



More than **sensors + automation**



www.jumo.net

Sensors

Pressure, Level, Flow



General information

Stock service

To be able to supply you with the required goods as soon as possible we have got an extensive warehouse with finished and preassembled devices. These stock versions have got a P/N or are marked with ●. These versions can also be ordered directly via our online shop.

Delivery time for stock versions

The stock versions will be dispatched within three working days after receipt of order. But these stock versions are subject to prior sale. In such cases we will send you an order confirmation with statement of delivery schedule.

Partial delivery

If your order includes devices of both delivery groups, unless otherwise indicated, you will receive the devices in one consignment.

Dispatch

The consignment is dispatched via parcel service or forwarder. Another delivery mode shall be subject to prior agreement.

Pricing

The prices in this catalogue are valid from 01.01.2020. Our prices are calculated ex works, excluding packaging, including statutory value-added tax. In the event of price changes the prices stated in our price catalogue valid on the delivery day are binding. Furthermore please refer to our "General Terms and Conditions of Delivery and Services".

Minimum order value

For stock versions:	150.00 EUR
For manufactured versions:	300.00 EUR
For special versions:	on request

Handling fee

For orders of spare parts and accessories < 100.00 EUR:	25.00 EUR
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Liability

The product details mentioned in our documents are based on our development and construction work and on our application-specific experiences. The technical data and specifications are descended from the best of our knowledge. But we reserve the right to realize technical changes based on any enhancements. Furthermore we assume no liability beside the individual contract concluded.

General Terms and Conditions of Delivery and Service

Our current version of the Terms and Conditions of Delivery and Services can be downloaded by clicking the following link on our website:
<http://agb.jumo-en.info>

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JUMO MIDAS

OEM-Pressure Transmitter

Applications

- Compressors
- Mechanical and plant engineering
- Industrial Pneumatics
- Commercial vehicles
- Building technology

Special features

- From 0 to 1,6 bar up to 0 to 100 bar, relative pressure
- Elastomer-sealed
- Compact design: from 58 mm length
- High chemical resistance
- High mechanical strength membrane

Description

The pressure transmitter is used for pressure measurement of liquid and gaseous media. With the well proofed ceramic thick film sensor, the pressure is measured, converted into an electrical standard signal (voltage or current) and output via electrical connections, e.g. line socket, M12 plug connector or attached cable.

A large number of process connections are available for adaptation to the process.



Type 401001

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Technical data

Electrical safety

Requirements	DIN EN 61010-1: 2020 The device must be equipped with an electrical circuit that meets the requirements for "Limited-energy circuits".
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Electrical data

Output signal ^a	4 to 20 mA, two-wire	DC 0.5 to 4.5 V, three-wire, ratiometric ^b	DC 0 to 10 V, three-wire
Burden or load ^c	$R_B \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A}$	$R_L \geq 20 \text{ k}\Omega$	$R_L \geq 10 \text{ k}\Omega$
Output current	3.6 to 22 mA	-20 to +250 μA	-20 μA to +1 mA
Voltage supply U_B ^d	DC 10 to 30 V	DC 4.75 to 5.25 V	DC 11.5 to 30 V
Nominal voltage	DC 24 V	DC 5 V	DC 24 V
Voltage supply influence	$\leq 0.02 \text{ \%}/\text{V}$	$\leq 0.02 \text{ \%}/\text{V}$	$\leq 0.02 \text{ \%}/\text{V}$
Current consumption ^e	$\leq 25 \text{ mA}$	$\leq 5 \text{ mA}$	$\leq 5 \text{ mA}$
Reverse voltage protection	Yes	No	Yes
Short-circuit resistance ^f	-	No	Yes
Step response T_{90}	$\leq 3 \text{ ms}$	$\leq 3 \text{ ms}$	$\leq 3 \text{ ms}$

Output signal ^a	DC 1 to 5 V, three-wire	DC 1 to 6 V, three-wire	DC 0 to 10 V, three-wire, increased driver power
Burden or load ^c	$R_L \geq 10 \text{ k}\Omega$	$R_L \geq 10 \text{ k}\Omega$	$R_L \geq 2 \text{ k}\Omega$
Output current	-20 μA to +1 mA	-20 μA to +1 mA	-200 μA to +5 mA
Voltage supply U_B ^d	DC 8 to 30 V	DC 8 to 30 V	DC 11.5 to 30 V
Nominal voltage	DC 24 V	DC 24 V	DC 24 V
Voltage supply influence	$\leq 0.02 \text{ \%}/\text{V}$	$\leq 0.02 \text{ \%}/\text{V}$	$\leq 0.02 \text{ \%}/\text{V}$
Current consumption ^e	$\leq 5 \text{ mA}$	$\leq 5 \text{ mA}$	$\leq 5 \text{ mA}$
Reverse voltage protection	Yes	Yes	Yes
Short-circuit resistance ^f	Yes	Yes	Yes
Step response T_{90}	$\leq 3 \text{ ms}$	$\leq 3 \text{ ms}$	$\leq 3 \text{ ms}$

^a Further outputs are available upon request.

^b Ratiometric output: output signal from 10 to 90 % of the voltage supply

^c Load resistance to S-

^d Residual ripple: The voltage peaks or dips must not exceed or fall below the specified voltage supply values!

^e For no-load operation (output unloaded)

^f Short-circuit resistance S+ against V-

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Inputs

Measuring range and accuracy

Measuring range bar	Linearity ^a % MSP ^f	Accuracy at		Long term stability ^b % MSP per year	Overload ^c bar	Burst bar
		20 °C ^d % MSP	-20 to +100 °C ^e % MSP			
0 to 1.6 bar relative pressure	0.3	0.5	1.6	≤ 0.2	6	12
0 to 2.5 bar relative pressure	0.3	0.5	1.6		6	12
0 to 4 bar relative pressure	0.3	0.5	1.6		12	25
0 to 6 bar relative pressure	0.25	0.5	1.4		12	25
0 to 10 bar relative pressure	0.25	0.5	1.4		20	38
0 to 16 bar relative pressure	0.25	0.5	1.4		50	75
0 to 25 bar relative pressure	0.25	0.5	1.4		50	75
0 to 40 bar relative pressure	0.25	0.5	1.4		120	200
0 to 60 bar relative pressure	0.25	0.5	1.4		120	200
0 to 100 bar relative pressure	0.25	0.5	1.4		180	250
-1 to +0.6 bar relative pressure	0.3	0.6	1.6		6	12
-1 to +1.5 bar relative pressure	0.3	0.6	1.6		6	12
-1 to +3 bar relative pressure	0.3	0.6	1.6		12	25
-1 to +5 bar relative pressure	0.25	0.6	1.4		12	25
-1 to +9 bar relative pressure	0.25	0.6	1.4		20	38
-1 to +15 bar relative pressure	0.25	0.6	1.4		50	75
-1 to +24 bar relative pressure	0.25	0.6	1.4		50	75

^a Linearity according to limit point-setting, DIN EN 61298-2

^b Reference conditions DIN EN 61298-1

^c All pressure transmitter are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset), and measuring range end

^e Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset) and measuring range end, thermal influences on measuring range start (offset), and measuring span

^f MSP = measuring span

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Environmental influences

Admissible temperatures	
Medium	-20 to +125 °C
Ambient	-20 to +85 °C
Storage	-40 to +125 °C (for version with connecting cable -20 to +100 °C)
Admissible air humidity	
Operation	100 % relative humidity including condensation on the device outer case
Storage	90 % relative humidity without condensation
Admissible mechanical load	IEC 60068-2-6, IEC 60068-2-27
Vibration resistance	20 g for 10 to 2000 Hz
Shock resistance	100 g for 1 ms
Electromagnetic compatibility (EMC)	DIN EN 61326-1:2013, DIN EN 61326-2-3:2013
Interference emission	Class B ^a
Interference immunity	Industrial requirements
Protection type	DIN EN 60529
Connecting cable	IP67
M12 plug connector ^b	IP67
Line socket ^{b, c}	IP65

^a The product is suitable for industrial use as well as for households and small businesses.

^b The protection type is only achieved with a suitable mounted counter piece.

^c Connecting cable diameter, minimum 5mm, maximum 8 mm

Mechanical features

Material	
Process connection	Stainless steel 305
Seal 601 (internal ^a)	FPM, standard
Seal 602 (internal ^a)	CR
Seal 604 (internal ^a)	FFPM
Process connection G 1/4" (external ^a)	FPM
Sensor	Ceramic Al ₂ O ₃ 96 %, Measuring principle: Thick film on ceramic body (piezoresistive)
Housing	Stainless steel 305
Connecting cable	PBT-GF30, PVC
M12 plug connector	PBT-GF30, stainless steel 303 L
Line socket	PBT-GF30, PA, silicone
Sensor	
Admissible load change	> 10 million, 0 to 100 % measuring range
Mounting position	Any
Calibration position	Device upright, process connection at the bottom
Weight	100 g with process connection G 1/4"

^a Note the medium durability of the selected seal material!

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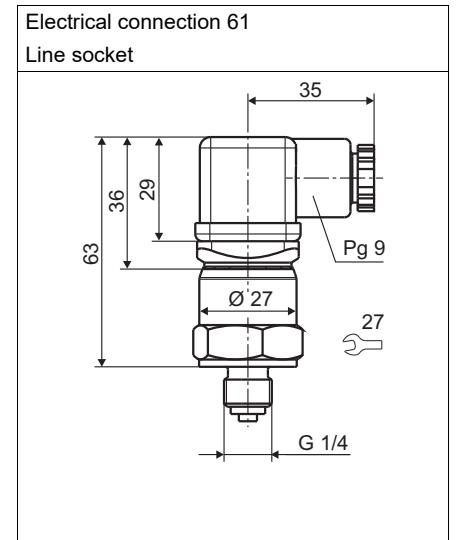
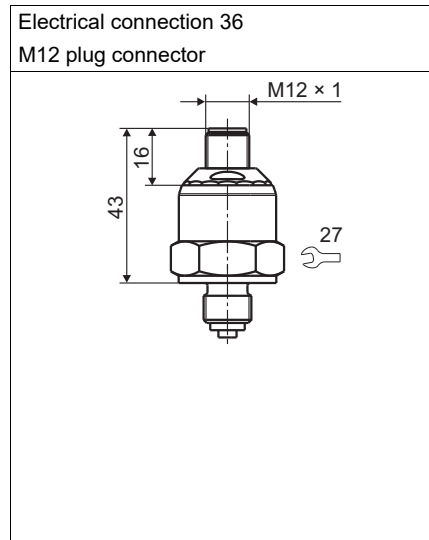
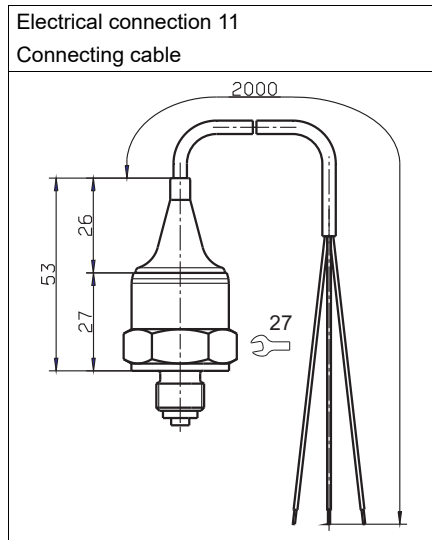
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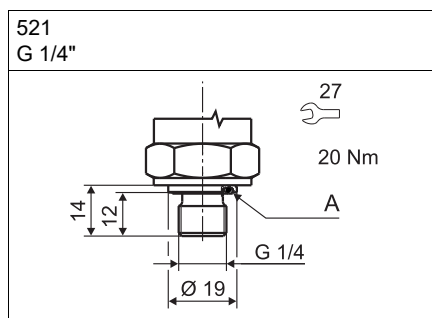
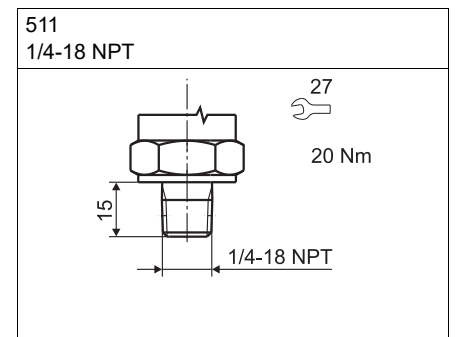
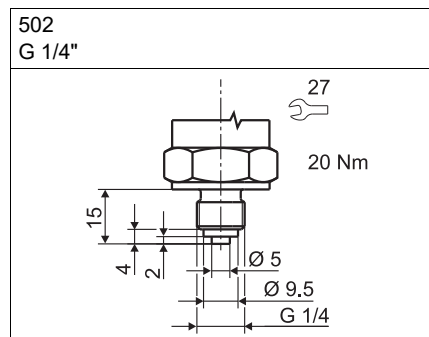
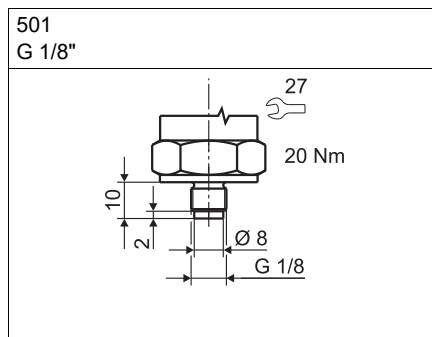


Dimensions

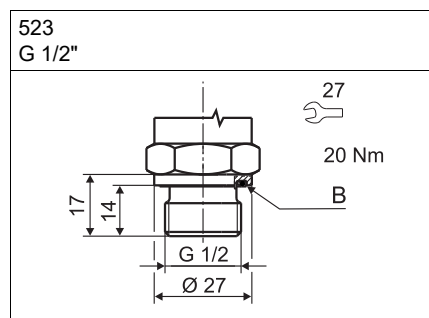
Device



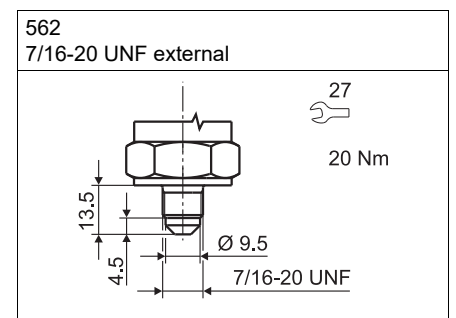
Process connections



A Profile seal G 1/4"



B Profile seal G 1/2"



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Connection elements

The connection elements in the data sheet provide information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Terminal assignment

	Connecting cable	M12 plug connector	Line socket

Designation	Description	Assignment ^a		
4 to 20 mA, two-wire Voltage supply DC 10 to 30 V	U _B /S+ 0 V/S-	WH (white) BN (brown)	1 WH (white) 3 BN (brown)	1 WH (white) 2 BN (brown)
DC 0.5 to 4.5 V, Dreileiter, ratiometric Voltage supply DC 4.75 to 5.25 V	U _B 0 V/S- S+	WH (white) BN (brown) YE (yellow)	1 WH (white) 2 BN (brown) 3 YE (yellow)	1 WH (white) 2 BN (brown) 3 YE (yellow)
DC 0 to 10 V, three-wire Voltage supply DC 11.5 to 30 V	U _B 0 V/S- S+	WH (white) BN (brown) YE (yellow)	1 WH (white) 2 BN (brown) 3 YE (yellow)	1 WH (white) 2 BN (brown) 3 YE (yellow)
DC 1 to 5(6) V, three-wire Voltage supply DC 8 to 30 V	U _B 0 V/S- S+	WH (white) BN (brown) YE (yellow)	1 WH (white) 2 BN (brown) 3 YE (yellow)	1 WH (white) 2 BN (brown) 3 YE (yellow)
Functional bonding conductor FB ^b		-	4	

^a The color coding is only valid for A-coded standard cables!

^b The pressure transmitter has to be connected to the potential equalization system of the plant via the electrical connection or process connection.

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Order details

	(1) Basic type
401001/000	JUMO MIDAS – OEM-Pressure transmitter
	(2) Input
455	0 to 1,6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
464	0 to 100 bar relative pressure ^a
479	-1 to +0.6 bar relative pressure
480	-1 to +1,5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
999	Special measuring range relative pressure
	(3) Output
405	4 to 20 mA, two-wire
412	0.5 to 4.5 V, three-wire
415	0 to 10 V, three-wire
418	1 to 5 V, three-wire
420	1 to 6 V, three-wire
	(4) Process connection
501	G 1/8" according to DIN EN 837
502	G 1/4" according to DIN EN 837
511	1/4-18 NPT according to DIN EN 837
521	G 1/4" according to DIN 3852-11
523	G 1/2" according to DIN 3852-11
562	7/16-20 UNF external
	(5) Process connection material
20	CrNi (stainless steel)
	(6) Seal
601	FPM (standard)
602	CR
604	FFPM
	(7) Electrical connection
11	Connecting cable (standard cable length is 2 m, further lengths available upon request)
36	M12 plug connector
61	Line socket DIN EN 175301-803, form A

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(8)	Extra code
000	None
591	Choke in the pressure channel
624	Oil and grease free
630	Enlarged pressure channel
954	Technical Passport

^a Only available in conjunction with extra code 630.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Order code	<input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	/ <input type="text"/> , ... ^a
Order example	401001/000	- 460	- 412	- 502	- 20	- 601	- 36	/ 591

^a List extra codes in sequence, separated by commas.

Accessories

Designation	Part no.
Line socket, 4-pole, M12 × 1, straight, length 2 m	00404585
Line socket, 4-pole, M12 × 1, angled, length 2 m	00409334
Line socket, 4-pole, M12 × 1, with control cable, 5 m	00512341

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JUMO MIDAS C08

OEM Pressure Transmitter – Basic

Applications

- compressors
- machinery and plant engineering
- industrial pneumatics
- commercial vehicles
- building technology

Brief description

This pressure transmitter is used as the core product for the MIDAS range for applications requiring reliable implementation of measuring tasks with long-term stability and excellent price-performance ratio. The MIDAS range provides solutions for all applications on the basis of this core product.

The innovative and patented sensor design of the specifically developed ceramic sensor provides excellent long-term stability of < 0.2 %. It can be used for recording relative pressures of 1.6 bar to 60 bar in gaseous or liquid media.

Customer benefits

- **process-reliable**
Through constructive measures, the pressure transmitter achieves excellent vibration resistance and enables application under high vibration load, as occurs in commercial vehicles for example. The throughput through the fully automatic measuring and calibration devices, the diagnostic function of the switching circuit, and the full final inspection complete the high standard of quality.
- **economic**
The QUICKON quick-clamp technology enables quicker and safer installation. The connection is even guaranteed with any temperature fluctuations that may occur thanks to the spring contacts. This electrical connection means that installation times can be shortened and as a result, costs are reduced by 60 % compared to conventional connection options.
- **versatile**
The universal application is reflected by the wide choice of measuring ranges, process connections, and electrical connections.



Type 401002
with QUICKON with M12 × 1
connector

Special features

- long-term stability < 0.2 %
- new level of quality for the OEM sector
- 60 % quicker device installation with the QUICKON quick-clamp technology
- temperature compensation range increased by 50 % to -20 °C to +100 °C
- 2.5 times more vibration resistance than the industry standard
- made in Germany

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor	
Measuring principle	Thick film on ceramic bodies (piezo-resistive)
Admissible load changes	> 10 million, 0 to 100 % measuring range
Mounting position	Any
Calibration position	Device upright, process connection at the bottom

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at			Long-term stability ^b	Overload capacity ^c	Burst pressure
	% MSP ^f	20 °C ^d % MSP	-10 to +85 °C ^e % MSP	-20 to +100 °C ^e % MSP			
0 to 1.6 bar relative pressure	0.25	0.5	0.65	1	0.2	6	12
0 to 2.5 bar relative pressure						6	12
0 to 4 bar relative pressure		0.35	0.5			12	25
0 to 6 bar relative pressure						12	25
0 to 10 bar relative pressure						20	38
0 to 16 bar relative pressure						50	75
0 to 25 bar relative pressure						50	75
0 to 40 bar relative pressure						120	200
0 to 60 bar relative pressure						120	200
-1 to +0.6 bar relative pressure		0.5	0.65			6	12
-1 to +1.5 bar relative pressure						6	12
-1 to +3 bar relative pressure		0.35	0.5			12	25
-1 to +5 bar relative pressure						12	25
-1 to +9 bar relative pressure						20	38
-1 to +15 bar relative pressure						50	75
-1 to +24 bar relative pressure						50	75

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c All pressure transmitters are vacuum-proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

^f MSP = Measuring span

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Output

Analog output	Further outputs are available upon request.
Current	4 to 20 mA, two-wire
Voltage	DC 0.5 to 4.5 V, three-wire, ratiometric 10 to 90 % of the voltage supply DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire
Step response T_{90}	≤ 2 ms
Burden	
Current	$R_L \leq (U_B - 8 \text{ V}) \div 0.02 \text{ A } (\Omega)$ at 4 to 20 mA, two-wire
Voltage	$R_L \geq 5 \text{ k}\Omega$ at DC 0.5 to 4.5 V, three-wire
(burden connected to "0 V/S-")	$R_L \geq 10 \text{ k}\Omega$ at DC 0 to 10 V, three-wire $R_L \geq 10 \text{ k}\Omega$ at DC 1 to 5 V, three-wire $R_L \geq 10 \text{ k}\Omega$ at DC 1 to 6 V, three-wire

Mechanical features

Material	
Process connection	Stainless steel 304
Seal 600 (internal ^a)	EPDM
Seal 601 (internal ^a)	FKM, standard
Seal 602 (internal ^a)	CR
Seal 604 (internal ^a)	FFKM
Seal 609 (internal ^a)	NBR
Process connection G 1/4 (external ^a)	FKM
Sensor	Ceramic Al_2O_3 96 %
Housing	Stainless steel 304
Attached cable	PBT-GF30, PVC
QUICKON	PBT-GF30
Round plug M12 × 1	PBT-GF30, stainless steel 303 L
Bayonet connector	PBT-GF30
Cable socket	PBT-GF30, PA, silicone
Weight	70 g with process connection G 1/4

^a Note the medium durability of the selected seal material!

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Environmental influences

Medium temperature for electrical connection	
Attached cable	-20 to +125 °C
Round plug M12 × 1	-20 to +125 °C
Bayonet connector	-20 to +125 °C
Cable socket	-20 to +125 °C
Ambient temperature for electrical connection	
Attached cable	-20 to +100 °C At ambient temperature of -30 °C restricted function. Only use when stationary. Risk of cable break.
Round plug M12 × 1	-20 to +100 °C
Bayonet connector	-20 to +100 °C
Cable socket	-20 to +100 °C
Storage temperature for electrical connection	
Attached cable	-30 to +100 °C
Round plug M12 × 1	-40 to +100 °C
Bayonet connector	-40 to +100 °C
Cable socket	-40 to +100 °C
Admissible humidity	
Operation	100 % rel. humidity including condensation on the device outer case
Storage	90 % rel. humidity without condensation
Admissible mechanical load	
Vibration resistance	50 g for 10 to 2000 Hz, according to IEC 60068-2-6
Shock resistance	50 g for 3 ms, 100 g for 2 ms, according to IEC 60068-2-27
Electromagnetic compatibility (EMC)	
Interference emission	According to EN 61326-2-3 Class B ^a
Interference immunity	Industrial requirement
Protection type for electrical connection	According to EN 60529
Attached cable	IP67
QUICKON ^b	IP67
Round plug M12 × 1 ^c	IP67
Bayonet connector ^c	IP67
Cable socket ^{c, d}	IP65

^a The product is suitable for industrial use as well as for households and small businesses.

^b Connecting cable diameter, minimum 3.5 mm, maximum 6 mm

^c The protection type is only achieved with a suitable mounted counter piece.

^d Connecting cable diameter, minimum 6 mm, maximum 8 mm

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Electrical data

Voltage supply U_B 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values! DC 8 to 30 V, rated voltage supply DC 24 V DC 3 to 5.25 V, rated voltage supply DC 5 V, ratiometric output 10 to 90 % of the voltage supply DC 11.5 to 30 V, rated voltage supply DC 24 V DC 8 to 30 V, rated voltage supply DC 24 V DC 8 to 30 V, rated voltage supply DC 24 V
Current consumption incl. load 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	≤ 25 mA ≤ 3 mA ≤ 3 mA ≤ 3 mA ≤ 3 mA
Reverse voltage protection	Yes
Electrical circuit	SELV
Requirements	The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

Approvals and approval marks

EAC Testing agency Certificates/certification numbers Inspection basis Valid for	«Промтехконтроль» EAЭC N RU Д-DE.PA01.B.80830/21 TR TS 020/2011 Type 401002
UL Testing agency Certificates/certification numbers Inspection basis Valid for	Underwriter Laboratories E201387 UL 61010-1 (3. Ed.), CAN/CSA-22.2 No. 61010-1 (3. Ed.) Extra code 061

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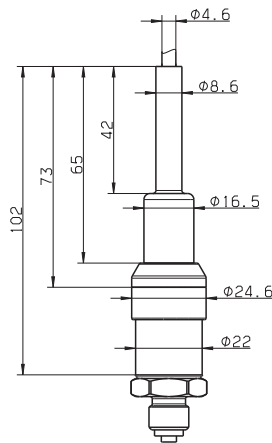
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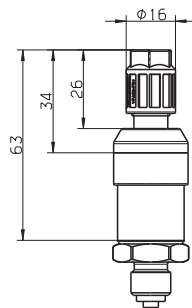
Dimensions

Electrical connection

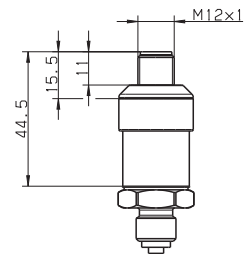
11
Attached cable



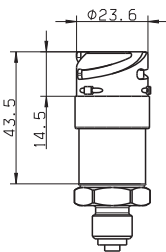
23
QUICKON



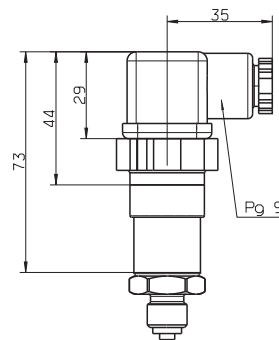
36
Round plug M12 × 1



53
Bayonet connector



61
Cable socket



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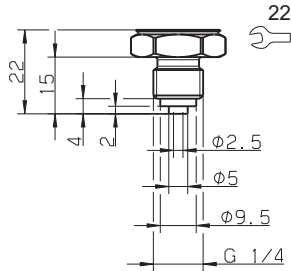
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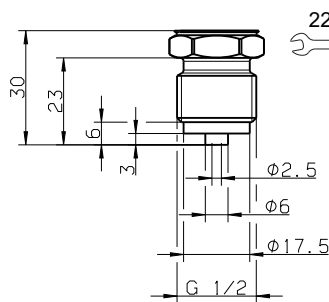
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**Process connection**

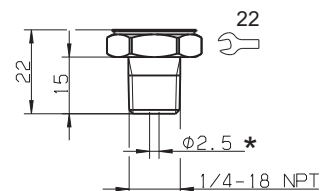
502
G 1/4



504
G 1/2

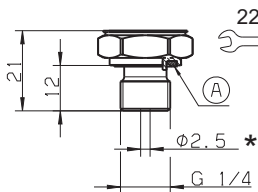


511
1/4-18 NPT



* Extra code 630 pressure channel
Ø 8 mm

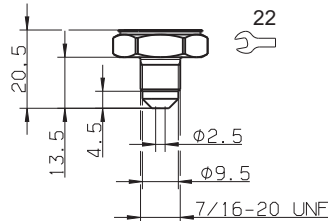
521
G 1/4



A Profile seal G 1/4

* Extra code 630 pressure channel
Ø 8 mm

562
7/16-20 UNF



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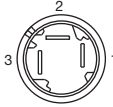
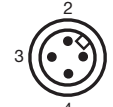
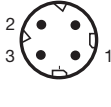
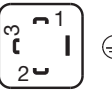

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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment (figure: connection to the pressure transmitter)				
						
		Attached cable	QUICKON	Round plug M12 × 1	Bayonet connector	Cable socket
4 to 20 mA, two-wire (output 405)						
Voltage supply DC 8 to 30 V	U _B /S+	WH	1	1	1	1
	0 V/S-	BN	3	3	2	2
DC 0.5 to 4.5 V ratiometric (output 412)						
Voltage supply DC 3 to 5.25 V	U _B	WH	1	1	1	1
Ratiometric output 10 to 90 % of the voltage supply	0 V/S-	BN	2	2	2	2
	S+	GN	3	3	3	3
DC 0 to 10 V, three-wire (output 415)						
Voltage supply DC 11.5 to 30 V	U _B	WH	1	1	1	1
	0 V/S-	BN	2	2	2	2
	S+	GN	3	3	3	3
DC 1 to 5 V, three-wire (output 418) DC 1 to 6 V, three-wire (output 420)						
Voltage supply DC 8 to 30 V	U _B	WH	1	1	1	1
	0 V/S-	BN	2	2	2	2
	S+	GN	3	3	3	3
Functional bonding conductor FB ^a		-	-	4	-	-

^a The pressure transmitter has to be connected to the potential equalization system of the plant through the electrical connection or process connection.

Color coding: connecting cable round plug M12 × 1		
1 BN	Brown	
2 WH	White	
3 BU	Blue	
4 BK	Black	
The color coding is only valid for A-coded standard cables!		

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Order details

(1) Basic type	
401002/000	JUMO MIDAS C08 – OEM pressure transmitter – basic
(2) Input	
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
479	-1 to +0.6 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
999	Special measuring range for relative pressure
(3) Output	
405	4 to 20 mA, two-wire
412	0.5 to 4.5 V, three-wire
415	0 to 10 V, three-wire
418	1 to 5 V, three-wire
420	1 to 6 V, three-wire
(4) Process connection	
502	G 1/4 DIN EN 837
504	G 1/2 DIN EN 837
511	1/4-18 NPT DIN EN 837
521	G 1/4 DIN
562	7/16-20 UNF
(5) Process connection material	
20	CrNi (stainless steel)
(6) Material seal	
600	EPDM
601	FKM (standard)
602	CR
604	FFKM
609	NBR
(7) Electrical connection	
11	Attached cable (standard cable length is 2 m, further lengths available upon request)
23	Quickon
36	Round plug M12 × 1
53	Bayonet connector DIN 72585
61	Cable socket DIN EN 175301-803, Form A

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(8)	Extra codes
000	None
061	UL approval
591	Choke in the pressure channel
624	Oil and grease free
630	Enlarged pressure channel ^a
876	Test report
954	Technical Passport

^a An enlarged pressure channel of diameter Ø 8 mm is only available with process connection 1/4-18 NPT, G 1/4 and the seal FKM.

Order code (1) (2) (3) (4) (5) (6) (7) (8)
 Order example 401002/000 - 460 - 412 - 504 - 20 - 600 - 36 / 591 , ...^a

^a List extra codes in sequence, separated by commas.

Stock version

Order code	Part no.
401002/000-459-405-502-20-601-23/000	00542743
401002/000-456-405-502-20-601-61/000	00546113
401002/000-457-405-502-20-601-61/000	00546119
401002/000-458-405-502-20-601-61/000	00546120
401002/000-459-405-502-20-601-61/000	00546121
401002/000-460-405-502-20-601-61/000	00546122
401002/000-460-405-504-20-601-61/000	00551012
401002/000-461-405-502-20-601-61/000	00546123
401002/000-462-405-502-20-601-61/000	00546124
401002/000-480-405-502-20-601-61/000	00552402
401002/000-481-405-502-20-601-61/000	00546125
401002/000-455-405-502-20-601-61/000	00550506

Accessories

Designation	Part no.
Cable socket, straight, 4-pole, M12 × 1, 2 m	00404585
Cable socket, angled, 4-pole, M12 × 1, 2 m	00409334
Cable socket, pressure compensation, 4-pole, M12 × 1, 5 m	00512341

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JUMO MIDAS SI

OEM-Pressure Transmitter

Applications

- Food and pharmaceutical industry
- Mechanical and plant engineering
- Compressors

Brief description

The pressure transmitter is available with relative pressure and absolute pressure measuring ranges.

The fully welded measuring system (without seals) made of high-grade stainless steel allows this device to be used in almost all media, even in harsh conditions. The structure ensures optimum protection against process medium leakage.

The device features a silicon sensor that is extremely resistant to overloading even in the lowest measuring ranges and is capable of handling millions of pressure cycles.

The device is certified according to EHEDG in the versions with process connections (clamp) DN 25, 32, and 40 as well as JUMO PEKA.

Customer benefits

- **Economic**
A high degree of automation reduces production time and manufacturing costs.
- **Process-reliable**
The piezoresistive silicon sensor has long-term stability and a high level of overload protection. The full final inspection in the fully automated measuring and calibration facility ensures that each pressure transmitter is of high quality.
- **Time-saving, uncomplicated, and versatile**
The installation of the measuring device requires little work and the electrical installation is simple. The modular structure allows universal use in almost any application.



Type 401006
with line socket or round plug

Special features

- 1 to 100 bar relative pressure, up to 25 bar also in absolute pressure
- High process reliability by welded measuring system (without seals)
- Robust and maintenance-free measuring technology by an extreme overload resistance
- Parts in contact with medium are made of stainless steel

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	To DIN 16086 and DIN EN 60770
Sensor	
Material	Silicon sensor with stainless steel separating diaphragm
Pressure transfer medium	Synthetic oil
Admissible load changes	> 10 million
Mouting position	Any
Calibration position	Device upright, process connection at the bottom

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at		Long term stability ^b	Overload ^c	Burst
bar	% MSP ^f	20 °C ^d % MSP	-20 to +100 °C ^e % MSP	% MSP per year	bar	bar
0 to 0.25 bar relative pressure	0.3	0.8	1.8	≤ 0.2	1	2.5
0 to 0.4 bar relative pressure	0.3	0.7	1.7		1.6	4
0 to 0.6 bar relative pressure	0.3	0.7	1.6		2.4	6
0 to 1 bar relative pressure	0.3	0.6	1.5		4	10
0 to 1.6 bar relative pressure	0.25	0.5	1.5		6.5	16
0 to 2.5 bar relative pressure	0.25	0.5	1.5		10	25
0 to 4 bar relative pressure	0.25	0.5	1.2		16	40
0 to 6 bar relative pressure	0.25	0.5	1.2		24	60
0 to 10 bar relative pressure	0.25	0.5	1.0		40	100
0 to 16 bar relative pressure	0.25	0.5	1.0		64	160
0 to 25 bar relative pressure	0.25	0.5	1.0		100	250
0 to 40 bar relative pressure	0.25	0.5	1.0		300	400
0 to 60 bar relative pressure	0.25	0.5	1.0		300	400
0 to 100 bar relative pressure	0.25	0.5	1.0		300	400
-1 to 0 bar relative pressure	0.3	0.6	1.5		4	10
-1 to +0.6 bar relative pressure	0.3	0.6	1.5		6.4	16
-1 to +1.5 bar relative pressure	0.25	0.5	1.3		10	25
-1 to +3 bar relative pressure	0.25	0.5	1.3		16	40
-1 to +5 bar relative pressure	0.25	0.5	1.3		24	60
-1 to +9 bar relative pressure	0.25	0.5	1.2		40	100
-1 to +15 bar relative pressure	0.25	0.5	1.2		64	160
-1 to +24 bar relative pressure	0.25	0.5	1.2		100	250

^a Linearity according to limit point-setting

^b Reference conditions DIN EN 61298-1

^c All pressure transmitter are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset), and measuring range end

^e Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset) and measuring range end, thermal influences on measuring range start (offset), and measuring span

^f MSP = measuring span

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Measuring range	Linearity ^a	Accuracy at		Long term stability ^b	Overload ^c	Burst
bar	% MSP ^f	20 °C ^d % MSP	-20 to +100 °C ^e % MSP	% MSP per year	bar	bar
0 to 0.6 bar absolute pressure	0.3	0.7	1.6	≤ 0.2	2.4	6
0 to 1.0 bar absolute pressure	0.3	0.6	1.5		4	10
0 to 1.6 bar absolute pressure	0.25	0.5	1.5		6.5	16
0 to 2.5 bar absolute pressure	0.25	0.5	1.5		10	25
0 to 4 bar absolute pressure	0.25	0.5	1.2		16	40
0 to 6 bar absolute pressure	0.25	0.5	1.2		24	60
0 to 10 bar absolute pressure	0.25	0.5	1.0		40	100
0 to 16 bar absolute pressure	0.25	0.5	1.0		64	160
0 to 25 bar absolute pressure	0.25	0.5	1.0		100	250

^a Linearity according to limit point-setting

^b Reference conditions DIN EN 61298-1

^c All pressure transmitter are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset), and measuring range end

^e Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset) and measuring range end, thermal influences on measuring range start (offset), and measuring span

^f MSP = measuring span

Electrical data

Output signal (further outputs upon request)	4 to 20 mA, two-wire	DC 0.5 to 4.5 V, three-wire, ratiometric ^a	DC 0 to 10 V, three-wire
Burden or load (load resistance to S-)	$R_L \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A}(\Omega)$	$R_L \geq 20 \text{ k}\Omega$	$R_L \geq 10 \text{ k}\Omega$
Output current	3.6 to 22 mA	-20 to +250 μA	-20 μA to +1 mA
Voltage supply U_B ^b	DC 10 to 30 V	DC 4.75 to 5.25 V	DC 11.5 to 30 V
Nominal voltage	DC 24 V	DC 5 V	DC 24 V
Voltage supply influence	≤ 0.02 %/V	≤ 0.02 %/V	≤ 0.02 %/V
Current consumption at no-load (unloaded)	≤ 25 mA	≤ 5 mA	≤ 5 mA
Reverse voltage protection	Yes	No	Yes
Short-circuit resistance (S+ against V-)	-	Yes	Yes
Step response t_{90}	≤ 3 ms	≤ 3 ms	≤ 3 ms
Current circuit ^c	SELV	SELV	SELV

Output signal (further outputs upon request)	DC 1 to 5 V, three-wire	DC 1 to 6 V, three-wire
Burden or load (load resistance to S-)	$R_L \geq 10 \text{ k}\Omega$	$R_L \geq 10 \text{ k}\Omega$
Output current	-20 μA to +1 mA	-20 μA to +1 mA
Voltage supply U_B ^b	DC 8 to 30 V	DC 8 to 30 V
Nominal voltage	DC 24 V	DC 24 V
Voltage supply influence	≤ 0.02 %/V	≤ 0.02 %/V
Current consumption at no-load (unloaded)	≤ 5 mA	≤ 5 mA
Reverse voltage protection	Yes	Yes
Short-circuit resistance (S+ against V-)	Yes	Yes
Step response t_{90}	≤ 3 ms	≤ 3 ms
Current circuit ^c	SELV	SELV

^a Ratiometric output: output signal from 10 to 90 % of the voltage supply

^b Residual ripple: The voltage peaks or dips must not exceed or fall below the specified voltage supply values!

^c The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

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Mechanical features

Material	
Process connection	Stainless steel 316 Ti and 316 L
Membranes	Stainless steel 316 L
Housing	Stainless steel 304
Attached cable	PA, PVC
Round plug M12 × 1	PBT-GF30, stainless steel 303
Bayonet connector	PBT-GF30
Line socket	PBT-GF30, PA, silicone
Weight	120 g with process connection G 1/2

Environmental influences

Admissible temperatures for electrical connection	
Attached cable	
Medium	-30 to +125 °C
Ambient	-20 to +100 °C
Storage	-20 to +100 °C
Round plug M12 × 1, line socket, bayonet connector	
Medium	-30 to +125 °C
Ambient	-20 to +100 °C
Storage	-40 to +125 °C
Admissible air humidity	
Operation	100 % relative humidity including condensation on the device outer case
Storage	90 % relative humidity without condensation
Admissible mechanical load	
Vibration resistance	max. 20 g for 15 to 2000 Hz, according to DIN EN 60068-2-6
Shock resistance	100 g for 1 ms, according to DIN EN 60068-2-27
Electromagnetic compatibility (EMC)	According to DIN EN 61326-2-3
Interference emission	Class B ^a
Interference immunity	Industrial requirements
Protection type	According to DIN EN 60529
Attached cable	IP67
Round plug M12 × 1	IP67 (only achieved with a suitable counter piece)
Bayonet connector	IP67 (only achieved with a suitable counter piece)
Line socket	IP65 (connecting cable diameter, minimum 5 mm, maximum 7 mm)

^a The product is suitable for industrial use as well as for households and small businesses.

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Approvals and approval marks

EHEDG	
Testing agency	Research Center Weihenstephan for Brewing and Food Quality
Certificates/certification numbers	EL Class 1/EHEDG-C2000058
Inspection basis	EHEDG design specifications (Doc. 8 – Hygienic Design Principles) EHEDG tests for verifying ease of cleaning (Doc. 2, Third Edition, July 2004, updated June 2007)
Valid for	Process connection 613 (clamp DN 25, 32, 40), Process connection 997 (JUMO PEKA hygienic process connection)
EAC	
Testing agency	«Промтехконтроль»
Certificates/certification numbers	EAЭC N RU Д-DE.PA01.B.80830/21
Inspection basis	TR TS 020/2011
Valid for	Type 401006

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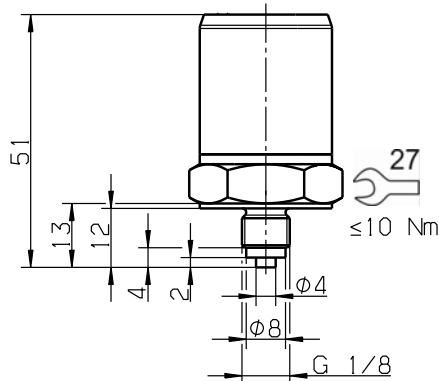
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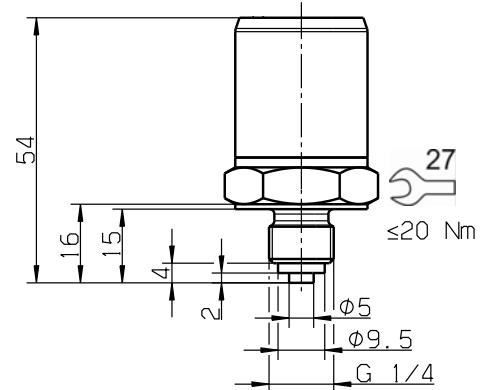
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**Process connection**

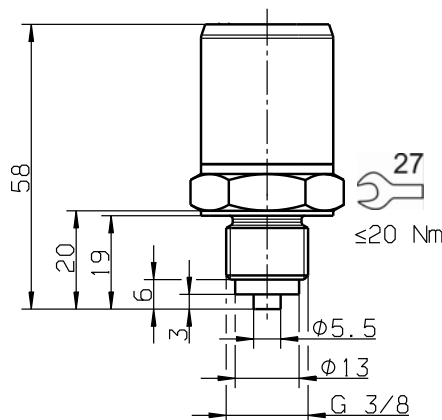
501
G 1/8



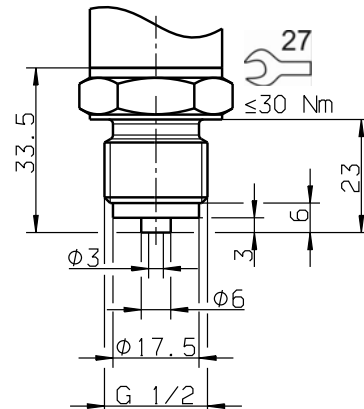
502
G 1/4



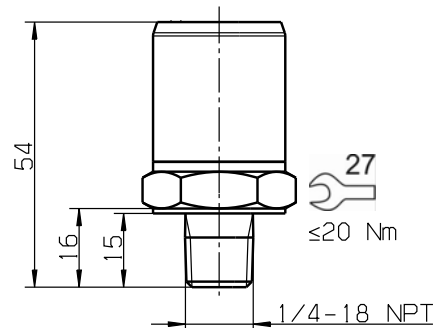
503
G 3/8



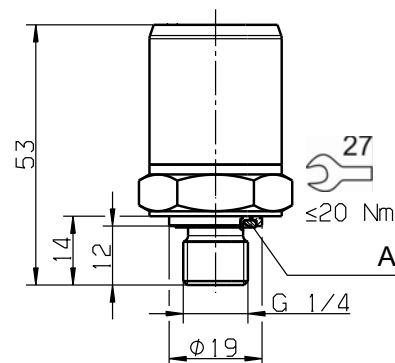
504
G 1/2



511
1/4-18 NPT



521
G 1/4



A Profile seal G 1/4

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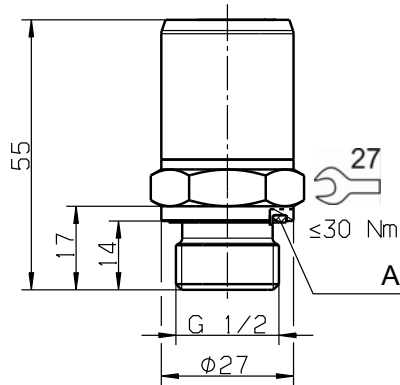
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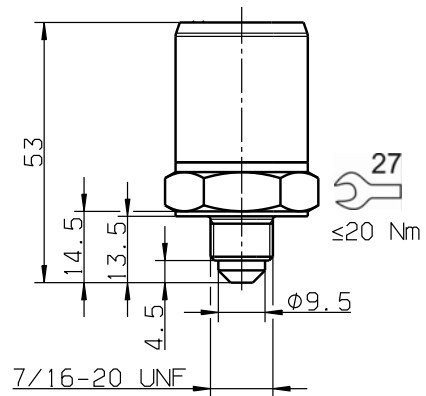


523
G 1/2



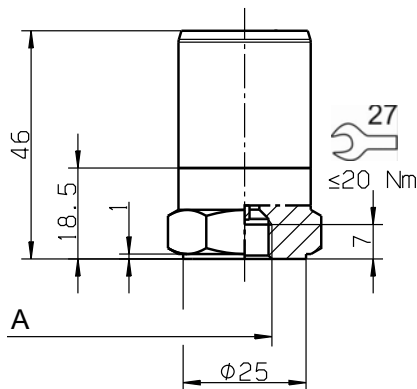
A Profile seal G 1/2

562
7/16-20 UNF



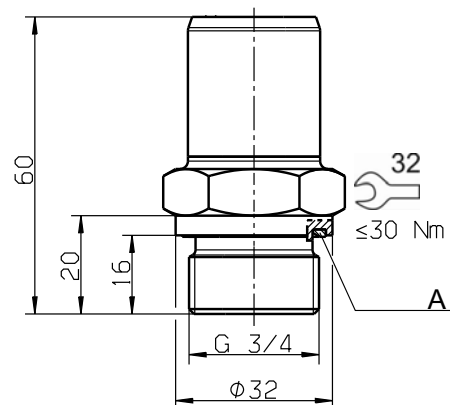
A

563
7/16-20 UNF interior, with valve core handle



A 7/16 UNF interior

571
G 3/4



A Profile seal G 3/4

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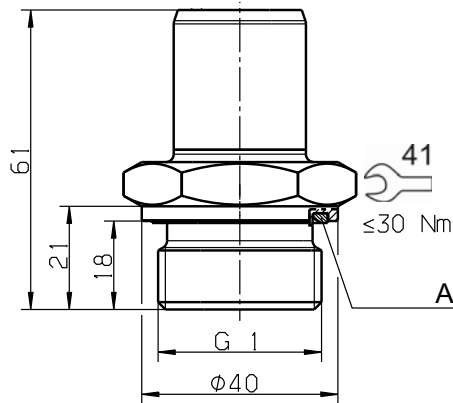
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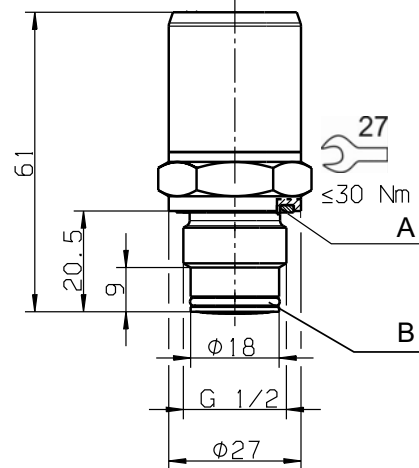


572
G 1



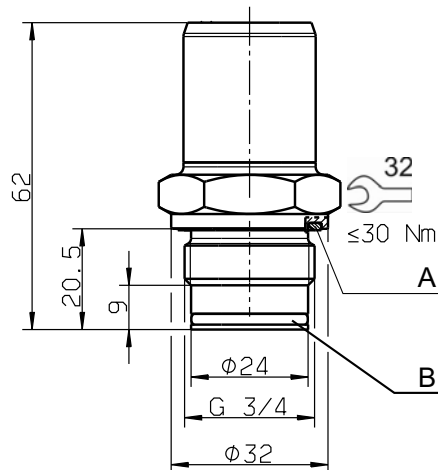
A Profile seal G 1

574
G 1/2



A Profile seal G 1/2
B O-ring 15.1 × 1.6

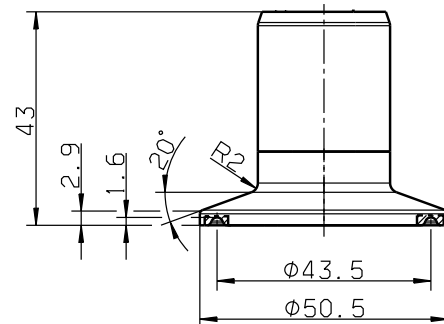
575
G 3/4



A Profile seal G 3/4
B O-ring 20.35 × 1.78

^a Certified according to EHEDG

613
Clamp DN 25/32/40^a



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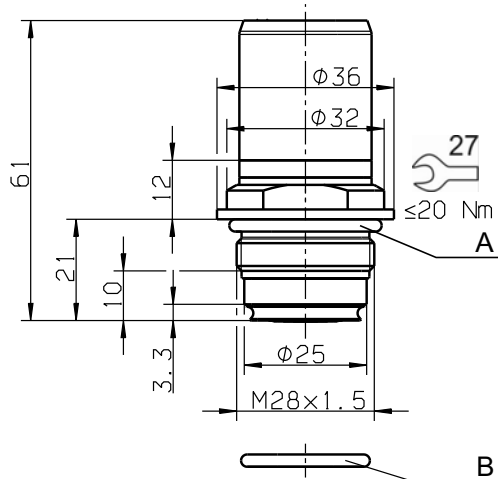
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997

JUMO PEKA hygienic process connection^a

A O-ring 26 × 2.5

B O-ring 21 × 2.5,
not included in the delivery scope, see data sheet 409711

^a Certified according to EHEDG

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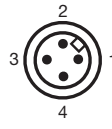
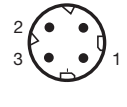
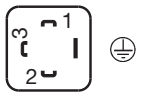


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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment ^a			
					
		11 Attached cable	36 Round plug M12 × 1	53 Bayonet connector	61 Line socket
4 to 20 mA, two-wire					
Spannungsversorgung DC 10 bis 30 V	U _B /S+ 0 V/S-	WH BN	1 3	1 2	1 2
DC 0.5 to 4.5 V ratiometric					
Voltage supply DC 4.75 to 5.25 V ratiometric output 10 to 90 % of voltage supply	U _B 0 V/S- S+	WH BN YE	1 2 3	1 2 3	1 2 3
DC 0 to 10 V, three-wire					
Voltage supply DC 11.5 to 30 V	U _B 0 V/S- S+	WH BN YE	1 2 3	1 2 3	1 2 3
DC 1 to 5 V, three-wire, DC 1 to 6 V, three-wire					
Voltage supply DC 8 to 30 V	U _B 0 V/S- S+	WH BN YE	1 2 3	1 2 3	1 2 3
Functional bonding conductor FB ^b		-	4	-	

^a Figure: Connection to the pressure transmitter

^b The pressure transmitter has to be connected to the potential equalization system of the plant via the electrical connection or process connection.

Color coding: connecting cable round plug M12 × 1			1 BN	Brown
			2 WH	White
			3 BU	Blue
			4 BK	Black
The color coding is only valid for A-coded standard cables!				

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Order details

	(1) Basic type
401006/000	JUMO MIDAS SI – OEM-Pressure transmitter
	(2) Input
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
487	0 to 0.6 bar absolute pressure
488	0 to 1.0 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
998	Special measuring range for absolute pressure
999	Special measuring range for relative pressure
	(3) Output
405	4 to 20 mA, two-wire
412	DC 0.5 to 4.5 V, three-wire
415	DC 0 to 10 V, three-wire
418	DC 1 to 5 V, three-wire
420	DC 1 to 6 V, three-wire
	(4) Process connection
501	G 1/8, DIN EN 837
502	G 1/4, DIN EN 837
503	G 3/8, DIN EN 837
504	G 1/2, DIN EN 837
511	1/4-18 NPT, DIN EN 837
521	G 1/4, DIN 3852-11
523	G 1/2, DIN 3852-11
562	7/16-20 UNF
563	7/16-20 UNF interior, with valve core handle
571	G 3/4 front-flush, DIN EN ISO 228-1
572	G 1 front-flush, DIN EN ISO 228-1
574	G 1/2 front-flush, with double seal
575	G 3/4 front-flush, with double seal
613	Clamp DN 25/32/40, DIN 32676/1, certified according to EHEDG
997	JUMO PEKA hygienic process connection, certified according to EHEDG
	(5) Process connection material
20	CrNi (stainless steel)
	(6) Electrical connection
11	Attached cable (standard cable length is 2 m, further lengths available upon request)
36	Round plug M12 × 1
53	Bayonet connector, DIN 72585
61	Line socket DIN EN 175301-802, form A

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(7)	Extra code
000	None
591	Choke in the pressure channel
624	Oil and grease free
630	Enlarged pressure channel
631	Improved moisture and vibration protection

⇒ For suitable process connection adapters, see data sheet 409711.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Order code	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>
Order example	401006/000	-	454	-	405	-	523
					20	-	11
							000

Accessories

Designation	Part no.
Line socket, straight, 4-pole, M12 × 1, 2 m	00404585
Line socket, angled, 4-pole, M12 × 1, 2 m	00409334
Line socket, pressure compensation, 4-pole, M12 × 1, 5 m	00512341

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JUMO MIDAS S19 R

OEM Pressure Transmitter – Railway

Applications

- Compressors
- Braking systems
- Climate control
- Sanitary equipment
- Hydrodynamic gears
- Water supply
- Fire extinguisher systems

Brief description

The pressure transmitter JUMO MIDAS S19 R has been especially designed and qualified for use in rail vehicles.

The fully welded measuring system (without seals) made of high-grade stainless steel allows this device to be used in almost all media, even in harsh conditions. The device features a silicon sensor that is extremely resistant to overloading even in the lowest measuring ranges and is capable of handling millions of pressure cycles.



Type 401008 with cable socket

Customer benefits

Tested according to typical standards for the railway industry:

- DIN EN 50155 "Electronic equipment used on rolling stock"
- DIN EN 61373 "Railway applications - rolling stock equipment", shock and vibration tests, category 1, class A + B
- DIN EN 50121-3-2 "Railway applications - electromagnetic compatibility"
- DIN EN/TS 45545-2 "Fire protection on railway vehicles"

Special features

- Tested acc. to railway standards
- Vibration and shock resistant
- Fulfills maximum EMC requirements
- Highly resistant to overload
- Welded stainless steel measuring system
- Suitable for HVAC applications

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor	
Measuring principle	Silicon sensor with stainless steel separating diaphragm (piezo-resistive)
Pressure transfer medium	Synthetic oil
Admissible load changes	> 10 million, 0 % to 100 % measuring range
Mounting position	Any
Calibration position	Device upright, process connection at the bottom

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at		Long-term stability ^b	Overload capacity ^c	Burst pressure
bar	% MSP ^f	20 °C ^d % MSP	-20 °C to +100 °C ^e % MSP	% MSP per year	bar	bar
0 bar to 1.6 bar relative pressure	0.25	0.5	1.5	0.2	6	10
0 bar to 2.5 bar relative pressure	0.25	0.5	1.5		10	15
0 bar to 4 bar relative pressure	0.25	0.5	1.2		16	24
0 bar to 6 bar relative pressure	0.25	0.5	1.2		24	36
0 bar to 10 bar relative pressure	0.25	0.5	1.0		40	60
0 bar to 16 bar relative pressure	0.25	0.5	1.0		60	100
0 bar to 25 bar relative pressure	0.25	0.5	1.0		150	250
0 bar to 40 bar relative pressure	0.25	0.5	1.0		300	400
0 bar to 60 bar relative pressure	0.2	0.5	1.0		300	400
0 bar to 100 bar relative pressure	0.25	0.5	1.0		300	400
-1 bar to +1.5 bar relative pressure	0.3	0.6	1.6		10	15
-1 bar to +3 bar relative pressure	0.3	0.5	1.3		16	24
-1 bar to +5 bar relative pressure	0.25	0.5	1.3		24	36
-1 bar to +9 bar relative pressure	0.25	0.5	1.2		40	60
-1 bar to +15 bar relative pressure	0.25	0.5	1.2		60	100
-1 bar to +24 bar relative pressure	0.25	0.5	1.2		150	250
0 bar to 1.6 bar absolute pressure	0.25	0.5	1.5		6	10
0 bar to 2.5 bar absolute pressure	0.25	0.5	1.5		10	15
0 bar to 4 bar absolute pressure	0.25	0.5	1.2		16	24
0 bar to 6 bar absolute pressure	0.25	0.5	1.2		24	36
0 bar to 10 bar absolute pressure	0.25	0.5	1.0		40	60
0 bar to 16 bar absolute pressure	0.25	0.5	1.0		60	100
0 bar to 25 bar absolute pressure	0.25	0.5	1.0		150	250
0 bar to 40 bar absolute pressure	0.25	0.5	1.0		300	400

^a Linearity according to limit point setting

^b Reference conditions DIN EN 61298-1

^c All pressure transmitters are vacuum-proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

^f MSP = measuring span

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Output

Analog output Output 405	4 mA to 20 mA, 2-wire
Step response T_{90}	≤ 3 ms
Burden 4 mA to 20 mA, 2-wire	$R_L \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A} (\Omega)$

Mechanical features

Material	
Process connection	Stainless steel 316 Ti
Membranes	Stainless steel 316 L
Case	Stainless steel 304
Round plug M12 × 1	Diecast zinc, nickel-plated, PA, stainless steel 303
Bayonet connector	Stainless steel 304
Plug connector	PBT-GF30
Line socket	PBT-GF30, PA, silicone
Process seal	The measuring system is welded and therefore entirely free of seals. ^a
Weight	135 g with process connection G 1/4

^a Pressure transmitters with process connection G 1/4 according to DIN 3852-1121 are supplied with an FPM seal. Ensure the medium durability of the seal material!

Environmental influences

Admissible temperatures	
Medium	-40 °C to +125 °C
Ambient	-40 to +100 °C
Storage	-50 to +100 °C
Admissible air humidity	
Operation	100 % relative humidity including condensation on the device outer case
Storage	90 % relative humidity without condensation
Admissible mechanical load	
Vibration resistance	0.1 g, 5 Hz to 150 Hz, according to DIN EN 61373, chapter 8, category 1, class B, 20 g, 15 Hz to 2,000 Hz, according to IEC 60068-2-6
Shock resistance	3 g for 30 ms, according to DIN EN 61373, chapter 10, category 1, class A + B, 100 g for 1 ms, according to IEC 60068-2-27
Electromagnetic compatibility (EMC)	
Interference emission	Class B ^a , according to DIN EN 50121-3-2
Interference immunity	Evaluation criterion A, according to DIN EN 61373, chapter 10, category 1, class A + B
Protection type for electrical connection	According to DIN EN 60529
Round plug M12 × 1 ^b	IP66/IP67
Bayonet connector ^g	IP66/IP67
Plug connector	IP50
Line socket ^c	IP65

^a The product is suitable for industrial use as well as for households and small businesses.

^b The protection type is only achieved with a suitable mounted counter piece.

^c Connecting cable diameter, minimum 6 mm, maximum 8 mm

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Electrical data

Voltage supply U_B^a 4 mA to 20 mA, 2-wire	DC 10 V to 30 V, rated voltage supply DC 24 V
Current consumption 4 mA to 20 mA, 2-wire	≤ 25 mA
Reverse voltage protection	Yes
Electrical circuit Requirements	SELV The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

Approvals and approval marks

EAC Testing agency Certificates/certification numbers Inspection basis Valid for	«Промтехконтроль» EAЭС N RU Д-DE.PA01.B.80830/21 TR TS 020/2011 Type 401008
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Certificate

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More than **sensors + automation**

CERTIFICATE

Environmental Testing

According to DIN EN 50155 / DIN EN 50121

Certificate no.	024000
Date of issue	October 12, 2014
Number of pages	2 pages
Applicants name	JUMO GmbH & Co. KG
Address	Moritz-Juchheim-Straße 1, 36039 Fulda, Germany
Manufacturer	JUMO GmbH & Co. KG
Address	Moritz-Juchheim-Straße 1, 36039 Fulda, Germany
Product description	Pressure sensor JUMO MIDAS S19 R / 401008
Trademark	JUMO
Model and/or type list	Railway application

Applied tests to JUMO MIDAS S19 R / 401008

Test	Standard	Result
1 Cold, - 50 °C, 2 h	EN 60068-2-1:2007	Passed
2 Damp heat cyclic, 25 °C / 55 °C, 95 % r.H., 2 cycles à 24 h	EN 60068-2-30:2005	Passed
3 Salt mist, 336 h	EN 60068-2-11:1999	Passed
4 Dry heat, 100 °C, 6 h	EN 60068-2-2:2007	Passed
5 EMC		
Electrical fast transient burst +/- 4 kV	EN 61000-4-4:2004	Passed
RF conducted disturbances 10 V RMS	EN 61000-4-6:2009	Passed
SURGE Asymmetrically +/- 1 kV (42 ohm), line to earth	EN 61000-4-5:2006	Passed
Radiated electromagnetic field 80 to 1000 MHz; 20 V/m 1000 to 2700 MHz; 10 V/m	EN 61000-4-3:2006 + A1:2008	Passed
Electrostatic discharge +/- 6 kV contact, +/- 8 kV air	EN 61000-4-2:2009	Passed

continued on next page

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CERTIFICATE **Environmental Testing**

According to DIN EN 50155 / DIN EN50121

Test	Standard	Result
6 Vibration and shock test		
Half sine puls Acceleration 30 m/s ² , 18 shocks (3 each positive and negative in the corresponding direction)	EN 61373:1999 Cat. 1B	Passed
Simulated lifetime test RMS acceleration 7.9 m/s ² , frequency range 5 Hz ≤ f ≤ 150 Hz, 5 hours per orientation	EN 61373:1999 Cat. 1B	Passed
Broadband noise RMS acceleration 1.0 m/s ² , frequency range 5 Hz ≤ f ≤ 150 Hz, approx. 10 minutes per orientation	EN 61373:1999 Cat. 1B	Passed
7 IP protection type		
valve connector, DIN EN 175301-803 Form A IP 65	EN 60529:1991 + A1:2000	Passed
round plug connector, M12x1 IP 66/67	EN 60529:1991 + A1:2000	Passed
bayonet connector, VG 95234A - 10SL IP 66/67	EN 60529:1991 + A1:2000	Passed
8 Accelerated lifetime test (lifetime: 190,000 h)	Lifetime [h]/ 2 ^Δ (temperature increase /10)= test time [h]	Passed
9 Accelerated ageing 150,000 pressure cycles, 0 to 60 bar, 3 Hz		Passed

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July 11, 2016

Joachim Vollmer
 Product Management Sensors

JUMO GmbH & Co. KG

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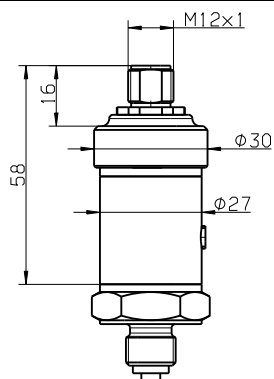


Dimensions

Electrical connection

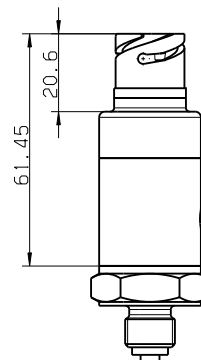
36

Round plug M12 × 1



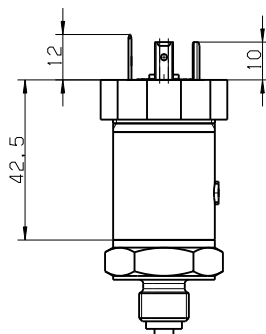
54

Bayonet connector



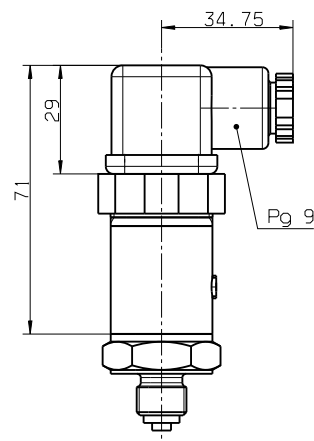
60

Plug connector



61

Line socket



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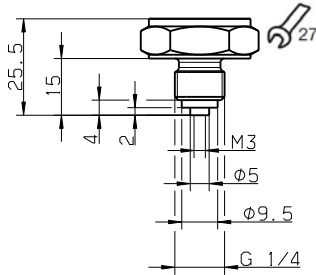
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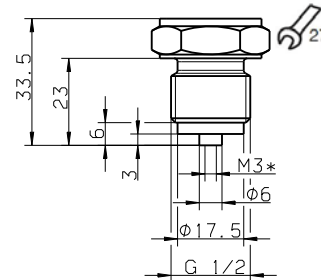
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**Process connection**

502
G 1/4

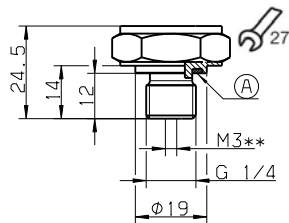


504
G 1/2



* Extra code 630 pressure channel Ø 12 mm

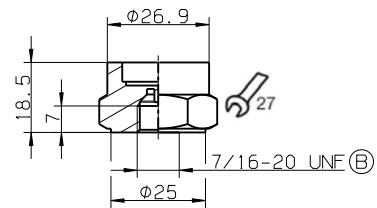
521
G 1/4



A Profile seal G 1/4

** Extra code 630 pressure channel Ø 8 mm

563
7/16-20 UNF interior



B With valve core handle

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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment ^a		
		36 Round plug M12 × 1	54 Bayonet connector	60 Plug connector 61 Line socket
4 mA to 20 mA, 2-wire				
Voltage supply DC 10 V to 30 V	U _B /S+ 0 V/S-	1 3	1 2	1 2
Functional bonding conductor FB ^b		2	3	

^a Figure: Connection to the pressure transmitter

^b The pressure transmitter has to be connected to the potential equalization system of the plant via the electrical connection or process connection.

Color coding: connecting cable round plug M12 × 1	1 BN	Brown
	2 WH	White
	3 BU	Blue
	4 BK	Black
	The color coding is only valid for A-coded standard cables!	

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Order details

	(1) Basic type
401008/000	JUMO MIDAS S19 R – OEM pressure transmitter – Railway
	(2) Input
455	0 bar to 1.6 bar relative pressure
456	0 bar to 2.5 bar relative pressure
457	0 bar to 4 bar relative pressure
458	0 bar to 6 bar relative pressure
459	0 bar to 10 bar relative pressure
460	0 bar to 16 bar relative pressure
461	0 bar to 25 bar relative pressure
462	0 bar to 40 bar relative pressure
463	0 bar to 60 bar relative pressure
464	0 bar to 100 bar relative pressure
480	-1 bar to +1.5 bar relative pressure
481	-1 bar to +3 bar relative pressure
482	-1 bar to +5 bar relative pressure
483	-1 bar to +9 bar relative pressure
484	-1 bar to +15 bar relative pressure
485	-1 bar to +24 bar relative pressure
489	0 bar to 1.6 bar absolute pressure
490	0 bar to 2.5 bar absolute pressure
491	0 bar to 4 bar absolute pressure
492	0 bar to 6 bar absolute pressure
493	0 bar to 10 bar absolute pressure
494	0 bar to 16 bar absolute pressure
495	0 bar to 25 bar absolute pressure
505	0 bar to 40 bar absolute pressure
998	Special measuring range for absolute pressure
999	Special measuring range for relative pressure
	(3) Output
405	4 mA to 20 mA, 2-wire
	(4) Process connection
502	G 1/4 according to DIN EN 837
504	G 1/2 according to DIN EN 837
521	G 1/4 according to DIN 3852-11
563	7/16-20 UNF interior, with valve core handle
	(5) Process connection material
20	CrNi (stainless steel)
	(6) Electrical connection
36	Round plug M12 × 1
54	Bayonet VG 95234A - 10SL
60	Plug connector DIN EN 174301-803, Form A (without cable socket)
61	Line socket DIN EN 175301-803, Form A

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(7) Extra codes	
000	None
591	Choke in the pressure channel
624	Oil and grease free
630	Enlarged pressure channel ^a
950	For railway applications ^b

^a Diameter 8 mm for process connection G 1/4 according to DIN 3852-11, diameter 12 mm for process connection G 1/2 according to DIN EN 837

^b Railway application is standard and must always be indicated.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
Order example	401008/000	-	455	-	405	-	504	-	20	-	61	/	950

^a List extra codes in sequence, separated by commas.

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JUMO MIDAS DR

Pressure transmitter for control cabinet

Brief description

This pressure transmitter can be used for measuring the relative (gauge) pressure in liquid or gaseous media. The transmitter operates on the thick-film strain gauge measurement principle. The pressure sensor features an aluminium-oxide ceramic (Al_2O_3) base material. The pressure is converted into an electrical signal.



Type 401009/000

Technical data

Unless further specified, all the following percentage value details refer to the measurement span.

Reference conditions

as per DIN 16086 and EN 60770

Measuring ranges

see order details

Overload limit¹

for the pressure transmitter

0 to 16 bar 3 x full scale

Bursting pressure¹

for the pressure transmitter

0 to 16 bar $\leq 5 \times$ full scale

Parts in contact with medium²

as standard: st. steel, mat. ref. 1.4305,

Al_2O_3 96 %

pluggable screwed gland: brass (CuZn)

seal: FPM

Output

4 to 20 mA

2-wire burden $\leq (U_B - 10 \text{ V})/0.02 \text{ A}$

0.5 to 4.5 V

radiometric burden $\geq 20 \text{ k}\Omega$

1 to (5)6 V burden $\geq 10 \text{ k}\Omega$

0 to 10 V burden $\geq 10 \text{ k}\Omega$

Overall error³

$< 1.5 \%$ of full scale⁴

Deviation from characteristic

$\leq 0.5 \%$ of full scale (limit point setting)

Burden error

$< 0.5 \%$

Zero offset

$\leq 0.3 \%$

Thermal hysteresis

(within compensated range -20 to $+80 \text{ }^\circ\text{C}$)

$\leq \pm 0.8 \%$

Step response

for current output $\leq 3 \text{ msec}$

for voltage output: $\leq 10 \text{ msec}$

Long-term stability per year

$\leq 1 \%$

Supply voltage

DC 10 to 30 V (for outputs 4 to 20 mA and 1 to (5)6 V)

DC 5 V $\pm 0.5 \text{ V}$ (for output 0.5 to 4.5 V)

DC 11.5 to 30 V (for output 0 to 10 V)

Ripple: the voltage peaks must not go outside the limits specified for the supply.

Max. current drawn: approx. 25 mA

Supply voltage error

$\leq 0.02 \%$ per V

(nominal supply voltage DC 24 V)

radiometric with output 0.5 to 4.5 V

Operating temperature

Ambient: -20 to $+80 \text{ }^\circ\text{C}$

Medium: -15 to $+60 \text{ }^\circ\text{C}$

Storage: -40 to $+80 \text{ }^\circ\text{C}$

Electromagnetic compatibility (EMC)

As per DIN EN 61326

Interference emission: Class B

Interference immunity: to industrial requirements

Mechanical shock

As per DIN EN 60068-2-27

100 g/1 msec

Mechanical vibration

As per DIN EN 60068-2-6

$\leq 20 \text{ g}$ at 15 to 2000 Hz

Enclosure protection

IP40 as per DIN EN 60529

Housing

Stainless steel, mat. ref. 1.4305

Process connection

See order details;

other connections upon request

Electrical connection

4-pole terminal block, grid dim. 5 mm

Conductor cross-section:

rigid 0.2 to 4 mm²

flexible 0.2 to 2.5 mm²

Stripped length: 8 mm

Screw terminals

Operating position

Unrestricted

Mounting

Snaps onto DIN rail, 35 mm to DIN EN 60715

Weight

100 g

¹ Depending on the process connection and pressure line used by the customer, the overload limits or bursting pressure may deviate from the assured values.

² The customer must check the compatibility with the medium being measured.

³ The overall error includes errors due to linearity, hysteresis, reproducibility and temperature drift within the range from -20 to $+80 \text{ }^\circ\text{C}$.

⁴ From end value

Approvals and approval marks (see technical data)



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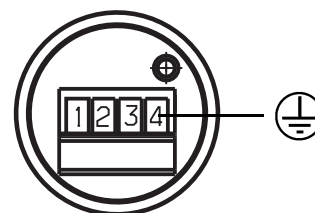


Approvals and approval marks

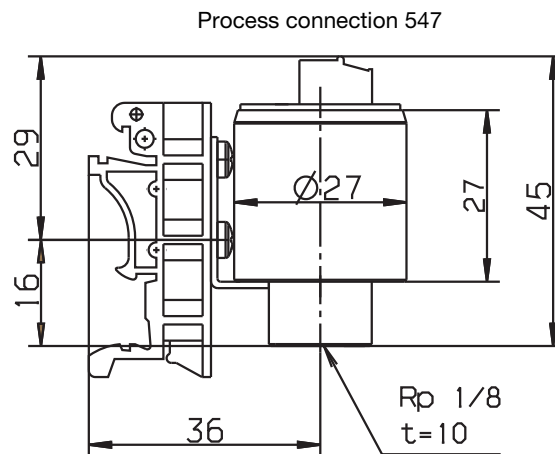
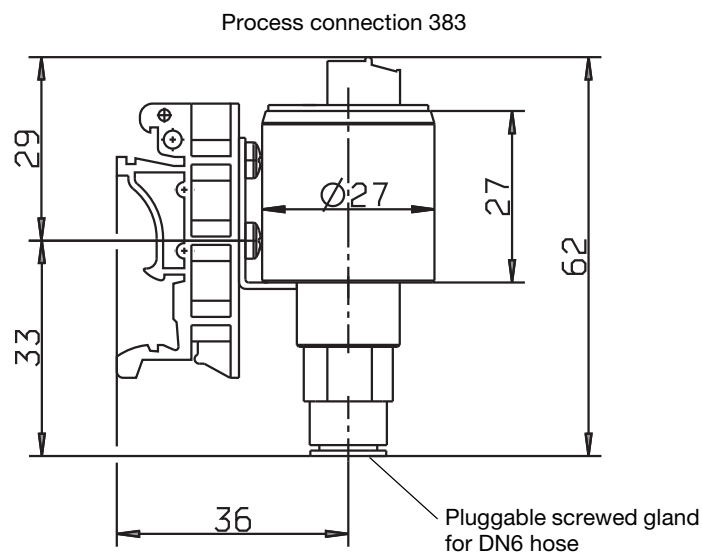
EAC	
Testing agency	«Промтехконтроль»
Certificates/certification numbers	EAЭС N RU Д-DE.PA01.B.80830/21
Inspection basis	TR TS 020/2011
Valid for	Type 401009

Electrical connection

Connection		Terminal assignment
		Terminal block
Supply (with output) DC 10 to 30 V (1 to (5)6 V) DC 11.5 to 30 V (0 to 10 V) DC 5 V (0.5 to 4.5 V)		1 L+ 2 L-
Output 1 to (5)6 V 0 to 10 V 0.5 to 4.5 V		2 - 3 +
Supply (with output) DC 10 to 30 V (4 to 20 mA, 2-wire)		1 L+ 2 L-
Output 4 to 20 mA, 2-wire		1 + 2 - Proportional 4 to 20 mA current in supply
PE (protective earth conductor)		4



Dimensions



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Order details

401009	(1) Basic type JUMO MIDAS DR – Pressure transmitter for control cabinet
/000	(2) Basic type extensions None
/999	Special version
455	(3) Input for gauge pressure 0 to 1.6 bar
456	0 to 2.5 bar
457	0 to 4 bar
458	0 to 6 bar
459	0 to 10 bar
460	0 to 16 bar
479	-1 to 0.6 bar
480	-1 to 1.5 bar
481	-1 to 3 bar
482	-1 to 5 bar
483	-1 to 9 bar
484	-1 to 15 bar
999	Special measuring range
405	(4) Output 4 to 20 mA, 2-wire
412	0.5 to 4.5 V, 3-wire
415	0 to 10 V, 3-wire
418	1 to 5 V, 3-wire
420	1 to 6 V, 3-wire
383	(5) Process connection DN6 pluggable screwed gland for pipe/hose 6x4, DN6 ¹
547	Rp 1/8 internal
20	(6) Housing material Stainless steel
601	(7) Seal material FPM
999	Special material
06	(8) Electrical connection 4-pole terminal block
000	(9) Extra codes None

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Order code									
Order example	401009	/ 000	- 459	- 405	- 383	- 20	- 601	- 06	/ 000

¹ Only suitable for negative gauge pressure (partial vacuum) up to -0.95 bar.

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JUMO MIDAS S05

OEM Pressure Transmitter – Universal

Applications

- HVAC (heating, ventilating, and air conditioning)
- Refrigeration engineering
- Compressor engineering
- Machinery and plant engineering
- Packaging industry

Brief description

The pressure transmitter is available with relative pressure and absolute pressure measuring ranges.

The fully welded measuring system (without seals) made of high-grade stainless steel allows this device to be used in almost all media, even in harsh conditions. The structure ensures optimum protection against process medium leakage.

The device features a silicon sensor that is extremely resistant to overloading even in the lowest measuring ranges and is capable of handling millions of pressure cycles.



Type 401010 with cable socket



Type 401010 with M12 × 1 connector

Customer benefits

- **Economic**
A high degree of automation (digital compensation and calibration of sensor module) reduces production time and manufacturing costs.
- **Process reliability**
The piezoresistive silicon sensor has a high level of overload protection and long-term stability. The full final inspection in the fully automated measuring and calibration facility ensures that each pressure transmitter is of high quality.
- **Time-saving, uncomplicated, and versatile**
The installation of the measuring device requires little work and the electrical installation is simple. The modular structure allows universal use in almost any application.

Special features

- 1 to 100 bar relative pressure, and also up to 25 bar absolute pressure
- High degree of process reliability due to a welded measuring system with no seals
- Robust and maintenance-free measurement technology thanks to extreme overload resistance
- 60 % quicker device installation with the QUICKON quick-clamp technology
- Robust construction guarantees a long operating life
- Wetted stainless steel parts

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor	
Material	Silicon sensor with stainless steel separating membrane
Pressure transfer means	Synthetic oil
Admissible load changes	> 10 million
Mounting position	Any
Calibration position	Device upright, process connection at the bottom

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at		Long-term stability ^b	Overload-capability ^c	Burst pressure
bar	% MSP ^f	20 °C ^d % MSP	-20 to +100 °C ^e % MSP	% MSP per year	bar	bar
0 to 1 bar relative/absolute pressure	0.3	0.6	1.5	< 0.2	4	6
0 to 1.6 bar relative/absolute pressure	0.25	0.5	1.4		6	10
0 to 2.5 bar relative/absolute pressure	0.25	0.5	1.3		10	15
0 to 4 bar relative/absolute pressure	0.25	0.5	1.2		16	24
0 to 6 bar relative/absolute pressure	0.25	0.5	1.2		24	36
0 to 10 bar relative/absolute pressure	0.25	0.5	1.0		40	60
0 to 16 bar relative/absolute pressure	0.2	0.5	1.0		60	100
0 to 25 bar relative/absolute pressure	0.2	0.5	1.0		100	150
0 to 40 bar relative/absolute pressure	0.2	0.5	1.0		100	150
0 to 60 bar relative pressure	0.2	0.5	1.0		180	250
0 to 100 bar relative pressure	0.2	0.5	1.0		180	250
-600 to +600 mbar relative pressure	0.3	0.6	1.5		4	6
-1 to 0 bar relative pressure	0.3	0.6	1.5		4	6
-1 to +0.6 bar relative pressure	0.3	0.6	1.5		6	10
-1 to +1 bar relative pressure	0.3	0.6	1.5		6	10
-1 to +1.5 bar relative pressure	0.3	0.6	1.4		10	15
-1 to +3 bar relative pressure	0.3	0.5	1.3		16	24
-1 to +5 bar relative pressure	0.25	0.5	1.3		24	36
-1 to +9 bar relative pressure	0.25	0.5	1.2		40	60
-1 to +15 bar relative pressure	0.25	0.5	1.0		60	100
-1 to +24 bar relative pressure	0.2	0.5	1.0		100	150
-1 to +30 bar relative pressure	0.2	0.5	1.0		100	150

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c All pressure transmitters are vacuum-proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

^f MSP = measuring span

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Output

Analog output ^a	
Current	4 to 20 mA, two-wire
Voltage	DC 0.5 to 4.5 V, three-wire, ratiometric 10 to 90 % of the voltage supply DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire
Step response T ₉₀	≤ 5 ms
Burden	
Current	$R_L \leq (U_B - 8 \text{ V}) \div 0.02 \text{ A } (\Omega)$ at 4 to 20 mA, two-wire
Voltage (burden connected to "0 V/S-")	$R_L \geq 5 \text{ k}\Omega$ at DC 0.5 to 4.5 V, three-wire $R_L \geq 10 \text{ k}\Omega$ at DC 0 to 10 V, three-wire $R_L \geq 10 \text{ k}\Omega$ at DC 1 to 5 V, three-wire $R_L \geq 10 \text{ k}\Omega$ at DC 1 to 6 V, three-wire

^a Further outputs are available upon request.

Mechanical features

Material	
Process connection	Stainless steel 304 ^a
Membranes	Stainless steel 316 L
Housing	Stainless steel 304
Attached cable	PBT-GF30, PVC, PE
QUICKON	PBT-GF30
Round plug M12 × 1	PBT-GF30, stainless steel 303
Bayonet connector	PBT-GF30
Line socket	PBT-GF30, PA, silicone
Weight	80 g with process connection G 1/4

^a Pressure transmitters with process connection G 1/4 are supplied with an FKM seal. Ensure the medium durability of the seal material!

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Environmental influences

Medium temperature for electrical connection	
Attached cable	-40 to +125 °C
Round plug M12 × 1	-40 to +125 °C
Bayonet connector	-40 to +125 °C
Line socket	-40 to +125 °C
Ambient temperature for electrical connection	
Attached cable	-30 to +100 °C At ambient temperature of -30 °C restricted function. Only use when stationary. Risk of cable break.
Round plug M12 × 1	-40 to +125 °C
Bayonet connector	-40 to +125 °C
Line socket	-40 to +125 °C
Storage temperature for electrical connection	
Attached cable	-30 to +100 °C
Round plug M12 × 1	-40 to +125 °C
Bayonet connector	-40 to +125 °C
Line socket	-40 to +125 °C
Admissible humidity	
Operation	100 % rel. humidity including condensation on the device outer case
Storage	90 % rel. humidity without condensation
Admissible mechanical load	
Vibration resistance	20 g at 10 to 2000 Hz, according to IEC 60068-2-6
Shock resistance	50 g for 11 ms, 100 g for 1 ms, according to IEC 60068-2-27
Electromagnetic compatibility (EMC)	
Interference emission	According to EN 61326-2-3 Class B ^a
Interference immunity	Industrial requirement
Protection type for electrical connection	According to EN 60529
Attached cable	IP66 for relative pressure measuring range, IP67 for absolute pressure measuring range
QUICKON ^b	IP66
Round plug M12 × 1 ^c	IP66
Bayonet connector ^c	IP67
Line socket ^{c, d}	IP65

^a The product is suitable for industrial use as well as for households and small businesses.

^b Connecting cable diameter, minimum 3.5 mm, maximum 6 mm

^c The protection type is only achieved with a suitable mounted counter piece.

^d Connecting cable diameter, minimum 6 mm, maximum 8 mm

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Electrical data

Voltage supply U_B^a 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	DC 8 to 30 V, rated voltage supply DC 24 V DC 3 to 5.25 V, rated voltage supply DC 5 V, ratiometric output 10 to 90 % of the voltage supply DC 11.5 to 30 V, rated voltage supply DC 24 V DC 8 to 30 V, rated voltage supply DC 24 V DC 8 to 30 V, rated voltage supply DC 24 V
Current consumption incl. load 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	≤ 25 mA ≤ 3 mA ≤ 3 mA ≤ 3 mA ≤ 3 mA
Reverse voltage protection 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	Yes No Yes Yes Yes
Electrical circuit Requirements	SELV The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

Approvals and approval marks

EAC Testing agency Certificates/certification numbers Inspection basis Valid for	«Промтехконтроль» EAЭС N RU Д-DE.PA01.B.80830/21 TR TS 020/2011 Type 401010
UL Testing agency Certificates/certification numbers Inspection basis Valid for	Underwriter Laboratories E201387 UL 61010-1 (3. Ed.), CAN/CSA-22.2 No. 61010-1 (3. Ed.) Extra code 061

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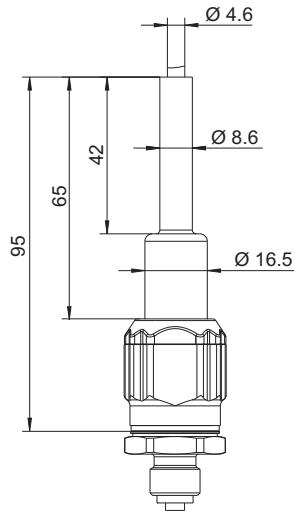
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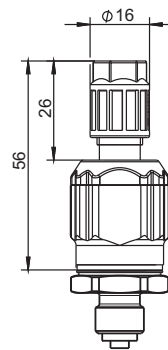
Dimensions

Electrical connection

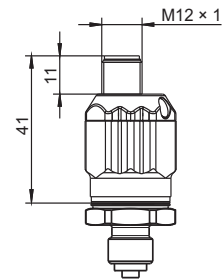
11
Attached cable



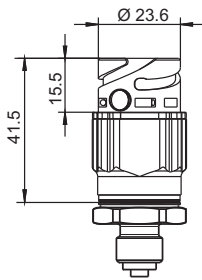
23
QUICKON



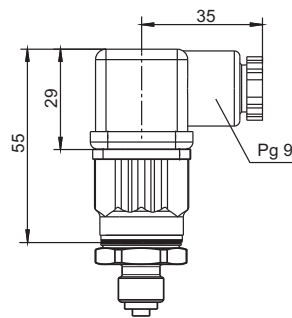
36
Round plug M12 × 1



53
Bayonet connector



61
Line socket



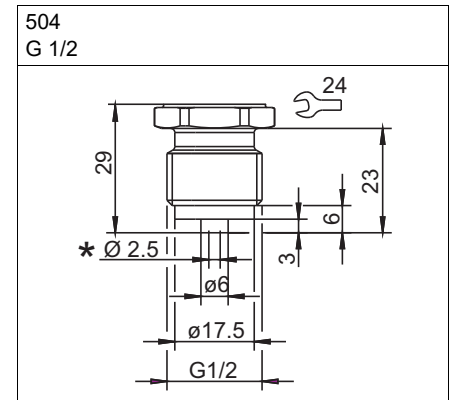
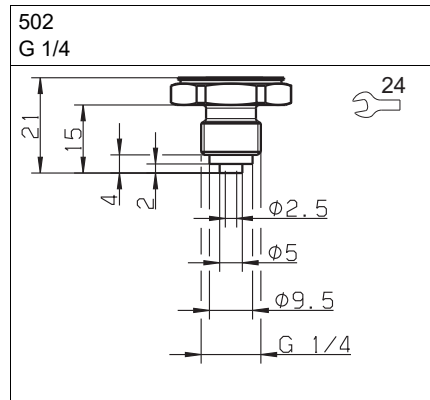
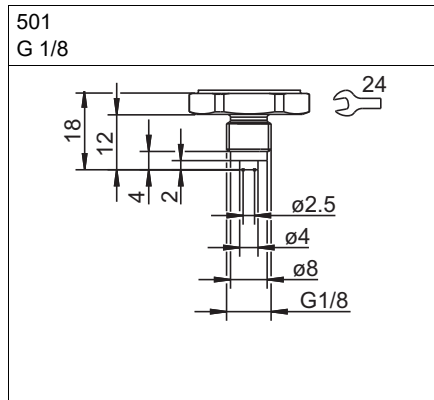
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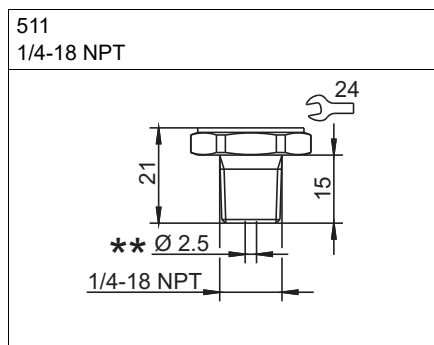
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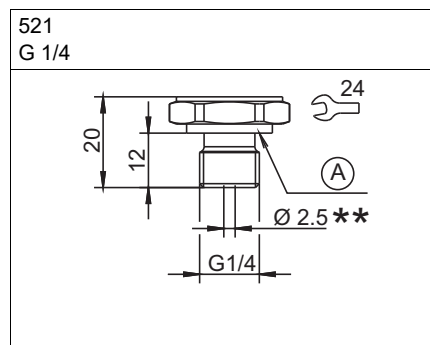
Process connection



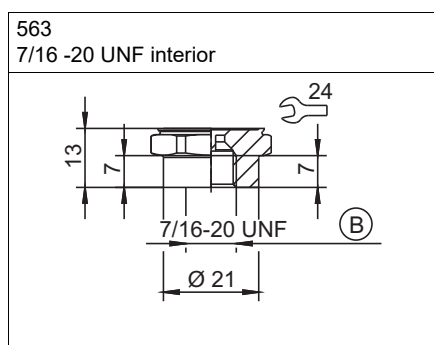
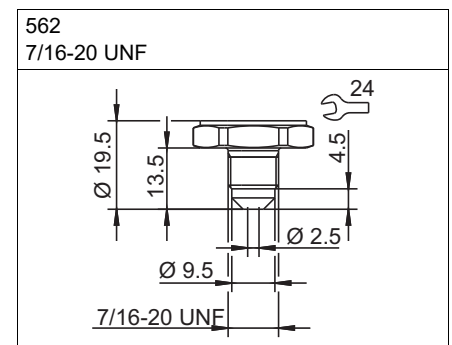
* Extra code 630 pressure channel
 Ø 12 mm



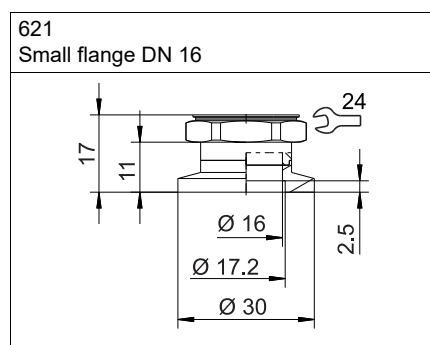
** Extra code 630 pressure channel
 Ø 8 mm



A Profile seal G 1/4
 ** Extra code 630 pressure channel
 Ø 8 mm



B With valve core handle



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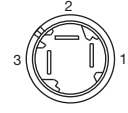
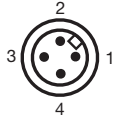
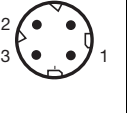
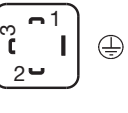


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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment (figure: connection to the pressure transmitter)				
						
		Attached cable	QUICKON	Round plug M12 × 1	Bayonet connector	Line socket
4 to 20 mA, two-wire						
Voltage supply DC 8 to 30 V	U _B /S+	WH	1	1	1	1
	0 V/S-	BN	3	3	2	2
DC 0.5 to 4.5 V, ratiometric						
Voltage supply DC 3 to 5.25 V	U _B	WH	1	1	1	1
Ratiometric output 10 to 90 % of the voltage supply	0 V/S-	BN	2	2	2	2
	S+	GN	3	3	3	3
DC 0 to 10 V, three-wire						
Voltage supply DC 11.5 to 30 V	U _B	WH	1	1	1	1
	0 V/S-	BN	2	2	2	2
	S+	GN	3	3	3	3
DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire						
Voltage supply DC 8 to 30 V	U _B	WH	1	1	1	1
	0 V/S-	BN	2	2	2	2
	S+	GN	3	3	3	3
Functional bonding conductor FB ^a		-	-	4	-	

^a The pressure transmitter has to be connected to the potential equalization system of the plant through the electrical connection or process connection.

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Assignment variants electrical connection, extra code 933

Please provide the assignment variant in plain text with the order details (for example "B1")!

Connection		Terminal assignment (figure: connection to the pressure transmitter)			
		36 Round plug M12 × 1		61 Line socket	
Assignment variants		B1	B2	B3	B4
4 to 20 mA, two-wire					
Voltage supply DC 8 to 30 V	U _B /S+	1	4		2
	0 V/S-	2	1		1
DC 0 to 10 V, three-wire					
Voltage supply DC 11.5 to 30 V	U _B	1	1	1	3
	0 V/S-	3	4	2	2
	S+	4	2	4	1
DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire					
Voltage supply DC 8 to 30 V	U _B	1	1	1	3
	0 V/S-	3	4	2	2
	S+	4	2	4	1
Functional bonding conductor FB ^a		-	-	-	

^a The pressure transmitter has to be connected to the potential equalization system of the plant through the electrical connection or process connection.

Color coding: connecting cable round plug M12 × 1		1 BN	Brown
		2 WH	White
		3 BU	Blue
		4 BK	Black
The color coding is only valid for A-coded standard cables!			

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Order details

(1) Basic type	
401010/000	JUMO MIDAS S05 – OEM Pressure Transmitter – Universal
(3) Input	
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
464	0 to 100 bar relative pressure
450	-600 to +600 mbar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
449	-1 to +1 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
527	-1 to +30 bar relative pressure
488	0 to 1 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
505	0 to 40 bar absolute pressure
998	Special measuring range for absolute pressure
999	Special measuring range for relative pressure
(3) Output	
405	4 to 20 mA, two-wire
412	DC 0.5 to 4.5 V, three-wire
415	DC 0 to 10 V, three-wire
418	DC 1 to 5 V, three-wire
420	DC 1 to 6 V, three-wire

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(4) Process connection	
501	G 1/8 according to DIN EN 837
502	G 1/4 according to DIN EN 837
504	G 1/2 according to DIN EN 837
511	1/4-18 NPT according to DIN EN 837
521	G 1/4 according to DIN 3852-11
562	7/16-20 UNF
563	7/16-20 UNF interior, with valve core handle
621	Small flange DN 16
(5) Process connection material	
20	CrNi (stainless steel)
(6) Electrical connection	
11	Attached cable ^a
23	QUICKON
36	Round plug M12 × 1
53	Bayonet DIN 72585
61	Line socket DIN EN 175301-803, Form A
(8) Extra codes	
000	None
061	UL approval
591	Choke in the pressure channel
624	Oil and grease free
630	Enlarged pressure channel ^b
876	Test report
933	Assignment variants electrical connection
954	Technical Passport

^a The standard cable length is 2 m. Further lengths are available upon request.

^b An enlarged pressure channel is only available with process connections 1/4-18 NPT, and G 1/4.

Order code (1) (2) (3) (4) (5) (6) (7)
 Order example 401010/000 - 460 - 412 - 504 - 20 - 36 / 591 , ...^a

^a List extra codes in sequence, separated by commas.

Stock versions

Order code	Part no.
401011/000-451-405-502-20-61/000	00543760
401011/000-451-405-504-20-61/000	00547882
401011/000-414-405-502-20-61/000	00535655
401011/000-414-405-504-20-61/000	00558996

Accessories

Designation	Part no.
Line socket, straight, 4-pole, M12 × 1, 2 m	00404585
Line socket, angled, 4-pole, M12 × 1, 2 m	00409334
Bayonet connector with 3 m cable	00463392

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JUMO MIDAS S06

OEM-Pressure Transmitter – Low Pressure

Applications

- HVAC (heating, ventilating, and air conditioning)
- Filter technology
- Mechanical and plant engineering
- Level measurement
- Bubble-through method
- Packaging industry

Brief description

The JUMO MIDAS S06 pressure transmitter is already available with measuring ranges as of 100 mbar. The used silicon sensor can handle extreme overloading even in the lowest measuring ranges and is capable of handling millions of pressure cycles.

The fully welded and therefore seal-free measuring system made of high-grade stainless steel allows this device to be used in almost all media, even when the conditions are rough.

The structure ensures optimum protection against process medium leakage.

Customer benefits

- **Economic**
A high degree of automation (digital compensation and calibration of sensor module) reduces production time and manufacturing costs.
- **Process reliability**
The piezoresistive silicon sensor has a high level of overload protection and long-term stability. The full final inspection in the fully automated measuring and calibration facility ensures that each pressure transmitter is of high quality.
- **Time-saving, uncomplicated, and versatile**
The installation of the measuring device requires little work and the electrical installation is simple. The modular structure allows universal use in almost any application.



Type 401011
with line socket with M12 connector

Special features

- Measuring ranges as of 100 mbar
- Suitable for measuring aggressive liquids
- High degree of process reliability due to a welded measuring system with no seals
- Robust and maintenance-free measurement technology thanks to extreme overload resistance
- 60 % quicker device installation with the QUICKON quick-clamp technology
- Parts in contact with media are made of stainless steel

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor	
Material	Silicon sensor with stainless steel separating membrane (piezo-resistive)
Pressure transfer medium	Synthetic oil
Admissible load changes	> 10 million
Mounting position	Any
Calibration position	Device stands upright, process connection at the bottom
Zero point offset depending on position	≤ 1.5 mbar, process connection at the top

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at 20 °C ^c	-20 to +100 °C ^d (80 °C)	Long-term stability ^b	Overload capacity	Burst pressure
mbar	% MSP ^e	% MSP	% MSP	% MSP per year	bar	bar
0 to 100 mbar relative pressure	0.35	1.2	2 ^f	< 1.0	-0.4 to +0.4	-0.6 to +0.6
0 to 160 mbar relative pressure	0.3	0.8	1.9 ^f		-0.7 to +0.7	-1 to +1
0 to 0,25 bar relative pressure	0.3	0.8	1.8 ^f		-1 to +1	-1 to +1.5
0 to 0,4 bar relative pressure	0.3	0.7	1.7	< 0.4	-1 to +1.6	-1 to +2
0 to 0,6 bar relative pressure	0.3	0.7	1.6		-1 to +2.4	-1 to +3.6
-100 to +100 mbar relative pressure	0.3	1	2 ^f		-0.4 to +0.4	-0.6 to +0.6
-400 to +400 mbar relative pressure	0.3	0.7	1.7		-1 to +1.6	-1 to +2

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

^e MSP = measuring span

^f Maximum admissible ambient and medium temperature 0 to 80 °C

Output

Analog output ^a	
Current	
Output 405	4 to 20 mA, two-wire
Voltage	
Output 412	DC 0.5 to 4.5 V, three-wire, ratiometric 10 to 90 % of the voltage supply
Output 415	DC 0 to 10 V, three-wire
Output 418	DC 1 to 5 V, three-wire
Output 420	DC 1 to 6 V, three-wire
Step response T ₉₀	≤ 5 ms
Burden	
Current	$R_L \leq (U_B - 8 \text{ V}) \div 0.02 \text{ A } (\Omega)$
4 to 20 mA, two-wire	
Voltage	
DC 0.5 to 4.5 V, three-wire	$R_L \geq 5 \text{ k}\Omega$
DC 0 to 10 V, three-wire	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 5 V, three-wire	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 6 V, three-wire	$R_L \geq 10 \text{ k}\Omega$

^a Further outputs are available upon request.

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Mechanical features

Material	
Process connection	Stainless steel 304 ^a
Membranes	Stainless steel 316 L
Housing	Stainless steel 304
Attached cable	PBT-GF30, PVC, PE
QUICKON	PBT-GF30
Round plug M12 × 1	PBT-GF30, stainless steel 303
Bayonet connector	PBT-GF30
Line socket	PBT-GF30, PA, silicone
Weight	80 g with process connection G 1/4

^a Pressure transmitters with process connection G 1/4 are supplied with an FPM seal. Note the medium durability of the seal material!

Environmental influences

Admissible temperatures	Measuring range 100, 160, 250, -100 to +100 mbar	Measuring range ≥ 0,4 bar
Medium temperature	0 to 80 °C	-20 to +100 °C
Ambient temperature	0 to 80 °C	-20 to +100 °C
Storage temperature	-20 to +100 °C	-20 to +100 °C
Admissible humidity		
Operation	100 % rel. humidity including condensation on the device outer case	
Storage	90 % rel. humidity without condensation	
Admissible mechanical load		
Vibration resistance	20 g at 10 to 2000 Hz, according to IEC 60068-2-6	
Shock resistance	50 g for 11 ms, 100 g for 1 ms, according to IEC 60068-2-27	
Electromagnetic compatibility	According to EN 61326-2-3	
Interference emission	Class B ^a	
Interference immunity	Industrial requirement	
Protection type for electrical connection	According to EN 60529	
Attached cable	IP66 for relative pressure measuring range, IP67 for absolute pressure measuring range	
QUICKON ^b	IP66	
Round plug M12 × 1 ^c	IP66	
Bayonet connector ^c	IP67	
Line socket ^{c, d}	IP65	

^a The product is suitable for industrial use as well as for households and small businesses.

^b Connecting cable diameter, minimum 3.5 mm, maximum 6 mm

^c The protection type is only achieved with a suitable mounted counter piece.

^d Connecting cable diameter, minimum 6 mm, maximum 8 mm

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Electrical data

Voltage supply U_B^a 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	DC 8 to 30 V, rated voltage supply DC 24 V DC 3 to 5.25 V, rated voltage supply DC 5 V, ratiometric output 10 to 90 % of the voltage supply DC 11.5 to 30 V, rated voltage supply DC 24 V DC 8 to 30 V, rated voltage supply DC 24 V DC 8 to 30 V, rated voltage supply DC 24 V
Current consumption 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	≤ 25 mA ≤ 2 mA ≤ 3 mA ≤ 3 mA ≤ 3 mA
Reverse voltage protection	Yes
Electrical circuit Requirements	SELV The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

Approvals and approval marks

EAC Testing agency Certificates/certification numbers Inspection basis Valid for	«Промтехконтроль» EAЭC N RU Д-DE.PA01.B.80830/21 TR TS 020/2011 Type 401011
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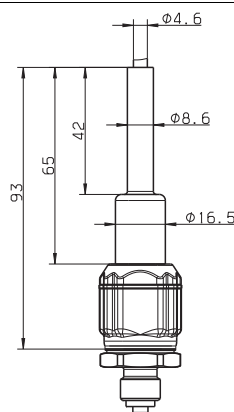
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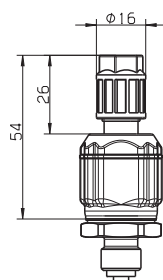
Dimensions

Electrical connection

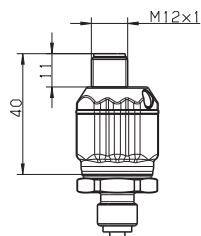
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Attached cable



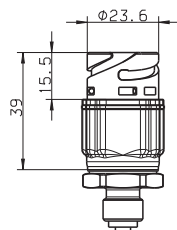
23
QUICKON



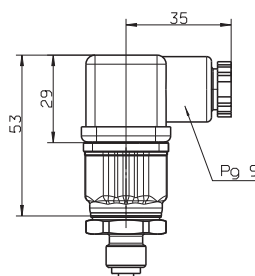
36
Round plug M12 × 1



53
Bayonet connector



61
Line socket



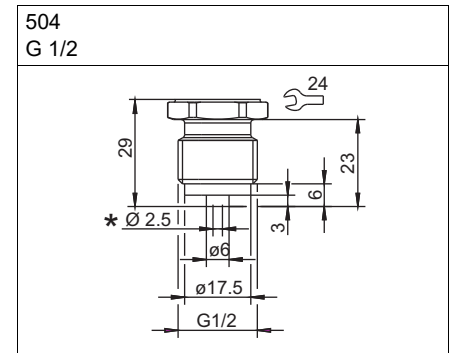
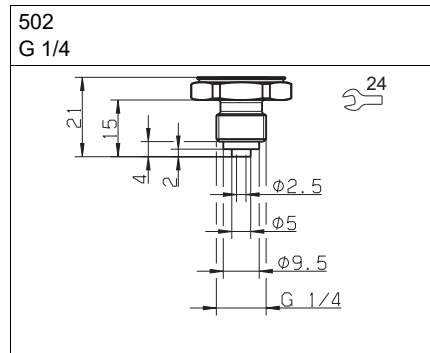
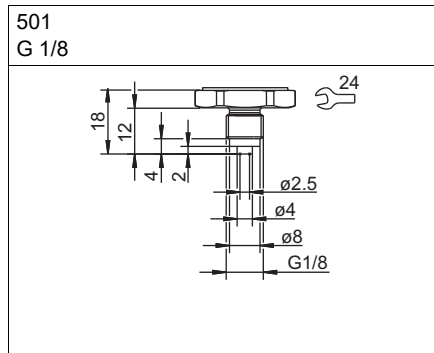
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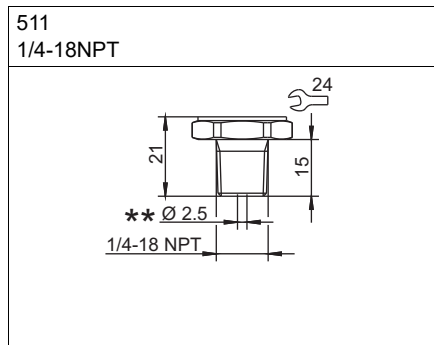
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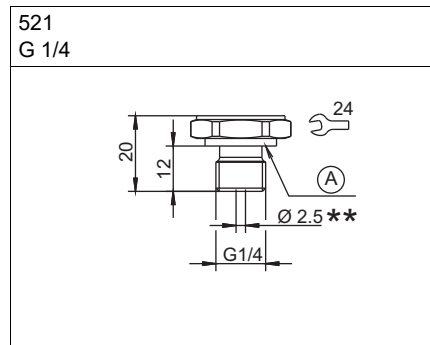
Process connection



* Extra code 630 pressure channel
 Ø 12 mm

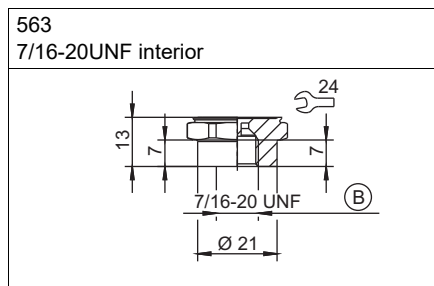
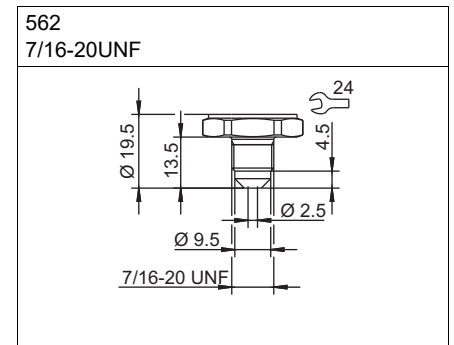


** Extra code 630 pressure channel
 Ø 8 mm



** Extra Code 630 pressure channel
 Ø 8 mm

A Profile seal G 1/4



B With valve core handle

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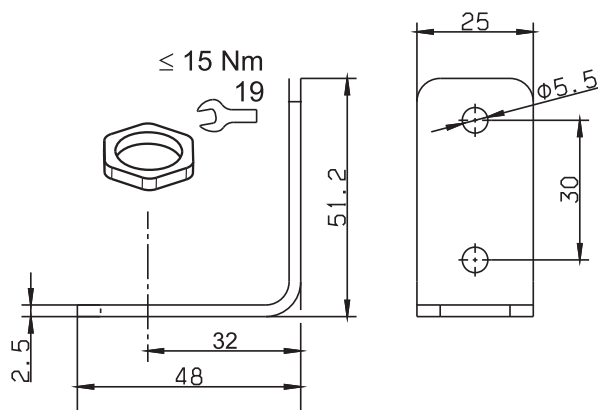
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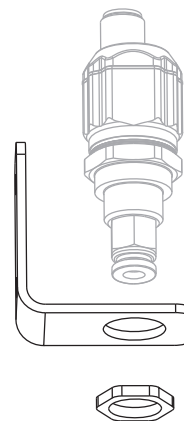
**Mounting kit****Accessories**

Part no. 00578663



Mounting example

Part no. 00578663



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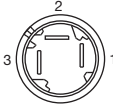
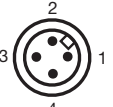

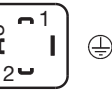


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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment (figure: connection to the pressure transmitter)				
						
		11 Attached cable	23 QUICKON	36 Round plug M12 × 1	53 Bayonet connector	61 Line socket
4 to 20 mA, two-wire						
Voltage supply DC 8 to 30 V	U _B /S+	WH	1	1	1	1
	0 V/S-	BN	3	3	2	2
DC 0.5 to 4.5 V, ratiometric						
Voltage supply DC 3 to 5.25 V Ratiometric output 10 to 90 % of the voltage supply	U _B	WH	1	1	1	1
	0 V/S-	BN	2	2	2	2
	S+	GN	3	3	3	3
DC 0 to 10 V, three-wire						
Voltage supply DC 11.5 to 30 V	U _B	WH	1	1	1	1
	0 V/S-	BN	2	2	2	2
	S+	GN	3	3	3	3
DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire						
Voltage supply DC 8 to 30 V	U _B	WH	1	1	1	1
	0 V/S-	BN	2	2	2	2
	S+	GN	3	3	3	3
Functional bonding conductor FB ^a		-	-	4	-	

^a The pressure transmitter has to be connected to the potential equalization system of the plant through the electrical connection or process connection.

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Assignment variants electrical connection, extra code 933

Please provide the assignment variant in plain text with the order details (for example "B1")!

Connection		Terminal assignment (figure: connection to the pressure transmitter)			
		36 Round plug M12 × 1		61 Line socket	
Assignment variants		B1	B2	B3	B4
4 to 20 mA, two-wire					
Voltage supply DC 8 to 30 V	U _B /S+	1	4		2
	0 V/S-	2	1		1
DC 0 to 10 V, three-wire					
Voltage supply DC 11.5 to 30 V	U _B	1	1	1	3
	0 V/S-	3	4	2	2
	S+	4	2	4	1
DC 1 to 5 V, three-wire					
DC 1 to 6 V, three-wire					
Voltage supply DC 8 to 30 V	U _B	1	1	1	3
	0 V/S-	3	4	2	2
	S+	4	2	4	1
Functional bonding conductor FB ^a		-	-	-	

^a The pressure transmitter has to be connected to the potential equalization system of the plant through the electrical connection or process connection.

Color coding: connecting cable round plug M12 × 1		1 BN	Brown
		2 WH	White
		3 BU	Blue
		4 BK	Black
The color coding is only valid for A-coded standard cables!			

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Order details

(1) Basic type	
401011/000	JUMO MIDAS S06 - OEM pressure transmitter – Low pressure
(2) Input	
414	0 to 100 mbar relative pressure
415	0 to 160 mbar relative pressure
451	0 to 0,25 bar relative pressure
452	0 to 0,4 bar relative pressure
453	0 to 0,6 bar relative pressure
446	-100 to +100 mbar relative pressure
447	-400 to +400 mbar relative pressure
999	Special measuring range for relative pressure
(3) Output	
405	4 to 20 mA, two-wire
412	DC 0.5 to 4.5 V, three-wire
415	DC 0 to 10 V, three-wire
418	DC 1 to 5 V, three-wire
420	DC 1 to 6 V, three-wire
(4) Process connection	
501	G 1/8 according to DIN EN 837
502	G 1/4 according to DIN EN 837
504	G 1/2 according to DIN EN 837
511	1/4-18 NPT according to DIN EN 837
521	G 1/4 according to DIN 3852-11
562	7/16-20 UNF
563	7/16-20 UNF inside, with valve core handle
(5) Process connection material	
20	CrNi (stainless steel)
(6) Electrical connection	
11	Attached cable ^a
23	QUICKON
36	Round plug M12 × 1
53	Device connector bayonet DN 72585
61	Line socket DIN EN 175301-803, Form A
(8) Extra codes	
000	None
591	Restrictor in pressure channel
624	Oil and grease free
630	Enlarged pressure channel ^b
933	Assignment variant electrical connection
950	Railway application ^c
954	Technical passport

^a The standard cable length is 2 m. Further lengths are available upon request.

^b An enlarged pressure channel is only available with process connections 1/4-18 NPT and G 1/4.

^c The devices are tested to railway standard EN 50155:2017. Extra code 950 can only be selected for devices with output 4 to 20 mA and round plug M12 × 1 or line socket DIN EN 175301-803, form A. Note on EMC: If interference is caused by high-frequency fields (DIN EN 61000-4-3), deviations of up to 3 % of the MSP may occur at certain frequencies.

Order code (1) (2) (3) (4) (5) (6) (7)
 - - - - - / , ...^a
 Order example 401011/000 - 454 - 405 - 504 - 20 - 61 / 591

^a List extra codes in sequence, separated by commas.

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Stock versions

Order code	Part no.
401011/000-451-405-502-20-61/000	00543760
401011/000-451-405-504-20-61/000	00547882
401011/000-414-405-502-20-61/000	00535655
401011/000-414-405-504-20-61/000	00558996

Accessories

Designation	Part no.
Line socket, straight, 4-pole, M12 × 1, 2 m	00404585
Line socket, angled, 4-pole, M12 × 1, 2 m	00409334
Line socket, pressure compensation, 4-pole, M12 × 1, 5 m	00512341



JUMO MIDAS C18 SW

OEM seawater pressure transmitter

Applications

- water treatment
- reverse osmosis, e.g. seawater desalination plants
- purification plants
- organic acids, e.g. acetic acid
- solutions containing chloride, e.g. brackish water, seawater and saline solutions
- ballast tanks on ships
- offshore applications

Brief description

The pressure transmitter features an impervious and hysteresis-free ceramic measuring cell, a titanium case, and a titanium process connection.

Titanium was selected as the material due its extremely high corrosion resistance, in particular to organic acids and solutions containing chloride.

The device can record relative pressures in measuring ranges of 1.6 bar up to 100 bar.

4 mA to 20 mA (two-wire) and DC 0 V to 10 V (three-wire) are available as standard signals.



Type 401012 with attached cable

Customer benefits

- **process-reliable**
The full final inspection in the fully automated measuring and calibration facility guarantees that each pressure transmitter is of a high quality.
The durability of the used materials results in high plant availability. In combination with the oil-free ceramic measuring cell which prevents filling oil leaks in the event of a burst, this guarantees a high degree of process reliability for critical processes such as reverse osmosis.
- **economic**
A proven design ensures efficient production, which in turn leads to short delivery times. The resistant materials reduce cleaning and repair processes, thereby reducing plant downtimes as well as the resulting costs of these.
The compact and light design opens up many fields of application for users and makes purchase decisions easier when replacements are needed.

Special features

- measuring cell made of aluminum oxide ceramic
- case and process connection made of titanium
- long-term stability < 0.2 %
- approx. 40 % weight reduction when compared to similar stainless steel versions
- potting as protection against vibrations, condensation, and moisture
- made in Germany

Approvals and approval marks



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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor	
Measuring principle	Thick film on ceramic bodies (piezo-resistive)
Admissible load changes	> 10 million, 0 % to 100 % measuring range
Mounting position	Any
Calibration position	Device upright, process connection at the bottom

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at		Long-term stability ^b	Overload capacity ^c	Burst pressure
bar	% MSP ^f	20 °C ^d % MSP	-20 C to +100 °C ^e % MSP			
0 bar to 1.6 bar relative pressure	0.3	0.5	1.6	0.2	6	12
0 bar to 2.5 bar relative pressure	0.3	0.5	1.6		6	12
0 bar to 4 bar relative pressure	0.3	0.5	1.6		12	25
0 bar to 6 bar relative pressure	0.25	0.5	1.4		12	25
0 bar to 10 bar relative pressure	0.25	0.5	1.4		20	38
0 bar to 16 bar relative pressure	0.25	0.5	1.4		50	75
0 bar to 25 bar relative pressure	0.25	0.5	1.4		50	75
0 bar to 40 bar relative pressure	0.25	0.5	1.4		120	200
0 bar to 60 bar relative pressure	0.25	0.5	1.4		120	200
0 bar to 100 bar relative pressure	0.25	0.5	1.4		180	250
-1 bar to +0.6 bar relative pressure	0.3	0.6	1.6		6	12
-1 bar to +1.5 bar relative pressure	0.3	0.6	1.6		6	12
-1 bar to +3 bar relative pressure	0.3	0.6	1.6		12	25
-1 bar to +5 bar relative pressure	0.25	0.5	1.4		12	25
-1 bar to +9 bar relative pressure	0.25	0.5	1.4		20	38
-1 bar to +15 bar relative pressure	0.25	0.5	1.4		50	75
-1 bar to +24 bar relative pressure	0.25	0.5	1.4		50	75

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c All pressure transmitters are vacuum-proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

^f MSP = measuring span

Output

Analog output	
Current	4 to 20 mA, two-wire
Voltage	DC 0 to 10 V, three-wire
Step response T ₉₀	≤ 2 ms
Burden	
Current	RL ≤ (U _B - 8 V) ÷ 0.02 A (Ω) for 4 to 20 mA, two-wire
Voltage	RL ≥ 10 kΩ for DC 0 to 10 V, three-wire

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Mechanical features

Material	
Process connection	Titanium grade 2 3.7035 (Ti2)
Process seal 600 ^a	EPDM
Process seal 601 ^a	FPM
Sensor	Ceramic Al ₂ O ₃ 96 %
Case	Titanium grade 2 3.7035 (Ti2)
Attached cable	Technomelt PA 678, PVC
Round plug M12 × 1	PBT-GF30
Line socket	PBT-GF30, PA, EPDM
Weight	44 g with process connection G 1/4 and round plug M12 × 1

^a Ensure the medium durability of the seal material!

Environmental influences

Medium temperature	-20 °C to +125 °C
Ambient temperature	-20 °C to +85 °C
Storage temperature	-40 °C to +125 °C -20 °C to +100 °C for version with attached cable
Admissible humidity	
Operation	100 % rel. humidity including condensation on the device outer case
Storage	90 % rel. humidity without condensation
Admissible mechanical load	
Vibration resistance	20 g, 15 to 2,000 Hz, according to IEC 60068-2-6
Shock resistance	100 g for 1 ms, according to IEC 60068-2-27
Electromagnetic compatibility	
Interference emission	Class B ^a , according to EN 61326-2-3
Interference immunity	Industrial requirement, according to EN 61326-2-3
Protection type for electrical connection	According to EN 60529
Attached cable ^b	IP67
Round plug M12 × 1 ^b	IP67
Line socket ^{b, c}	IP65

^a The product is suitable for industrial use as well as for households and small businesses.

^b The protection type is only achieved with a suitable mounted counter piece.

^c Connecting cable diameter, minimum 6 mm, maximum 8 mm

Electrical data

Voltage supply U _B ^a	
4 mA to 20 mA, two-wire	DC 10 V to 30 V, rated voltage supply DC 24 V
DC 0 V to 10 V, three-wire	DC 11.5 V to 30 V, rated voltage supply DC 24 V
Current consumption	
4 mA to 20 mA, two-wire	≤ 25 mA
DC 0 V to 10 V, three-wire	≤ 3 mA
Reverse voltage protection	Yes
Electrical circuit	SELV
Requirements	The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values.

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Approvals and approval marks

EAC	
Testing agency	«Промтехконтроль»
Certificates/certification numbers	EAЭС N RU Д-DE.PA01.B.80830/21
Inspection basis	TR TS 020/2011
Valid for	Type 401012
DNV	
Testing agency	DNV
Certificates/certification numbers	TAA0000211
Inspection basis	Class Guideline DNV CG-00339
Valid for	Type 401012/062

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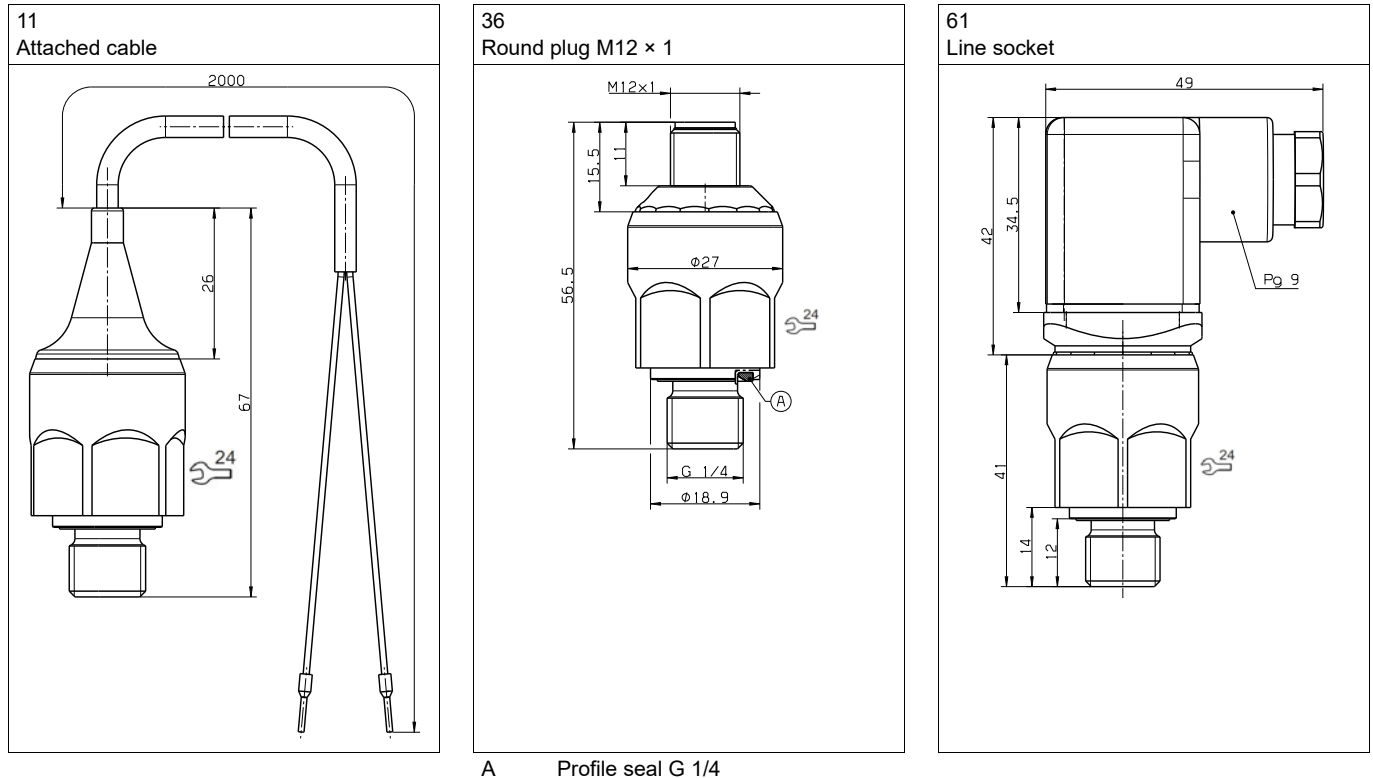
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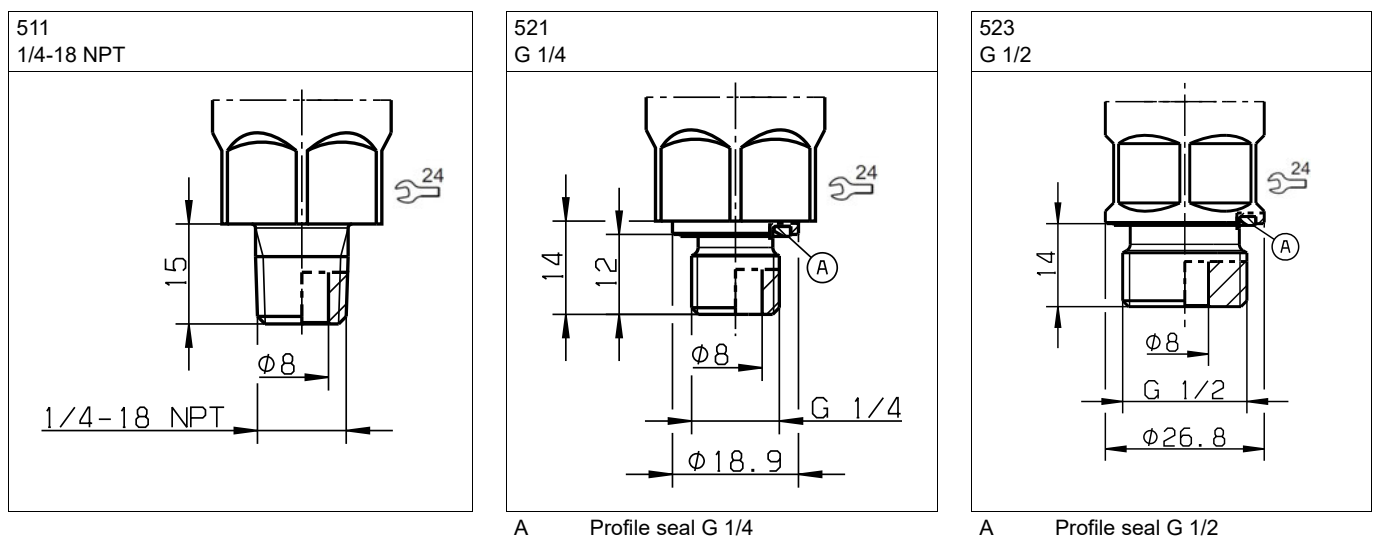
Dimensions

Electrical connection



Process connection

The process connections are designed as standard with an enlarged pressure channel of Ø 8 mm (extra code 630).



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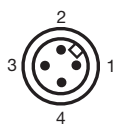
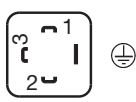


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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment (figure: connection to the pressure transmitter)		
				
		Attached cable	Round plug M12 × 1	Line socket
4 to 20 mA, two-wire				
Voltage supply DC 10 to 30 V	$U_B/S+$ 0 V/S-	WH BN	1 3	1 2
DC 0 to 10 V, three-wire				
Voltage supply DC 11.5 to 30 V	U_B 0 V/S- S+	WH BN YE	1 2 3	1 2 3
Functional bonding conductor FB ^a		-	4	

^a The pressure transmitter has to be connected to the potential equalization system of the plant through the electrical connection or process connection.

Color coding: connecting cable round plug M12 × 1		1 BN	Brown
		2 WH	White
		3 BU	Blue
		4 BK	Black

The color coding is **only** valid for A-coded standard cables!

Order details

(1) Basic type	
401012	JUMO MIDAS C18 SW – OEM seawater pressure transmitter
(2) Basic type extension	
000	None
062	DNV approval
(3) Input	
455	0 bar to 1.6 bar relative pressure
456	0 bar to 2.5 bar relative pressure
457	0 bar to 4 bar relative pressure
458	0 bar to 6 bar relative pressure
459	0 bar to 10 bar relative pressure
460	0 bar to 16 bar relative pressure
461	0 bar to 25 bar relative pressure
462	0 bar to 40 bar relative pressure
463	0 bar to 60 bar relative pressure
464	0 bar to 100 bar relative pressure
479	-1 bar to +0.6 bar relative pressure
480	-1 bar to +1.5 bar relative pressure
481	-1 bar to +3 bar relative pressure
482	-1 bar to +5 bar relative pressure
483	-1 bar to +9 bar relative pressure
484	-1 bar to +15 bar relative pressure
485	-1 bar to +24 bar relative pressure
999	Special measuring range for relative pressure ^a
(4) Output	
405	4 mA to 20 mA, two-wire
415	DC 0 V to 10 V, three-wire
(5) Process connection	
511	1/4-18 NPT DIN EN 837
521	G 1/4 DIN 3852-11 ^b
523	G 1/2 DIN 3852-11
(6) Process connection material	
60	Ti (Titanium)
(7) Material seal	
600	EPDM
601	FPM
(8) Electrical connection	
11	Attached cable, 2 m (other lengths upon request) ^c
36	Round plug M12 × 1
61	Line socket DIN EN 175301-803, Form A
(9) Extra codes	
000	None
630	Enlarged pressure channel

^a With DNV approval, special measuring ranges (input) are not allowed to exceed the 100 bar limit.

^b The process connection G 1/4 DIN 3852-11 is only available as standard in conjunction with extra code 630.

^c Without DNV approval

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Order code	<input type="text"/>	/ <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	/ <input type="text"/>
Order example	401012	/ 000	- 460	- 405	- 521	- 60	- 601	- 11	/ 630

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Accessories

The accessories are not checked according to DNV requirements.

Designation	Part no.
Line socket, straight, 4-pole, M12 × 1, 2 m	00404585
Line socket, angled, 4-pole, M12 × 1, 2 m	00409334
Line socket, pressure compensation, 4-pole, M12 × 1, 5 m	00512341

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JUMO MAERA S25

Level probe

Applications

Level and level measurements¹

- In rainwater cisterns
- In gray water recycling
- Heating oil and diesel oil tanks
- In AUS32 (known in Europe as "AdBlue®", "DEF" in North America, or "ARLA 32" in Brazil)

Brief description

The JUMO MAERA S25 level probe is used for the continuous hydrostatic level measurement of liquids. Filling heights between 2.50 mWS and 10 mWS (water column) can be achieved in ventilated tanks.

When the level probe is immersed into a liquid, a liquid column emerges above the probe. The liquid column increases as the probe is immersed deeper into the liquid and creates a hydrostatic pressure on the measuring system by the force of its weight. The measured pressure is transferred as a standard signal. The signal is linearly proportional to the rising liquid column.

Any variations in air pressure are automatically compensated for using a protective hose and the surrounding pressure is therefore taken into account.

Further information on our level probes from the JUMO MAERA series can be found in the brochure "Level probes – Hydrostatic level and level measurement" in the documentation.

Customer benefits

- **Economic**
The standardized, constructive design and constant optimization of the production process result in an excellent price-performance ratio of the level probe.
- **Process-reliable**
The core of the level probe is a piezoresistive measuring cell, which features high overload resistance and is particularly safe, reliable, and temperature resistant. Each level probe is tested in a fully automated measuring and calibration facility to ensure consistently high product quality. A reverse-polarity protection mechanism protects the measuring instrument against damage, ensuring maximum safety during startup.



Type 401015 with process connection 707

Special features

- Level probe for continual level measurement in liquids
- Measuring ranges: 0.25 bar to 1 bar (2.5 to 10 mWS)
- Medium temperature 0 to 50 °C
- Piezoresistive silicon sensor
- Accuracy: 0.3% MSP² (linearity)
- Sensor technology proven thousands of times over
- Reverse-polarity protection mechanism
- Suitable for indoor installation

¹ These recommendations are based on many years of experience; however, in individual cases they may not be fully applicable. We would be happy to provide further information, including regarding additional applications.

² MSP = measuring span

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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Measuring principle	Piezoresistive sensor with stainless steel separating membrane
Pressure transfer means	Synthetic oil
Admissible load changes	> 10 million, 0 to 100 % measuring range
Mounting position	Vertical/hanging from the cable

Measuring range and accuracy

Measuring range bar	Linearity ^a % MSP ^e	Accuracy at		Long-term stability ^b % MSP per year	Overload capability bar	Burst pressure bar
		20 °C ^c % MSP	0 to 50 °C ^d % MSP			
0 to 0.25 bar relative pressure	0.3	0.5	1	≤ 0.3	0.75	1
0 to 0.4 bar relative pressure	0.3	0.5	1		1.2	1.6
0 to 0.6 bar relative pressure	0.3	0.5	1		1.8	2.4
0 to 1 bar relative pressure	0.3	0.5	1		3	4

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset), and measuring range end

^d Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset) and measuring range end, thermal influences on measuring range start (offset), and measuring span

^e MSP = measuring span

Output

Analog output	
Current	
Output 405	4 to 20 mA, two-wire
Voltage	
Output 412	DC 0.5 to 4.5 V, three-wire, ratiometric 10 to 90 % of the voltage supply
Output 415	DC 0 to 10 V, three-wire
Output 418	DC 1 to 5 V, three-wire
Output 420	DC 1 to 6 V, three-wire
Step response	
T ₉₀	≤ 10 ms
Burden	
Current	
4 to 20 mA, two-wire (output 405)	$R_L \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A } (\Omega)$
Voltage	
DC 0.5 to 4.5 V, three-wire (output 412)	$R_L \geq 20 \text{ k}\Omega$
DC 0 to 10 V, three-wire (output 415)	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 5 V, three-wire (output 418)	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 6 V, three-wire (output 420)	$R_L \geq 10 \text{ k}\Omega$

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Mechanical features

Ensure the medium durability of the material!

Process connection	
Material	Stainless steel 316 L (G 1/4 inside [process connection 567]) Stainless steel 316 Ti (M3 (× 0.5) inside [process connection 707])
Measuring membranes	
Material	Stainless steel 316 L
Case	
Material	Stainless steel 304
Protective cap	
Material	Hard PVC
Weight	90 g (without cable)
Diameter	25 mm

Environmental influences

Admissible temperatures	
Medium	0 to 50 °C The device must not freeze in the medium! A restriction may be required depending on the medium.
Storage	-20 to +80 °C, dry
Electromagnetic compatibility	
Interference emission ^a	Class B ^b
Interference immunity ^c	Industrial requirements
Protection type ^d	IP68, submersible to 20 m

^a According to EN 61326-1

^b The product is suitable for industrial use as well as for households and small businesses.

^c According to EN 61326-2-3

^d According to EN 60529

Auxiliary power

Voltage supply U _B ^a	
4 to 20 mA, two-wire (output 405)	DC 10 to 30 V, nominal voltage DC 24 V
DC 0.5 to 4.5 V, three-wire (output 412)	DC 5 V
DC 0 to 10 V, three-wire (output 415)	DC 11.5 to 30 V, nominal voltage DC 24 V
DC 1 to 5 V, three-wire (output 418)	DC 10 to 30 V, nominal voltage DC 24 V
DC 1 to 6 V, three-wire (output 420)	DC 10 to 30 V, nominal voltage DC 24 V

^a The voltage peaks must not exceed or fall below the specified voltage supply values!

Reverse voltage protection	Yes (except DC 0.5 to 4.5 V, three-wire [output 412])
Max. current consumption	25 mA
Electrical circuit	SELV
Requirements	The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

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Electrical connection

For this construction, a stranded PVC cable is encased in an application-oriented protective hose made from either PE or PA.

To prevent moisture penetrating into the protective hose, in this case the pressure equalization hose, the delivery includes a hose end piece with the fitting materials.

Protective hose	
Material	PE, PA ^a
Color	Natural (PE + PA, not UV resistant) ^b , black (PA, UV resistant)
Outer diameter	8 mm
Bending radius	Approx. 120 mm It is vital to take into account that if the protective hose is kinked or pinched, this will prevent ambient pressure compensation.
Admissible medium temperatures	0 to 50 °C (depending on the medium and the level probe)
Yield stress	
PE protective hose	10 M Pa
PA protective hose	22 M Pa

^a Depending on the version ordered

^b The non UV-resistant cable is not suitable for outdoor use.

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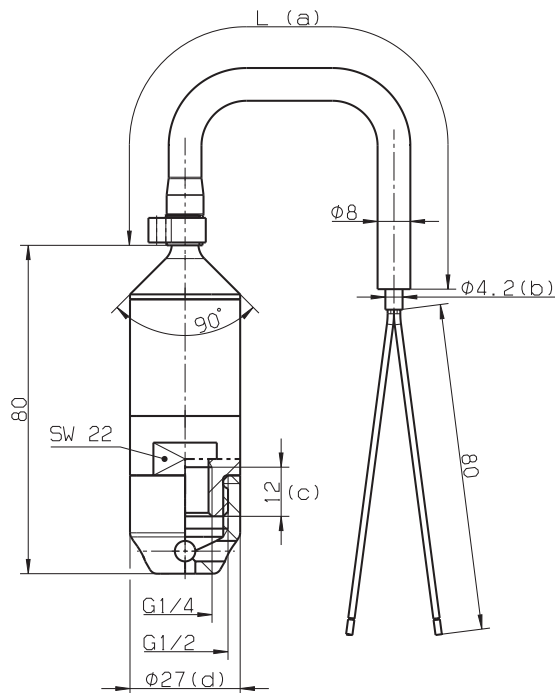


Dimensions

Process connection

567

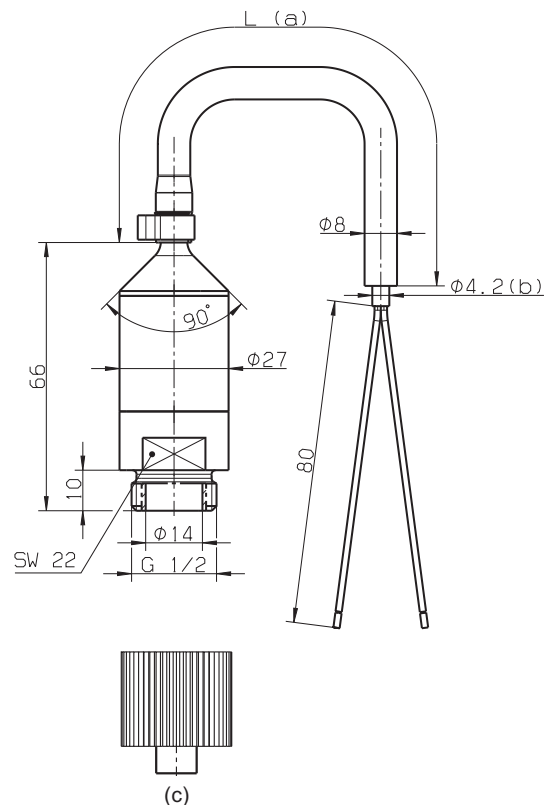
G 1/4 female



- (a) Cable length according to customer preference
- (b) Ø 4.6 for three-wire output
- (c) Maximum screw-in depth
- (d) The protective cap has three bore holes (Ø 3) and protects the case against contact corrosion and the sensitive separating membrane.

659

Connection open at bottom



- (a) Cable length according to customer preference
- (b) Ø 4.6 for three-wire output
- (c) The protective cap is provided for transportation and has to be removed before implementing.

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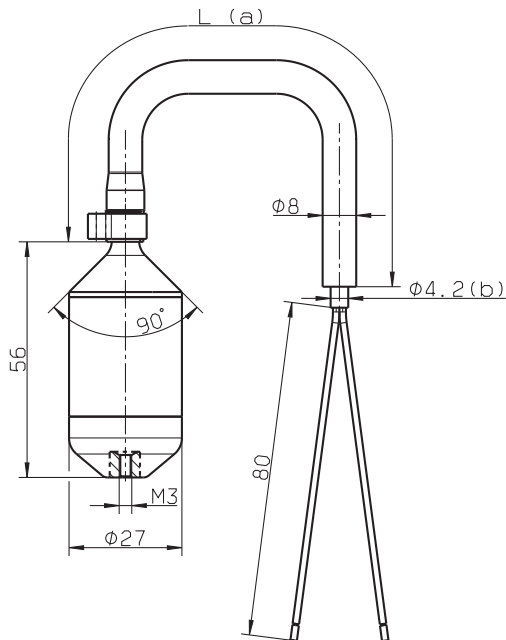
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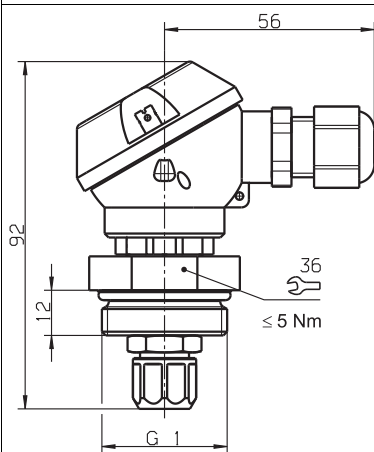
M3 (× 0.5) female



- (a) Cable length according to customer preference
(b) Ø 4.6 for three-wire output

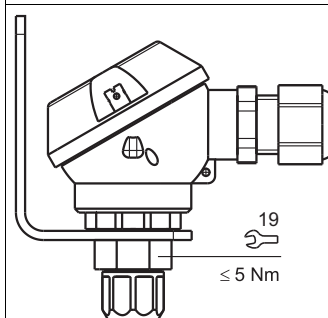
Accessories**Terminal head for pressure compensation**

Tank cover mounting
Part no. 00602743



Wall mounting

Part no. 00602744



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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment
		
		Cable ^a
4 to 20 mA, two-wire (output 405)		
Voltage supply DC 10 to 30 V, Rated voltage supply DC 24 V	$U_{B/S+}^b$ 0 V/S-	White Brown
DC 0.5 to 4.5 V ratiometric (output 412)		
Voltage supply DC 5 V, Rated voltage supply DC 5 V	U_B^b 0 V/S- S+	White Brown Green
DC 0 to 10 V, three-wire (output 415)		
Voltage supply DC 11.5 to 30 V, Rated voltage supply DC 24 V	U_B^b 0 V/S- S+	White Brown Green
DC 1 to 5 V, three-wire (output 418) DC 1 to 6 V, three-wire (output 420)		
Voltage supply DC 10 to 30 V, Rated voltage supply DC 24 V	U_B^b 0 V/S- S+	White Brown Green

^a For cable specifications, see installation instructions B 401015.4, chapter 6 "Installation and mounting".

^b The voltage peaks must not exceed or fall below the specified voltage supply values!

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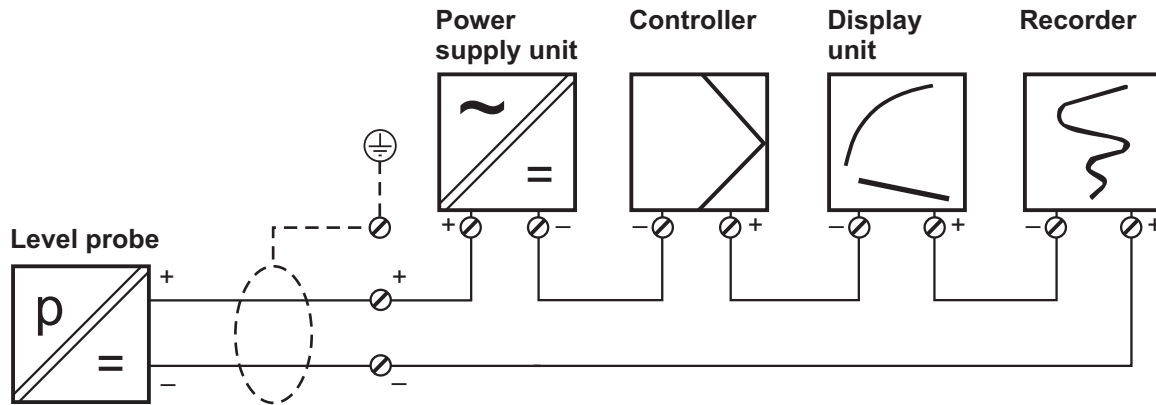
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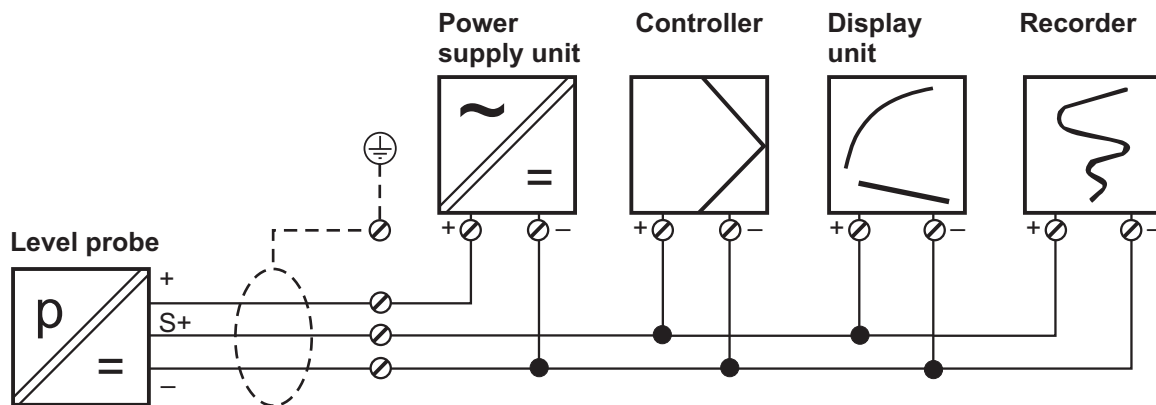


Connection example

Current output



Voltage output



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Order details

(1) Basic type	
401015/000	JUMO MAERA S25 – level probe
401015/999	JUMO MAERA S25 – level probe, special version
(2) Input	
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
(3) Output	
405	4 to 20 mA, two-wire
412	DC 0.5 to 4.5 V, three-wire
415	DC 0 to 10 V, three-wire
418	DC 1 to 5 V, three-wire
420	DC 1 to 6 V, three-wire
(4) Process connection	
567	G 1/4 inside
659	Connection open at the bottom
707	M3 (× 0.5) inside
(5) Process connection material	
20	CrNi (stainless steel)
(6) Electrical connection type	
11	Attached cable
(7) Protective hose	
1	PE protective hose (not UV resistant) ^a
2	PA protective hose (not UV resistant) ^a
3	PA protective hose (UV resistant)
(8) Cable length of the connecting cable	
005	5 m
010	10 m
025	25 m
(9) Extra codes	
000	None
691	Improved moisture and vibration protection

^a The non UV-resistant cable is not suitable for outdoor use.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)								
Order code	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>						
Order example	401015/000	-	452	-	405	-	707	-	20	-	11	-	1	-	005	/	000



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Accessories

Item	Description	Part no.
Terminal head for pressure compensation Tank cover mounting 	The terminal head is only suitable for application in the level probe variant JUMO MAERA S25 (type 401015). It is used to mount the level probes cost-effectively and in the best possible way. Protection type IP 67 is achieved. By using it locally with the tank mounting or wall mounting versions, a rapid pressure compensation can be achieved and the length of the special cable can be minimized. The costs are thereby reduced as an electric standard cable can be used as the outgoing cable from the terminal head. Furthermore, the direction (for example to the control cabinet) can be individually specified.	00602743
Wall mounting 		00602744

Scope of delivery

Item	Description
Hose end piece 	With this device, a standard cable is encased in a protective hose suitable for the application. The hose end piece prevents the hose, which is used as a pressure compensation hose, from being cut off or bent, for example when being routed through a wall. The hose end piece may be used for example in routing through walls in masonry, clamp or cutting ring fittings in a tank, or cable glands in a control cabinet. The hose end piece is supplied with the device.

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JUMO MIDAS H20 HP

OEM Pressure Transmitter - High Pressure

Applications

- Mobile hydraulics, such as forklifts, harvesters, and construction machinery
- Injection molding machines
- Laundry/cleaning systems
- Welding machines
- Industrial hydraulics

Brief description

The pressure transmitter is used for measuring the pressure of liquid and gaseous media. The product is based on the thin-film measuring principle. The measured pressure is converted into an electrical standard signal of voltage or current and is output via various electrical connections. These include connector variants such as M12, Deutsch DT, Metri-Pack, or AMP. An attached cable and the cable socket are also available.

ECE type approval is available for applications such as those required in mobile hydraulics.

The high degree of resistance to vibration and shock, combined with the high insulation voltage guarantees reliable operation even in difficult conditions. The compact design type of the pressure transmitter provides greater spatial freedom in its use.



Type 401020 with Metri-Pack connector variant



Type 401020 with AMP connector variant

Customer benefits

- Impervious to pressure peaks
- Highly resistant to shock and vibration
- Robust product design
- Standard connector variants available
- Can be used in harsh conditions thanks to mechanical and electrical stability
- Welded sensor technology ensures long-term tightness against leaks
- Standardization
- Protection against leaks of oil or other measuring media thanks to high bursting strength
- High accuracy even when used in fluctuating temperature conditions
- Compact design type saves space

Special features

- Measuring ranges from 100 to 1000 bar
- Temperature ranges from -40 to +125 °C
- Compact design type from 35 mm in length
- Electric strength of AC 500 V
- Protection types up to IP69K
- ECE type approval

Approvals and approval marks



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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor	
Measuring principle	Thin-film technology
Admissible load changes	> 10 million
Mounting position	Any
Calibration position	Device upright, process connection at the bottom

Measuring range and accuracy

Measuring range bar	Linearity ^a % MSP ^f	Accuracy at			Long-term stability ^b % MSP per year	Overload capacity ^c bar	Burst pressure bar
		20 °C ^d % MSP	-10 to +85 °C % MSP	-20 to +100 °C ^e % MSP			
0 to 100 bar relative pressure	0.5	0.7	1	1.5	≤ 0.2	200	500
0 to 160 bar relative pressure	0.5	0.7	1	1.5		320	800
0 to 200 bar relative pressure	0.5	0.7	1	1.5		400	1000
0 to 250 bar relative pressure	0.5	0.7	1	1.5		500	1250
0 to 350 bar relative pressure	0.5	0.7	1	1.5		700	1750
0 to 400 bar relative pressure	0.5	0.7	1	1.5		800	2000
0 to 600 bar relative pressure	0.5	0.7	1	1.5		1200	3000
0 to 1000 bar relative pressure	1	1.2	1.5	2		1500	3000

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c All pressure transmitters are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

^f MSP = measuring span

Output

Analog output Current Voltage	4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire, ratiometric output 10 to 90 % of the voltage supply DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire
Step response T_{90}	≤ 3 ms
Burden Current Voltage (burden connected to „0 V/S-“)	$R_L \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A } (\Omega)$ at 4 to 20 mA, two-wire $R_L \geq 20 \text{ k}\Omega$ at DC 0.5 to 4.5 V, three-wire $R_L \geq 10 \text{ k}\Omega$ at DC 0 to 10 V, three-wire $R_L \geq 10 \text{ k}\Omega$ at DC 1 to 5 V, three-wire $R_L \geq 10 \text{ k}\Omega$ at DC 1 to 6 V, three-wire

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**Mechanical features**

Material	
Process connection	Stainless steel 304 ^a
Membrane	Stainless steel 630
Housing	Stainless steel 304
Attached cable	PBT-GF30, PVC, PE
Round plug M12 × 1	PBT-GF30
Metri-Pack	PBT-GF30
Line socket	PBT-GF30, PA, silicone
Deutsch DT04	PBT-GF30
AMP Superseal	PBT-GF30
Weight	55 g with process connection G 1/4 and round plug M12 × 1

^a Process transmitters with process connections G 1/4 and 7/16-20 UNF-2A are supplied with an FKM seal. Ensure the medium durability of the seal material!

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Environmental influences

Medium temperatures for electrical connection	
Attached cable	-40 to +125 °C
Round plug M12 × 1	-40 to +125 °C
Metri-Pack	-40 to +125 °C
Line socket	-40 to +125 °C
AMP Superseal	-40 to +125 °C
Deutsch DT04	-40 to +125 °C
Ambient temperatures for electrical connection	
Attached cable	-30 to +100 °C At ambient temperature of -30 °C restricted function; only use when stationary, risk of cable break
Round plug M12 × 1	-40 to +100 °C
Metri-Pack	-40 to +100 °C
Line socket	-40 to +100 °C
AMP Superseal	-40 to +100 °C
Deutsch DT04	-40 to +100 °C
Storage temperatures for electrical connection	
Attached cable	-30 to +100 °C
Round plug M12 × 1	-40 to +100 °C
Metri-Pack	-40 to +100 °C
Line socket	-40 to +100 °C
AMP Superseal	-40 to +100 °C
Deutsch DT04	-40 to +100 °C
Admissible humidity	
Operation	100 % rel. humidity including condensation on the device outer case
Storage	90 % rel. humidity without condensation
Admissible mechanical load	
Vibration resistance	20 g at 10 to 2000 Hz, according to IEC 60068-2-6
Shock resistance	50 g for 11 ms, 500 g for 1 ms, according to IEC 60068-2-27
Electromagnetic compatibility (EMC)	
Interference emission	Class A ^a , according to EN 61326-2-3 UN ECE R10
Interference immunity	Industrial requirement, according to EN 61326-2-3 UN ECE R10
Insulation voltage	AC 500 V
Protection type for electrical connection	According to EN 60529
Attached cable	IP67/69K
Round plug M12 × 1	IP67
Metri-Pack	IP67
Line socket	IP65
AMP Superseal	IP67
Deutsch DT04	IP67

^a The product is only suitable for industrial use.

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 Fax: +1 315 437 5860
 Email: info.us@jumo.net
 Internet: www.jumousa.com



Electrical data

Voltage supply U_B^a 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	DC 10 to 30 V, rated voltage supply DC 24 V DC 4.5 to 5.5 V, rated voltage supply DC 5 V, ratiometric output 10 to 90 % of the voltage supply DC 12 to 30 V, rated voltage supply DC 24 V DC 9 to 30 V, rated voltage supply DC 24 V DC 9 to 30 V, rated voltage supply DC 24 V
Current consumption incl. load 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	≤ 25 mA ≤ 10 mA ≤ 5 mA ≤ 5 mA ≤ 5 mA
Reverse voltage protection 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	Yes No Yes Yes Yes
Electrical circuit Requirements	SELV The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

Approvals and approval marks

EAC Testing agency Certificates/certification numbers Inspection basis Valid for	«Промтехконтроль» EAЭC N RU Д-DE.PA01.B.80830/21 TR TS 020/2011 Type 401020
UL Testing agency Certificates/certification numbers Inspection basis Valid for	Underwriters Laboratories E201387 UL 61010-1 (3. Ed.), CAN/CSA-22.2 No. 61010-1 (3. Ed.) Type 401020 in connection with extra code 061
E24 Testing agency Certificates/certification numbers Inspection basis Valid for	NSAIO (National Standards Authority of Ireland) E24 10R-051971 UN ECE R10 Type 401020

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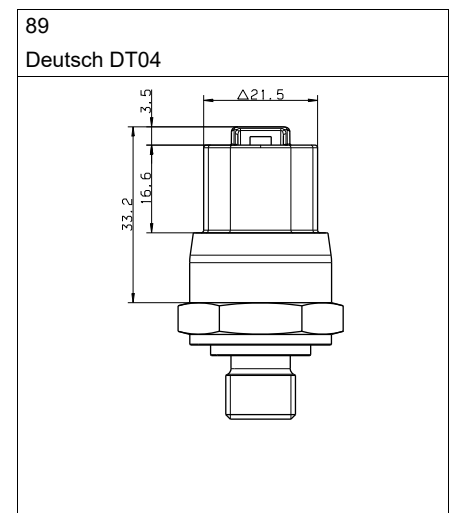
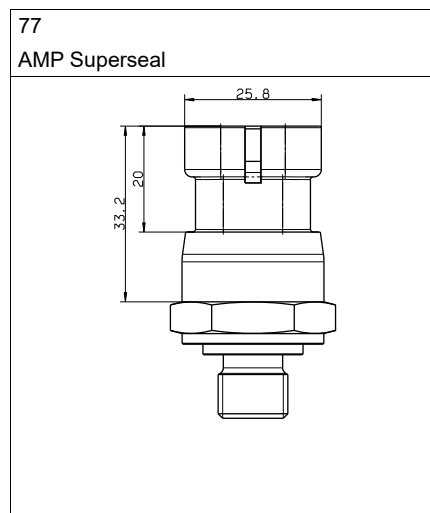
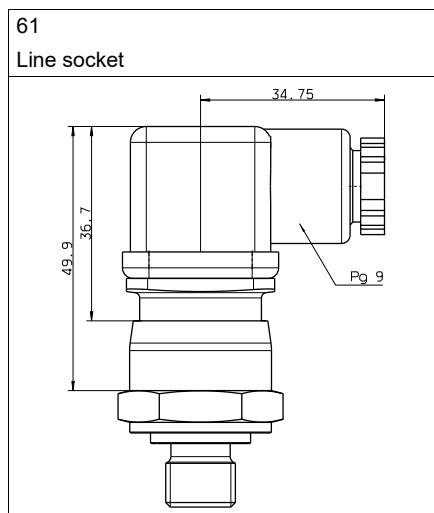
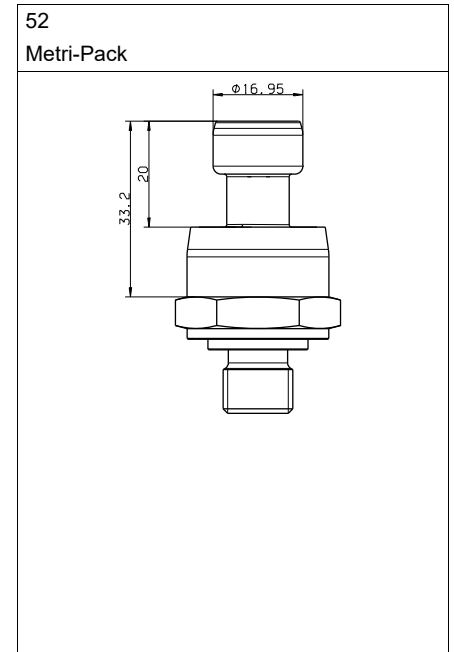
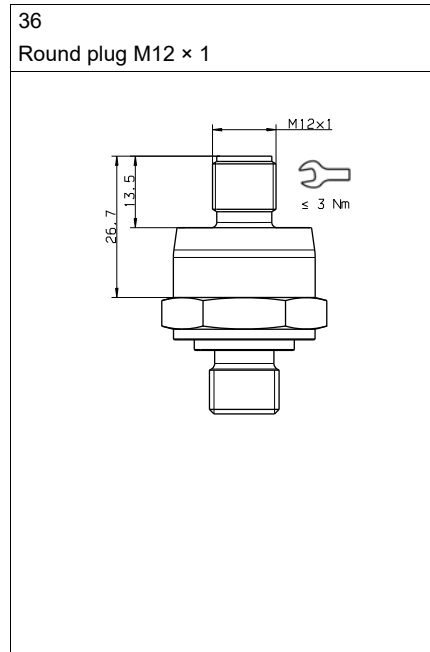
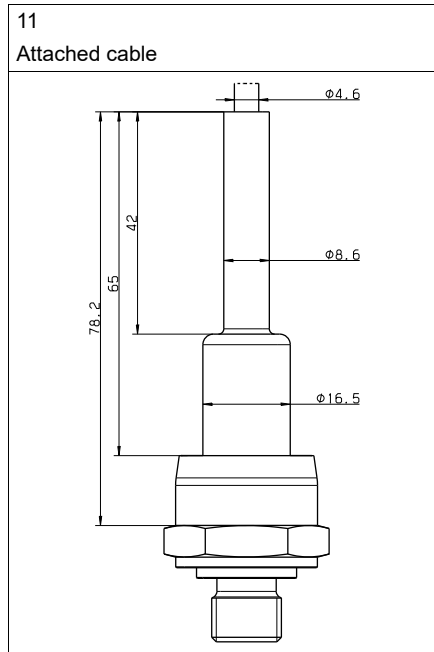
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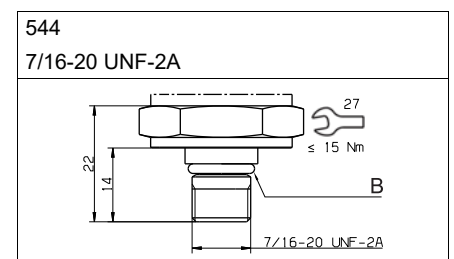
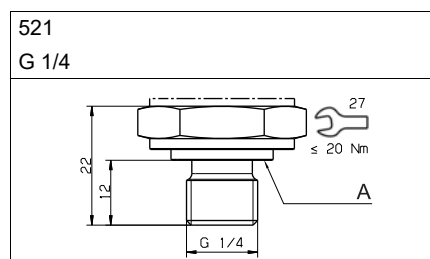
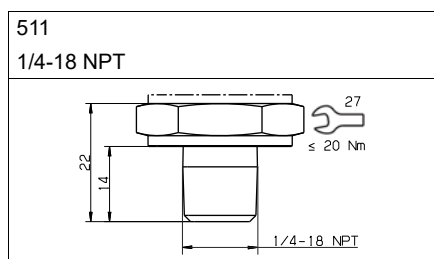


Dimensions

Electrical connection



Process connection



A Profile seal G 1/4

B O-ring

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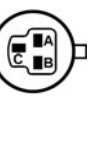
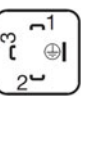

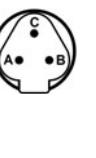


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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment (figure: Connection to the pressure transmitter)					
							
		Attached cable	Round plug M12 x 1	Metri-Pack	Line socket	AMP Superseal	Deutsch DT04
4 to 20 mA, two-wire							
Voltage supply DC 10 to 30 V	U _B /S+ 0 V/S-	WH BN	1 3	B A	1 2	3 1	A B
DC 0.5 to 4.5 V, ratiometric							
Voltage supply DC 4.5 to 5.5 V	U _B 0 V/S-	WH BN	1 2	B A	1 2	3 1	A B
Ratiometric output 10 to 90 % of the voltage supply	S+	GN	3	C	3	2	C
DC 0 to 10 V, three-wire							
Voltage supply DC 12 to 30 V	U _B 0 V/S-	WH BN	1 2	B A	1 2	3 1	A B
	S+	GN	3	C	3	2	C
DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire							
Voltage supply DC 9 to 30 V	U _B 0 V/S-	WH BN	1 2	B A	1 2	3 1	A B
	S+	GN	3	C	3	2	C
Functional bonding conductor FB ^a		-	4	C ^b		2 ^c	C ^c

^a The pressure transmitter has to be connected to the potential equalization system of the plant via the electrical connection or process connection.

^b Only for two-wire

Colour coding: connecting cable round plug M12 x 1			1 BN	Brown
			2 WH	White
			3 BU	Blue
			4 BK	Black
The colour coding is only valid for A-coded standard cables!				

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Order details

(1) Basic type	
401020	JUMO MIDAS H20 HP – OEM pressure transmitter – high pressure
(2) Basic type extension	
000	none
(3) Input (measuring range)	
464	0 to 100 bar relative pressure
465	0 to 160 bar relative pressure
511	0 to 200 bar relative pressure
466	0 to 250 bar relative pressure
517	0 to 350 bar relative pressure
467	0 to 400 bar relative pressure
468	0 to 600 bar relative pressure
469	0 to 1000 bar relative pressure
999	Special measuring range for relative pressure
(4) Output	
405	4 to 20 mA, two-wire
412	0.5 to 4.5 V, three-wire, ratiometric
415	0 to 10 V, three-wire
418	1 to 5 V, three-wire
420	1 to 6 V, three-wire
(5) Process connection	
511	1/4-18 NPT according to DIN EN 837
521	G 1/4 according to DIN 3852-11 ^a
544	7/16-20 UNF-2A ^b
(6) Process connection material	
20	CrNi (stainless steel)
(7) Electrical connection	
11	Attached cable
36	Round plug M12 × 1
52	Metri-Pack series 150, 3-pin
61	Line socket DIN EN 175301-803, Form A
77	AMP Superseal, 3-pin
89	Deutsch DT04, 3-pin
(8) Extra code	
000	none
061	UL approval ^c
591	Choke in the pressure channel
624	Oil and grease free

^a The process connection G 1/4 is only available with measuring range end up to 400 bar.

^b The process connection 7/16-20 UNF is only available with measuring range end up to 600 bar.

^c The UL approval stipulates use of the pressure transmitter indoors. Special measuring ranges (input) are not allowed to exceed the 1000 bar limit.

Order code (1) (2) (3) (4) (5) (6) (7) (8)
 / - - - - - - / , ...^a
Order example 401020 / 000 - 467 - 415 - 521 - 20 - 36 / 000

^a List extra codes in sequence, separated by commas.

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Accessories

Designation	Part no.
Line socket, straight, 4-pole, M12 × 1, 2 m	00404585
Line socket, angled, 4-pole, M12 × 1, 2 m	00409334
Line socket, pressure compensation, 4-pole, M12 × 1, 5 m	00512341

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JUMO MIDAS S07 MA

OEM Pressure Transmitter - Maritime Approved

Applications

In the shipping and offshore sector:

- HVAC (heating, ventilating, and air conditioning)
- Refrigeration engineering
- Compressors
- Engines
- Separators
- Pumps

Brief description

The JUMO MIDAS S07 MA pressure transmitter is available with both relative and absolute pressure measuring ranges.

The fully welded measuring system (without seals) made of high-grade stainless steel allows this device to be used in almost all media even when the conditions are rough. The structure ensures optimum protection against process medium leakage. The device features a silicon sensor that is extremely resistant to overloading even in the lowest measuring ranges and is capable of handling millions of pressure cycles.



Type 401021 with M12 connector



Type 401021 with cable socket

Customer benefits

- **Economic**
A high degree of automation (digital compensation and calibration of sensor module) reduces production time and manufacturing costs.
- **Process-reliable**
The piezoresistive silicon sensor has long-term stability and a high level of overload protection. The full final inspection in the fully automated measuring and calibration facility ensures that each pressure transmitter is of high quality.
- **Time-saving, uncomplicated, and versatile**
The installation of the measuring device requires little work and the electrical installation is simple. The modular structure allows universal use in almost any application.

Special features

- Maritime approved
- 1 to 100 bar relative pressure, and also up to 25 bar absolute pressure
- High degree of process reliability due to a welded measuring system with no seals
- Robust and maintenance-free measurement technology thanks to extreme overload resistance
- Robust construction guarantees a long operating life
- Parts in contact with media are made of stainless steel

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor	
Material	Silicon sensor with stainless steel separating membrane
Pressure transfer medium	Synthetic oil
Admissible load changes	> 10 million
Position	
Mounting position	Any
Calibration position	Device upright, process connection at the bottom

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at		Long-term stability ^b	Overload capacity ^c	Burst pressure
bar	% MSP ^f	20 °C ^d % MSP	-20 °C to +100 °C ^e % MSP	% MSP per year	bar	bar
0 bar to 1 bar relative/absolute pressure	0.3	0.6	1.5	≤ 0.2	4	6
0 bar to 1.6 bar relative/absolute pressure	0.25	0.5	1.4		6	10
0 bar to 2.5 bar relative/absolute pressure	0.25	0.5	1.3		10	15
0 bar to 4 bar relative/absolute pressure	0.25	0.5	1.2		16	24
0 bar to 6 bar relative/absolute pressure	0.25	0.5	1.2		24	36
0 bar to 10 bar relative/absolute pressure	0.25	0.5	1.0		40	60
0 bar to 16 bar relative/absolute pressure	0.2	0.5	1.0		60	100
0 bar to 25 bar relative/absolute pressure	0.2	0.5	1.0		100	150
0 bar to 40 bar relative pressure	0.2	0.5	1.0		100	150
0 bar to 60 bar relative pressure	0.2	0.5	1.0		180	250
0 bar to 100 bar relative pressure	0.2	0.5	1.0		180	250
-1 to 0 bar relative pressure	0.3	0.6	1.5		4	6
-1 bar to +0.6 bar relative pressure	0.3	0.6	1.5		6	10
-1 bar to +1.5 bar relative pressure	0.3	0.6	1.4		10	15
-1 bar to +3 bar relative pressure	0.3	0.5	1.3		16	24
-1 bar to +5 bar relative pressure	0.25	0.5	1.3		24	36
-1 bar to +9 bar relative pressure	0.25	0.5	1.2		40	60
-1 bar to +15 bar relative pressure	0.25	0.5	1.0		60	100
-1 bar to +24 bar relative pressure	0.2	0.5	1.0		100	150

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c All pressure transmitters are vacuum-proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

^f MSP = measuring span

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Output

Analog output	
Current	
Output 405	4 to 20 mA, two-wire
Voltage	
Output 415	0 V to 10 V, three-wire
Output 418	1 V to 5 V, three-wire
Output 420	1 V to 6 V, three-wire
Step response T_{90}	≤ 5 ms
Burden	
Current	
4 to 20 mA, two-wire	$R_L \leq (U_B - 8 \text{ V}) \div 0.02 \text{ A } (\Omega)$
Voltage	
0 V to 10 V, three-wire	$R_L \geq 10 \text{ k}\Omega$
1 V to 5 V, three-wire	$R_L \geq 10 \text{ k}\Omega$
1 V to 6 V, three-wire	$R_L \geq 10 \text{ k}\Omega$

Mechanical features

Material	
Process connection	Stainless steel 304 ^a
Membrane	Stainless steel 316 L
Housing	Stainless steel 304
Attached cable	PBT-GF30, PVC, PE
Round plug M12 × 1	PBT-GF30, stainless steel 303
Plug connector	PBT-GF30
Line socket	PBT-GF30, PA, silicone
Weight	80 g with process connection G 1/4

^a Pressure transmitters with process connection 521 are supplied with an FPM seal. Ensure the medium durability of the seal material!

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Environmental influences

Admissible temperatures for	Medium	Ambiance	Storage
Attached cable	-40 to +125 °C	-40 to +100 °C	-40 to +100 °C
Roundplug M12 × 1	-40 to +125 °C	-40 to +125 °C	-40 to +125 °C
Line socket	-40 to +125 °C	-40 to +125 °C	-40 to +125 °C
Admissible humidity			
Operation	100 % relative humidity including condensation on the device outer case		
Storage	90 % relative humidity without condensation		
Admissible mechanical load			
Vibration resistance	20 g at 10 to 2000 Hz, according to IEC 60068-2-6		
Shock resistance	50 g for 11 ms, 100 g for 1 ms, according to IEC 60068-2-27		
Electromagnetic compatibility (EMC)	According to EN 61326-2-3		
Interference emission	Class B ^a		
Interference immunity	Industrial requirement		
Protection type	According to EN 60529		
Attached cable	IP66		
Relative pressure measuring range	IP67		
Absolute pressure measuring range	IP66		
Round plug M12 × 1 ^b	IP30		
Plug connector	IP65		
Line socket ^c			

^a The product is suitable for industrial use as well as for households and small businesses.

^b The protection type is only achieved with a suitable mounted counter piece.

^c Connecting cable diameter, minimum 6 mm, maximum 8 mm

Electrical data

Voltage supply U _B ^a	
4 to 20 mA, two-wire	DC 10 to 25 V, rated voltage supply DC 24 V
0 V to 10 V, three-wire	DC 15 to 25 V, rated voltage supply DC 24 V
1 V to 5 V, three-wire	DC 10 to 25 V, rated voltage supply DC 24 V
1 V to 6 V, three-wire	DC 10 to 25 V, rated voltage supply DC 24 V
Current consumption	≤ 25 mA
Reverse voltage protection	Yes
Electrical circuit	SELV
Requirement	The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to „Limited-energy circuits“.

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

Approvals and approval marks

DNV	
Testing agency	DNV GL
Certificates/certification numbers	TAA00001JS
Inspection basis	Class Guideline DNV GL CG-0339
Valid for	Type 401021
EAC	
Testing agency	«Промтехконтроль»
Certificates/certification numbers	EAЭС N RU Д-DE.PA01.B.80830/21
Inspection basis	TR TS 020/2011
Valid for	Type 401021

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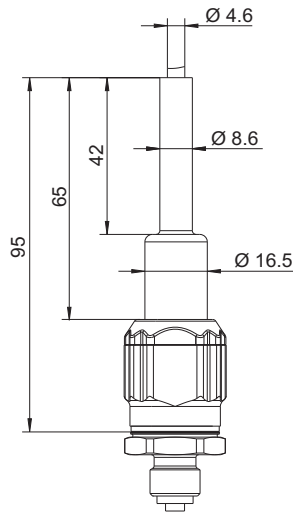
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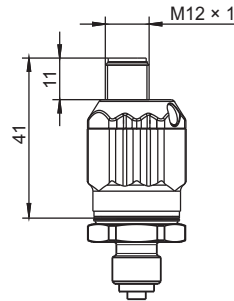
Dimensions

Electrical connection

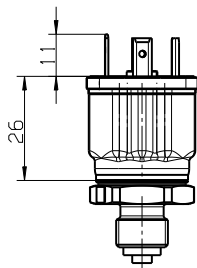
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Attached cable



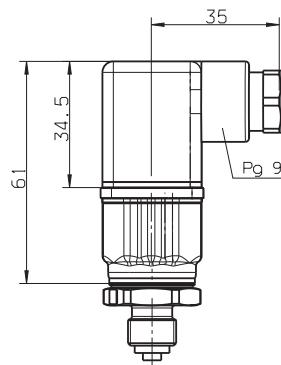
36
Round plug M12 × 1



60
Plug connector



61
Line socket



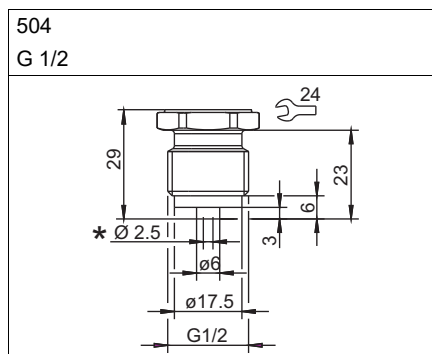
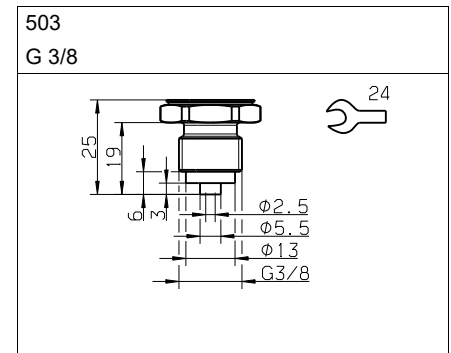
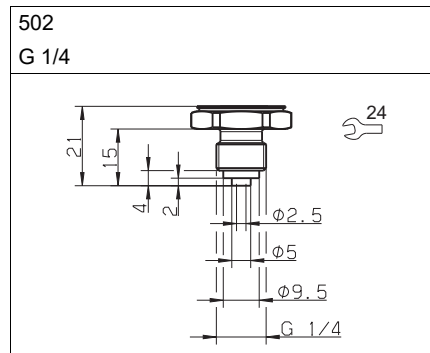
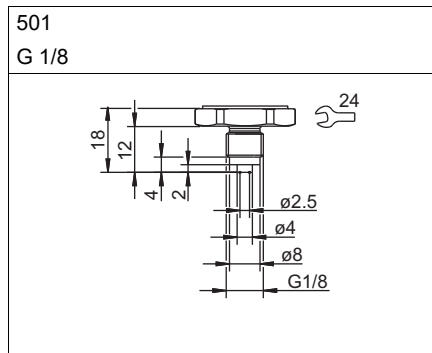
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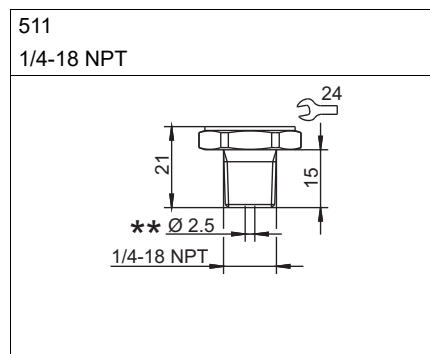
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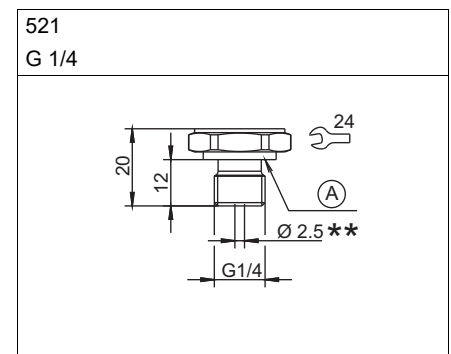
Process connection



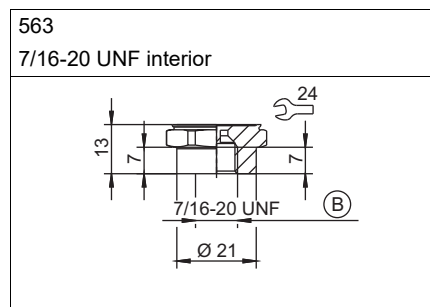
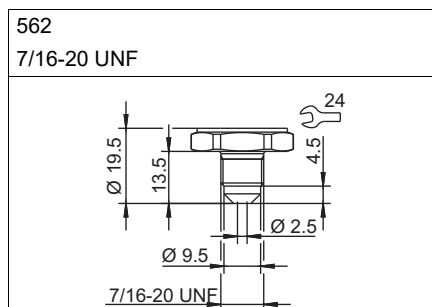
* Extra code 630 pressure channel
 Ø 12 mm



** Extra code 630 pressure channel
 Ø 8 mm



** Extra code 630 pressure channel
 Ø 8 mm
 A Profile seal G 1/4



B With valve core handle

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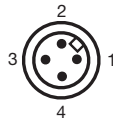
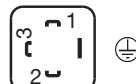


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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment ^a		
				
		11 Attached cable	36 Round plug M12 × 1	60 Plug connector 61 Line socket
4 mA to 20 mA, two-wire				
Voltage supply DC 10 to 25 V	U _B /S+ 0 V/S-	WH BN	1 3	1 2
0 V to 10 V, three-wire				
Voltage supply DC 15 to 25 V	U _B 0 V/S- S+	WH BN GN	1 2 3	1 2 3
1 V to 5 V, three-wire 1 V to 6 V, three-wire				
Voltage supply DC 10 to 25 V	U _B 0 V/S- S+	WH BN GN	1 2 3	1 2 3
Functional bonding conductor FB ^b		-	4	

^a Figure: Connection to the pressure transmitter

^b The pressure transmitter has to be connected to the potential equalization system of the plant via the electrical connection or process connection.

Colour coding: connecting cable round plug M12 × 1			1 BN	Brown
			2 WH	White
			3 BU	Blue
			4 BK	Black
The colour coding is only valid for A-coded standard cables!				

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Order details

(1) Basic type	
401021	JUMO MIDAS S07 MA – OEM Pressure Transmitter
(2) Basic type extension	
000	None
999	Special version
(3) Input (measuring range)	
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
464	0 to 100 bar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
488	0 to 1 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
998	Special measuring range for absolute pressure
999	Special measuring range for relative pressure
(4) Output	
405	4 to 20 mA, two-wire
415	0 V to 10 V, three-wire
418	1 V to 5 V, three-wire
420	1 V to 6 V, three-wire
(5) Process connection	
501	G 1/8 according to DIN EN 837
502	G 1/4 according to DIN EN 837
503	G 3/8 according to DIN EN 837
504	G 1/2 according to DIN EN 837
511	1/4-18 NPT according to DIN EN 837
521	G 1/4 according to DIN 3852-11
562	7/16-20 UNF
563	7/16-20 UNF interior, with valve core handle

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(6) Process connection material	
20	CrNi (stainless steel)
(7) Electrical connection	
11	Attached cable ^a
36	Round plug M12 × 1
60	Plug connector DIN EN 175301-803, Form A (without line socket)
61	Line socket DIN EN 175301-803, Form A
(8) Extra codes	
000	None
462	Inverted signal
591	Choke in the pressure channel
624	Oil and grease free
630	Enlarged pressure channel ^b
876	Test report

^a The standard cable length is 2 m. Further lengths up to a max. of 6 m are available upon request.

^b An enlarged pressure channel is only available in conjunction with process connections 504, 511 and 521.

Order code (1) (2) (3) (4) (5) (6) (7) (8)
 / - - - - - / , ...^a
Order example 401021 / 000 - 460 - 412 - 504 - 20 - 36 / 591

^a List extra codes in sequence, separated by commas.

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JUMO MIDAS DP10

Differential pressure transmitter

Brief description

This differential pressure transmitter measures the pressure in liquid and gaseous media. The difference between the two pressures is converted into an analog output signal. The piezo-resistive silicon sensor is built into a stainless steel housing.

Technical data

Unless further specified, all the following percentage values refer to the measurement span.

Reference conditions

as per DIN 16086 and EN 60 770

Measuring ranges

Measuring range	Max. system pressure ²	Max. overload on both sides ²	Max. single-sided overload		Bursting pressure	Overall error ³ (% of full scale)	Long-term stability (per annum)
			+ side	- side			
0 to 0.4 bar	5 bar	7.5 bar	7.5 bar	5 bar	≥ 60 bar	≤ 2.5 % ⁴	≤ 0.6 %
0 to 0.6 bar						≤ 2.5 % ⁴	
0 to 1 bar						≤ 2.3 % ⁴	
0 to 1.6 bar	10 bar	15 bar	15 bar	10 bar	≥ 60 bar	≤ 2.0 % ⁴	≤ 0.6 %
0 to 2.5 bar						≤ 2.0 % ⁴	
0 to 4 bar	30 bar ¹	45 bar	15 bar	10 bar	≥ 60 bar	≤ 1.8 % ⁴	≤ 0.4 %
0 to 6 bar			25 bar			≤ 1.8 % ⁴	
0 to 10 bar			30 bar			≤ 1.5 % ⁴	
0 to 16 bar			30 bar			≤ 1.5 % ⁴	

Parts in contact with medium⁵

stainless steel, Mat. Ref. 1.4571
 stainless steel, Mat. Ref. 1.4435
 stainless steel, Mat. Ref. 1.4305
 plastic, PBT GF30 or
 plastic, PA66
 Seal: FPM

Output

4 to 20 mA 2-wire
 burden ≤ (U_B-10 V)/0.02A
 0.5 to 4.5 V ratiometric
 burden ≥ 20 kΩ
 0 to 10 V 3-wire
 burden ≥ 20 kΩ

Zero offset

≤ 0.3 %

Thermal hysteresis

(within the compensated range -15 to +85 °C)
 for measuring ranges ≤ 0.6 bar: ≤ ± 1 %
 for measuring ranges > 0.6 bar: ≤ ± 0.5 %

¹ Maximum ambient temperature 60°C

² For simultaneous pressure on both + and - sides

³ The total error includes errors due to linearity, hysteresis, reproducibility and temperature drift over the range from -15 to +85°C.

⁴ Of full scale

⁵ The customer must test the compatibility with the medium being measured.

⁶ If the medium is water at temperatures above 50 °C, then pipes or hoses must be used to separate the transmitter from the process.
 E. g. for water at 85 °C, at least 200 mm long (depending on the ambient temperature).

® Bayer Material Science

Approvals and approval marks (see technical data)



Type 401050/000-xxx-xxx-xxx-xx-xxx-61

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Step response

for current output ≤ 3 msec
 for voltage output ≤ 10 msec

Supply voltage

DC 10 to 30 V (for 4 to 20 mA output)
 DC 5 V ± 0.5 V (for 0.5 — 4.5 V output)
 DC 11.5 to 30 V (for 0 to 10 V output)
 Ripple: the voltage peaks must not go outside the limits specified for the supply.
 Max. current drawn: 25 mA

Supply voltage error

≤ 0.02 % per V for 4 to 20 mA output

Nominal supply voltage

DC 24 V
 ratiometric for 0.5 to 4.5 V output

Operating temperature

Ambient: -20 to +80 °C
 Medium: -15 to +100 °C⁶
 Storage: -50 to +100 °C

Electromagnetic compatibility (EMC)

as per EN 61326
 interference emission: Class B
 interference immunity: to industrial requirements

Mechanical shock

(to IEC 68-2-27)
 100 g/1 msec

Mechanical vibration

(to IEC 68-2-6)
 ≤ 20 g for 15 to 2000 Hz

Enclosure protection

(to EN 60529)
 with round connector M12 \times 1: IP67
 with bayonet to DIN 72585: IP67
 with fixed cable: IP67

Process connection

2 \times G 1/8 internal thread
 adapters for pipes and hoses: see order details

Electrical connection

see order details
 round connector M12 \times 1
 or
 bayonet connector DIN 72585
 or
 fixed cable, 2 m
 (other lengths upon request)

Operating position

Any
 (deviations from the nominal operating position can cause an error of up to 2 mbar)

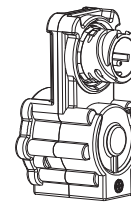
Weight

180 g
 (approx. 220 g with mounting bracket)

Fixing options

- 3 holes on housing bottom
- mounting bracket (accessory)
- on measurement lines (e.g. 6 \times 1 pipe)

Nominal position



Approvals and approval marks

EAC	
Testing agency	«Промтехконтроль»
Certificates/certification numbers	EAЭC N RU Д-DE.PA01.B.80830/21
Inspection basis	TR TS 020/2011
Valid for	Type 401009

Electrical connection

		 Bayonet connector	 Round connector	Cable
Voltage output				
Supply voltage DC 11.5 to 30 V (with output 0 to 10 V) DC 5 V ± 0.5 V (with output 0.5 to 4.5 V)		1 L+ 2 L-		white L+ brown L-
Output 0 to 10 V 0.5 to 4.5 V		2 - 3 +		brown - black +
Current output				
Supply voltage DC 10 to 30 V			1 + 3 -	white L+ brown L-
Output 4 to 20 mA (2-wire)			1 + 3 -	white L+ brown L-

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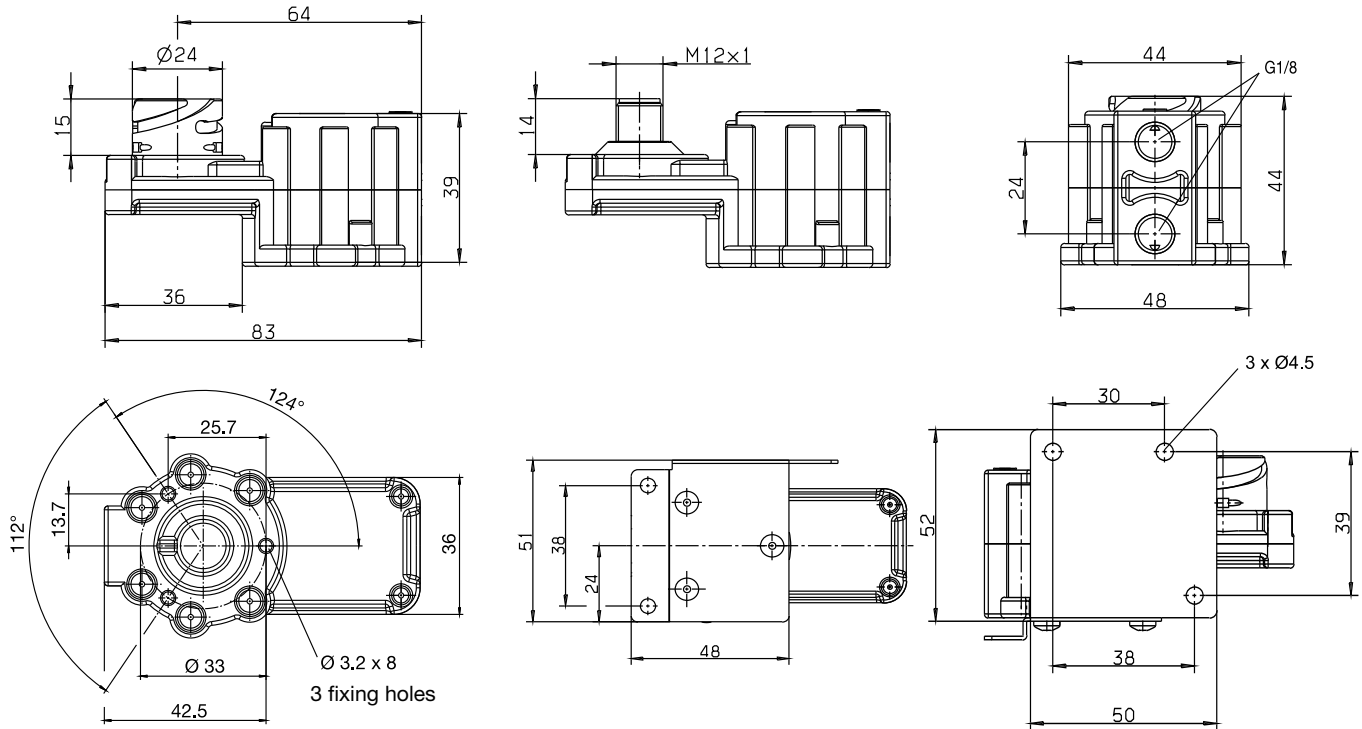
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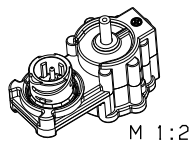
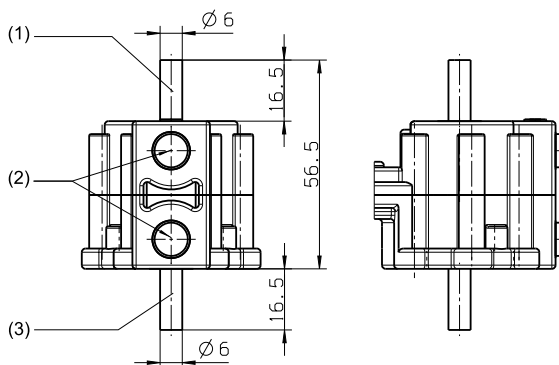
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**Dimensions****Process connection**

297

Stainless steel tube, 6 mm diameter



- (1) + Side
- (2) No use
- (3) - Side

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Order details

401050	(1) Basic type JUMO MIDAS DP 10 – Differential pressure transmitter
000	(2) Basic type extensions None
999	Special version
452	(3) Input for differential pressure 0 to 0.4 bar
453	0 to 0.6 bar
454	0 to 1.0 bar
455	0 to 1.6 bar
456	0 to 2.5 bar
457	0 to 4 bar
458	0 to 6 bar
459	0 to 10 bar
460	0 to 16 bar
999	Special measuring range
405	(4) Output 4 to 20 mA 2-wire
412	0.5 to 4.5 V 3-wire
415	0 to 10 V 3-wire
297	(5) Process connection¹ Stainless steel tube, 6mm dia., stainless steel 1.4571
305	Screwed pipe joint, 6mm dia., stainless steel 1.4571/FPM
306	Screwed pipe joint, 6mm dia., brass
593	2× G 1/8 to EN 837
68	(6) Housing material PBT
601	(7) Seal material FPM
11	(8) Electrical connection Fixed cable, 2 m
36	Round connector M 12 x 1
53	Bayonet connector to DIN 72585
000	(9) Extra codes None

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)						
Order code	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
Order example	401050	/	000	-	454	-	405	-	593	-	68	-	601	-	36 / 000

Accessories

Designation	Part no.
4-pole straight connector M12 x 1 with 2m PVC cable	00404585
4-pole angled connector M12x1 with 2m PVC cable	00409334
Angled mounting bracket	00448193
Straight mounting bracket	00490132
Bayonet jack with 3m cable	00463392

¹ other process connections on request.

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Multi-range pressure and differential pressure transmitter

Type 402005

Applications

- Ventilation
- Air conditioning
- Clean-room technology
- Flue draft mechanisms
- Filter monitoring

Brief description

This transmitter has a piezoresistive pressure sensor and can be used to measure differential pressure in non-aggressive gases.

Differential pressure measurement is used, for example, in clean rooms. Permanent overpressure protects the process against dust penetration.

The multi-range pressure and differential pressure transmitter is a many-faceted, microprocessor-controlled measuring instrument. Apart from the varied range of applications, DIP switches (dual in-line package) are used to choose between standardized output signals (current or voltage signal) and each of four different measuring ranges in the hecto-pascal range. Adjustable damping is incorporated for widely fluctuating pressures. A connector system allows an LCD display to be added-on, to display the pressure on-site.



Type 402005

Customer benefits

• Versatile and economic

A 9-way DIP switch with a strikingly simple configuration is used to select the measuring range, the output and the damping.

This multi-faceted measuring instrument combines numerous functions, thus limiting the number of variations required, and as a result, reducing prices to a minimum and shortening delivery times. Because the measuring system is wear-free, operation is almost maintenance-free.

• Compact and uncomplicated

Small but effective. The compact size of this measuring instrument makes it easy to install and saves space at the same time. Time is also saved on start-up, thanks to an uncomplicated DIP switch.

Key features

- 4 measuring ranges, adjustable within two basic measuring ranges:
Basic range 1:
2.5 hPa, 5 hPa, 7.5 hPa, 10 hPa
Basic range 2:
25 hPa, 50 hPa, 75 hPa, 100 hPa
- Output signal: 0 - 10 V DC and 0(4) - 20 mA, adjustable
- Damping is adjustable for widely fluctuating pressures
- LCD display connection option

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Technical data

General

Reference conditions	DIN 16086 and EN 60770
Sensor	
Principle of measurement	Silicon sensor (piezoresistive)
Location	
Mounting location	Device standing vertically, process connection on bottom
Calibration location	Device standing vertically, process connection on bottom

Measuring range

Basic range 1	The measuring ranges start at 0 hPa.				
Measuring range	2.5	5	7.5	10	hPa
Overload capacity	680				hPa
Bursting pressure	2000				hPa
Maximum both-sided system pressure	8000				hPa
Basic range 2	The measuring ranges start at 0 hPa.				
Measuring range	25	50	75	100	hPa
Overload capacity	680				hPa
Bursting pressure	2000				hPa
Maximum both-sided system pressure	8000				hPa

Output

Analog output	
Output 409	0 - 10 V DC, 3 wires 0 - 20 mA, 3 wires 4 - 20 mA, 3 wires
Damping	10 ms; 0.5 s; 2 s; 4 s
Burden	
Voltage 0 to 10 V DC, 3 wires	$R_L \geq 2 \text{ k}\Omega$
Current 0(4) - 20 mA, 3 wires	from 14 to 18 V supply voltage $R_L \leq 300 \Omega$ above 18 V supply voltage $R_L \leq 500 \Omega$

Mechanical properties

Parts in contact with the media	
Material	PU, glass, FeNiCo, Au, Al, PEI

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Enclosure	
Dimensions	86 x 56 x 40 mm (H x W x D)
Weight	200 g

Ambient conditions

Permissible temperatures	
Medium	10 to 50 °C
Environment	10 to 50 °C
Storage	-10 to +70 °C
Permissible relative humidity	80% relative humidity
Permissible mechanical loading	
Vibration resistance	on request
Shock resistance ^a	100 g for 6 ms
Electromagnetic compatibility	
Interference emission ^b	Class B
Interference immunity ^c	Industrial requirements
Enclosure protection^a	IP54

^a EN 60068-2-27^b EN 61000-6-3^c EN 61000-6-2^d EN 60529**Accuracy**

Linearity^a	± 2 % of the set measuring range
Long-term stability^b	± 2 % of the set measuring range per year (typical)

^a Linearity based on limit point setting^b with reference conditions to EN 61298-1**Auxiliary power**

Supply voltage U_B^a	14 - 38 V DC, 12 - 31 V AC
Power consumption	approx. 20 mA (without load)
Reverse polarity protection	YES
Circuit	SELV

^a Residual ripple: Peak voltages must **not** exceed or fall below the values specified for the supply voltage!

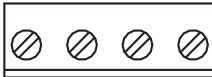
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Connection diagram

Connection			Terminal assignment
			1 2 3 4 
			Screw terminal
0(4) - 20 mA, 3 wires, output 409			
Supply voltage	14 - 38 V DC, 12 - 31 V AC	U_B 0 V/S- S+	3 2/4 1
0 - 10 V DC, 3 wires, output 409			
Supply voltage	14 - 38 V DC, 12 - 31 V AC	U_B 0 V/S- S+	3 2/4 1

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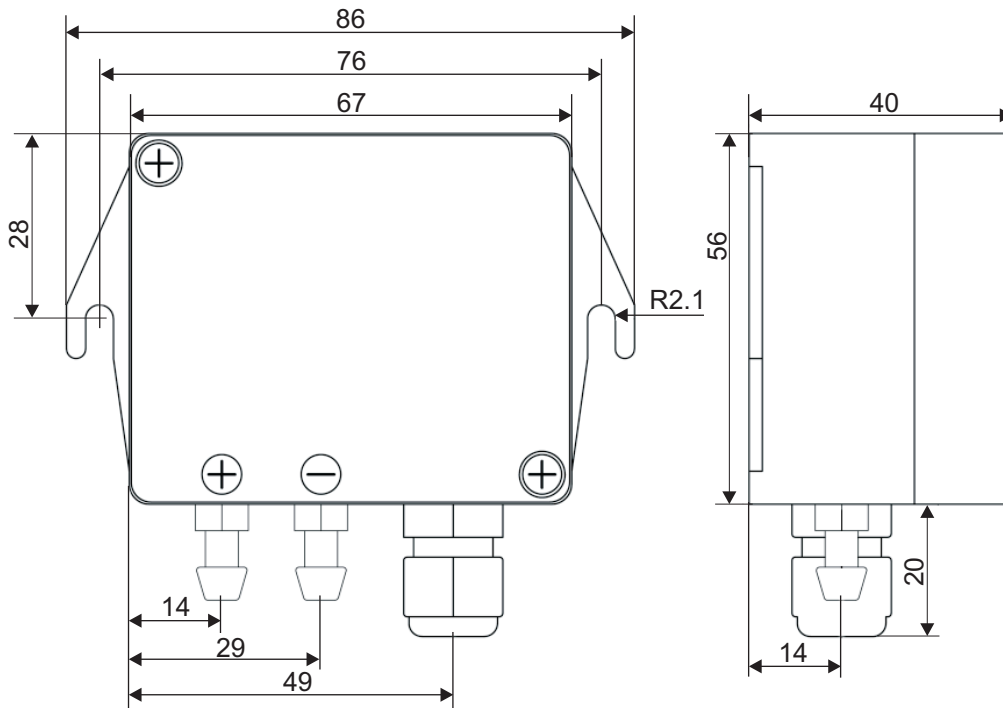
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Dimensions



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Order details

402005/000	(1) Basic type Multi-range pressure and differential pressure transmitter
	(2) Relative pressure measuring range Overpressure
441	0 - 2.5 hPa, 0 - 5 hPa, 0 - 7.5 hPa, 0 - 10 hPa
442	0 - 25 hPa, 0 - 50 hPa, 0 - 75 hPa, 0 - 100 hPa
	(3) Output
409	0(4) - 20 mA / DC 0 - 10 V3 wires (switchable)
	(4) Process connection
294	Tube connection \varnothing 6.6 mm x 10 mm (for flexible tubing \varnothing 6 mm)
	(5) Extra codes
000	none

Order code	(1)	-	(2)	-	(3)	-	(4)	/	(5)
Order example	402005/000	-	441	-	409	-	294	/	000

Stock instruments

Delivery in 3 working days after receipt of order

Type	Version	Part No.
402005/000-441-409-294	0 - 2.5 hPa, 0 - 5 hPa, 0 - 7.5 hPa, 0 - 10 hPa	00561200
402005/000-442-409-294	0 - 25 hPa, 0 - 50 hPa, 0 - 75 hPa, 0 - 100 hPa	00550210

Accessories

Delivery in 3 working days after receipt of order

Item	Part No.
Connectable LCD display	00550211

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JUMO dTRANS p31

Pressure transmitter for increased media temperatures

General application

Pressure transmitters are used for measuring the relative (gauge) and absolute pressures in liquids and gases. The pressure transmitter operates on the piezo-resistive measuring principle. The pressure is converted into an electrical signal.



Type 402050

Technical data

Reference conditions	To DIN 16086 and IEC 770/5.3
Ranges	See order details
Overload limit	All ranges 3× full scale
Bursting pressure	All ranges 4× full scale
Parts in contact with medium	Standard: stainless steel 316 Ti/316 L
Output	
0 to 20 mA, two-wire (output 402)	Burden $\leq (U_B - 12 \text{ V}) \div 0.02 \text{ A}$
4 to 20 mA, two-wire (output 405)	Burden $\leq (U_B - 10 \text{ V}) \div 0.02 \text{ A}$
4 to 20 mA, three-wire (output 406)	Burden $\leq (U_B - 12 \text{ V}) \div 0.02 \text{ A}$
0,5 to 4,5 V, three-wire (output 412)	Burden $\geq 50 \text{ k}\Omega$
0 to 10 V, three-wire (output 415)	Burden $\geq 10 \text{ k}\Omega$
1 to 5 V, three-wire (output 418)	Burden $\geq 10 \text{ k}\Omega$
1 to 6 V, three-wire (output 420)	Burden $\geq 10 \text{ k}\Omega$
Burden error	< 0.5 % max.
Zero offset	$\leq 0.3 \text{ % MSP (measuring span)}$
Thermal hysteresis	$\leq \pm 0.5 \text{ % MSP (within compensated temperature range)}$
Ambient temperature error	Within range 0 to 100 °C (compensated temperature range)
Zero	$\leq 0.02 \text{ %/K typical, } \leq 0.04 \text{ %/K max.}$
Measuring span	$\leq 0.02 \text{ %/K typical, } \leq 0.04 \text{ %/K max.}$
Deviation from characteristic	$\leq 0.5 \text{ % MSP (limit point setting)}$
For basic type extension 023	$\leq 0.2 \text{ % MSP (limit point setting)}$
Hysteresis	$\leq 0.1 \text{ % MSP}$

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Repeatability	≤ 0.05 % MSP
Response time	
Current output	
0 to 20 mA, two-wire (output 402)	≤ 3 msec max.
4 to 20 mA, two-wire (output 405)	≤ 3 msec max.
4 to 20 mA, three-wire (output 406)	≤ 3 msec max.
Voltage output	
0,5 to 4,5 V, three-wire (output 412)	≤ 10 msec max.
0 to 10 V, three-wire (output 415)	≤ 10 msec max.
1 to 5 V, three-wire (output 418)	≤ 10 msec max.
1 to 6 V, three-wire (output 420)	≤ 10 msec max.
Stability over 1 year	≤ 0.5 % MSP
Voltage supply ^a	
0 to 20 mA, two-wire (output 402)	DC 11,5 to 30 V
4 to 20 mA, two-wire (output 405)	DC 10 to 30 V
4 to 20 mA, three-wire (output 406)	DC 11,5 to 30 V
0,5 to 4,5 V, three-wire (output 412)	DC 5 V
0 to 10 V, three-wire (output 415)	DC 11,5 to 30 V
1 to 5 V, three-wire (output 418)	DC 10 to 30 V
1 to 6 V, three-wire (output 420)	DC 10 to 30 V
Max. current drawn	Approx. 25 mA
Voltage supply influence	≤ 0.02 %/V, nominal voltage supply DC 24 V ratiometric with voltage supply DC 5 V (±0.5 V)
Permissible ambient temperature (max. housing temperature)	-20 to +125 °C
Storage temperature	-40 to +125 °C
Permissible temperature of medium	-30 to +200 °C
Electromagnet compatibility	EN 61326
Interference emission	Class B
Interference immunity	Industrial requirements
Mechanical shock ^b	100 g/1 msec
Mechanical vibration ^c	Max. 20 g at 15 to 2000 Hz
Protection type ^d	
Terminal box (electrical connection 12)	IP67
Round plug M12 × 1 (electrical connection 36)	IP67
Cable socket (electrical connection 61)	IP65 (connecting cable diameter min. 5 mm, max. 7 mm)
Housing	Stainless steel, mat. ref. 1.4301 Polycarbonate GF
Pressure connection	See order details; other connections on request
Electrical connection	See order details
Terminal box (electrical connection 12)	4-pole, PVC cable, length 2 m, other length on request
Round plug M12 × 1 (electrical connection 36)	4-pole
Cable socket (electrical connection 61)	To DIN EN 175301-803, conductor cross-section up to max. 1.5 mm ²
Nominal position	Any
Weight	200 g

^a Ripple: The voltage spikes must **not** go above or below the values specified for the supply.

^b DIN IEC 68-2-27

^c DIN IEC 68-2-6

^d EN 60529

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





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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection only use the installation instructions or the operating manual. The knowledge and the correct technical execution of the safety information/instructions contained in these documents are mandatory for installation, electrical connection, startup, and for safety during operation.

Connection		Terminal assignment		
		12 Fixed cable	36 Round plug M12 × 1	61 Cable socket
Voltage supply DC 10 to 30 V DC 11,5 to 30 V DC 5 V		White Grey	1+ 3-	1 L+ 2 L-
Output 1 to 6 V 0 to 10 V 0,5 to 4,5 V		Grey Yellow	3- 4+	2 - 3 +
Output 4 to 20 mA, two-wire		White Grey Proportional current 4 to 20 mA in voltage supply	1+ 3-	1 + 2 -
Output 0(4) to 20 mA, three-wire		Grey Yellow	3- 4+	2 - 3 +
Protection conductor				
Screen		Black	2	
Caution: Earth device (pressure connection and/or  or screen)!				

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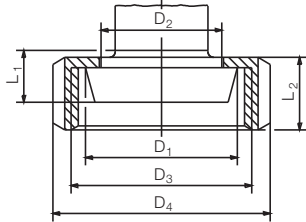
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603 to 607

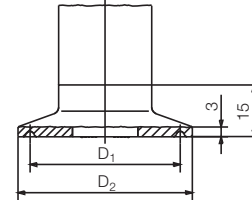
Taper socket with grooved union nut



Process connection	DN	Ø D ₁	Ø D ₂	Ø D ₃	Ø D ₄	L ₁	L ₂
603	20	36.5	30	RD 44 × 1/6	54	13	21
604	25	44	35	RD 52 × 1/6	63	15	
605	32	50	41	RD 58 × 1/6	70		
606	40	56	48	RD 65 × 1/6	78		
607	50	68.5	61	RD 78 × 1/6	92	16	22

612 to 616

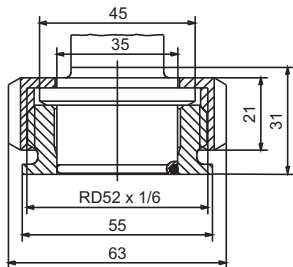
Clamp



Process connection	DN DIN 32676	DN (Zoll)	Nominal Size ISO 2852	Ø D ₁	Ø D ₂
612	20 15		12 12.7 17.2 21.3	27.5	34
613	25 32 40	1" 1.5"	25 33.7 38	43.5	50.5
616	50	2"	40 51	56.5	64

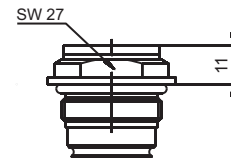
652

Tank connection with grooved union nut



997

Adapter system JUMO PEKA



Suitable for the adapter system JUMO PEKA,
see data sheet 409711

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Order details

(1) Basic type	
402050/000	JUMO dTRANS p31 – Pressure transmitter for increased media temperatures
402050/023	JUMO dTRANS p31 – Pressure transmitter for increased media temperatures, reduced deviation from characteristic ^a
402050/999	JUMO dTRANS p31 – Pressure transmitter for increased media temperatures, special version
(2) Input	
454	0 to 1 bar relative pressure
455	0 to 1,6 bar relative pressure
456	0 to 2,5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0,6 bar relative pressure
480	-1 to +1,5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
488	0 to 1 bar absolute pressure
489	0 to 1,6 bar absolute pressure
490	0 to 2,5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
998	Sondermessbereich absolute pressure
999	Sondermessbereich relative pressure
(3) Output	
402	0 to 20 mA, three-wire
405	4 to 20 mA, two-wire
406	4 to 20 mA, three-wire
412	0,5 to 4,5 V, three-wire
415	0 to 10 V, three-wire
418	1 to 5 V, three-wire
420	1 to 6 V, three-wire
(4) Process connection	
550	Aseptic to DIN 11864-1A, DN 20
551	Aseptic to DIN 11864-1A, DN 25
552	Aseptic to DIN 11864-1A, DN 32
553	Aseptic to DIN 11864-1A, DN 40
554	Aseptic to DIN 11864-1A, DN 50
570	G 1 1/2 front-flush, DIN EN ISO 228-1
571	G 3/4 front-flush, DIN EN ISO 228-1
575	G 3/4 front-flush with double seal

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576	G 1 with double seal
584	SMS, DN 1
585	SMS, DN1 1/2
586	SMS, DN 2
603	Taper socket with grooved union nut DN 20, to DIN 11851 (dairy pipe fitting)
604	Taper socket with grooved union nut DN 25, to DIN 11851 (dairy pipe fitting)
605	Taper socket with grooved union nut DN 32, to DIN 11851 (dairy pipe fitting)
606	Taper socket with grooved union nut DN 40, to DIN 11851 (dairy pipe fitting)
607	Taper socket with grooved union nut DN 50, to DIN 11851 (dairy pipe fitting)
612	Clamping socket (clamp) DN 10, DN 15, DN 20 ^b to DIN 32676
613	Clamping socket (clamp) DN 25, DN 40 ^b to DIN 32676
616	Clamping socket (clamp) DN 50 (2") ^b to DIN 32676
619	Clamping socket (clamp) DN 15 (3/4") ^b to DIN 32676
623	Small flange DN 25, to DIN 28403
652	Tank connection with grooved union nut DN 25
661	Clamping flange (DRD), Ø 65 mm
684	VARIVENT® connection, DN 15/10
685	VARIVENT® connection, DN 32/25
686	VARIVENT® connection, DN 50/40
997	JUMO-PEKA hygienic process connection ^c
(5) Process connection material	
20	CrNi (stainless steel)
(6) Electrical connection	
12	Terminal box, screened, 2 m (other length on request)
36	Round plug M12 × 1
61	Cable socket DIN EN 175301-803, form A
(7) Extra codes	
000	None
452	Parts in contact with the medium are electropolished, surface roughness Ra ≤ 0.8 µm
631	Improved moisture and vibration protection

^a A reduced deviation from characteristic is not available for ± ranges; it is available only in conjunction with 4 to 20 mA, two-wire (output 405).

^b These process connections are only suitable with measuring spans up to 25 bar.

^c Suitable process connection adapter, see data sheet 409711

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Order code							
Order example	402050/000	- 459	- 405	- 571	- 20	- 61	/ 000

Accessories

Article	Part no.
Cable box (straight) with control cable, screen, 4-pole, 5 m PVC cable, pressure compensation	00512341

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JUMO dTRANS p32 Pressure Transmitter

General application

Pressure transmitters are used for measuring relative (gauge) pressures in dry, non-corrosive and non-ionizing gaseous media. The transmitter operates on the piezoresistive measuring principle. The pressure is converted into an electrical signal.



Technical data

Reference conditions

to DIN 16 086 and IEC 770/5.3

Measurement ranges

see Order details

Overload limit

4 x full scale

Bursting pressure

8 x full scale

Parts in contact with medium

Si, borosilicate glass, silicone, Au, CrNi steel

Output

0 — 20 mA	
3-wire	burden $\leq (U_B - 12 \text{ V}) / 0.02 \text{ A}$
4 — 20 mA	
2-wire	burden $\leq (U_B - 10 \text{ V}) / 0.02 \text{ A}$
4 — 20 mA	
3-wire	burden $\leq (U_B - 12 \text{ V}) / 0.02 \text{ A}$
0.5 — 4.5 V	burden $\geq 50 \text{ k}\Omega$
1 — 6 V	burden $\geq 10 \text{ k}\Omega$
0 — 10 V	burden $\geq 10 \text{ k}\Omega$

Burden error

< 0.5% max.

Zero signal deviation

$\leq 0.4\%$ of full scale

Thermal hysteresis

(within compensated temperature range)
 $\leq \pm 2\%$

Ambient temperature error

within range 0 to +100°C
 (compensated temperature range)
 zero: $\leq 0.03\%/^{\circ}\text{C}$ typical,
 $\leq 0.05\%/^{\circ}\text{C}$ max.
 span: $\leq 0.02\%/^{\circ}\text{C}$ typical,
 $\leq 0.04\%/^{\circ}\text{C}$ max.

Deviation from characteristic

$\leq 0.5\%$ of full scale
 (limit setting)

Hysteresis

$\leq 0.1\%$ of full scale

Repeatability

$\leq 0.05\%$ of full scale

Settling time

for current output (output 402, 405 or 406):
 $\leq 3 \text{ msec}$ max.

for voltage output (output 412, 415,
 418 or 420):
 $\leq 10 \text{ msec}$ max.

Stability over 1 year

$\leq 1\%$ of full scale

Supply

10 — 30 V DC	(output 4 — 20 mA and 1 — 6 V)
5 V DC	(output 0.5 — 4.5 V)
11.5 — 30 V DC	(output 0 — 10 V)
11.5 — 30 V DC	(output 0(4) — 20 mA)

Ripple:

The voltage spikes must not go outside the limits specified for the supply.

Max. current drawn: approx. 25 mA

Supply voltage error

$\leq 0.02\%$ per V
 (nominal supply voltage 24 V DC)
 ratiometric with supply voltage 5 V DC
 ($\pm 0.5 \text{ V}$)

Permissible ambient temperature

-20 to +100°C

Storage temperature

-40 to +125°C

Permissible temperature of medium

-30 to +120°C

Electromagnetic compatibility

EN 61 326
 interference emission: Class B
 interference immunity: to industrial requirements

Mechanical shock

(to IEC 68-2-27)
 100 g/1 msec

Mechanical vibration

(to IEC 68-2-6)
 20 g max. at 15 — 2000 Hz

Protection

with terminal box
 IP65 to EN 60 529
 (connection cable diameter:
 5 mm min., 7 mm max.)

with connection cable
 IP67 to EN 60 529

Housing

stainless steel, Mat. Ref. 1.4301
 polycarbonate GF

Pressure connection

see Order details;
 other connections on request

Electrical connection

see Order details
 terminal box to DIN 43 650,
 Style A,
 conductor cross-section up to 1.5 mm²;
 or
 attached 4-core PVC cable, 2 m long
 other lengths on request

Nominal position

unrestricted

Weight

200 gm

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Electrical connection

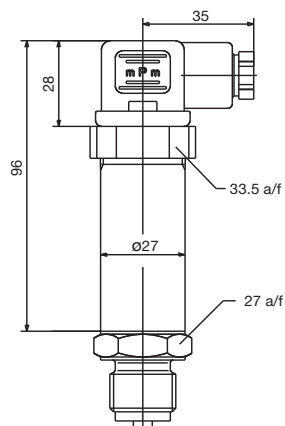
Connection		Terminals	
		Connector	Cable
Supply 10 — 30 V DC 11.5 — 30 V DC 5 V DC		1 L+ 2 L-	white gray
Output 1 — 6 V 0 — 10 V 0.5 — 4.5 V		2 - 3 +	gray yellow
Output 4 — 20 mA, 2-wire		1 + 2 - proportional 4 to 20 mA current in supply	white gray
Output 0(4) — 20 mA, 3-wire		2 - 3 +	gray yellow
Protective earth conductor			
Screen			black

Caution:

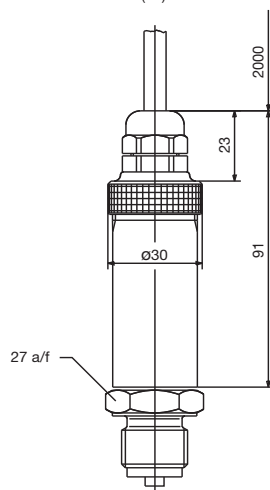
Earth the instrument!
 (pressure connection and / or or screen)

Dimensions

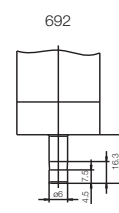
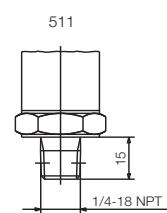
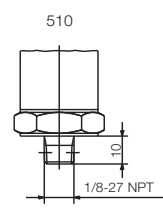
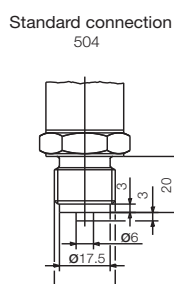
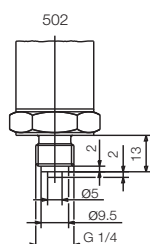
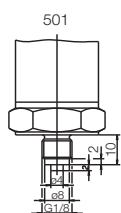
Electrical connection
by terminal box
(61)



Electrical connection
by attached cable
(12)



Connections, not front-flush



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Order details

Basic type

402051 Pressure transmitter JUMO dTRANS p32

Basic type extension

/000 none
 /034 Sensor mit Gelvorlage
 /999 special version

Input

411 0 40 mbar gauge pressure
 413 0 60 mbar gauge pressure
 414 0 100 mbar gauge pressure
 415 0 160 mbar gauge pressure
 451 0 0.25 bar gauge pressure
 452 0 0.4 bar gauge pressure
 453 0 0.6 bar gauge pressure
 999 special gauge pressure range

Output

402 0 to 20 mA 3-wire
 405 4 to 20 mA 2-wire
 406 4 to 20 mA 3-wire
 412 0.5 to 4.5 V 3-wire
 415 0 to 10 V 3-wire
 418 1 to 5 V 3-wire
 420 1 to 6 V 3-wire

Process connection (not front-flush)

501 pressure connection G 1/8 to EN 837
 502 pressure connection G 1/4 to EN 837
 504 pressure connection G 1/2 to EN 837 (standard connection)
 510 pressure connection 1/8-27 NPT to DIN 837
 511 pressure connection 1/4-18 NPT to DIN 837
 692 6 mm hose connection

Material of process connection

20 stainless steel

Electrical connection

12 by attached cable (cable length in plain text)
 36 by circular connector M12 x 1
 61 by terminal box

402051 / - - - - 20 - Order code

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JUMO CANtrans p Ceramic

Pressure Transmitter with CANopen output

Description

Pressure transmitters are used for measuring relative (gauge) and absolute pressures in liquids and gases. The pressure transmitter operates on the thick-film strain gauge measuring principle. An alumina ceramic (Al_2O_3) is used as the base material for the sensing element.

The pressure measurement is digitized and made available for further processing via the CANopen serial bus protocol (CAN slave).

Several useful extra functions have been implemented through the DS 404 device profile. All settings can be made using standard CANopen software tools.

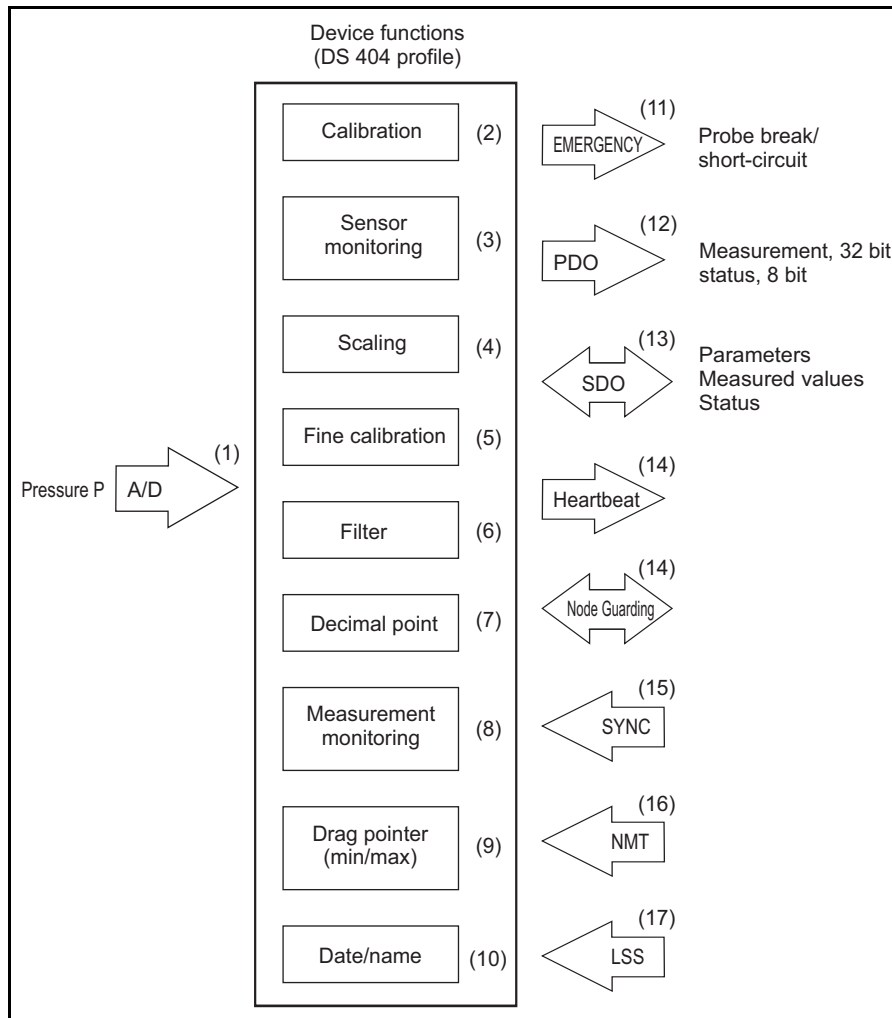
Further transmitters with CANopen output: Data Sheet 402056, Data Sheet 902910.



Type 402055



Block diagram



Operation

- (1) The analog signal from the pressure cell is digitized with 12-bit resolution.
- (2) The pressure signal is digitally calibrated at the factory.
- (3) The sensor monitoring facility continuously checks the correct performance of the sensor signal and triggers high-priority emergency telegrams in the event of an error.
- (4) The pressure measurement can be scaled to any dimensional unit (or in % of range).
- (5) Fine calibration features an auto-zeroing function and a freely adjustable shift of the characteristic.
- (6) Undesirable signal fluctuations can be suppressed through the (adjustable) filter constant.
- (7) The measurement is output with a freely selectable decimal place.
- (8) Range monitoring features freely selectable upper and lower limits. The result is output as a status byte with the measurement in the PDO telegram.
- (9) The drag pointer function stores the minimum and maximum pressure measurements.
- (10) Date and name of the last servicing action can be stored.
- (11) An emergency telegram is triggered in the event of a sensor fault.
- (12) The PDO telegram contains the 32-bit measurement and the 8-bit status. The measurement that is output can be controlled by means of different trigger conditions.
- (13) Parameters can be set through SDO telegrams, and measurements and status can be requested.
- (14) The heartbeat signal or Node Guarding can be used to additionally monitor the transmitter function.
- (15) The transmission of measurements can additionally be controlled through the Sync command.
- (16) NMT telegrams serve to control the operational state of the transmitter.
- (17) The CAN module ID and CAN baud rate are set via LSS or SDO, according to choice.

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Technical data

Reference conditions

DIN 16086, DIN IEC 770/5.3

Measurement ranges

0 to 1.6 bar relative pressure,
0 to 2.5 bar relative pressure,
0 to 4 bar relative pressure,
0 to 6 bar relative pressure,
0 to 10 bar relative pressure,
0 to 16 bar relative pressure,
0 to 25 bar relative pressure,
0 to 40 bar relative pressure,
0 to 60 bar relative pressure,
-1 to +0.6 bar relative pressure,
-1 to +1.5 bar relative pressure,
-1 to +3 bar relative pressure,
-1 to +5 bar relative pressure,
-1 to +9 bar relative pressure,
-1 to +15 bar relative pressure,
-1 to +24 bar relative pressure

Overload limit

For measuring ranges
0 to 1.6 mbar to 0 to 40 bar: 3 times MSP¹
For measuring ranges
0 to 60 bar: 2 times MSP

Bursting pressure

For measuring ranges
0 to 1.6 mbar to 40 bar: 4 times MSP
For measuring ranges
0 to 60 bar: 3 times MSP

Parts in contact with medium

Standard: stainless steel, mat. ref. 1.4305,
(Al₂O₃) 96 %
Seal: FPM or FFPM

Output

CANopen as per CiA DS 301 V4.02
Measurement resolution: 12 bit

Zero offset

≤ 0.3 % MSP

Thermal hysteresis

≤ ± 0.4 % MSP

Ambient temperature effect

Within range -20 to +85 °C
(compensated temperature range)
Zero: ≤ 0.02 %/°C typical,
≤ 0.04 %/°C max.
Measuring span: ≤ 0.02 %/°C typical,
≤ 0.04 %/°C max.

Deviation from characteristic

≤ 0.5 % MSP (limit point adjustment)

Hysteresis

≤ 0.2 % MSP

Repeatability

≤ 0.1 % MSP

Cycle time

1 msec
Optionally 0.5 msec (11 bit)

Stability per year

≤ 1 % MSP

Supply

DC 10 to 30 V
Max. current drawn: Approx. 45 mA

Voltage supply influence

Reference voltage DC 24 V
≤ 0.0005 % per V

Permissible ambient temperature

-20 to +85 °C

Storage temperature

-40 to +85 °C

Permissible medium temperature

-20 to +85 °C

Electromagnetic compatibility (EMC)

DIN EN 61326-1:2013,
DIN EN 61326-2-3:2013
Interference emission: Class B²
Immunity to interference: Industrial require-
ments

Electrical connection

M12 plug connector
Recommended: Screened 5-wire cable

Mechanical shock

DIN IEC 68-2-27
100 g/5 msec

Mechanical vibration

DIN IEC 68-2-6
20 g max. at 15 to 2000 Hz

Enclosure protection

DIN EN 60529
IP 67 with connector screwed on

Housing

Stainless steel, mat. ref. 1.4305

Process connection

G 1/4" according to DIN EN 837,
1/4-18 NPT according to DIN 837,
G 1/4" according to DIN 3852-11,
G 1/2" according to DIN 3852-11,
other connections on request

Nominal position

Unrestricted

Weight

95 g with process connection G 1/4"

CANbus

Protocol

CiA DS 301, V4.02, CANopen slave

Profile

CiA DS 404, V1.2
Measuring devices and closed-loop
controllers

Baud rate

20 kbaud to 1 Mbaud
setting via LSS or SDO

Module (node) ID

1 to 127
setting via LSS or SDO

PDO

0 Rx, 1 Tx

SDO

1 Rx, 1 Tx

Emergency

Yes

Heartbeat

Yes

Node Guarding

Yes

LSS

Yes

SYNC

Yes

Operation and project design

All parameters are accessible via the
CANopen object directory (EDS) and can be
set using standard CANopen software tools.

EDS (Electronic Data Sheet)

Yes

Available for download at www.jumo.net.

Factory setting

Operating Instructions B 402055.0.
Available for download at www.jumo.net.

² The product is suitable for industrial use as
well as for households and small busi-
nesses.

¹ MSP = measuring span

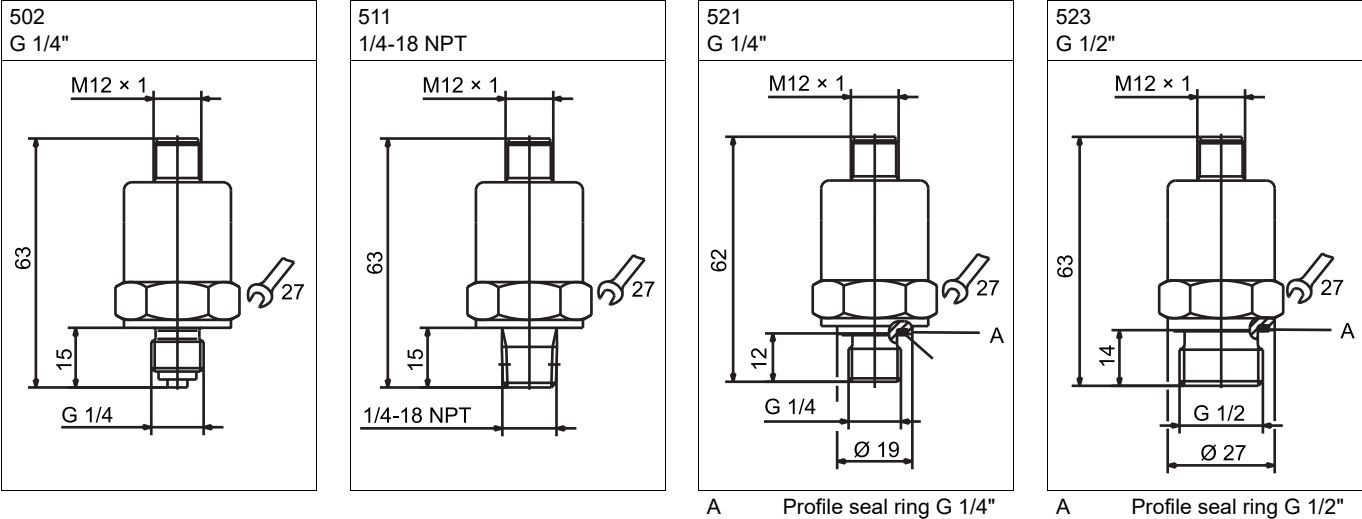
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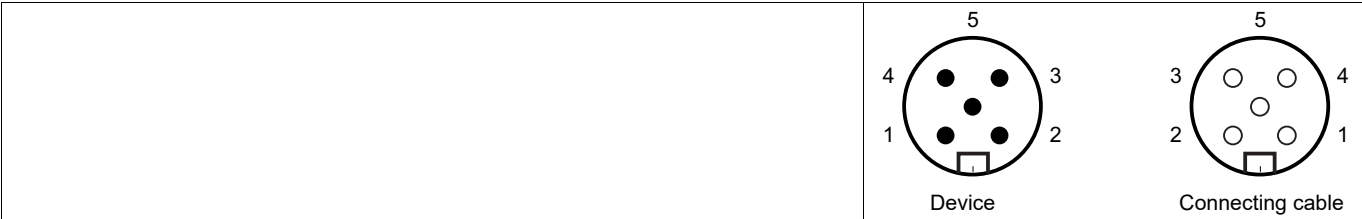
Dimensions



Connection elements

The connection elements in the data sheet provide information on product selection.
For the electrical connection, only use the installation instructions or the operating manual!

M12 plug connector



Terminal assignment

Designation	Description	Assignment
Voltage supply	V+	2
DC 10 to 30 V	V-	3
Output	Screen	1
CANopen	CAN_H	4
	CAN_L	5

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Order details

(1)	Basic type
402055/000	JUMO CANtrans p Ceramic – Pressure transmitter with CANopen output
(2)	Input
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
479	-1 to +0,6 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
999	Special measuring range relative pressure
(3)	Output
450	CANopen
(4)	Process connection
502	G 1/4" according to DIN EN 837
511	1/4-18 NPT according to DIN 837
521	G 1/4" according to DIN 3852-11
523	G 1/2" according to DIN 3852-11
(5)	Process connection material
20	CrNi (stainless steel)
(6)	Seal
601	FPM
604	FFPM ^a
(7)	Electrical connection
36	M12 plug connector
(8)	Extra code
000	None
100	Customer-specific configuration (specifications in plain text)

^a Product characteristics similar to PTFE.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)							
Order code	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>				
Order example	402055/00	-	462	-	450	-	502	-	20	-	601	-	36	/	000

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Accessories

Designation	Part No.
Line socket, 5-pole, M12 × 1, straight, 5 m	00337625
Line socket, 5-pole, M12 × 1, angled, with moulded cable, 2 m	00375164
Tee-piece, 5-pole, M12 × 1	00419129
Line socket, 5-pole, M12 × 1, straight, no connecting cable, assembly by customer	00419130
Line socket, 5-pole, M12 × 1, angled, no connecting cable, assembly by customer	00419133
PC CAN interface for USB interface (configuration software included)	00449941
Extension cable, 5-pole, with connector and plug M12 × 1, 2 m	00461589
Termination resistor for CAN bus/digiLine, M12 × 1	00461591

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JUMO CANtrans p

Pressure Transmitter with CANopen output

Short description

Pressure transmitters are used for measuring relative (gauge) and absolute pressures in liquids and gases. The pressure transmitter operates on the piezoresistive or thin-film strain gauge measuring principle.

The pressure measurement is digitized and made available for further processing via the CANopen serial bus protocol (CAN slave). Several useful extra functions are implemented through the DS 404 device profile. All settings can be made using standard CANopen software tools.

Further transmitters with CANopen output: Data Sheet 402055, Data Sheet 902910.



Type 402056

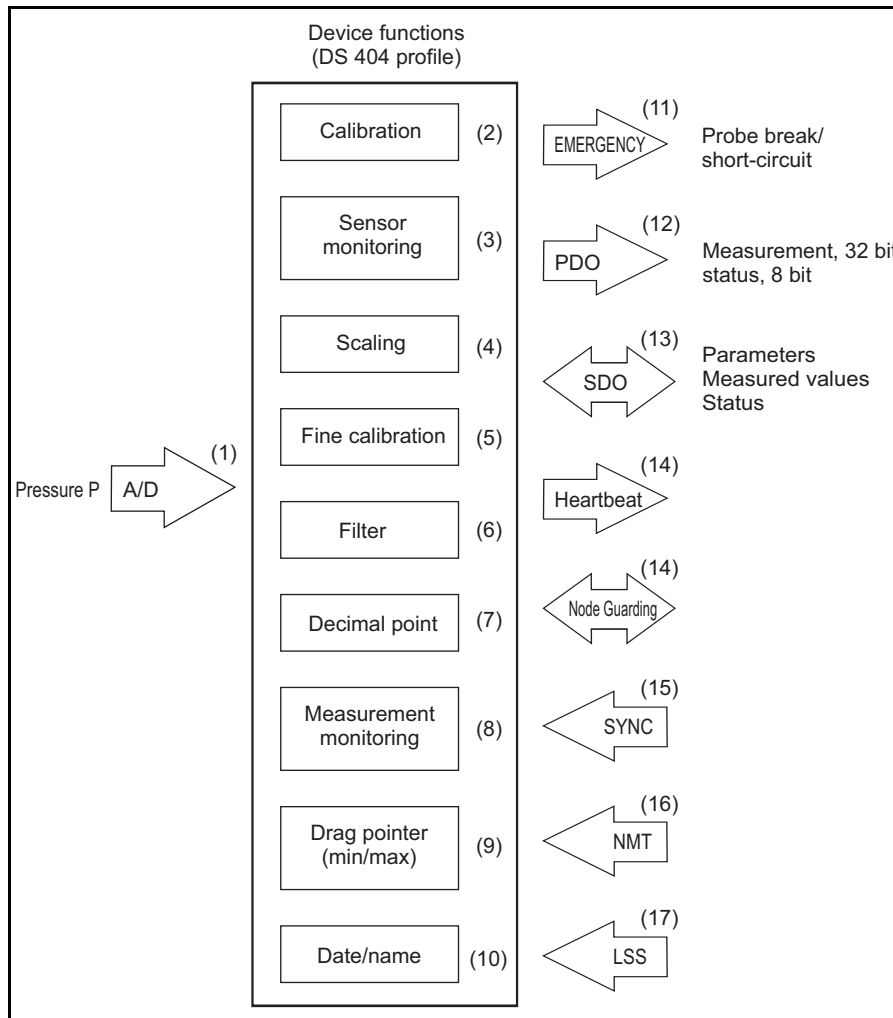
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Block diagram



Operation

- (1) The analog signal from the pressure cell is digitized with 12-bit resolution.
- (2) The pressure signal is digitally calibrated at the factory.
- (3) The sensor monitoring facility continuously checks the correct performance of the sensor signal and triggers high-priority emergency telegrams in the event of an error.
- (4) The pressure measurement can be scaled to any dimensional unit (or in % of range).
- (5) Fine calibration features an auto-zeroing function and a freely adjustable shift of the characteristic.
- (6) Undesirable signal fluctuations can be suppressed through the (adjustable) filter constant.
- (7) The measurement is output with a freely selectable decimal place.
- (8) Range monitoring features freely selectable upper and lower limits. The result is output as a status byte with the measurement in the PDO telegram.
- (9) The drag pointer function stores the minimum and maximum pressure measurements.
- (10) Date and name of the last servicing action can be stored.
- (11) An emergency telegram is triggered in the event of a sensor fault.
- (12) The PDO telegram contains the 32-bit measurement and the 8-bit status. The measurement that is output can be controlled by means of different trigger conditions.
- (13) Parameters can be set through SDO telegrams, and measurements and status can be requested.
- (14) The heartbeat signal or Node Guarding can be used to additionally monitor the transmitter function.
- (15) The transmission of measurements can additionally be controlled through the Sync command.
- (16) NMT telegrams serve to control the operational state of the transmitter.
- (17) The CAN module ID and CAN baud rate are set via LSS or SDO, as selected.

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Technical data

Reference conditions

DIN 16086, IEC 770/5.3

Measurement ranges

0 to 0.25 bar relative pressure,
0 to 0.4 bar relative pressure,
0 to 0.6 bar relative pressure,
0 to 1.0 bar relative pressure,
0 to 1.6 bar relative pressure,
0 to 2.5 bar relative pressure,
0 to 4 bar relative pressure,
0 to 6 bar relative pressure,
0 to 10 bar relative pressure,
0 to 16 bar relative pressure,
0 to 25 bar relative pressure,
0 to 40 bar relative pressure,
0 to 60 bar relative pressure,
0 to 100 bar relative pressure,
0 to 160 bar relative pressure,
0 to 250 bar relative pressure,
0 to 400 bar relative pressure,
0 to 600 bar relative pressure,
-1 to 0 bar relative pressure,
-1 to +0.6 bar relative pressure,
-1 to +1.5 bar relative pressure,
-1 to +3 bar relative pressure,
-1 to +5 bar relative pressure,
-1 to +9 bar relative pressure,
-1 to +15 bar relative pressure,
-1 to +24 bar relative pressure,
0 to 0.6 bar absolute pressure,
0 to 1.0 bar absolute pressure,
0 to 1.6 bar absolute pressure,
0 to 2.5 bar absolute pressure,
0 to 4 bar absolute pressure,
0 to 6 bar absolute pressure,
0 to 10 bar absolute pressure,
0 to 16 bar absolute pressure,
0 to 25 bar absolute pressure

Overload limit

For ranges
0 to 0.25 bar to 0 to 25 bar: 3 x MSP¹
For ranges
0 to 40 to 0 to 250 bar: 2 x MSP
For ranges
0 to 400 to 0 to 600 bar: 1.5 x MSP

Bursting pressure

For ranges
0 to 0.25 bar to 0 to 40 bar: ≤ 4 x MSP
For ranges
0 to 60 to 0 to 100 bar: 8 x MSP
For ranges
0 to 160 to 0 to 400 bar: 5 x MSP
For ranges 0 to 600 bar: 3 x MSP

Parts in contact with medium

Standard:
Stainless steel, mat. ref. 1.4571/1.4435;
For range ≥ 60 bar, mat. ref. 1.4571/1.4542

Output

CANopen as per CiA DS 301 V4.02
Measurement resolution: 12 bit

Zero offset

≤ 0.3 % MSP

Thermal hysteresis

≤ ±0.5 % MSP
(within compensated temperature range)
≤ ±1 % for ranges 0 to 0.25 bar, 0 to 0.4 bar,
0 to 0.6 bar

Ambient temperature effect

Within range 0 to 100 °C
(compensated temperature range)
For ranges 0.25 and 0.4 bar
Zero: ≤ 0.03 %/°C typical,
≤ 0.05 %/°C max.

Span: ≤ 0.02 %/°C typical,
≤ 0.04 %/°C max.

For ranges above 0.6 bar

Zero: ≤ 0.02 %/°C typical,
≤ 0.04 %/°C max.

Span: ≤ 0.02 %/°C typical,
≤ 0.04 %/°C max.

Deviation from characteristic
≤ 0.5 % MSP (limit point setting)

Hysteresis

≤ 0.1 % MSP

Repeatability

≤ 0.05 % MSP

Cycle time

1 msec
Optionally 0.5 msec (11 bit)

Stability per year

≤ 0.5 % MSP

Supply

DC 10 to 30 V
Max. current drawn: approx. 45 mA

Supply voltage error

≤ 0.03 % per V

Permissible ambient temperature

-20 to +85 °C

Storage temperature

-40 to +85 °C

Permissible temperature of medium

Standard version: -40 to +125 °C

Electromagnetic compatibility

DIN EN 61326-1:2013
DIN EN 61326-2-3:2013
Interference emission: Class B²
Immunity to interference: to industrial requirements

Electrical connection

M12 plug connector
Recommended: screened 5-wire cable

Mechanical shock

DIN IEC 68-2-27
100 g/5 msec

Mechanical vibration

DIN IEC 68-2-6
20 g max. at 15 to 2000 Hz

Enclosure protection

DIN EN 60529
With connector screwed on IP67

Housing

Stainless steel, mat. ref. 1.4305

Process connection

G 1/4" according to DIN EN 837,
G 1/2" according to DIN EN 837,
1/4-18 NPT according to DIN 837,
1/2-14 NPT according to DIN 837,
G 1/2" according to DIN 3852-11,
7/16-20 UNF,
G 3/4" front-flush DIN EN ISO 228-1,
G 3/4" front-flush with double gasket,
other connections upon request

Nominal position

Unrestricted

Weight

95 g with process connection G 1/4"

CANbus

Protocol

CiA DS 301, V4.02, CANopen slave

Profile

CiA DS 404, V1.2
Measuring devices and closed-loop controllers

Baud rate

20 kbaud to 1 Mbaud
Setting via LSS or SDO

Module (node) ID

1 to 127
Setting via LSS or SDO

PDO

0 Rx, 1 Tx

SDO

1 Rx, 1 Tx

Emergency

Yes

Heartbeat

Yes

Node Guarding

Yes

LSS

Yes

SYNC

Yes

Operation and project design

All parameters are accessible via the CANopen object directory (EDS) and can be set using standard CANopen software tools.

EDS (electronic data sheet)

Yes

Available for download at www.jumo.net.

Factory setting

Operating Instructions B 402055.0.

Available for download at www.jumo.net.

² The product is suitable for industrial use as well as for households and small businesses.

¹ MSP = measuring span

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Dimensions

Gerät

Basic type extension	L [mm]
000	48

Process connections

502 G 1/4"	504 G 1/2"	511 1/4-18 NPT	512 1/2-14 NPT
523 G 1/2"	562 7/16-20 UNF	571 G 3/4" 'front-flush'	575 G 3/4" front-flush with double gasket
A Profile seal G 1/2"		A Profile seal G 3/4"	A Profile seal G 3/4"
			B O-ring

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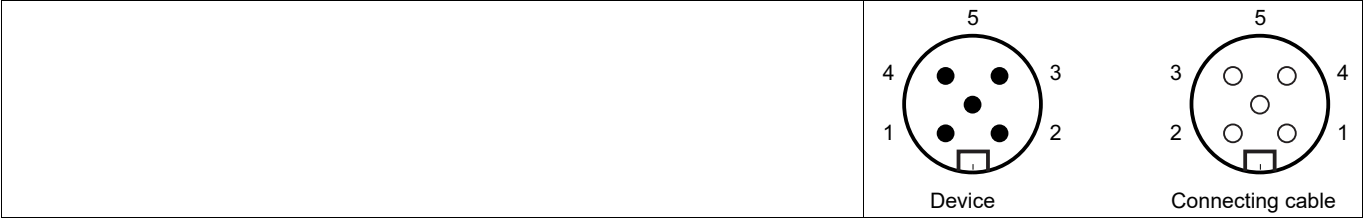
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Connection elements

The connection elements in the data sheet provide information on product selection.
For the electrical connection, only use the installation instructions or the operating manual.

M12 plug connector



Terminal assignment

Designation		Description	Assignment
Voltage supply DC 10 to 30 V		V+ V-	2 3
Output CANopen		Screen CAN_H CAN_L	1 4 5

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**Order details**

(1)	Basic type
402056/000	JUMO CANtrans p – Pressure transmitter with CANopen output
402056/999	JUMO CANtrans p – Pressure transmitter with CANopen output, special version
(2)	Input
451	0 to 0.25 bar gauge pressure
452	0 to 0.4 bar gauge pressure
453	0 to 0,6 bar gauge pressure
454	0 to 1.0 bar gauge pressure
455	0 to 1.6 bar gauge pressure
456	0 to 2.5 bar gauge pressure
457	0 to 4 bar gauge pressure
458	0 to 6 bar gauge pressure
459	0 to 10 bar gauge pressure
460	0 to 16 bar gauge pressure
461	0 to 25 bar gauge pressure
462	0 to 40 bar gauge pressure
463	0 to 60 bar gauge pressure
464	0 to 100 bar gauge pressure
465	0 to 160 bar gauge pressure
466	0 to 250 bar gauge pressure
467	0 to 400 bar gauge pressure
468	0 to 600 bar gauge pressure
478	-1 to 0 bar gauge pressure
479	-1 to 0.6 bar gauge pressure
480	-1 to 1.5 bar gauge pressure
481	-1 to 3 bar gauge pressure
482	-1 to 5 bar gauge pressure
483	-1 to 9 bar gauge pressure
484	-1 to 15 bar gauge pressure
485	-1 to 24 bar gauge pressure
487	0 to 0.6 bar absolute pressure
488	0 to 1.0 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2,5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
998	Special measuring range absolute pressure
999	Special measuring range gauge pressure
(3)	Output
450	CANopen
(4)	Process connections
502	G 1/4" according to DIN EN 837
504	G 1/2" according to DIN EN 837
511	1/4-18NPT according to DIN EN 837
512	1/2-14NPT according to DIN EN 837
523	G 1/2" according to DIN 3852-11
562	7/16-20UNF

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571	G 3/4" front-flush DIN EN ISO 228-1 ^a
575	G 3/4" front-flush with double gasket ^a
(5)	Process connection material
20	CrNi (stainless steel)
(6)	Electrical connection
36	M12 plug connector
(7)	Extra code
000	None
100	Customer-specific configuration (specifications in plain text)

^a Front-flush process connections are only available for measuring spans up to 25 bars.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)						
Order code	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>				
Order example	402056/000	-	462	-	450	-	502	-	20	-	36	/	000

Accessories

Designation	Part No.
Line socket, 5-pole, M12 × 1, straight, 5 m	00337625
Line socket, 5-pole, M12 × 1, angled, with moulded connecting cable, 2 m	00375164
Tee piece, 5-pole, M12 × 1	00419129
Line socket, 5-pole, M12 × 1, straight, without connecting cable, assembly by customer	00419130
Line socket, 5-pole, M12 × 1, angled, without connecting cable, assembly by customer	00419133
PC CAN interface for USB interface (configurations software included)	00449941
Extension cable, 5-pole, with connector and plug M12 × 1, 2 m	00461589
Termination resistor for CAN bus/digiLine, M12 × 1	00461591



JUMO dTRANS p35

Pressure Sensor with IO-Link

Application

- Process automation
- Machines for the food and beverage industry
- General mechanical and apparatus engineering

Brief description

The pressure sensor serves to measure relative and absolute pressure and monitor it in liquids and gases. The effect of the pressure on the pressure sensor generates a signal, which is amplified, digitalized, and processed.

The pressure sensor is equipped with an IO-Link interface according to specification 1.1. IO-Link supports bidirectional communication and is used to exchange process data, parameters, diagnostic information, and status messages. The two green LEDs are permanently lit as soon as voltage is supplied to the device. Once an IO-Link connection is established, the LEDs flash.

The switching behavior and the switching thresholds of the switching outputs (max. 2 pieces; p or n switching) can be individually configured - along with many other parameters. Any IO-Link master can be used for the configuration.

The pressure sensor is therefore suitable for use in plant and mechanical engineering in connections to automation systems. A variety of pressure connections and measuring ranges are available to the user.



Type 402058

Customer benefits

- IO-Link
 - Multi-vendor point-to-point connection
 - Open standard with maximum transparency to the field level (IEC 61131-9)
 - Inexpensive, pre-fabricated connecting cable (no wiring errors)
 - Simple and uniform wiring and startup thanks to standardized interface
- Industry 4.0: pervasive communication from the control to the sensors
 - Retrieval of process data and diagnostic information
 - Dynamic parameter changes
- More safety during sensor replacement
 - Automatic parameterization possible
 - Replacement with sensors of same type, but with different properties, can be detected
- Optimization of the production process through communication down to the lowest field level
- Reduction of mounting and startup times
- Reduction of maintenance and service costs with simultaneous increase in plant availability

Special features

- Small, compact, robust
- Stainless steel, fully welded
- Various process connections
- Hygienic connections
- Simple startup
- Easy sensor replacement
- Proven accuracy
- Connection via IO-Link master
- LED status display
- Also available as a temperature sensor with IO-Link; see data sheet 902915

Approvals




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Approvals

	Designation	UL
	Testing agency	-
	Certificate no.	2022-07-27-E201387
	Inspection basis	UL 61010-1, 3 Ed. Mai 2012 revised 19. Juli 2019 und CAN/CSA-C22.2 No. 61010-1 (2012-05). 3. Ed. with revision through 2018-11
	Valid for	Type 402058

Technical data

Input

Measuring range and accuracy

Measuring range (MB)	Linearity ^a	Accuracy at 20 °C ^d		Long-term stability ^b	Overload capacity ^c	Burst pressure	Response of MB	
Bar	% MSP ^f	% MSP	-20 to +80 °C ^e	% MSP per year	Bar	Bar	under-range	over-range
-400 to +400 mbar relative pressure	0.3	0.7	2.0	≤0.3	1	1.5	linear up to -1.5 % MSP	linear up to 5 % MSP
-1 bar to +1 bar relative pressure	0.3	0.6	1.8	≤0.2	4	8	Error value: 1·10 ³⁷	Error value: 2·10 ³⁷
-1 bar to +2.5 bar relative pressure	0.3	0.5	1.3		16	24		
-1 bar to +5 bar relative pressure	0.3	0.5	1.2		40	60		
-1 bar to +12 bar relative pressure	0.25	0.5	1.0		100	150		
-1 bar to +30 bar relative pressure	0.2	0.5	1.0		100	150		
-1 bar to +100 bar relative pressure	0.2	0.5	1.0		300	400		
-1 bar to +250 bar relative pressure	0.5	0.7	1.2		500	2000		
-1 bar to +400 bar relative pressure	0.5	0.7	1.2		800	2000		
-1 bar to +600 bar relative pressure	0.5	0.7	1.2		1200	2500		

^a Linearity according to limit point setting.

^b Reference conditions EN 61298-1.

^c All pressure sensors are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value, and measuring range end value.

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value, measuring range end value, thermal effect on measuring range start, and measuring span.

^f MSP = measuring span

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Measuring range (MB)	Linearity ^a	Accuracy at		Long-term stability ^b	Overload capacity ^c	Burst pressure	Response of	
Bar	% MSP ^f	20 °C ^d % MSP	-20 to +80 °C ^e % MSP	% MSP per year	Bar	Bar	MB under-range	MB over-range
0 bar to 1 bar absolute pressure	0.3	0.5	1.3	≤0.2	4	6	No detection	linear up to 5 % MSP Error value: 2·10 ³⁷
0 bar to 2.5 bar absolute pressure	0.25	0.5	1.2		16	24		
0 bar to 5 bar absolute pressure	0.25	0.5	1.2		40	60		
0 bar to 12 bar absolute pressure	0.25	0.5	1.0		100	150		
0 bar to 30 bar absolute pressure	0.2	0.5	1.0		100	150		
0 bar to 100 bar absolute pressure	0.2	0.5	1.0		400	400		

^a Linearity according to limit point setting.

^b Reference conditions EN 61298-1.

^c All pressure sensors are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value, and measuring range end value.

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value, measuring range end value, thermal effect on measuring range start, and measuring span.

^f MSP = measuring span

Signal processing

Input filter	Digital filter, 2nd order; filter time constant can be set
--------------	--

Measuring circuit monitoring

Process data invalid	IO-Link event configurable; appears in the process value as an error value
Measuring range overflow	
Measuring range underflow	
Device hardware fault	

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Output

Number	1 output in IO-Link operation (output signal according to IO-Link communication standard version 1.1; see section "Interface", Page 4) 2 outputs for switch operation (SIO mode; SIO = standard IO)
Switching functions configurable	Hysteresis function or window function N/C or N/O contact Output p switching (PNP) or n switching (NPN) Switch-on/switch-off delay
Switching current	≤100 mA per output
Voltage drop at switching transistor	≤2 V
Short-circuit proof	Yes (clocked)
Reverse polarity protected	Yes
Current limiting	Yes
Hysteresis	
For hysteresis function	Configurable
For window function	Fixed setting (symmetrical; ±0.25 % of the measuring range)
Switch-on, switch-off delay	0 to 100 s
Response time	
Switching output	≤7 ms
IO-Link	≤7 ms + IO-Link cycle time

Interface

Communication interface	IO-Link device V 1.1, downward compatible to V 1.0
Data transfer rate (baud rate)	COM 3 (230.4 kBaud)
Max. cable length	20 m, unshielded
Min. cycle time	2 ms
IO Device Description (IODD)	Depending on the ordered input range; available on the manufacturer's website www.jumo.de or at http://ioddfinder.io-link.com

Electrical data

Voltage supply	
In IO-Link operation	DC 18 to 32 V
In switch operation	DC 9.6 to 32 V
Nominal voltage	DC 24 V
Current consumption	
In idle mode	≤10 mA
In IO-Link operation	≤12 mA
In switch operation	≤250 mA (with 2 switching outputs)
Electrical safety	Protection rating III according to DIN EN 61140
Intended use	Pressure measurement in industrial plants

The auxiliary energy of the pressure sensor must meet SELV requirements. Furthermore, the device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

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Mechanical features

Materials	
Sensor	Stainless steel (membrane: 1.4435, welding ring: 1.4404)
High-pressure sensor	Stainless steel 1.4548 (for pressure ranges > 100 bar)
Process connection	Stainless steel 316L (1.4404 or 1.4571)
Housing	Stainless steel 304 (1.4301)
Installation position	Any
Calibration position	Device upright, process connection at the bottom
Weight	Approx. 160 g

Environmental influences

Admissible temperatures	
Medium	-40 °C to +125 °C
Ambient temperature	-40 to +85 °C (Ambient temperature range of the head)
Storage	-40 to +85 °C
Resistance to climatic conditions	
During operation	≤100 % relative humidity without condensation on the outer skin of the device
During storage	≤90 % relative humidity without condensation
Climate class	3K7 according to DIN EN 60721-3-3
Admissible mechanical load	
Vibration resistance	10 g, at 10 to 2000 Hz according to DIN EN 60068-2-6
Shock resistance	20 g for 11 ms according to DIN EN 60068-2-27 50 g for 1 ms according to DIN EN 60068-2-27
Process media	Liquid and gaseous media
Protection type	According to DIN EN 60529
With absolute pressure version	IP65/IP67
With relative pressure version	IP65
Electromagnetic compatibility	According to DIN EN 61326-2-3
Interference emission	Class B ^a
Interference immunity	Industrial requirement

^a The product is suitable for industrial use as well as for households and small businesses.

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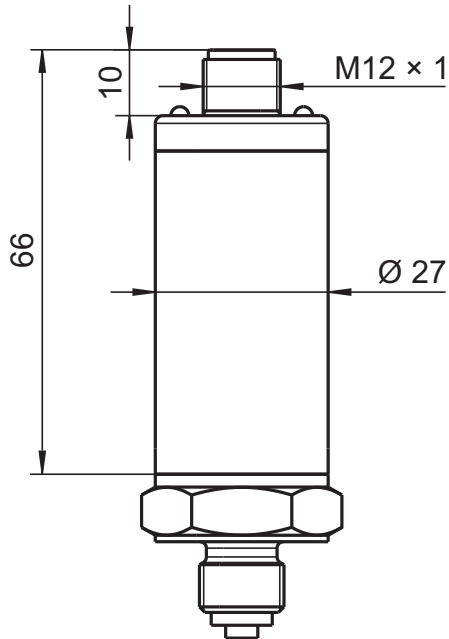


Dimensions

Type 402058/000-XXX-458-5XX-20-36/000

Non-front-flush versions

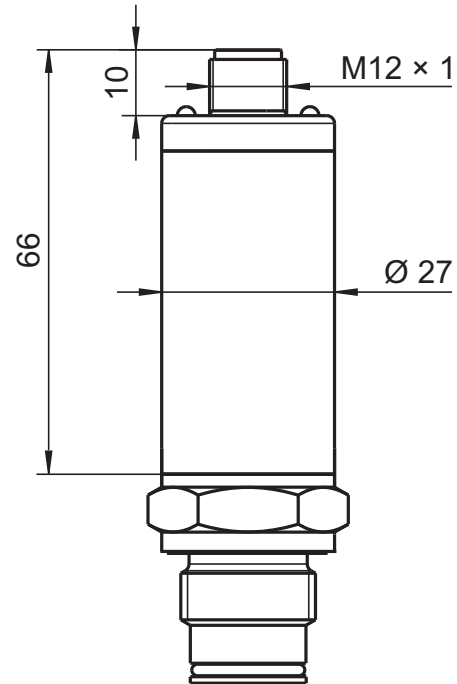
502, 504, 511, 521 and 523; measuring range ≤ 100 bar



Type 402058/000-XXX-458-5XX-20-36/000

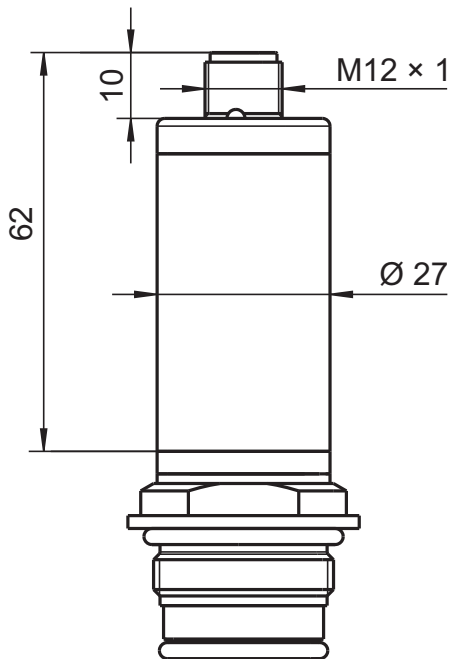
Front-flush version

571, 574 and 575; measuring range ≤ 100 bar



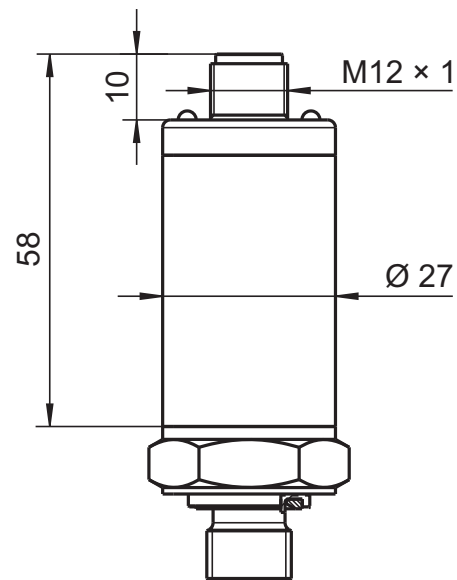
Type 402058/000-XXX-458-997-20-36/000

JUMO PEKA; measuring range ≤ 100 bar



Type 402058/000-XXX-458-XXX-20-36/000

High-pressure version; measuring range > 100 bar



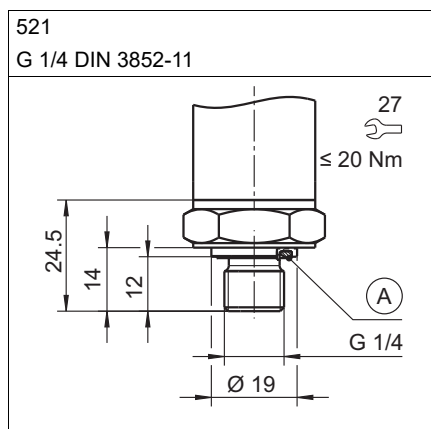
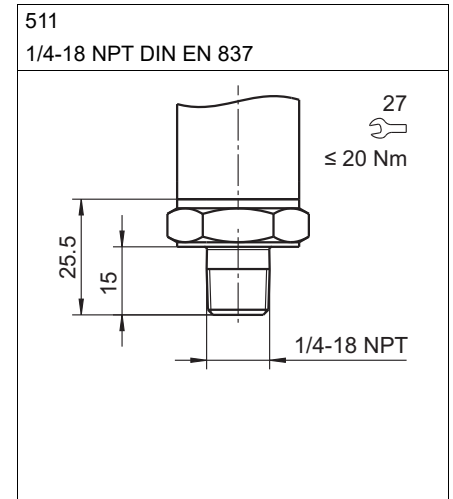
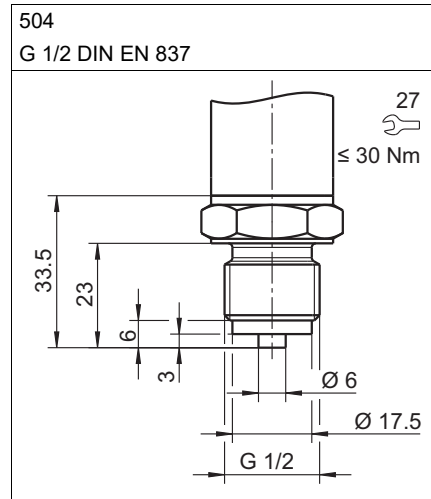
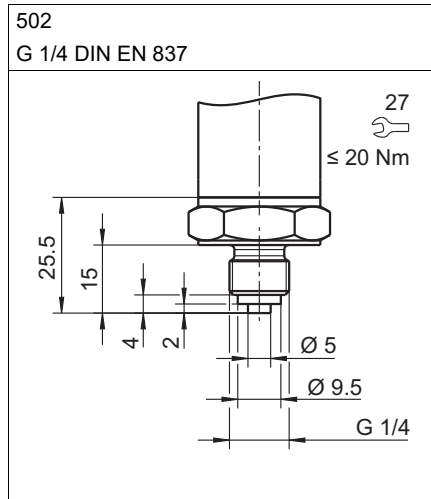
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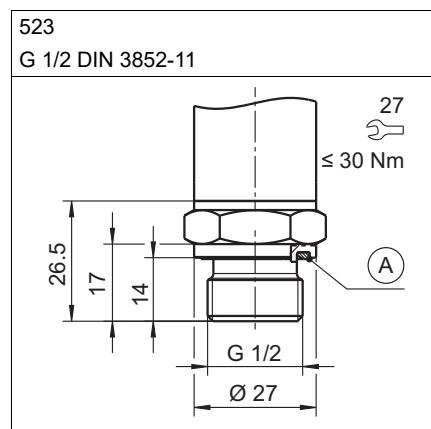
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 Internet: www.jumousa.com



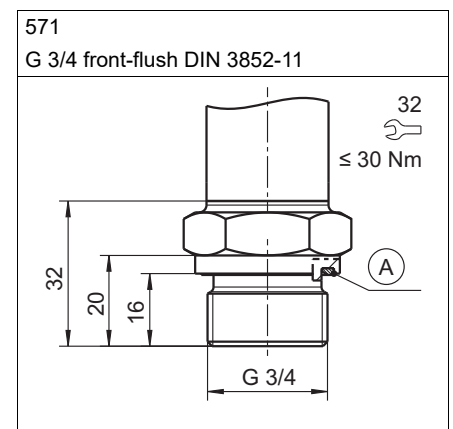
Process connections



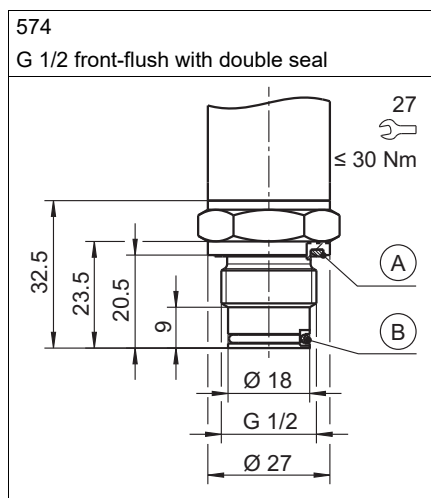
A Profile seal G 1/4



A Profile seal G 1/2

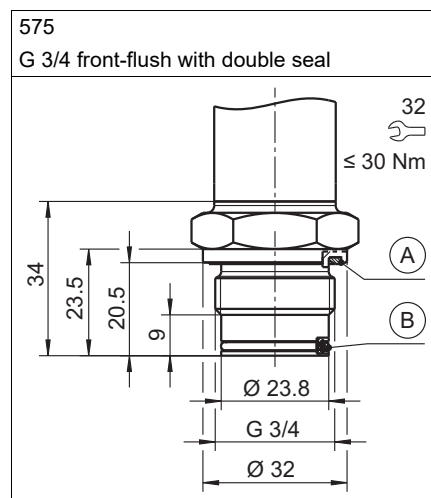


A Profile seal G 3/4



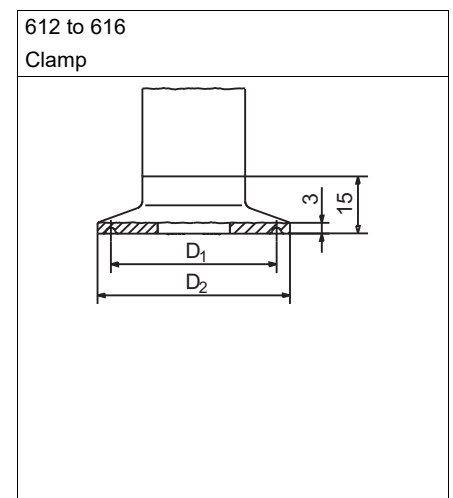
A Profile seal G 1/2

W O-ring 15.1 × 1.6



A Profile seal G 3/4

W O-ring 20.35 × 1.78



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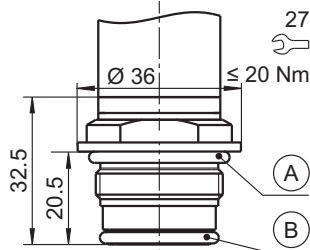
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997

JUMO PEKA



A O-ring 26 × 2.5

W O-ring 21 × 2.5

Hygienic process connection for adapter
system JUMO PEKA (data sheet 409711)

Process connection	DN DIN 32676	DN (Zoll)	Nominal size ISO 2852	Ø D ₁	Ø D ₂
612	10 15 20		12 12.7 17.2 21.3	27.5	34
613	25 32 40	1" 1.5"	25 33.7 38	43.5	50.5
616	50	2"	40 51	56.5	64

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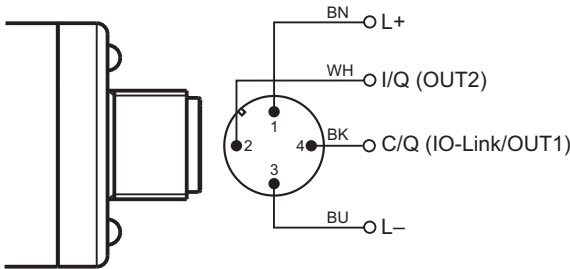

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Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Connection	Terminal assignment	
		
	M12 x 1 round plug (A-coded, non-rotating)	
Switch operation		
Voltage supply ^a DC 9.6 to 32 V	1 BN (brown) ^b 3 BU (blue)	L+ L-
Switching output 1	4 BK (black)	C/Q = OUT1
Switching output 2	2 WH (white)	I/Q = OUT2
IO-Link operation		
Voltage supply ^a DC 18 to 32 V	1 BN (brown) 3 BU (blue)	L+ L-
IO-Link	4 BK (black)	C/Q = IO-Link
Switching output 2	2 WH (white)	I/Q = OUT2
Potential equalization		
Functional bonding conductor FB ^c		

^a The auxiliary energy of the pressure sensor must meet SELV requirements. Furthermore, the device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^b The colour coding is **only** valid for A-coded standard cables!

^c The pressure sensor must be connected to the plant's potential equalization system via the process connection.

NOTE!

When using the device with UL approval, the user must make sure that the accessory he uses is also approved for a UL application (e. g. cable with UL approval AVL2/8 and/or cable with UL approval CYJV/7 or CYJV/8 or PVVA/7 or PVVA2/8, in each case approved for ambient temperatures > 90 °C).

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Connection examples

IO-Link operation with 1 switching output	Switch operation with 2 switching outputs
<p>p switching (PNP)</p>	<p>p switching (PNP)</p>
<p>n switching (NPN)</p>	<p>n switching (NPN)</p>

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Order details

(1) Basic type	
402058	JUMO dTRANS p35 – pressure sensor with IO-Link
(2) Basic type extension	
000	None
999	Special version
(3) Input	
447	-400 to +400 mbar relative pressure
449	-1 bar to +1 bar relative pressure
473	-1 bar to +2.5 bar relative pressure
482	-1 bar to +5 bar relative pressure
526	-1 bar to +12 bar relative pressure
527	-1 bar to +30 bar relative pressure
515	-1 bar to +100 bar relative pressure
508	-1 bar to +250 bar relative pressure
509	-1 bar to +400 bar relative pressure
516	-1 bar to +600 bar relative pressure
488	0 bar to 1 bar absolute pressure
490	0 bar to 2.5 bar absolute pressure
500	0 bar to 5 bar absolute pressure
501	0 bar to 12 bar absolute pressure
503	0 bar to 30 bar absolute pressure
507	0 bar to 100 bar absolute pressure
(4) Output	
458	IO-Link measured value transmission, including digital output
(5) Process connection	
502	G 1/4 DIN EN 837
504	G 1/2 DIN EN 837
511	1/4-18 NPT DIN EN 837
521	G 1/4 DIN 3852-11
523	G 1/2 DIN 3852-11
571	G 3/4 front-flush DIN EN ISO 228-1 ^a
574	G 1/2 front-flush with double seal ^a
575	G 3/4 front-flush with double seal ^a
612	Clamp DN 10/15/20 according to DIN 32676 ^b
613	Clamp DN 25/32/40 according to DIN 32676 ^b
616	Clamp DN 50 (2") according to DIN 32676 ^b
997	JUMO PEKA hygienic process connection ^a
999	Other process connections upon request
(6) Process connection material	
20	Stainless steel 316L
(7) Electrical connection	
36	Round plug M12 × 1
(8) Extra code	
061	With UL approval
100	Customer-specific configuration (specifications in plain text)
591	Restrictor in the pressure channel ^c
631	Improved moisture and vibration protection

^a The process connection can only be supplied for inputs (measuring range) up to 100 bar.

^b The process connections 612, 613 and 616 are only available for measuring span up to 25 bar.

^c Restrictor only for non-front-flush process connections.

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	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
Order code	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
Order example	402058	/	000	-	526	-	458	-	504	-	20	-	36	/	061

Scope of delivery

Designation
1 pressure sensor in the ordered version
1 installation instructions

Accessories

Designation
IO-Link master upon request
Device data (IODD) on www.jumo.de or on http://ioddfinder.io-link.com



JUMO Wtrans p

Pressure Transmitter with Wireless Data Transmission

Brief description

The pressure transmitter with wireless data transmission Wtrans p is intended for industrial applications. It is used in combination with a Wtrans receiver for stationary or mobile recording of the pressure in liquefied or gaseous media. The pressure transmitter operates according to the strain gauge measuring principle.

The measured values are transmitted wirelessly to the receiver of the Wtrans system. The measured values are displayed on the receiver and are available at the RS485 interface in digital form as well as in electrical standard signals at the analog outputs. Optionally, different alarms can be signaled at the receiver with two relay outputs.

The pressure transmitter can be installed in any installation position. Optimum alignment with the receiver must be ensured. The ambient temperature range in which the device can be used is from -30 to +85 °C.

The transmission frequency of the Wtrans measuring system is 868.4 MHz (Europe). This frequency is almost impervious to external interference and allows data to be transmitted even in harsh industrial environments. When using the antenna holder for wall mounting with the 3 m antenna cable for the receiver, the open air range is up to 300 m.

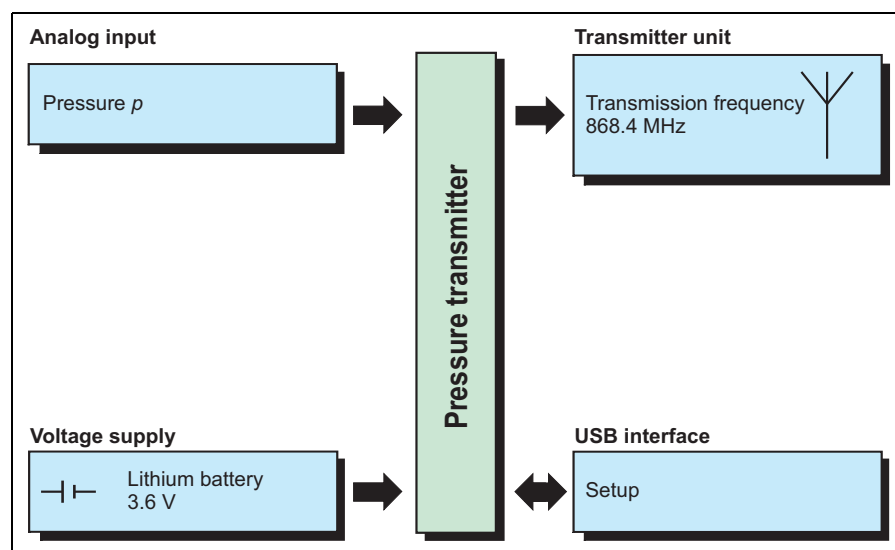
A 3.6 V lithium battery (size C) is used to supply voltage to the pressure transmitter.

A setup program is available as an accessory for easy configuration and parameterization of the pressure transmitter and the Wtrans receiver on the laptop/PC. As an optional extra, the On-lineChart function can be used to record the measured values on the laptop/PC.



Type 402060

Block diagram



Special features

- Transmission frequency 868.4 MHz (Europe)
- Open air range up to 300 m
- Configurable transmitter detection
- Battery status monitoring
- High moisture and vibration resistance
- Configurable via easy-to-use setup program
- OnlineChart of the measured values

Additional Wtrans transmitters

- Data sheet 707060
- Data sheet 902928
- Data sheet 902930

Suitable Wtrans receivers

- Data sheet 902931

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Technical data

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at		Long-term stability ^b	Overload capacity ^c	Burst pressure
bar	% MSP	20 °C ^d % MSP	-20 to +80 °C ^e % MSP	% MSP per year	bar	bar
0 bar to 0.25 bar relative pressure	0.3	0.7	2.0	≤ 0.2	1	1.5
0 bar to 0.4 bar relative pressure	0.3	0.7	1.8		1.6	2.4
0 bar to 0.6 bar relative pressure	0.3	0.6	1.8		2.4	3.6
0 bar to 1 bar relative pressure	0.3	0.5	1.3		4	6
0 bar to 1.6 bar relative pressure	0.25	0.5	1.3		6.4	9.6
0 bar to 2.5 bar relative pressure	0.25	0.5	1.2		10	15
0 bar to 4 bar relative pressure	0.25	0.5	1.2		16	24
0 bar to 6 bar relative pressure	0.25	0.5	1.2		24	36
0 bar to 10 bar relative pressure	0.25	0.5	1.0		40	60
0 bar to 16 bar relative pressure	0.2	0.5	1.0		64	96
0 bar to 25 bar relative pressure	0.2	0.5	1.0		100	150
0 bar to 40 bar relative pressure	0.2	0.5	1.0		160	240
0 bar to 60 bar relative pressure	0.2	0.5	1.0		240	360
0 bar to 100 bar relative pressure	0.2	0.5	1.0		400	600
0 bar to 160 bar relative pressure	0.3	0.7	1.2		320	800
0 bar to 250 bar relative pressure	0.3	0.7	1.2		500	1250
0 bar to 400 bar relative pressure	0.3	0.7	1.2		600	1200
0 bar to 600 bar relative pressure	0.3	0.7	1.2		900	1800
-1 bar to 0 bar relative pressure	0.3	0.5	1.3		4	5
-1 bar to +0.6 bar relative pressure	0.3	0.5	1.3		2.4	3
-1 bar to +1.5 bar relative pressure	0.3	0.5	1.2		6	7.5
-1 bar to +3 bar relative pressure	0.3	0.5	1.2		12	15
-1 bar to +5 bar relative pressure	0.25	0.5	1.2		20	25
-1 bar to +9 bar relative pressure	0.25	0.5	1.0		36	45
-1 bar to +15 bar relative pressure	0.25	0.5	1.0		60	75
-1 bar to +24 bar relative pressure	0.2	0.5	1.0		96	120
0 bar to 0.6 bar absolute pressure	0.3	0.6	1.8		2.4	3
0 bar to 1 bar absolute pressure	0.3	0.5	1.3		4	5
0 bar to 1.6 bar absolute pressure	0.25	0.5	1.3		6.4	8
0 bar to 2.5 bar absolute pressure	0.25	0.5	1.2		10	12.5
0 bar to 4 bar absolute pressure	0.25	0.5	1.2		16	20
0 bar to 6 bar absolute pressure	0.25	0.5	1.2		24	30
0 bar to 10 bar absolute pressure	0.25	0.5	1.0		40	50
0 bar to 16 bar absolute pressure	0.2	0.5	1.0		64	80
0 bar to 25 bar absolute pressure	0.2	0.5	1.0		100	125

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c All pressure transmitters are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring span (MSP)

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring span (MSP), thermal effect on measuring range start and measuring span (MSP)

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Output (radio transmission)

Transmitter detection (transmitter ID)	Max. 5-digit ID, default setting, customer-specific configuration possible
Transmission interval	Adjustable from 0.5 to 3600 s (default setting 5 s)
Transmission frequency	868.4 MHz (Europe)
Transmission power	< +10 dBm
Open air range	Max. 300 m when using the antenna holder for wall mounting for the receiver and the 3-meter antenna cable. When mounting the antenna directly to the receiver, a reduction in the range of approx. 40 % must be taken into account.
Unit of the output signal	bar (configurable)
Configuration	With setup program
Configurable parameters	Transmitter detection (max. 5-digit ID), transmission interval, and offset

Electrical data

Voltage supply	Rated voltage: 3.6 V, rated capacity: 3.6 Ah (size C)
Lithium battery (accessory)	
Battery operating life	Approx. 1 year with default settings: Transmission interval = 5 s and room temperature (approx. 20 °C); shorter transmission interval and high or low ambient temperature reduce the battery operating life.

Environmental influences

Operating temperature range	-30 to +85 °C
Measuring material temperature range	-30 to +85 °C
Storage temperature range	-30 to +85 °C
Site altitude	Max. 2000 m above sea level
Climate class	Class 3K8H according to DIN EN 60721-3-3 (Air temperature: -25 to +70 °C, relative humidity: 10 to 100 %)
Vibration resistance	Max. 5 g, 15 to 2000 Hz according to DIN EN 60068-2-6 20 g for 11 ms according to DIN EN 60068-2-27 50 g for 1 ms according to DIN EN 60068-2-27
Shock resistance	
Electromagnetic compatibility (EMC)	DIN EN 61326-1
Interference emission	Class B - households and small businesses -
Interference immunity	Industrial requirement
Radio frequency spectrum	ETSI EN 300 220-1 and ETSI EN 300 220-2
Protection type	IP66 or IP67

Mechanical features

Housing material	PA, transparent (UV-resistant)
Case seal material	VMQ
Pressure sensor material	Stainless steel 17-4 PH at 0 to 160 bar, 0 to 250 bar, 0 to 400 bar, and 0 to 600 bar; Stainless steel 316 L at all other pressure ranges
Process connection material	Stainless steel 316Ti; Stainless steel 316 L with surface roughness Ra < 0.8 µm for JUMO PEKA hygienic process connection
Cleaning	The device can be cleaned with conventional washing, rinsing, and cleaning agents.
Installation position	Any (with due consideration of the application) (can be used inside and outside of buildings)
Weight	Approx. 250 g (with lithium battery and process connection 504: G 1/2 DIN EN 837)

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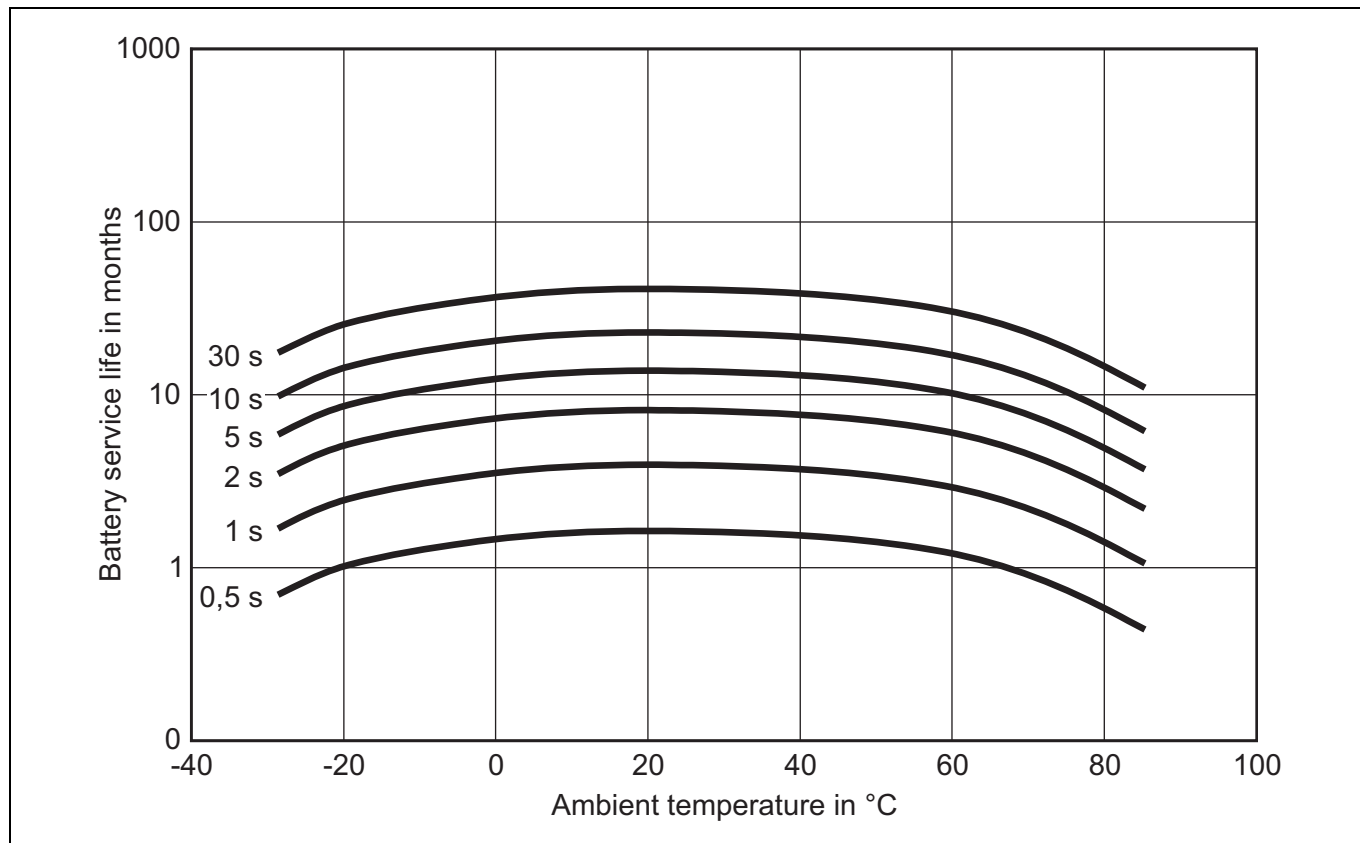
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Battery operating life

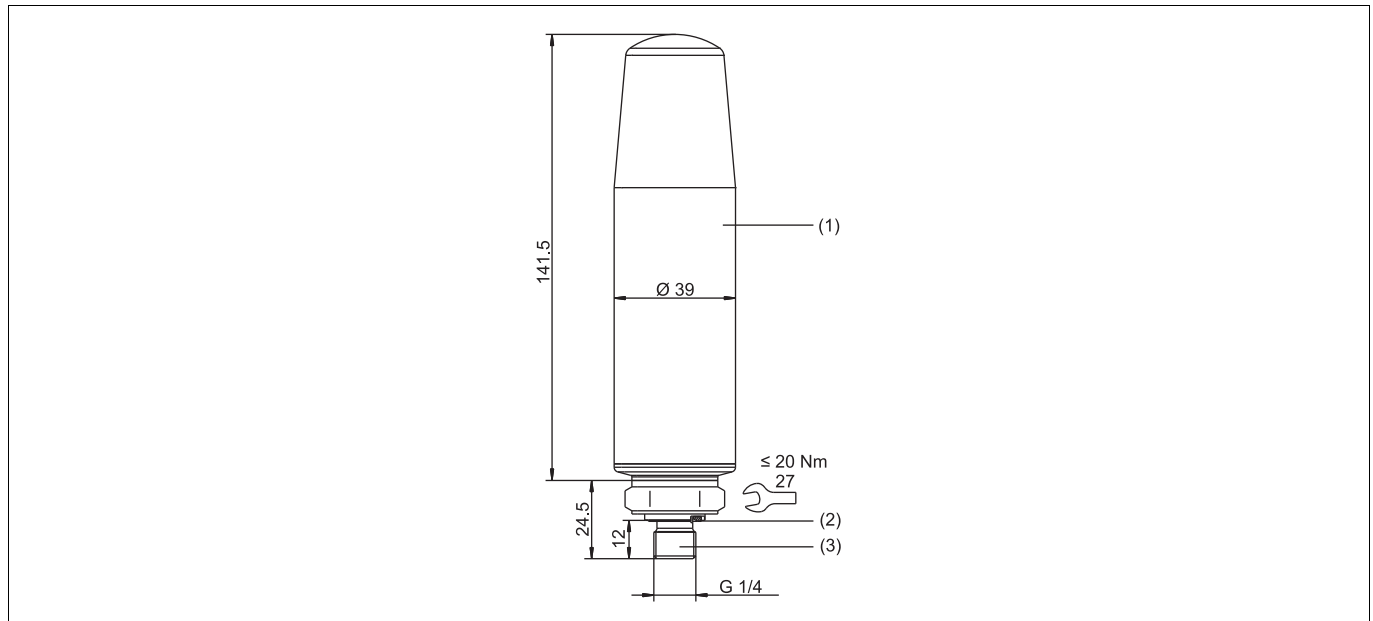
The following figure shows the battery service life for the lithium battery available in the accessories depending on the transmission interval (0.5 s, 1 s, 2 s, 5 s, 10 s, and 30 s) and the ambient temperature.





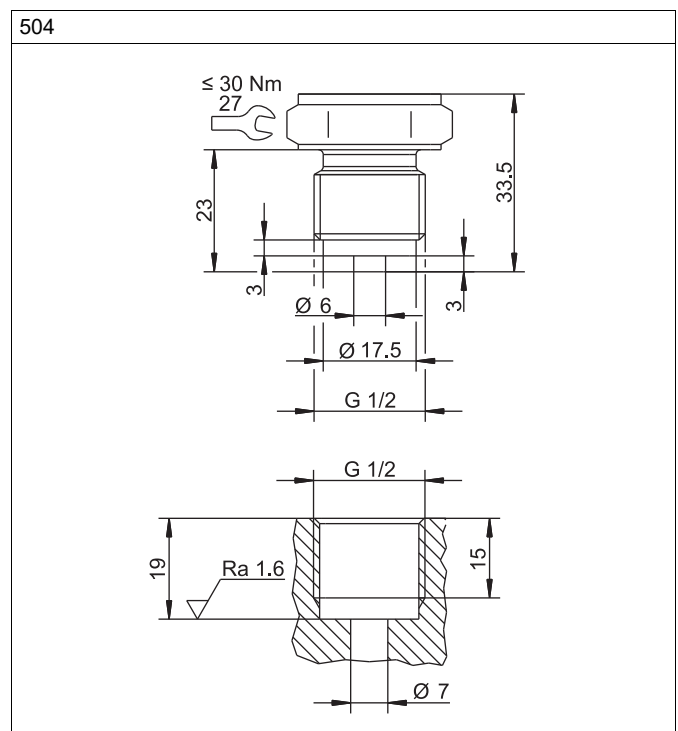
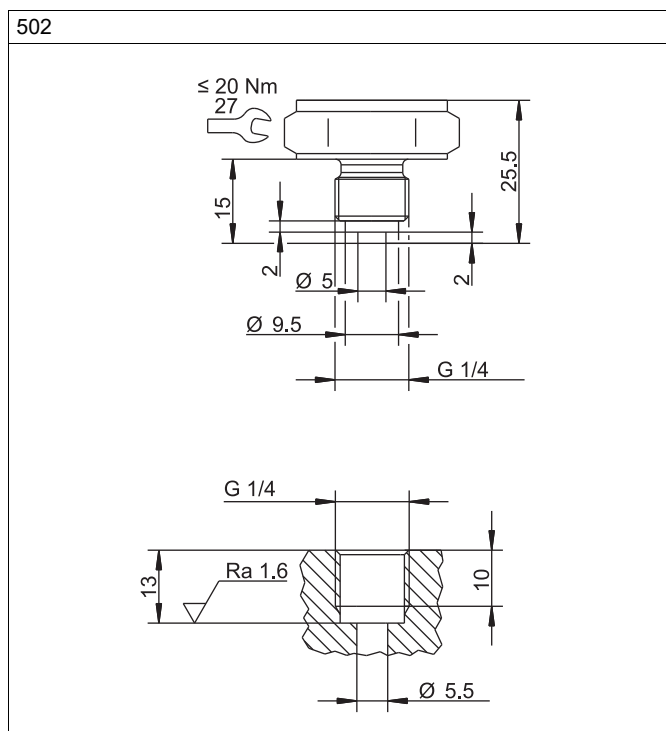
Dimensions and process connections

Pressure transmitter with wireless data transmission



- (1) Housing – tighten hand-tight (10 ± 5 Nm)
- (2) Profile seal G 1/4
- (3) Process connection

Process connections



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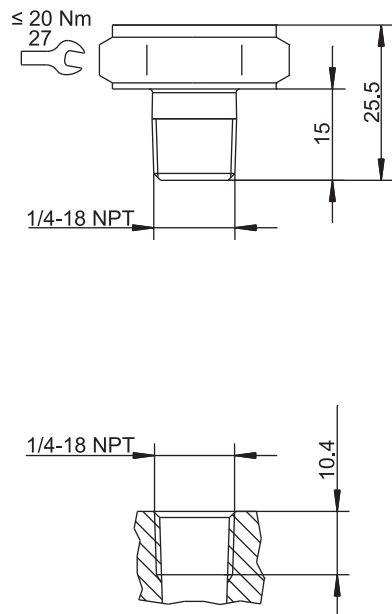
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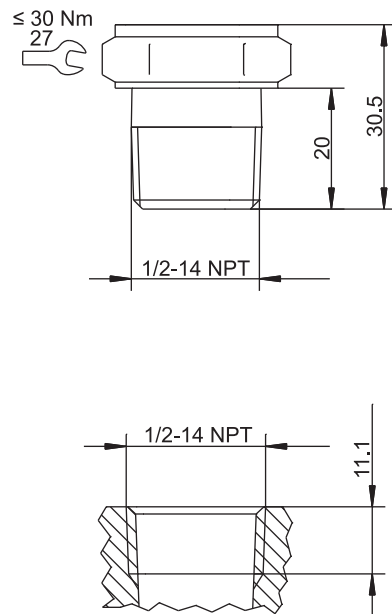
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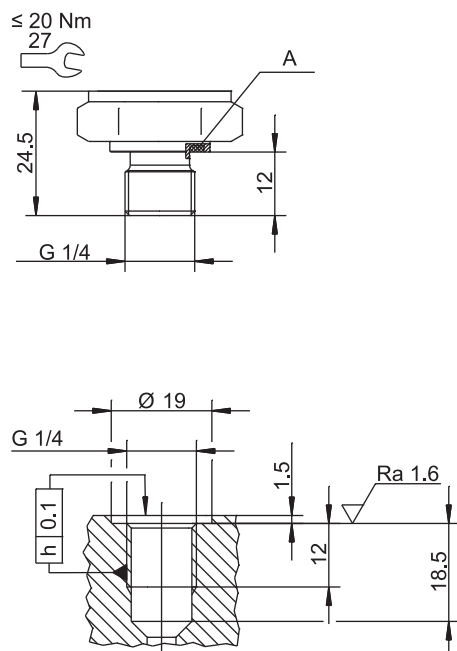
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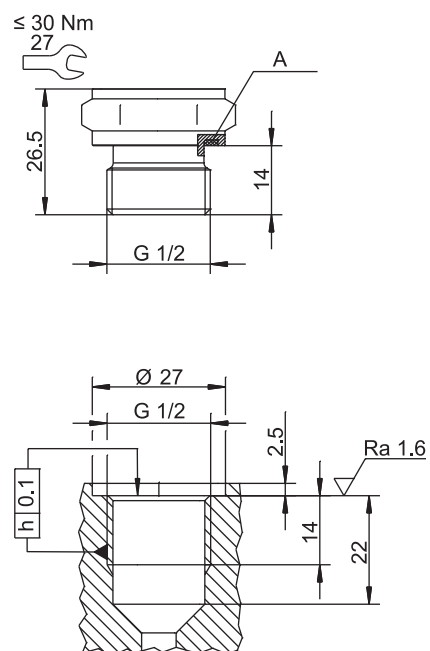


521



A Profile seal G 1/4

523



A Profile seal G 1/2

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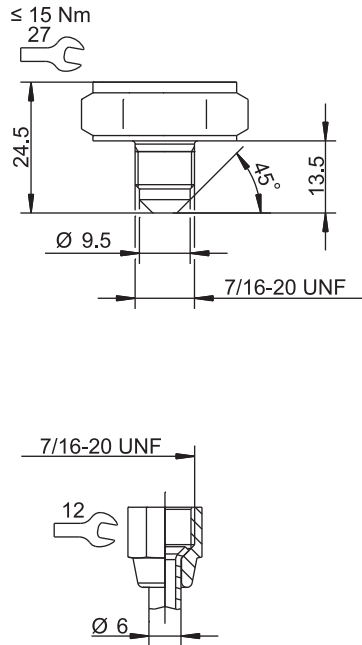
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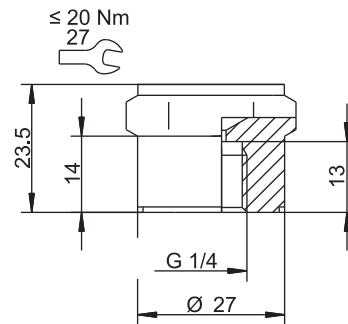
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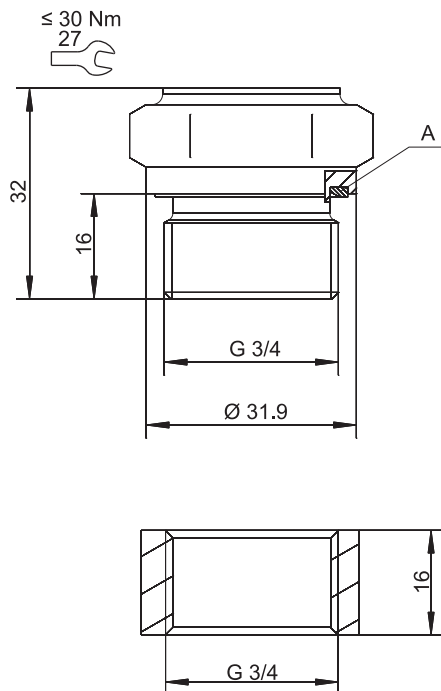
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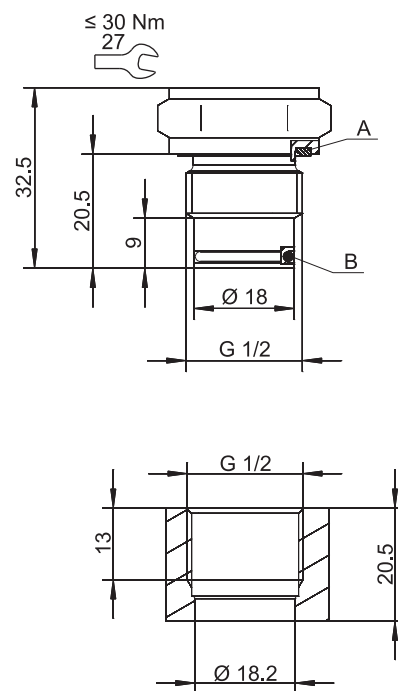


571



A Profile seal G 3/4

574



A Profile seal G 1/2

B O-ring 14 × 1.78

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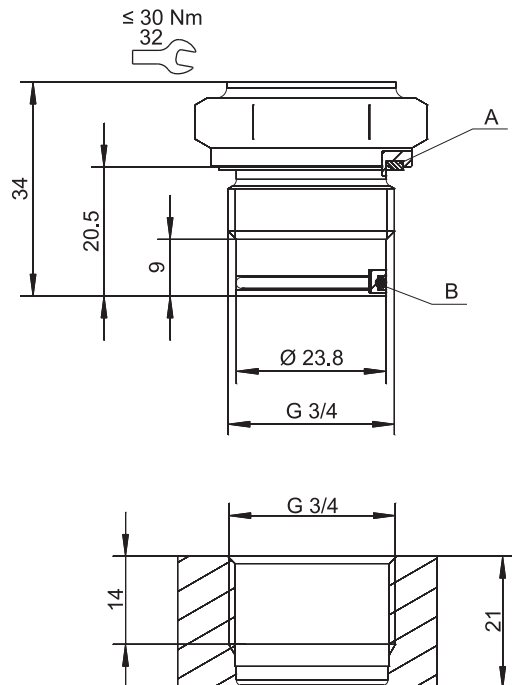
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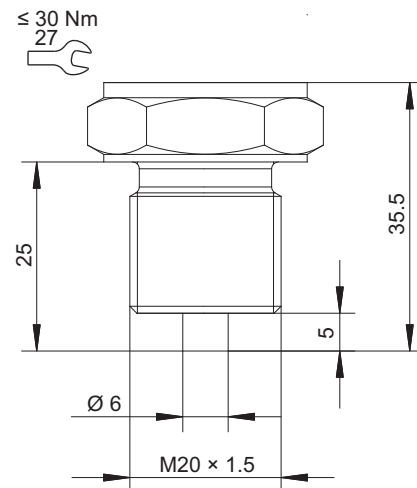


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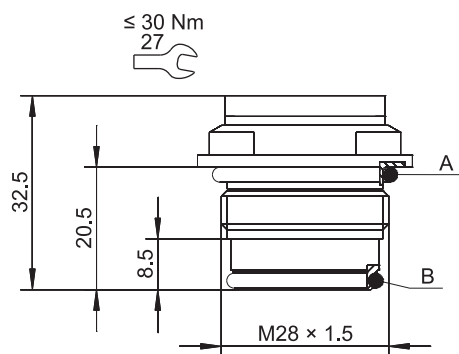


- A Profile seal G 3/4
B O-ring 20.35 × 1.78

583



997



- A O-ring 26 × 2.5
B O-ring 21 × 2.2
JUMO PEKA hygienic process connection (data sheet 409711)

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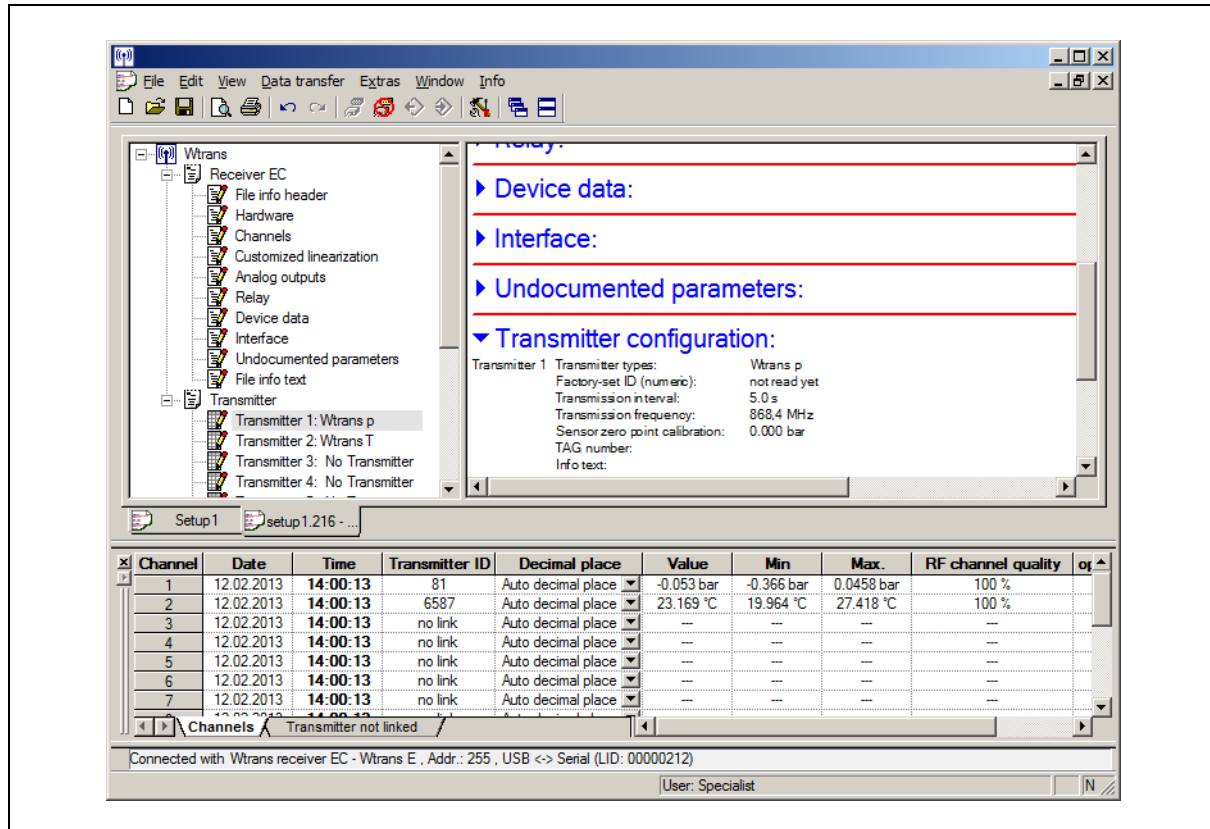
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Setup program

The setup program enables the pressure transmitter to be configured using a PC. The configuration data can be archived on data storage devices and printed.


The setup program can be used to overwrite changed parameters with the factory settings at any time. The connection between the transmitter and the PC is established via a USB interface.



Configurable parameters	Default settings
Transmitter detection (transmitter ID)	Consecutive
Transmission interval	5 s
Offset	0 bar
TAG number (20-digit)	Customer-specific specifications
Installation date	Current date

PC interface

The USB interface is designed only to configure the pressure transmitter. Continuous operation is not admissible.

Connection for	Type	Terminal assignment
USB connection to the PC	USB interface (Mini-B; "Full-Speed")	Standard (5-pin) 

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Order details

	(1) Basic type
402060	Wtrans p pressure transmitter with wireless data transmission
	(2) Basic type extension
000	None
999	Special version
	(3) Input (measuring range)
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
464	0 to 100 bar relative pressure
465	0 to 160 bar relative pressure
466	0 to 250 bar relative pressure
467	0 to 400 bar relative pressure
468	0 to 600 bar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
487	0 to 0.6 bar absolute pressure
488	0 to 1 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
998	Special measuring range for absolute pressure
999	Special measuring range for relative pressure
	(4) Transmission frequency
10	868.4 MHz (Europe)
	(5) Process connection
502	G 1/4 DIN EN 837
504	G 1/2 DIN EN 837
511	1/4-18 NPT DIN EN 837

JUMO TAROS S46 H

Pressure Transmitter

Applications

- Food and beverage industry
- Sterilization and autoclaves
- Biogas and bioethanol manufacturing
- Pharmaceuticals, medicine, and biotechnology

Brief description

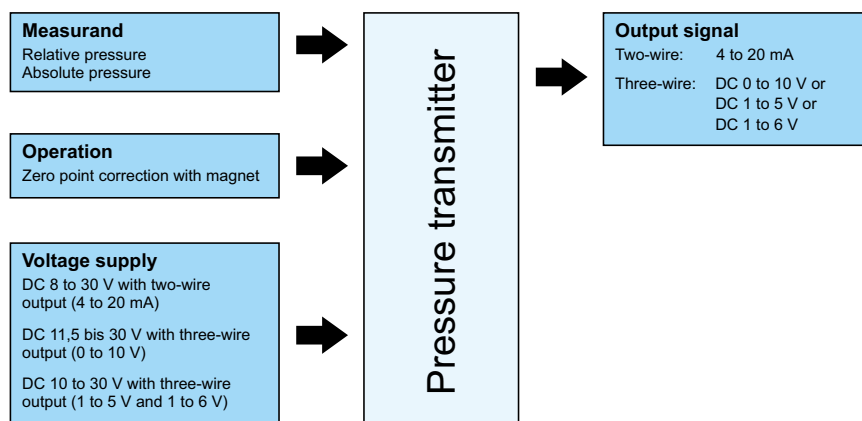
The pressure transmitter is used to acquire relative and absolute pressures in liquid and gaseous media.

The JUMO TAROS S46 H with analog output signal has been developed specifically for hygienic applications. The pressure transmitter has a pressure measuring cell with a piezoresistive silicon sensor. The pressure is converted into an electrical current or voltage signal and output via various electrical connections.

A built-in magnetoresistive switch (MRS) enables the user to adjust the zero point of the device externally using a magnet.

The pressure transmitter is EAC-compliant and UL-approved¹. It is certified according to EHEDG in the versions with the process connections clamp, VARIVENT®, and JUMO PEKA.

Block diagram



Type 402071

Special features

- High degree of accuracy
- For hygienic applications
- A large selection of process connections and electrical connections
- Zero point adjustment using a magnet
- Autoclave-compatible version available
- Average roughness value $R_a \leq 0.8 \mu\text{m}$ for parts coming into contact with the medium
- Each device has its own calibration certificate

¹ The approval stipulates use of the transmitter indoors only. All surfaces are made from stainless steel in the versions with electrical **connection 36** (round plug M12 × 1) and electrical **connection 75** (terminal head). These versions of the transmitter are also suitable for outdoor use.

Approvals and approval marks (see technical data)



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Technical data

Mechanical features

Materials of parts coming into contact with the pressurized medium	
Membrane	Stainless steel 1.4435 (316 L)
O-ring/sealing ring	FPM, others available as an optional extra (e.g. EPDM, VMQ)
Process connection	Stainless steel 1.4404 (316 L)
Welding ring	Stainless steel 1.4404 (316 L)
Materials of other parts	
Housing	Stainless steel 1.4301 (304)
Cover cap M12 × 1 ^a	Stainless steel 1.4301 (304)
Electrical connection	
Attached cable	Cable fitting made from stainless steel 1.4301 (304); PUR cable with and without pressure compensation
Round plug M12 × 1	Threaded bushing made from stainless steel 1.4301 (304)
Cable socket	Holding ring/connector fastener made from high-quality plastic, comparable with PBT GF30 V0
Terminal head	Stainless steel 1.4301 (304); cable fitting: stainless steel
Rated position	Upright, with downward process connection
Operating position	Any, but there may be a zero offset relative to the rated position

^a Included on autoclave-compatible variant.

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Measuring range and accuracy

Measuring range	Linearity ^a % MSP ^f	Accuracy at			Long-term stability ^b % MSP per year	Overload capability ^c bar	Burst pressure bar
		20 °C ^d % MSP	-20 to +80 °C ^e % MSP	-20 to +100 °C % MSP			
-1 to 0 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	10	20
-1 to +0.6 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	10	20
-1 bar to +1 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	10	20
-1 to +1.5 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	20	40
-1 to +3 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	25	50
-1 to +5 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
-1 to +9 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
-1 to +15 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
-1 to +24 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
-0.4 to +0.4 bar relative pressure	0.15	0.4	1	1.2	≤ 0.2	10	20
-0.1 to +0.1 bar relative pressure	0.2	0.5	1	1.2	≤ 0.2	6	10
0 to 0.1 bar relative pressure	0.25	0.75	1.2	---	≤ 0.2	1.5	3
0 to 0.16 bar relative pressure	0.25	0.75	1.2	1.5	≤ 0.2	6	10
0 to 0.25 bar relative pressure	0.25	0.5	1	1.2	≤ 0.2	6	10
0 to 0.4 bar relative pressure	0.15	0.4	1	1.2	≤ 0.15	10	20
0 to 0.6 bar relative pressure	0.15	0.4	1	1.2	≤ 0.15	10	20
0 to 1 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	10	20
0 to 1.6 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	20	40
0 to 2.5 bar relative pressure	0.15	0.3	1	1.2	≤ 0.1	20	40
0 to 4 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	25	50
0 to 6 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
0 to 10 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
0 bar to 16 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
0 bar to 25 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
0 bar to 40 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	300	400
0 bar to 60 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	300	400
0 bar to 100 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	300	400
0 to 0.6 bar absolute pressure	0.15	0.4	1	1.2	≤ 0.15	10	20
0 to 1 bar absolute pressure	0.15	0.3	1	1.2	≤ 0.15	10	20
0 to 1.6 bar absolute pressure	0.15	0.3	1	1.2	≤ 0.15	20	40
0 to 2.5 bar absolute pressure	0.15	0.3	1	1.2	≤ 0.1	20	40
0 to 4 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	25	50
0 to 5 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	25	50
0 to 6 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
0 to 10 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
0 to 16 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
0 to 25 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
0 to 40 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	200	300

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c All measuring ranges are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range start value (offset) and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range start value (offset) and measuring range end value, thermal effect on measuring range start (offset) and measuring span

^f MSP = measuring span

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Electrical data

Voltage supply ^a	
2-wire circuit ^b	
4 to 20 mA	DC 8 to 30 V, nominal voltage DC 24 V
3-wire ^c	
DC 0 to 10 V	DC 11.5 V to 30 V, nominal voltage DC 24 V
DC 1 to 5 V	DC 10 V to 30 V, nominal voltage DC 24 V
DC 1 to 6 V	DC 10 V to 30 V, nominal voltage DC 24 V

^a The auxiliary energy of the pressure transmitter must meet SELV requirements. Furthermore, the device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^b Maximum current consumption ≤ 25 mA.

^c Maximum current consumption ≤ 5 mA.

Burden/load ^a	
2-wire circuit	
4 to 20 mA	$R_L \leq (U_B - 8 \text{ V}) \div 0.02 \text{ A } (\Omega)$
3-wire	
DC 0 to 10 V	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 5 V	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 6 V	$R_L \geq 10 \text{ k}\Omega$

^a Maximum effect < 0.5 %.

Behavior if measured value is out of range	Error signal in the case of	NAMUR exceedance, linear
Two-wire		
4 to 20 mA	≤ 3.6 mA and ≥ 21.5 mA	3.8 to 20.5 mA
Three-wire		
DC 0 to 10 V	10.7 V	0 to 10.5 V
DC 1 to 5 V	5.7 V	0.8 to 5.5 V
DC 1 to 6 V	6.7 V	0.8 to 6.5 V

Behavior after power on	Ready for operation after < 120 ms
Voltage supply influence	≤ 0.02 %/V
Reverse voltage protection	U_B to 0 V (all output variants)
Short-circuit resistance	S+ to 0 V (only voltage variants)
Overvoltage protection	The operating voltage must be restricted to max. 33 V
Step response of 90 % (according to DIN 16068 Point 3.3.8)	< 5 ms
Insulation resistance	> 100 MΩ at DC 500 V
Insulation voltage	AC 500 V

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Environmental influences

Admissible temperatures	Ambient temperature	Medium temperature	Storage temperature
with MSP ^a ≤ 0.4 bar	-20 to +85 °C	-20 °C to +125 °C	-20 to +100 °C
with MSP > 0.4 bar	-40 to +85 °C ^b	-40 to +125 °C ^c	-40 to +100 °C

^a MSP = measuring span

^b Autoclave-compatible version: ≤ 140 °C for maximum 30 minutes.

^c Use in CIP/SIP processes: maximum of 140 °C for 1 h/day without being destroyed.

Use in CIP/SIP processes	The transmitter will withstand a medium temperature of 140 °C for 1 h/day without being destroyed.
Autoclave-compatible version	
Device versions	Basic type extension 045, only with round plug M12 × 1
Sterilization conditions	Complete transmitter with screwed-on protective cap
Process duration	≤ 30 minutes
Sterilization temperature	≤ 140 °C
Ambient pressure during sterilization	≤ 3.6 bar absolute
Depending on how often the CIP/SIP cleaning or the autoclaving is carried out, the long-term stability may differ from the specifications given in the table on page 3.	

Resistance to climatic conditions	100 % relative humidity including condensation on the device's outer case; 90 % relative humidity without condensation
Degree of protection	According to DIN EN 60529
Types with attached cable	IP68 ^a (IP66/IP68)
Types with round plug M12 × 1	IP67 (IP66/IP67)
Types with cable socket	IP65
Types with terminal head	IP69 (IP66/IP69)
Admissible mechanical load	
Vibration resistance	20 g at 10 to 2000 Hz, 10 cycles per axis, device in X, Y, Z axis, industrial requirement according to IEC 60068-2-6
Shock resistance	50 g for 11 ms and 100 g for 1 ms, industrial requirement according to IEC 60068-2-27
Electromagnetic compatibility (EMC)	According to DIN EN 61326-2-3
Interference emission	Class A – only for industrial use –
Noise immunity	Industrial requirements
Process media	Liquid and gaseous media which are compatible with the materials of the parts coming into contact with the pressurized medium

^a For 1 h at a depth of 2 m.

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Approvals and approval marks

EHEDG Test facility Certificate/certification number Inspection basis Valid for	Research Center Weihenstephan for Brewing and Food Quality EL Class 1/EHEDG-C2000058 EHEDG design specifications (doc. 8 – Hygienic Design Principles) Process connection 613 Clamp DN 25, 32, 40 with Tri-Clamp seals Combifit International B.V. Process connection 616 Clamp DN 50 with Tri-Clamp seals Combifit International B.V. Process connection 685 VARIVENT® DN 32/25 with EPDM O-ring Process connection 686 VARIVENT® DN 50/40 with EPDM O-ring Process connection 997 JUMO PEKA with FKM O-ring
EAC Test facility Certificate/certification number Inspection basis Valid for	Промтехконтроль EAЭС N RU Д-DE.PA01.B.80830/21 TR TS 020/2011 All device versions
c UL us Test facility Certificate/certification number Inspection basis Valid for	Underwriters Laboratories E201387 UL 61010-1 (3rd Ed.), CAN/CSA-22.2 No. 61010-1 (3rd Ed.) All device versions with electrical connections 36, 61 and 75

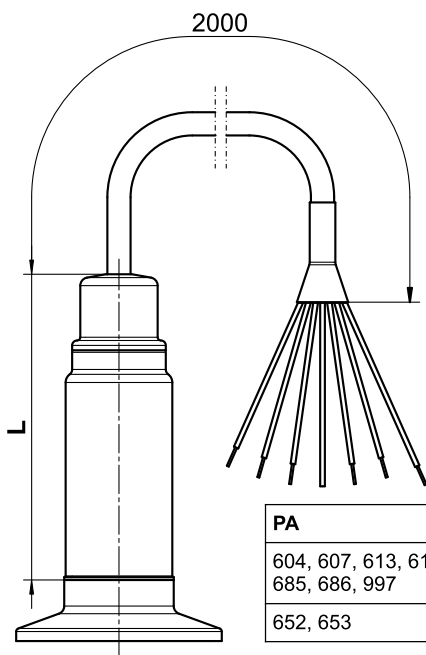


Dimensions

Transmitter with electrical connections

12

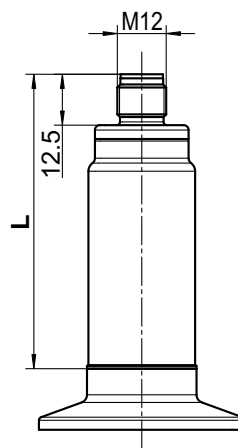
Attached cable, length of 2 m (standard)



PA	L (mm)
604, 607, 613, 616, 685, 686, 997	75
652, 653	50

36

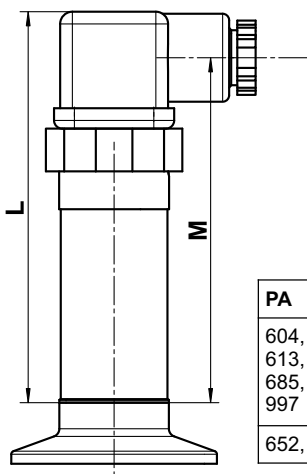
Round plug M12 × 1



PA	L (mm)
604, 607, 613, 616, 685, 686, 997	73
652, 653	48

61

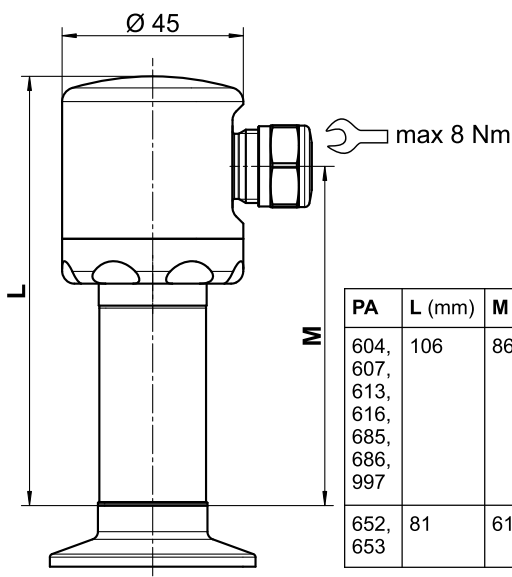
Line socket DIN EN 175301-803, form A



PA	L (mm)	M (mm)
604, 607, 613, 616, 685, 686, 997	96	85
652, 653	71	60

75

Terminal head



PA	L (mm)	M (mm)
604, 607, 613, 616, 685, 686, 997	106	86
652, 653	81	61

Cable fitting M16, seal area 5 to 11 mm

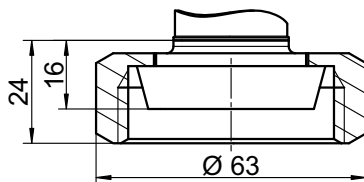
PA = process connection



Process connections

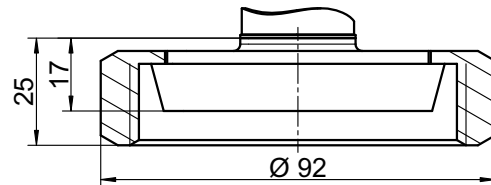
604

Taper socket with union nut DN 25



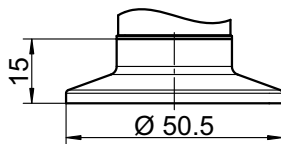
607

Taper socket with union nut DN 50



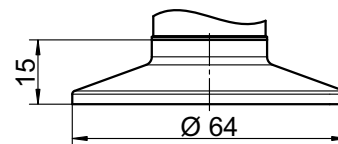
613

Clamping socket (clamp) DN 25, 32, 40



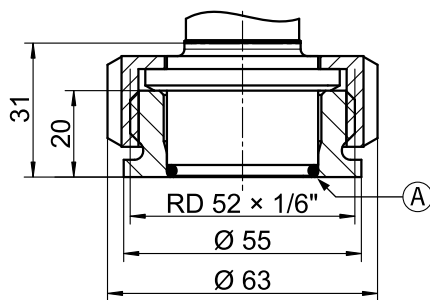
616

Clamping socket (clamp) DN 50



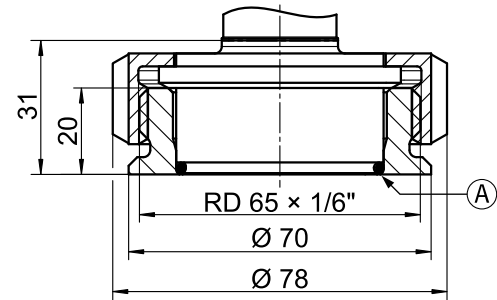
652

Tank connection with grooved union nut DN 25 (including welding socket)



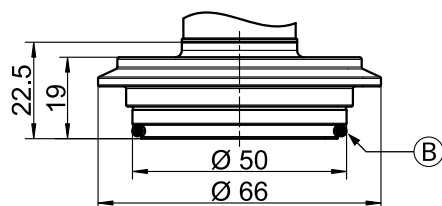
653

Tank connection with grooved union nut DN 40 (including welding socket)



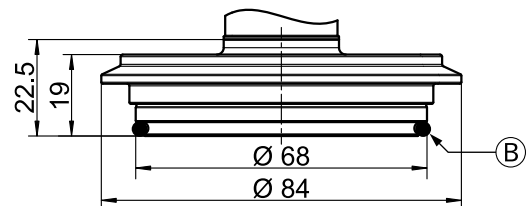
685

VARIVENT® connection DN 32/25



686

VARIVENT® connection DN 50/40



(A) Sealing ring, FPM

(B) Sealing ring, EPDM^a

^a EHEDG conformity according to "EHEDG Position Paper" is only ensured with EPDM.

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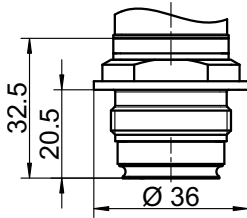
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**997**

JUMO PEKA

**NOTE**

Detailed specifications on the JUMO PEKA process connection system can be found in data sheet 409711.

Other process connections upon request!

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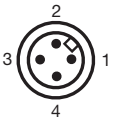
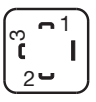
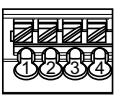


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Connection diagram

Transmitter

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment ^a			
					
		12 Attached cable	36 Round plug M12 × 1	61 Cable socket	75 Terminal head
4 to 20 mA, 2-wire (output 405)					
Voltage supply DC 8 to 30 V	U _B /S+	White	1	1	1
	0 V/S-	Black	3	2	2
DC 0 to 10 V, 3-wire (output 415)					
Voltage supply DC 11.5 V to 30 V	U _B	White	1	1	1
	0 V/S-	Black	2	2	2
	S+	Yellow	3	3	3
DC 1 to 5 V, three-wire (output 418) DC 1 to 6 V, three-wire (output 420)					
Voltage supply DC 10 to 30 V	U _B	White	1	1	1
	0 V/S-	Black	2	2	2
	S+	Yellow	3	3	3
Functional bonding conductor FB ^b (all output variants)		Shield/green	4		4

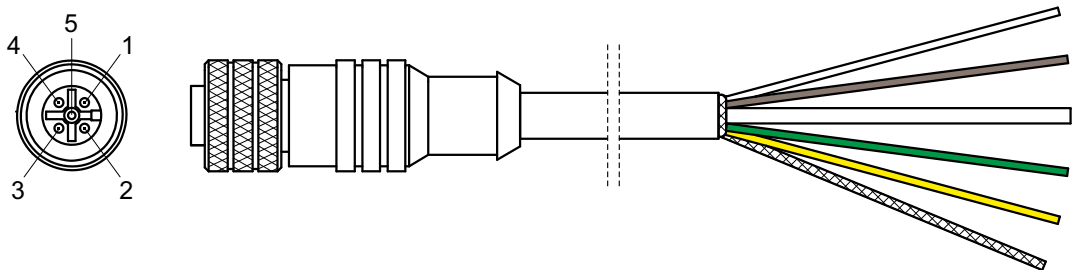
^a Figure: Connection to the pressure transmitter

^b As a basic principle, the device is grounded via the process connection. Alternatively, the device can also be grounded via the electrical connection on all variants. However, grounding via both the process connection **and** the electrical connection is not admissible.

Admissible effect on the "attached cable" variant	
Smallest bending radius (fixed)	40 mm
Max. tensile force on the cable	20 N

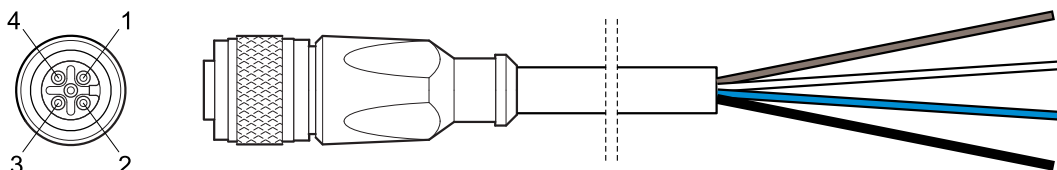
Accessories

Cable socket M12×1 with pressure compensation (part no. 00512341)

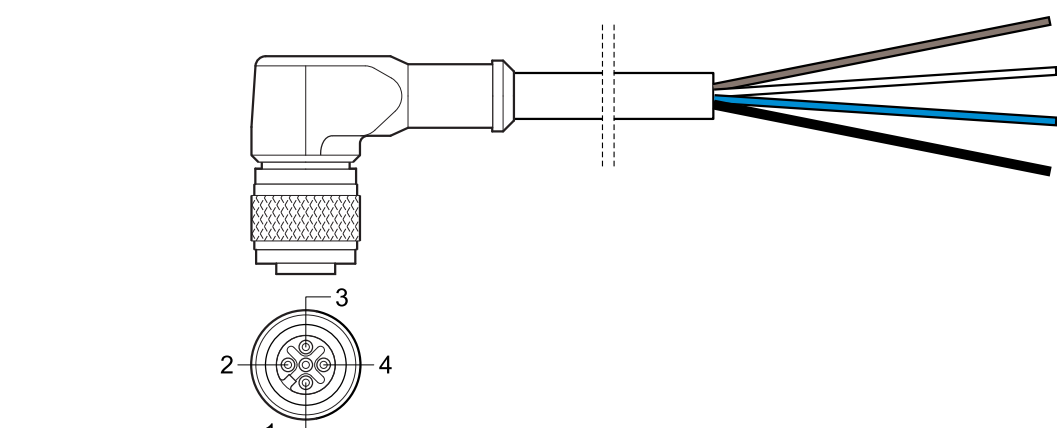
Figure	Pin	Color
	1	White
	2	Brown
	5 ^a	Colorless
	3	Green
	4	Yellow
	Shielding	

^a Hose for pressure equalization.

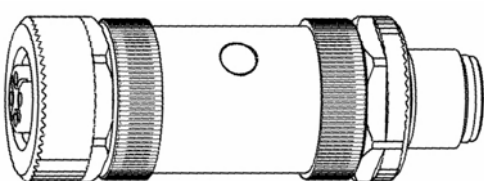
Line socket, 4-pole, M12 × 1, without pressure compensation, straight (part no. 00404585)

Figure	Pin	Color
	1	Brown
	2	White
	3	Blue
	4	Black

Line socket, 4-pole, M12 × 1, without pressure compensation, angled (part no. 00409334)

Figure	Pin	Color
	1	Brown
	2	White
	3	Blue
	4	Black

Pressure compensation adapter M12×1 (part no. 00739821)

Figure


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Order details

(1) Basic type	
402071	JUMO TAROS S46 H – pressure transmitter
(2) Basic type extension	
000	None
045	Autoclave-compatible version ^{a, b}
051	Relative-pressure version without zero point adjustment
999	Special version
(3) Input	
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
449	-1 to +1 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
428	-0.4 to +0.4 bar relative pressure
427	-0.1 to +0.1 bar relative pressure
425	0 to 0.1 bar relative pressure
426	0 to 0.16 bar relative pressure
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 bar to 16 bar relative pressure
461	0 bar to 25 bar relative pressure
462	0 bar to 40 bar relative pressure
463	0 bar to 60 bar relative pressure
464	0 bar to 100 bar relative pressure
487	0 to 0.6 bar absolute pressure
488	0 to 1 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
500	0 to 5 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
505	0 to 40 bar absolute pressure
998	Special measuring range for absolute pressure
999	Special measuring range for relative pressure

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(4) Output	
405	4 to 20 mA, 2-wire
415	DC 0 to 10 V, three-wire
418	DC 1 to 5 V, three-wire
420	DC 1 to 6 V, three-wire
(5) Process connection	
604	Taper socket with union nut DN 25, DIN 11851 (dairy pipe fitting) ^c
607	Taper socket with union nut DN 50, DIN 11851 (dairy pipe fitting) ^d
613	Clamping socket (clamp) DN 25, 32, 40, DIN 32676 ^e
616	Clamping socket (clamp) DN 50, DIN 32676, 2" ISO 2852 ^e
652	Tank connection with grooved union nut DN 25 ^c
653	Tank connection with grooved union nut DN 40 ^c
685	VARIVENT® connection DN 32/25
686	VARIVENT® connection DN 50/40
997	JUMO PEKA hygienic process connection
(6) Process connection material	
53	Stainless steel 1.4404/1.4435
(7) Electrical connection	
12	Attached cable, shielded, length of 2 m
36	Round plug M12 × 1
61	Line socket DIN EN 175301-803, form A
75	Terminal head
(8) Measuring system, filling medium	
01	Silicone oil
(9) Extra codes	
000	None
061	With UL approval ^f
374	Inspection certificate 3.1 EN 10204 – material
452	Parts wetted by medium electrolytically polished
462	Inverted output signal
624	Oil and grease free
870	Inspection certificate 3.1 EN 10204 – surface
871	Inspection certificate 3.1 EN 10204 – accuracy
872	Declaration of compliance with the order 2.1 EN 10204 – material
873	Declaration of compliance with the order 2.1 EN 10204 – surface
874	Declaration of compliance with the order 2.1 EN 10204 – accuracy
875	Declaration of compliance with the order 2.1 EN 10204 – data sheet

^a Only with round plug M12 × 1 (electrical connection 36).

^b If the devices work with relative pressure, the relative pressure is compensated using round plug M12 × 1. To ensure reliable pressure compensation, use a corresponding mating connector with pressure equalization hose in the cable (part no. 00512341). Alternatively, a pressure compensation adapter (part no. 00739821) can be used.

^c Only possible with measuring ranges up to 40 bar.

^d Only possible with measuring ranges up to 25 bar.

^e The maximum measuring range that can be used is based on the clamp's pressure stage.

^f Not possible with electrical connection 12 (attached cable).

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)
Order code		/		-		-		-		-		-		-		/	
Order example	402071	/	999	-	453	-	405	-	613	-	53	-	36	-	01	/	374,870

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Accessories

NOTE!

The following accessories are **not** UL-approved.

Item	Part no.
Cable socket, 4-pole, M12 × 1, straight, with 5 m PVC cable, with PA pressure equalization hose	00512341
Line socket, 4-pole, M12 × 1, straight, with 2-m PVC cable, without pressure compensation	00404585
Line socket, 4-pole, M12 × 1, angled, with 2-m PVC cable, without pressure compensation	00409334
Magnetic pin for simple adjustment of zero point	00736330
End cap M12 × 1 (for autoclave-compatible version)	00736095
Pressure compensation adapter M12 × 1	00739821

NOTE!

When using a transmitter with UL approval, the user must make sure that the accessory he uses is also approved for a UL application (e.g. cable with UL approval AVL2/8 and/or cable with UL approval CYJV/7 or CYJV/8 or PVVA/7 or PVVA2/8, in each case approved for ambient temperatures > 90 °C).

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JUMO TAROS S47 P

Pressure Transmitter

Applications

- Test equipment construction
- Calibration technology
- Plant construction and mechanical engineering
- Laboratories

Brief description

The pressure transmitter is used to acquire relative and absolute pressures in liquid and gaseous media.

The JUMO TAROS S47 P with an analog output signal has a pressure measuring cell with a piezoresistive silicon sensor. The pressure is converted into an electrical current or voltage signal and output via various electrical connections.

A built-in magnetoresistive switch (MRS) enables the user to adjust the zero point of the device externally using a magnet.

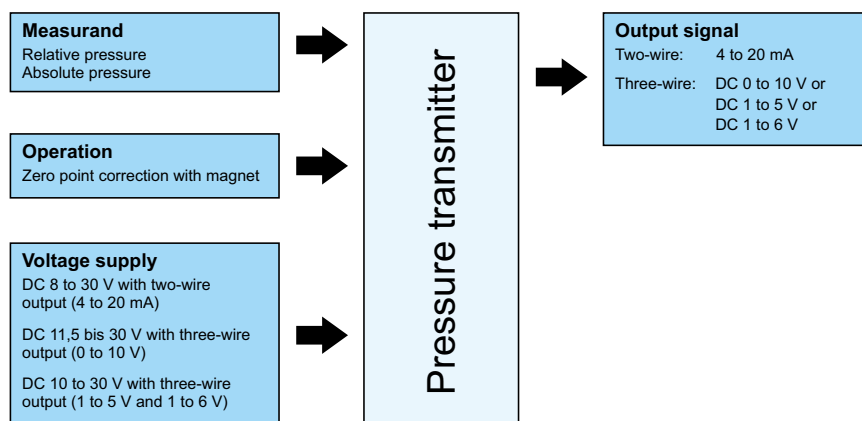
The pressure transmitter is EAC-compliant and UL-approved¹

¹ The approval stipulates use of the transmitter indoors only. All surfaces are made from stainless steel in the versions with electrical **connection 36** (round plug M12 × 1) and electrical **connection 75** (terminal head). These versions of the transmitter are also suitable for outdoor use.



Type 402072

Block diagram



Special features

- High degree of accuracy
- A large selection of process connections and electrical connections
- Zero point adjustment using a magnet
- Active temperature compensation
- Compact dimensions

Approvals and approval marks (see technical data)



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Technical data

Mechanical features

Materials of parts coming into contact with the pressurized medium	
Membrane	Stainless steel 1.4435 (316L)
O-ring/sealing ring	FPM, others available as an optional extra (e.g. EPDM, VMQ)
Process connection	Stainless steel 1.4571 (316Ti)
Welding ring	Stainless steel 1.4404 (316L)
Materials of other parts	
Housing	Stainless steel 1.4301 (304)
Electrical connection	
Attached cable	Cable fitting made from stainless steel 1.4301 (304); PUR cable with and without pressure compensation
Round plug M12 × 1	Threaded bushing made from stainless steel 1.4301 (304)
Line socket	Holding ring/connector fastener made from high-quality plastic, comparable with PBT GF30 V0
Terminal head	Stainless steel 1.4301 (304); cable fitting: stainless steel
Rated position	Upright, with downward process connection
Operating position	Any, but there may be a zero offset relative to the rated position

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Measuring range and accuracy

Measuring range	Linearity ^a % MSP ^f	Accuracy at			Long-term stability ^b % MSP per year	Overload capability ^c bar	Burst pressure bar
		20 °C ^d % MSP	-20 to +80 °C ^e % MSP	-20 to +100 °C % MSP			
-1 to 0 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	10	20
-1 to +0.6 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	10	20
-1 bar to +1 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	10	20
-1 to +1.5 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	20	40
-1 to +3 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	25	50
-1 to +5 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
-1 to +9 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
-1 to +15 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
-1 to +24 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
-0.4 to +0.4 bar relative pressure	0.15	0.4	1	1.2	≤ 0.2	10	20
-0.1 to +0.1 bar relative pressure	0.2	0.5	1	1.2	≤ 0.2	6	10
0 to 0.1 bar relative pressure	0.25	0.75	1.2	---	≤ 0.2	1.5	3
0 to 0.16 bar relative pressure	0.25	0.75	1.2	1.5	≤ 0.2	6	10
0 to 0.25 bar relative pressure	0.25	0.5	1	1.2	≤ 0.2	6	10
0 to 0.4 bar relative pressure	0.15	0.4	1	1.2	≤ 0.15	10	20
0 to 0.6 bar relative pressure	0.15	0.4	1	1.2	≤ 0.15	10	20
0 to 1 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	10	20
0 to 1.6 bar relative pressure	0.15	0.3	1	1.2	≤ 0.15	20	40
0 to 2.5 bar relative pressure	0.15	0.3	1	1.2	≤ 0.1	20	40
0 to 4 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	25	50
0 to 6 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
0 to 10 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
0 bar to 16 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
0 bar to 25 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
0 bar to 40 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	300	400
0 bar to 60 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	300	400
0 bar to 100 bar relative pressure	0.1	0.25	0.75	0.8	≤ 0.1	300	400
0 to 0.6 bar absolute pressure	0.15	0.4	1	1.2	≤ 0.15	10	20
0 to 1 bar absolute pressure	0.15	0.3	1	1.2	≤ 0.15	10	20
0 to 1.6 bar absolute pressure	0.15	0.3	1	1.2	≤ 0.15	20	40
0 to 2.5 bar absolute pressure	0.15	0.3	1	1.2	≤ 0.1	20	40
0 to 4 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	25	50
0 to 5 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	25	50
0 to 6 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
0 to 10 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	50	60
0 to 16 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
0 to 25 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	120	200
0 to 40 bar absolute pressure	0.1	0.25	0.75	0.8	≤ 0.1	200	300

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c All measuring ranges are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range start value (offset) and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range start value (offset) and measuring range end value, thermal effect on measuring range start (offset) and measuring span

^f MSP = measuring span

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Electrical data

Voltage supply ^a	
2-wire circuit ^b	
4 to 20 mA	DC 8 to 30 V, nominal voltage DC 24 V
3-wire ^c	
DC 0 to 10 V	DC 11.5 V to 30 V, nominal voltage DC 24 V
DC 1 to 5 V	DC 10 V to 30 V, nominal voltage DC 24 V
DC 1 to 6 V	DC 10 V to 30 V, nominal voltage DC 24 V

^a The auxiliary energy of the pressure transmitter must meet SELV requirements. Furthermore, the device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^b Maximum current consumption ≤ 25 mA.

^c Maximum current consumption ≤ 5 mA.

Burden/load ^a	
2-wire circuit	
4 to 20 mA	$R_L \leq (U_B - 8 \text{ V}) \div 0.02 \text{ A } (\Omega)$
3-wire	
DC 0 to 10 V	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 5 V	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 6 V	$R_L \geq 10 \text{ k}\Omega$

^a Maximum effect < 0.5 %.

Behavior if measured value is out of range	Error signal in the case of	NAMUR exceedance, linear
Two-wire		
4 to 20 mA	≤ 3.6 mA and ≥ 21.5 mA	3.8 to 20.5 mA
Three-wire		
DC 0 to 10 V	10.7 V	0 to 10.5 V
DC 1 to 5 V	5.7 V	0.8 to 5.5 V
DC 1 to 6 V	6.7 V	0.8 to 6.5 V

Behavior after power on	Ready for operation after < 120 ms
Voltage supply influence	≤ 0.02 %/V
Reverse voltage protection	U_B to 0 V (all output variants)
Short-circuit resistance	S+ to 0 V (only voltage variants)
Overvoltage protection	The operating voltage must be restricted to max. 33 V
Step response of 90 % (according to DIN 16068 Point 3.3.8)	< 5 ms
Insulation resistance	> 100 MΩ at DC 500 V
Insulation voltage	AC 500 V

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Environmental influences

Admissible temperatures	Ambient temperature	Medium temperature	Storage temperature
with MSP ^a ≤ 0.4 bar	-20 to +85 °C	-20 °C to +125 °C	-20 to +100 °C
with MSP > 0.4 bar	-40 to +85 °C	-40 to +125 °C	-40 to +100 °C

^a MSP = measuring span

Resistance to climatic conditions	100 % relative humidity including condensation on the device's outer case; 90 % relative humidity without condensation
Protection type	According to DIN EN 60529
Types with attached cable	IP68 ^a (IP66/IP68)
Types with round plug M12 × 1	IP67 (IP66/IP67)
Types with line socket	IP65
Types with terminal head	IP69 (IP66/IP69)
Admissible mechanical load	
Vibration resistance	20 g at 10 to 2000 Hz, 10 cycles per axis, device in X, Y, Z axis, industrial requirement according to IEC 60068-2-6
Shock resistance	50 g for 11 ms and 100 g for 1 ms, industrial requirement according to IEC 60068-2-27
Electromagnetic compatibility (EMC)	According to DIN EN 61326-2-3
Interference emission	Class A – only for industrial use –
Interference immunity	Industrial requirement
Process media	Liquid and gaseous media which are compatible with the materials of the parts coming into contact with the pressurized medium

^a For 1 h at a depth of 2 m.

Approvals and approval marks

EAC	
Test facility	Промтехконтроль
Certificate/certification number	EAЭC N RU Д-DE.PA01.B.80830/21
Inspection basis	TR TS 020/2011
Valid for	All device versions
c UL us	
Test facility	Underwriters Laboratories
Certificate/certification number	E201387
Inspection basis	UL 61010-1 (3rd Ed.), CAN/CSA-22.2 No. 61010-1 (3rd Ed.)
Valid for	All device versions with electrical connections 36, 61 and 75

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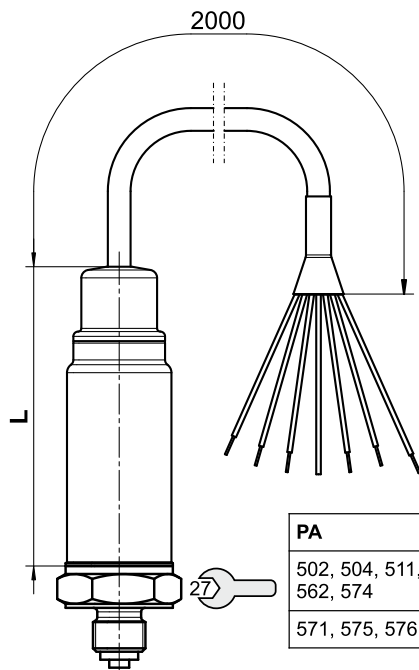


Dimensions

Transmitter with electrical connections

12

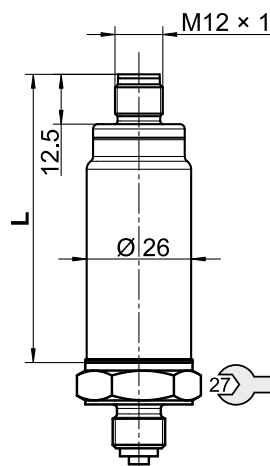
Attached cable, length of 2 m (standard)



PA	L (mm)
502, 504, 511, 512, 562, 574	75
571, 575, 576	50

36

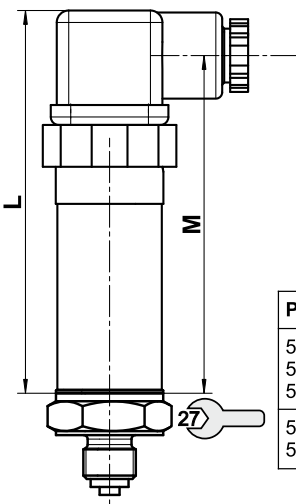
Round plug M12 × 1



PA	L (mm)
502, 504, 511, 512, 562, 574	73
571, 575, 576	48

61

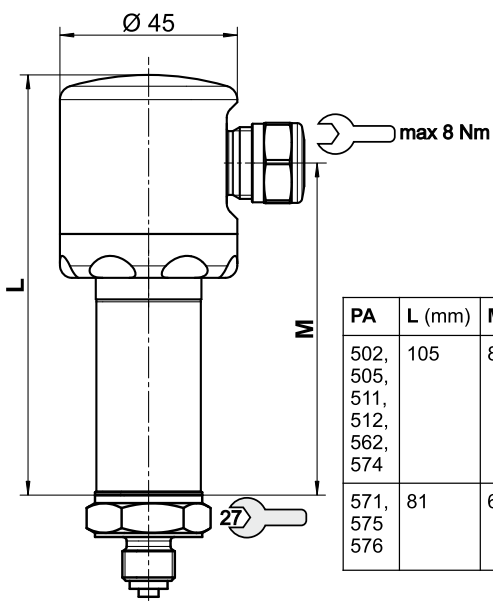
Line socket DIN EN 175301-803, form A



PA	L (mm)	M (mm)
502, 504, 511, 512, 562, 574	96	85
571, 575, 576	71	60

75

Terminal head



PA	L (mm)	M (mm)
502, 505, 511, 512, 562, 574	105	84
571, 575, 576	81	61

Cable fitting M16, seal area 5 to 11 mm

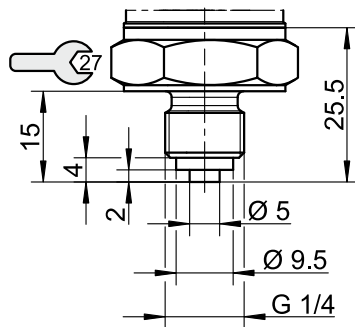
PA = process connection



Process connections, not front-flush

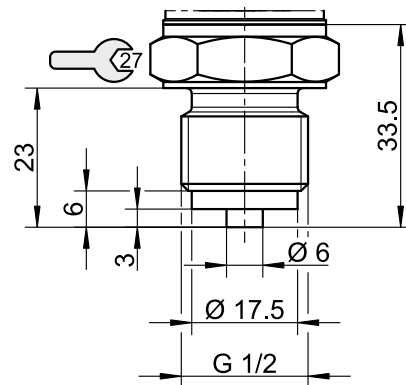
502

G 1/4 DIN EN 837



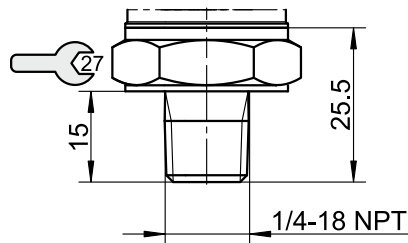
504

G 1/2 DIN EN 837



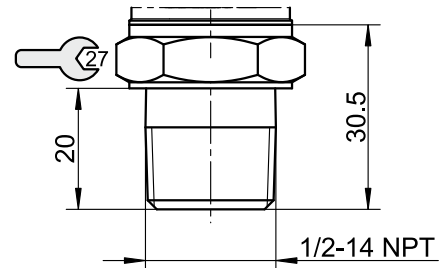
511

1/4-18 NPT DIN EN 837



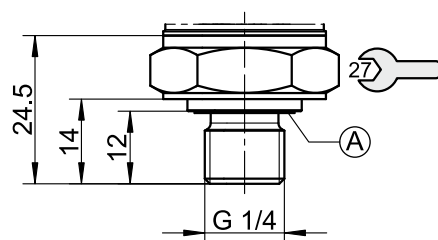
512

1/2-14 NPT DIN EN 837



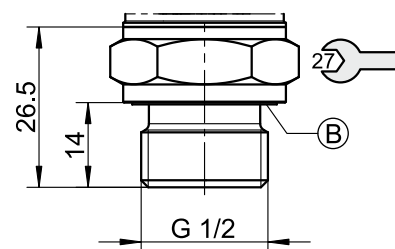
521

G 1/4 DIN 3852-11



523

G 1/2 DIN 3852-11



(A) Profile sealing ring G 1/4

(B) Profile sealing ring G 1/2

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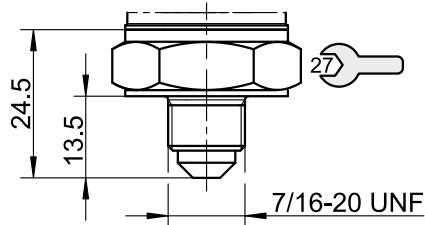
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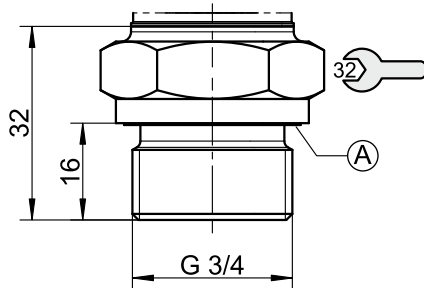
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**562**

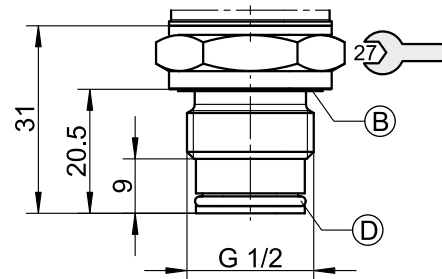
7/16-20 UNF

**Process connections, front-flush****571**

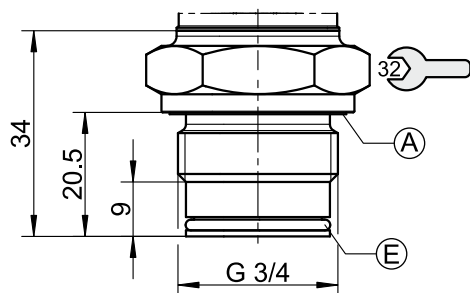
G 3/4 DIN EN ISO 228-1

**574**

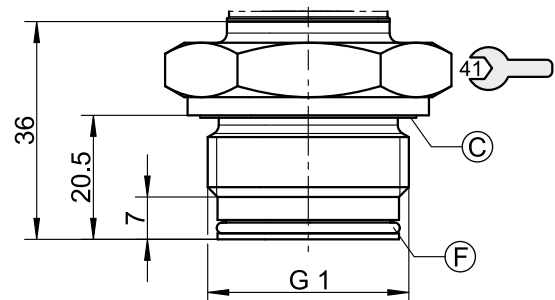
G 1/2 with double seal

**575**

G 3/4 with double seal

**576**

G 1 with double seal



- (A) Profile sealing ring G 3/4
- (B) Profile sealing ring G 1/2
- (C) Profile sealing ring G 1

- (D) O-ring 15.1 × 1.6
- (E) O-ring 20.35 × 1.78
- (F) O-ring 26.7 × 1.78

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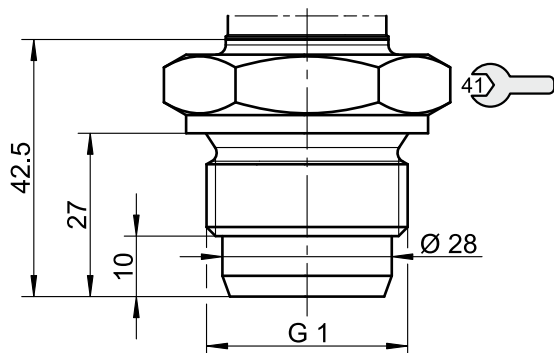
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**581**

G 1 front-flush with conical seal



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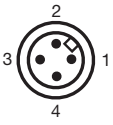

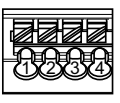


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Connection diagram

Transmitter

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment ^a			
					
		12 Attached cable	36 Round plug M12 × 1	61 Cable socket	75 Terminal head
4 to 20 mA, 2-wire (output 405)					
Voltage supply DC 8 to 30 V	U _B /S+	White	1	1	1
	0 V/S-	Black	3	2	2
DC 0 to 10 V, 3-wire (output 415)					
Voltage supply DC 11.5 V to 30 V	U _B	White	1	1	1
	0 V/S-	Black	2	2	2
	S+	Yellow	3	3	3
DC 1 to 5 V, three-wire (output 418) DC 1 to 6 V, three-wire (output 420)					
Voltage supply DC 10 to 30 V	U _B	White	1	1	1
	0 V/S-	Black	2	2	2
	S+	Yellow	3	3	3
Functional bonding conductor FB ^b (all output variants)		Shield/green	4		4
^a Figure: Connection to the pressure transmitter ^b As a basic principle, the device is grounded via the process connection. Alternatively, the device can also be grounded via the electrical connection on all variants. However, grounding via both the process connection and the electrical connection is not admissible.					
Admissible effect on the "attached cable" variant					
Smallest bending radius (fixed)		40 mm			
Max. tensile force on the cable		20 N			

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Accessories

Line socket, 4-pole, M12 × 1, without pressure compensation, straight (part no. 00404585)

Figure	Pin	Color
	1	Brown
	2	White
	3	Blue
	4	Black

Line socket, 4-pole, M12 × 1, without pressure compensation, angled (part no. 00409334)

Figure	Pin	Color
	1	Brown
	2	White
	3	Blue
	4	Black

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Order details

(1) Basic type	
402072	JUMO TAROS S47 P – pressure transmitter
(2) Basic type extension	
000	None
051	Relative-pressure version without zero point adjustment
999	Special version
(3) Input	
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
449	-1 to +1 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
428	-0.4 to +0.4 bar relative pressure
427	-0.1 to +0.1 bar relative pressure
425	0 to 0.1 bar relative pressure
426	0 to 0.16 bar relative pressure
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 bar to 16 bar relative pressure
461	0 bar to 25 bar relative pressure
462	0 bar to 40 bar relative pressure
463	0 bar to 60 bar relative pressure
464	0 bar to 100 bar relative pressure
487	0 to 0.6 bar absolute pressure
488	0 to 1 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
500	0 to 5 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
505	0 to 40 bar absolute pressure
998	Special measuring range for absolute pressure
999	Special measuring range for relative pressure
(4) Output	
405	4 to 20 mA, two-wire

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415	DC 0 to 10 V, three-wire
418	DC 1 to 5 V, three-wire
420	DC 1 to 6 V, three-wire
(5) Process connection	
502	G 1/4 DIN EN 837
504	G 1/2 DIN EN 837
511	1/4-18 NPT DIN EN 837
512	1/2-14 NPT DIN EN 837
521	G 1/4 DIN 3852-11
523	G 1/2 DIN 3852-11
562	7/16-20 UNF
571	G 3/4 front-flush DIN EN ISO 228-1
574	G 1/2 front-flush with double seal
575	G 3/4 front-flush with double seal
576	G 1 front-flush with double seal
581	G 1 front-flush with conical seal
(6) Process connection material	
20	Stainless steel
(7) Electrical connection	
12	Attached cable, shielded
36	Round plug M12 × 1
61	Line socket DIN EN 175301-803, form A
75	Terminal head
(8) Measuring system, filling medium	
01	Silicone oil
(9) Extra codes	
000	None
061	With UL approval ^a
374	Inspection certificate 3.1 EN 10204 – material
462	Inverted output signal
624	Oil and grease free
769	Calibration certificate

^a Not possible with electrical connection 12 (attached cable).

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)
Order code		/		-		-		-		-		-		-		/	
Order example	402072	/	000	-	491	-	405	-	504	-	20	-	61	-	01	/	000

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Accessories

NOTE!

The following accessories are **not** UL-approved.

Item	Part no.
Line socket, 4-pole, M12 × 1, straight, with 2-m PVC cable, without pressure compensation	00404585
Line socket, 4-pole, M12 × 1, angled, with 2-m PVC cable, without pressure compensation	00409334
Magnetic pin for simple adjustment of zero point	00736330

NOTE!

When using a transmitter with UL approval, the user must make sure that the accessory he uses is also approved for a UL application (e.g. cable with UL approval AVL2/8 and/or cable with UL approval CYJV/7 or CYJV/8 or PVVA/7 or PVVA2/8, in each case approved for ambient temperatures > 90 °C).



JUMO MAERA S26

Level probe

Applications

Level and filling level measurement¹

- in storage tanks or reservoirs
- for gray water recycling
- in heating oil and diesel oil tanks
- in the water and wastewater sector

Brief description

The JUMO MAERA S26 level probe is used for the continuous hydrostatic level measurement of liquids. Filling heights between 2.5 mWS and 25 mWS (water column) can be achieved in ventilated tanks.

When the level probe is immersed into a liquid, a liquid column emerges above the probe. The liquid column increases as the probe is immersed deeper into the liquid and creates a hydrostatic pressure on the measuring system by the force of its weight. The measured pressure is transmitted as a standard signal. The signal is linearly proportional to the rising liquid.

The surrounding pressure is realized using a special cable with an integrated pressure equalization hose. Any variations in air pressure are thereby automatically compensated for and the surrounding pressure is therefore taken into account.

The level probe is approved for use in drinking water.

Further information on our level probes from the JUMO MAERA series can be found in the brochure "Limit Level Measurement and Level Measurement" in the documentation.

Customer benefits

- **process reliable**
 The core of the level probe is a piezoresistive measuring cell, which features high overload resistance, and is particularly stable in the long term, reliable, and temperature resistant. The level probes are manufactured entirely from stainless steel and are therefore resistant to many media. A reverse-polarity protection mechanism protects the measuring instrument against damage, ensuring maximum safety during startup.
- **versatile**
 The level probe is available in numerous variants for several measuring ranges. The version with several cable materials and process connections provides maximum possible flexibility. A model with greater measuring accuracy is also available, which also meets the most stringent requirements.



Type 402090/... with process connection 658

Special features

- measuring ranges: 0.25 bar to 2.5 bar (0.2 % MSP² also available) (2.50 mWS to 25 mWS)
- medium temperature: 0 °C to 50 °C
- piezoresistive silicon sensor
- accuracy: 0.3 % MSP (linearity) (0.2 % MSP also available)
- excellent long-term stability
- high overload resistance
- reverse polarity protection
- suitable for indoor mounting

¹ These recommendations are based on many years of experience; however, in individual cases they may not be fully applicable. We would be happy to provide further information, including regarding additional applications.

² MSP = measuring span

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Measuring principle	Piezoresistive sensor with stainless steel separating membrane
Pressure transfer means	Synthetic oil
Admissible load changes	> 10 million, 0 to 100 % measuring range
Mounting position	Vertical/hanging from the cable

Measuring range and accuracy

Measuring range bar	Linearity ^a % MSP ^e	Accuracy at		Long-term stability ^b % MSP per year	Overload capacity bar	Burst pressure bar
		20 °C ^c % MSP	0 to 50 °C ^d % MSP			
0 to 0.25 bar relative pressure	0.3	0.5	1.6	≤ 0.3	0.75	1
0 to 0.4 bar relative pressure	0.3	0.5	1.6		1.2	1.6
0 to 0.6 bar relative pressure	0.3/0.2 ^f	0.5	1.3		1.8	2.4
0 to 1 bar relative pressure	0.3/0.2 ^f	0.5	1.1		3	4
0 to 1.6 bar relative pressure	0.3/0.2 ^f	0.5	1.1		4.8	6,4
0 to 2.5 bar relative pressure	0.3/0.2 ^f	0.5	1.1		7.5	10
0 to 4 bar relative pressure	0.2	0.3	0.8		12	16
0 to 6 bar relative pressure	0.2	0.3	0.8		18	24
0 to 10 bar relative pressure	0.2	0.3	0.8		30	40

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset), and measuring range end

^d Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset) and measuring range end, thermal influences on measuring range start (offset), and measuring span

^e MSP = measuring span

^f for basic type 023 with improved accuracy

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Output

Analog output	
Current	
Output 402	0 to 20 mA, three-wire
Output 405	4 to 20 mA, two-wire
Output 406	4 to 20 mA, three-wire
Voltage	
Output 412	DC 0.5 to 4.5 V, three-wire, ratiometric 10 to 90 % of the voltage supply
Output 415	DC 0 to 10 V, three-wire
Output 418	DC 1 to 5 V, three-wire
Output 420	DC 1 to 6 V, three-wire
Step response T_{90}	≤ 10 ms
Burden	
Current	
0 to 20 mA, three-wire	$R_L \leq (U_B - 12 \text{ V}) \div 0.02 \text{ A } (\Omega)$
4 to 20 mA, two-wire	$R_L \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A } (\Omega)$
4 to 20 mA, three-wire	$R_L \leq (U_B - 12 \text{ V}) \div 0.02 \text{ A } (\Omega)$
Voltage	
DC 0.5 to 4.5 V, three-wire	$R_L \geq 50 \text{ k}\Omega$
DC 0 to 10 V, three-wire	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 5 V, three-wire	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 6 V, three-wire	$R_L \geq 10 \text{ k}\Omega$

Electrical data

Voltage Supply U_B^a	
0 mA to 20 mA, three-wire	DC 11.5 V to 30 V
4 mA to 20 mA, two-wire	DC 10 V to 30 V
4 mA to 20 mA, three-wire	DC 11.5 V to 30 V
DC 0.5 V to 4.5 V, three-wire	DC 5 V
DC 0 V to 10 V, three-wire	DC 11.5 V to 30 V
DC 1 V to 5 V, three-wire	DC 10 V to 30 V
DC 1 V to 6 V, three-wire	DC 10 V to 30 V
Nominal voltage	DC 24 V
Reverse voltage protection	Yes (except DC 0.5 to 4.5 V, three-wire)
Max. current consumption	≤ 25 mA
Electrical circuit	SELV
Requirements	The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^a Residual ripple: The voltage peaks must not exceed or fall below the specified voltage supply values!

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Electrical connection

6-core, shielded cable with integrated pressure compensation hose, AWG 24 with ferrules

Outer diameter	Approx. 8.4 mm
Conductor cross section	0.25 mm ²
Bending radius	
Moving	160 mm
Fixed	120 mm
	It is vital to take into account that if the protective hose is kinked or pinched, this will prevent ambient pressure compensation.
Tensile force	Up to 400 N
Admissible medium temperatures	-20 to +60 °C (depending on the medium)

for level probe with EPR cable (electrical connection 26)

2-core cable without pressure compensation with ferrules

Outer diameter	Approx. 8.3 mm
Conductor cross section	1 mm ²
Bending radius	
Moving	40 mm
Fixed	30 mm
Tensile force	Up to 400 N
Admissible medium temperatures	-40 to +60 °C

Mechanical features

Ensure the medium durability of the material!

Materials	
Process connection	Stainless steel 316 Ti
Measuring membrane	Stainless steel 316 L
Case	Stainless steel 316 Ti
Sealing cone	FPM, EPDM
Outer sheath	Basic type: PE (black), PUR (pebble gray), FEP (black) Basic type with submersible motor cable: EPR (blue)
Pressure compensation hose	PA
Weight	200 g (without cable) plus 1500 g for process connection with mounted protective cage (without cable)
PE cable	Approx. 63 g/m
PUR cable	Approx. 115 g/m
FEP cable	Approx. 90 g/m
EPR cable	Approx. 92 g/m
UV resistance	
PE, PUR cable	According to VDE 0207, test method EN 60811 part 2-1, section 8
FEP cable	According to DIN ISO 4892-2
Diameter	25 mm

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Environmental influences

Inadmissible temperatures Medium, environment	0 to 50 °C The device must not freeze in the medium! A restriction may be required depending on the medium.
Storage	-20 to +80 °C, dry
Electromagnetic compatibility (EC) Interference emission Interference immunity	Class B ^a , according to EN 61326-1 Industrial requirements, according to EN 61326-2-3
Protection type	IP68, according to EN 60529, submersible to 60 m

^a The product is suitable for industrial use as well as for households and small businesses.

Approvals and approval marks

CSA Testing agency Certificates/certification numbers Inspection basis Valid for	CSA Group 70209471 CAN/CSA-C22.2 No. 61010-1-12, UL Std. No. 61010-1 (3rd Edition) Extra code 067
ACS Testing agency Certificates/certification numbers Inspection basis Valid for	Eurofins Expertises Environnementales 22 ACC NY 044 DGS/SD7A 2002 n° 571 Extra code 881
EAC Testing agency Certificates/certification numbers Inspection basis Valid for	«Промтехконтроль» EAЭС N RU Д-DE.PA01.B.80830/21 TR TS 020/2011 Type 402090

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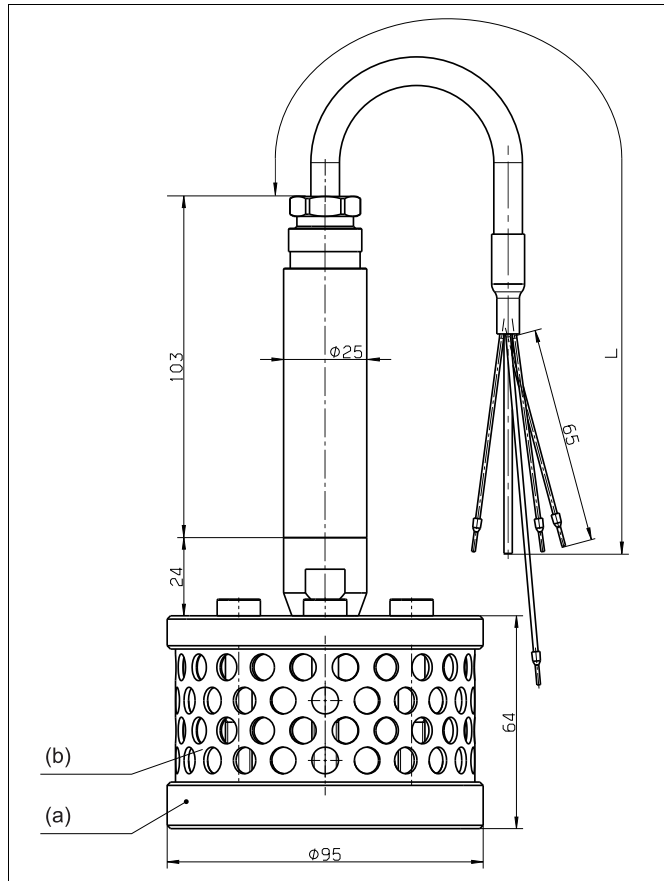
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Dimensions

With mounted cage



L Cable length according to customer preference

(a) Protective cage

(b) Perforated metal grid Ø 8 mm

The stainless steel version with mounted protective cage is designed for difficult level measurements where sludge, turbulence or currents may be present (e.g. pumping stations, wastewater lifting stations).

The additional weight reduces effects on the output signal with strongly moving media.

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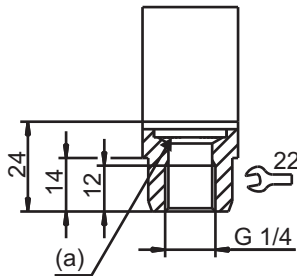
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Process connections

567

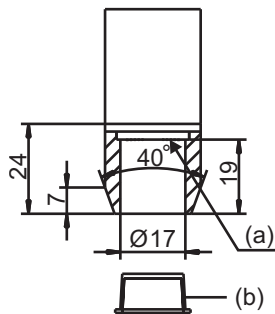
G 1/4 inside



(a) Sensitive membrane

659

Connection open at the bottom

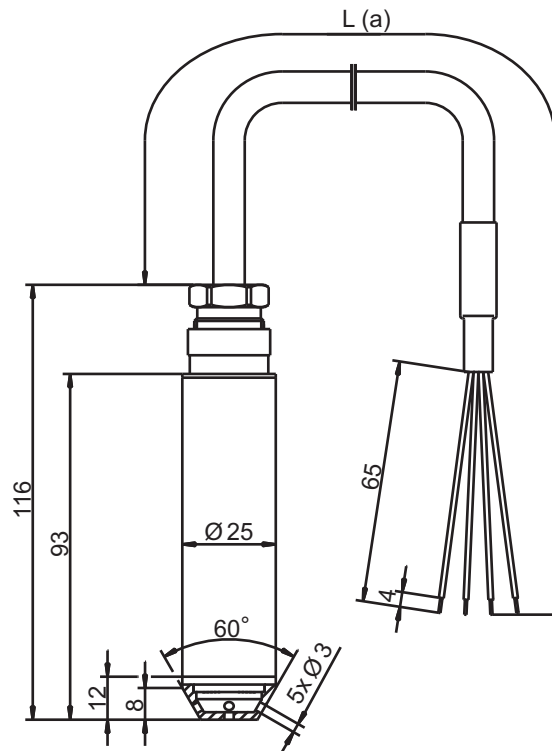


(a) Sensitive membrane

(b) Protective cap

658

Connection closed at the bottom



L (a) Cable length according to customer preference

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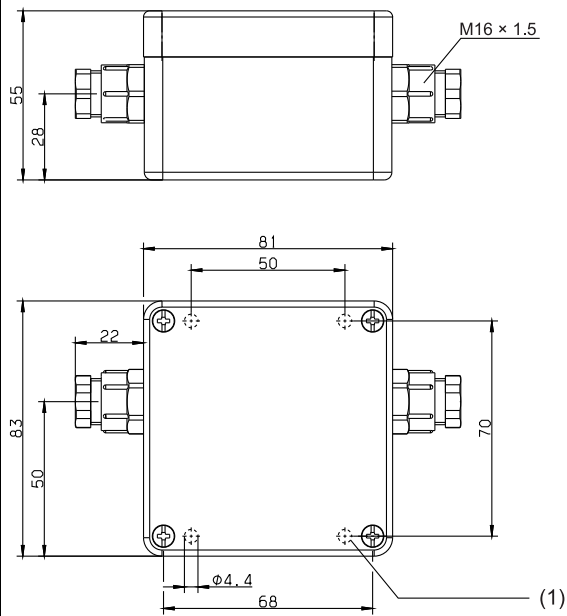
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**Accessories**

Terminal box with pressure compensation

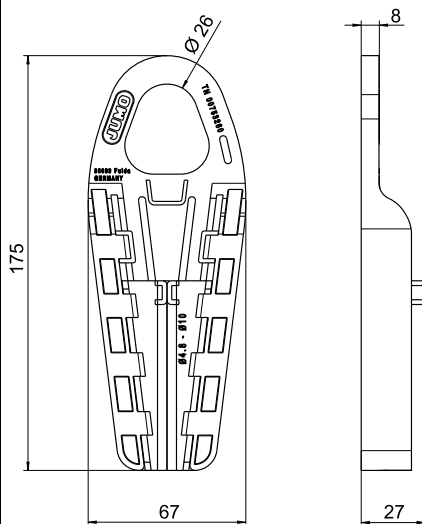
Part no. 00061206



(1) Fastening hole

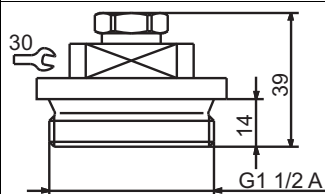
Cable clamp

Part no. 00753260



Sealing screw

Part no. 00333329



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Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Connection		Terminal assignment
		
		Cable ^a
0 to 20 mA, three-wire		
Voltage supply DC 11.5 to 30 V Rated voltage supply DC 24 V	U_B ^b 0 V/S- S+	White Gray Yellow
4 to 20 mA, two-wire		
Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V	$U_{B/S+}$ 0 V/S-	White Gray
4 to 20 mA, two-wire		
Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V	$U_{B/S+}$ 0 V/S-	Brown Blue
4 to 20 mA, three-wire		
Voltage supply DC 11.5 to 30 V Rated voltage supply DC 24 V	U_B 0 V/S- S+	White Gray Yellow
DC 0.5 to 4.5 V, ratiometric		
Voltage supply DC 5 V Rated voltage supply DC 5 V	U_B 0 V/S- S+	White Gray Yellow
DC 0 to 10 V, three-wire		
Voltage supply DC 11.5 to 30 V Rated voltage supply DC 24 V	U_B 0 V/S- S+	White Gray Yellow
DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire		
Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V	U_B 0 V/S- S+	White Gray Yellow
Shielding		
Caution: Ground the device! Ground all connected devices (such as pumps and valves) to the same potential!		Black

^a For cable specifications, see installation instructions B 401015.4, chapter 6 "Installation and mounting".

^b The voltage peaks must not exceed or fall below the specified voltage supply values!

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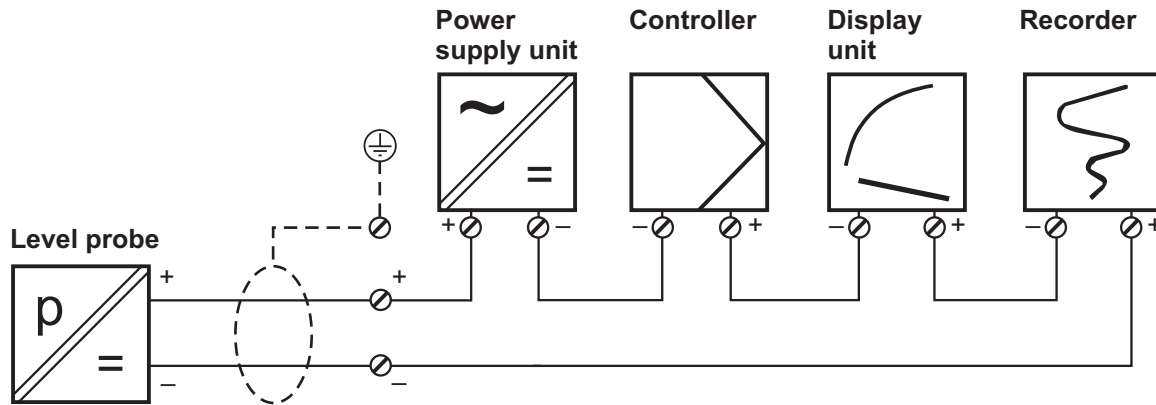
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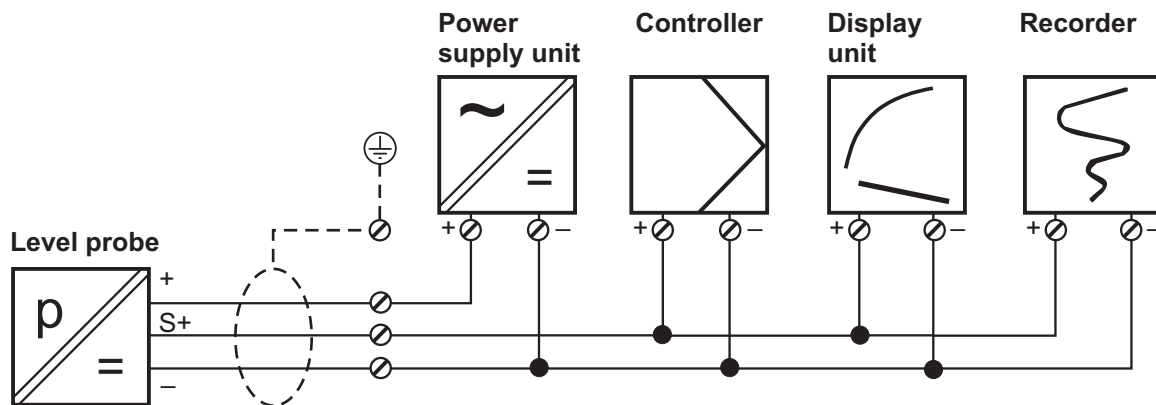


Connection example

Current output



Voltage output



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Order details

(1) Basic type	
402090/000	JUMO MAERA S26 – Level probe
402090/023	JUMO MAERA S26 – Level probe with improved accuracy ^a
(2) Input	
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
999	Special measuring range for relative pressure ^b
(3) Output	
402	0 to 20 mA, three-wire
405	4 to 20 mA, two-wire
406	4 to 20 mA, three-wire
412	0.5 to 4.5 V, three-wire
415	0 to 10 V, three-wire
418	1 to 5 V, three-wire
420	1 to 6 V, three-wire
(4) Process connection	
567	G 1/4 inside
658	Connection closed at the bottom
659	Connection open at the bottom
759	Mounted protective cage Ø 95 mm
(5) Process connection material	
20	CrNi (stainless steel)
(6) Electrical connection type	
14	PUR cable, pebble gray, shielded, UV-resistant
15	PE-LD cable, black, shielded, UV-resistant
25	FEP cable, black, shielded, UV-resistant
26	Submersible motor cable, EPR cable, blue ^c
(7) Cable length of the connecting cable	
005	5 m
010	10 m
...	...
100	100 m

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(8) Extra codes	
000	None
067	CSA approval
593	Cutting ring fitting (preparation for protection tube)
631	Improved moisture and vibration protection
881	Drinking water approval ^d
917	EPDM seal

^a Measuring devices with improved accuracy can only be supplied with output 4 to 20 mA, two-wire, **and** measuring ranges from 0 to 0.6 bar.




^b Measuring ranges up to 10 bar (100 mWS) are available with CSA approval.

^c Only available with 4 to 20 mA, two-wire.

^d Only available with EPDM seal, PE-LED cable, or submersible motor cable, EPR cable.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)							
Order code	<div></div>	-	<div></div>	-	<div></div>	-	<div></div>	-	<div></div>	/	<div></div>				
Order example	402090/000	-	454	-	405	-	659	-	20	-	15	-	010	/	000

Accessories

Item	Description	Part no.
Terminal box with pressure compensation element 	The terminal box is used for secure installation of the level probe cable. The end of the pressure equalization hose is always protected from precipitate and condensation (IP65). The remaining distribution can be performed with a cable without a pressure equalization hose. The terminal case should be mounted as close as possible to the medium surface while still outside the medium to ensure the system is implemented cost-effectively and in the best possible way.	00061206
Cable clamp 	The cable clamp holds the probe in the liquid at a defined depth and provides strain relief. Use of the cable clamp ensures that the cable is not deformed in an unacceptable manner. The cable clamp is compatible with all JUMO level probes. The clamping range is 4.8 mm to 10 mm. The maximum tensile strength is 390 N. The cable clamp is made of UV-resistant, corrosion-free and fiberglass-reinforced polyamide. The central elongated holes are provided for optional, application-dependent fixing of the cable to prevent the clamping jaws from sliding upwards. The side elongated hole is provided for fixing additional cable length.	00753260
Sealing screw 	For closed containers or water wells with a well head, the cable should be guided through and fastened by a sealing screw. The sealing screw is made up of a G 1 1/2" thread and is used to route the cable.	00333329
Pressure compensation filter for cable	The pressure compensation filter is a breathable filter that ensures aeration and exhaust-air ventilation without moisture penetrating. It is fitted at the end of the special cable.	00382632



JUMO dTRANS p20 DELTA

Differential pressure transmitter

Brief description

The device with HART® interface combines maximum precision with simple operation. It is used to measure the system pressure of gases, steams, and liquids. The integrated LCD display shows measured values and device data.

The version with explosion protection "Ex ia (intrinsically safe)" allows the device to be installed up to zone 0.

The housing and sensors are manufactured from high-grade stainless steel. Diaphragm seals can also be connected for specific process technology applications (see data sheets 409772 to 409784).

The device is programmable and therefore readily adaptable to a variety of different measurement tasks. An easy-to-use setup program is available as an accessory to enable operation via the interfaces. A rotary knob makes manual operation on-site very convenient and quick.

The pressure transmitter with 4 to 20 mA and HART® protocol was evaluated with regard to functional safety and is certified by exida according to IEC 61508/-1/-2/-3. These measuring devices are suitable for monitoring process level and process pressure up to SIL2. Further details can be found in the Safety Manual.

For the "Ex d" explosion protection version, see data sheet 403023.

For the relative and absolute pressure version, see data sheet 403025 and 403026.



Type 403022/0-0-1-...

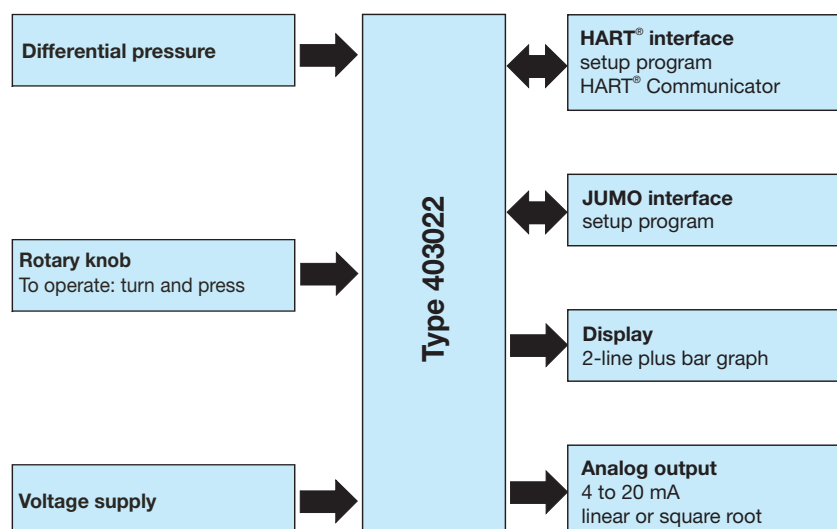


Type 403022/0-0-2-...



Type 403022/0-0-3-...

Block diagram



Special features

- Stainless steel case
- SIL certified (exida)
- HART® interface
- Explosion protection Ex ia (gas and dust) according to ATEX and EAC
- Linearity 0.07 %
- Simple operation with rotary knob
- Setup program
- LCD display with bar graph
- Display scaling with a choice of measuring units
- Display of sensor temperature
- Display of minimum and maximum pressures
- Current-generator function
- Characteristic line and display also adjustable for flow measurement

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN EN 60770 and DIN EN 61298
Ambient temperature	22 °C ±5 K
Air pressure	1000 hPa (±25 hPa)
Voltage supply	DC 24 V
Burden	50 Ω
Sensor system	Silicon sensor with stainless steel separating diaphragm
Pressure transfer medium	
For measuring system filling medium 1	Silicon oil
For measuring system filling medium 2	Halogenized filling oil
Admissible load changes	> 10 million
Position	
Mounting position	Any
Calibration position	Device upright, process connection at the bottom
Zero offset depending on position	≤ 1 mbar A zero offset is possible on-site or via setup
Display ^a	LCD, two-line with bar graph
Alignment	Display unit rotatable in 90° steps Housing rotatable ±160°
Size	Display 22 × 35 mm, font size 7 mm/5-digits
Color	Black
Portrayable measuring units	
Input pressure	inH ₂ O, inHg, ftH ₂ O, mmH ₂ O, mmHg, psi, bar, mbar, kg/cm ² , kPa, torr, MPa, mH ₂ O
Measured value	% or scaled with freely adjustable measuring unit
Output current	mA
Sensor temperature	°C, °F
Additional display data	Minimum pressure, maximum pressure, error, overrange, underrange, operating hours
Operation	
On-site	With rotary knob and LCD
Setup program	Via interface
Interface	
Standard	JUMO interface ^b
For output 410 (4 to 20 mA with HART®)	JUMO interface ^b and HART® interface

^a optional; SIL version only available with display

^b The JUMO interface may not be used in a potentially explosive area! In such a case the device can be operated via the rotary knob or the HART® interface.

Input

Nominal pressure					
Nominal measuring range	-10 to +10 mbar DP ^a	-1 to +1 bar DP	0 to 1 bar DP	-1 to +6 bar DP	-1 to +100 bar DP
Nominal pressure (bar)	PN2	PN210	PN210, optionally PN420		

^a Without SIL

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Output

analog output For output 405 (4 to 20 mA) For output 410 (4 to 20 mA with HART®) Jump response time T60 Attenuation	4 to 20 mA, 2-wire 4 to 20 mA, two-wire with HART® version 7 ≤ 190 ms without attenuation Adjustable 0 to 100 s
Burden For output 405 (4 to 20 mA) For output 410 (4 to 20 mA with HART®)	$\text{Burden} \leq (U_B - 12 \text{ V}) \div 0.022 \text{ A}$ $\text{Burden} \leq (U_B - 12 \text{ V}) \div 0.022 \text{ A}$; additional: min. 250 Ω , max. 1100 Ω

Voltage supply

For version Explosion protection 0 (none) Explosion protection 1 (ATEX Ex ia)	DC 12 to 36 V DC 12 to 28 V The voltage supply must be intrinsically safe and must not exceed the following maximum values: $U_i \leq \text{DC } 28 \text{ V}$ $I_i \leq 115 \text{ mA}$ $P_i \leq 750 \text{ mW}$ $C_i = 6 \text{ nF}$ $L_i = 105 \mu\text{H}$
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 Internet: www.jumousa.com



Mechanical features

Process connection Materials Membranes For process connection 20 (stainless steel) For process connection 82 (HASTELLOY®) For process connection 80 (tantalum) Flange Seal	Stainless steel 316 L HASTELLOY® C276, material-no. 2.4819 Tantalum Stainless steel 316 PTFE
Housing Materials For housing 1 (short, stainless steel) For housing 2 (long, stainless steel) For housing 3 (precision casting) For material lid 20 (stainless steel) For material lid 85 (plastic) For electrical connection 36 (round plug M12 × 1) For electrical connection 82 (cable fitting, plastic) For electrical connection 93 (cable fitting, metal) For operation 0 (without control knob) For operation 1 (with control knob)	Stainless steel 1.4404 Stainless steel 1.4404, VMQ Stainless steel 1.4408 Precision casting 1.4408, seal FPM PA, seal FPM Brass, nickel-plated PA Brass, nickel-plated - PA
Explosion protection For Explosion protection 0 (without) Explosion protection 1 (ATEX Ex ia)	The device is not approved for use in an Ex-area. EC-type examination certificate SEV 09 ATEX 0138 X  II 1G Ex ia IIC T4 Ga II 1D Ex ia IIIC T105 °C Da
Weight Type 403022/0-0-1 (housing, short) Type 403022/0-0-2 (housing, long) Type 403022/0-0-3 (housing, precision casting) For extra code 694 (increased nominal pressure)	Approx. 3.0 kg Approx. 3.3 kg Approx. 4.0 kg The weight of the device increases by approximately 3.8 kg.

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Environmental influences

Admissible temperatures Operation	Version	Temperature class	Maximum medium temperature	Ambient temperature ^a	Increased ambient temperature (extra code 681) ^{a, b, c}
	Standard		110 °C	-40 to +85 °C	-50 to +85 °C
	II 1G Ex ia	T4	100 °C	-40 to +60 °C	-50 to +60 °C
	II 1D Ex ia	T105 °C	100 °C	-40 to +60 °C	-50 to +60 °C
Storage	-40 to +85 °C				
Admissible humidity					
Operation	100 % including condensation on the device outer case				
Storage	90 % without condensation				
Admissible mechanical load					
Vibration strength	2 g, 10 to 500 Hz according to DIN EN 60770-3				
Shock resistance	15 g for 6 ms according to IEC 60068-2-29				
Electromagnetic compatibility	According to EN 61326				
Interference emission	Class B ^d				
Interference immunity	Industry				
Protection type					
For version					
Explosion protection 0 (without)	IP66/67 according to DIN EN 60529				
Explosion protection 1 (ATEX Ex ia)	IP66 according to DIN EN 60529				

^a Under -20 °C limited function: stationary use, increased danger of cable break, display without function; under -30 °C operation of the device not possible.

^b In the range from -40 to -50 °C the device must be permanently in operation. Furthermore, the lid with the device inspection glass must additionally be protected against mechanical impact and shock effects. Please contact JUMO for further details.

^c Without SIL

^d The product is suitable for industrial use as well as for households and small businesses.

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Accuracy

Including non-linearity, hysteresis, non-repeatability, zero point and final value deviation (corresponds to measurement deviations according to IEC 61298-2), calibrated at vertical installation position with the process connection at the bottom

Differential pressure					
Nominal measuring range	-10 to +10 mbar DP ^a	-1 to +1 bar DP	0 to 1 bar DP	-1 to +6 bar DP	-1 to +100 bar DP
Default measuring range	0 to 10 mbar	0 to 1 bar		0 bar to 6 bar	0 bar to 100 bar
Smallest MSP ^b	1 mbar ^c	5 mbar ^c		0.350 bar	2.5 bar
Turndown ratio (r) ^d	r ≤ 20	r ≤ 400	r ≤ 200	r ≤ 20	r ≤ 40
Non-linearity for reference conditions	0.1 % for r ≤ 2	0.07 % for r ≤ 10		0.07 % for r ≤ 5	
	r × 0.05 % for 2 ≤ r ≤ 20	r × 0.007 % for 10 ≤ r ≤ 400	r × 0.007 % for 10 ≤ r ≤ 400	r × 0.014 % for 5 ≤ r ≤ 20	r × 0.014 % for 5 ≤ r ≤ 40
Accuracy in % of the set MSP at 20 °C	0.2 % for r ≤ 2	0.1 % for r ≤ 10		0.1 % for r ≤ 5	
	r × 0.1 % for 2 ≤ r ≤ 20	r × 0.01 % for 10 ≤ r ≤ 400	r × 0.01 % for 10 ≤ r ≤ 200	r × 0.02 % for 5 ≤ r ≤ 20	r × 0.02 % for 5 ≤ r ≤ 40
Accuracy in % of the set MSP Range: 20 to 85 °C	0.5 % for r ≤ 2 (only to 60 °C)	0.2 % for r ≤ 10		0.2 % for r ≤ 5	
	r × 0.25 % for 2 ≤ r ≤ 20 (only to 60 °C)	r × 0.02 % for 10 ≤ r ≤ 400	r × 0.02 % for 10 ≤ r ≤ 200	r × 0.04 % for 5 ≤ r ≤ 20	r × 0.04 % for 5 ≤ r ≤ 40
Accuracy in % of the set MSP Range: -40 to +20 °C	1.0 % for r ≤ 2	0.6 % for r ≤ 10		0.6 % for r ≤ 5	
	r × 0.5 % for 2 ≤ r ≤ 20	r × 0.06 % for 10 ≤ r ≤ 400	r × 0.06 % for 10 ≤ r ≤ 200	r × 0.12 % for 5 ≤ r ≤ 20	r × 0.12 % for 5 ≤ r ≤ 40
Accuracy in % of the set MSP Range: 60 to 85 °C	2.0 % for r ≤ 2	2.0 % for r ≤ 2		2.0 % for r ≤ 2	
	r × 1.0 % for 2 ≤ r ≤ 20				
Influence of the static pressure P (bar) in % from the nominal measuring range	≤ 1 %	≤ P × 0.0005 %	≤ P × 0.0003 %	≤ P × 0.0025 %	≤ P × 0.001 %
Long-term stability in % as of the nominal measuring range	≤ 0.6 %/year	≤ 0.1 %/year			≤ 0.2 %/year

^a Without SIL

^b MSP = measuring span

^c For the calibration certificate from JUMO the smallest MSP is 10 mbar. MSPs smaller than 10 mbar can be adjusted by the user.

^d r = span of the nominal measuring range + adjusted measuring span

Approvals and approval marks

Approval mark	Test facility	Certificates/ certification numbers	Inspection basis	Valid for
ATEX	Electrosuisse	SEV 09 ATEX 0138 X, issue 04 (2017-10-13)	EN 60079-0 EN 60079-11 EN 60079-26	403022/x-1-...
EAC TR ZU	RU	RU C-DE.HB07.B.00086/20	TR ZU 012/2011 (Ex)	Extra code 226
SIL	exida	JUMO 2203088 C001	IEC 61508:2010-1/-2/-3	Basic type extension 2

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

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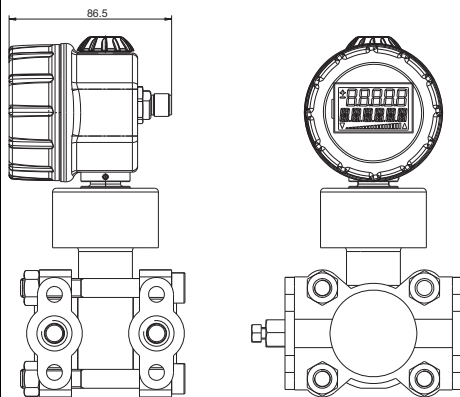
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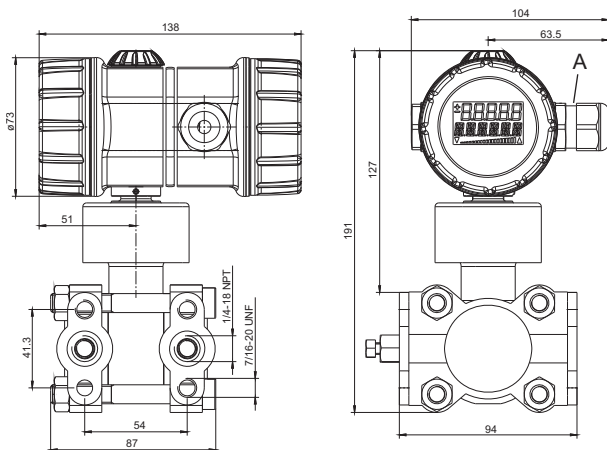


Dimensions

Type 403022/0-0-1
 (short, stainless steel, with M12 connection)

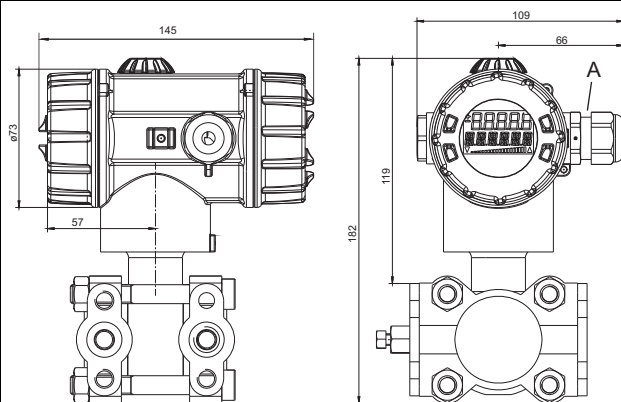


Type 403022/0-0-2
 (long, stainless steel, with cable fitting)



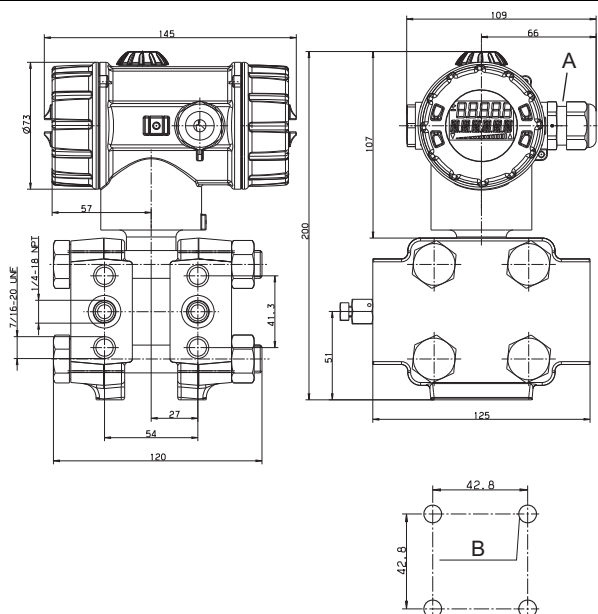
A M20 × 1.5 cable fitting

Type 403022/0-0-3
 (precision casting, with cable fitting)



A M20 × 1.5 cable fitting

For extra code 694
 (increased nominal pressure PN420)



A M20 × 1.5 cable fitting

B M8 for mounting

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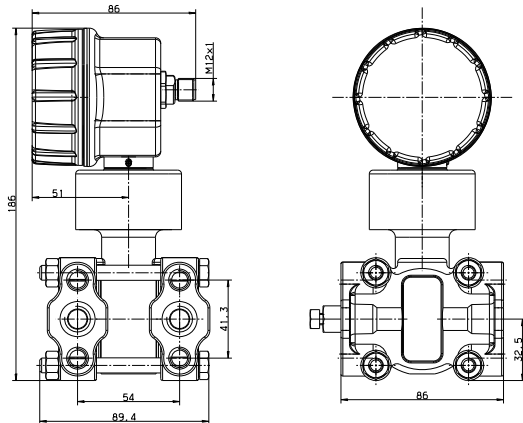
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**Type 403022/0-0-1 (without display and operation)
for nominal measuring range -10 to +10 mbar,
nominal pressure PN2 (bar)**



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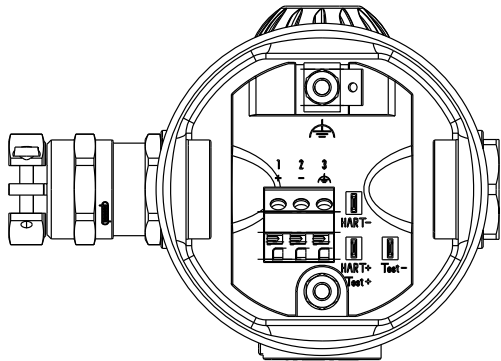
Connection diagram

The connection diagram in the data sheet provides information on product selection.
For the electrical connection, only use the installation instructions or the operating manual.

Connection		Terminal assignment	
		82 (plastic), 93 (metal) Cable gland	36 Round plug M12 × 1
Voltage supply DC 12 to 36 V for none Ex version DC 12 to 28 V for Ex version		1 L+ 2 L-	1 L+ 3 L-
Output 4 to 20 mA, two-wire Impressed current 4 to 20 mA in voltage supply		1 L+ 2 L-	1 L+ 3 L-
Current output test connection Inherent resistance of ammeter ≤ 10 Ω		TEST + TEST -	
HART® test connection Burden must be present!		HART + HART -	
Functional ground		3	4

Cable fitting

Round plug M12 × 1



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Order details

	(1) Basic type
403022	JUMO dTRANS p20 DELTA – Differential pressure transmitter
	(2) Basic type extension
0	None
2	SIL ^a
9	Special version
	(3) Explosion protection
0	None
1	ATEX Ex ia ^b
	(4) Housing
1	Short, stainless steel, with M12 connection ^c
2	Long, stainless steel, with cable fitting
3	Precision casting, with cable fitting M20
	(5) Electrical connection
36	Round plug M12 × 1
82	Plastic cable fitting
93	Metal cable fitting
	(6) Cover material
20	CrNi (stainless steel)
85	Plastic
	(7) Display
0	None
1	With display (LCD)
	(8) Operation
0	None
1	With control knob
	(9) Input – nominal measuring range
532	0 to 1 bar DP
530	-10 to +10 mbar DP ^d
531	-1 to +1 bar DP
533	-1 to +6 bar DP
534	-1 to +100 bar DP
	(10) Output
405	4 to 20 mA, two-wire, without SIL
410	4 to 20 mA, two-wire with HART® protocol
	(11) Process connection
511	2× pressure connection 1/4-18 NPT according to DIN EN 837
998	Diaphragm seal version, screwed
	(12) Process connection material
20	CrNi (stainless steel)
80	Tantalum
82	NiMo

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(13) Measuring system, filling medium	
01	Silicon oil
02	Halogenized oil for oxygen application
(14) Extra codes	
000	None
100	Customer-specific factory setting ^e
226	GOST/EAC approval ^f
624	Oil and grease free
633	Mounting brackets for 2" tube
634	TAG number
635	NACE manufacturer's declaration ^g
681	Expanded admissible ambient temperature ^h
694	Increased nominal pressure PN 420 bar

^a Only available with output 410 and display 1. Not available with input 530 and extra code 681.

^b Only available with output 410. Not available with electrical connection 82, cover material 85 and process connection material 80.

^c The housing 1 is only available with electrical connection 36 and vice versa.

^d Only available with process connection material 20.

^e Please specify the setting you want in plain text. For default setting see "Accuracy" section in the data sheet.

^f Available upon request.

^g Only available with process connection 512, 564 and process connection material 82. Not available with input 530, 531.

^h Not available with input 530, 531.

Order code (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)
 / - - - - - - - - - - - - /
Order example 403022 / 0 - 0 - 2 - 82 - 20 - 1 - 1 - 532 - 405 - 511 - 20 - 1 / 000

Accessories

Designation	Part no.
PC interface with USB/TTL converter ^a	00456352
HART® modem USB ^b	00443447
4-pole cable box, straight, M12 × 1 with 2 m PVC cable	00404585
4-pole cable box, angled, M12 × 1 with 2 m PVC cable	00409334
SET oval flange 1/2" NPT/accessory set 7/16-20UNF	00543775
Ex-i Power supply/input isolating amplifier, Type 707530	00577948
Mounting brackets, set includes screws 7/16-20UNF	00543777

Designation	Data sheet
Valve manifolds	409706
Diaphragm seal with dairy pipe fitting DIN 11851	409772
Diaphragm seal with clamp connection	409774
Diaphragm seal with DRD flange or VARIVENT® socket	409776
Diaphragm seal with ISS/SMS/RJT socket and (grooved) union nut	409778
Membrane diaphragm seal 4MDV-10	409780
Diaphragm seal with screw-in thread DIN ISO 228/1 or ANSI B1.201	409782
Diaphragm seal with flange connection DIN EN 1092-1 with sealing strip form B1	409784
Diaphragm seal with flange connection according to ANSI B 16.5 with sealing strip form RF	409786
Ex-i repeater power supply/input isolating amplifier	707530

^a The PC interface cable is the connection between the JUMO interface of the differential pressure transmitter and the USB interface of a PC.

^b The HART® modem is the connection between the HART® interface of the differential pressure transmitter and the USB interface of a PC.

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Software

Description	Part no.
JUMO setup dTRANS p20 series	00537577
Device Type Manager (DTM), JUMO dTRANS p20	00738288

Stock versions

Order code	Input	Process connection	Part no.
403022/0-1-1-36-20-1-1-530-410-511-20-01/000	-10 to +10 mbar DP	2× pressure connection	00569267
403022/0-1-1-36-20-1-1-532-410-511-20-01/000	0 to 1 bar DP	1/4-18NPT DIN EN 837	00573301

JUMO dTRANS p20 DELTA Ex d

Differential pressure transmitter with explosion-proof enclosure

Brief description

The JUMO dTRANS p20 DELTA Ex d differential pressure transmitter combines maximum precision with simple operation. It is used to measure the differential pressure of gases, vapors, and liquids. The integrated LCD display shows measured values and device data.

The differential pressure transmitter with flameproof enclosure can be installed in zone 0. The housing and sensors are manufactured from high-grade stainless steel. Diaphragm seals can also be connected for specific process technology applications (see data sheets 409772 to 409784).

The differential pressure transmitter is programmable and therefore readily adaptable to a variety of different measurement tasks. An easy-to-use setup program is available as an accessory to enable operation via the interfaces. A rotary knob makes manual operation on-site very convenient and quick.

The pressure transmitter with 4 to 20 mA and HART® protocol was evaluated with regard to functional safety and is certified by exida according to IEC 61508/-1/-2/-3. These measuring devices are suitable for monitoring process level and process pressure up to SIL2. Further details can be found in the Safety Manual.

For the „Ex ia“ explosion protection version, see data sheet 403022.

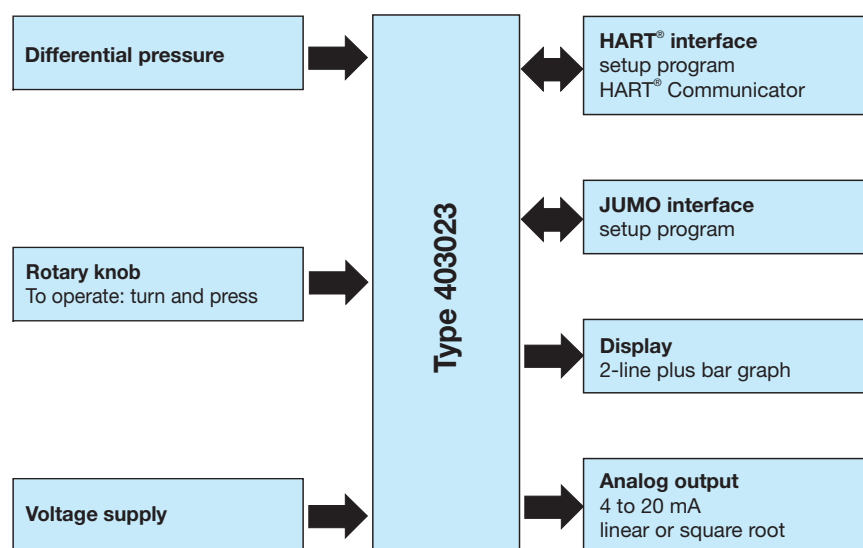
For the relative or absolute pressure versions, see data sheet 403025 and data sheet 403026.

HART
 COMMUNICATION PROTOCOL



Type 403023

Block diagram



Special features

- Stainless steel case
- SIL certified (exida)
- HART® interface
- Explosion protection Ex d (gas and dust) according to ATEX and EAC
- Linearity 0.07 %
- Simple operation with rotary knob
- Setup program
- LCD display with bar graph
- Display scaling with a choice of measuring units
- Display of sensor temperature
- Display of minimum and maximum pressures
- Current-generator function
- Characteristic line and display also adjustable for flow measurement

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN EN 60770 and DIN EN 61298
Ambient temperature	22 °C ±5 K
Air pressure	1000 hPa (±25 hPa)
Voltage supply	DC 24 V
Burden	50 Ω
Sensor system	Silicon sensor with stainless steel separating diaphragm
Pressure transfer medium	
For measuring system filling medium 1	Silicon oil
For measuring system filling medium 2	Halogenized filling oil
Admissible load changes	> 10 million
Position	
Mounting position	Any
Calibration position	Device upright, process connection at the bottom
Zero offset depending on position	≤ 1 mbar A zero offset is possible on-site or via setup
Display ^a	LCD, two-line with bar graph
Alignment	Display unit rotatable in 90° steps Housing rotatable ±160°
Size	Display 22 × 35 mm, font size 7 mm/5-digits
Color	Black
Portrayable measuring units	
Input pressure	inH ₂ O, inHg, ftH ₂ O, mmH ₂ O, mmHg, psi, bar, mbar, kg/cm ² , kPa, torr, MPa, mH ₂ O
Measured value	% or scaled with freely adjustable measuring unit
Output current	mA
Sensor temperature	°C, °F
Additional display data	Minimum pressure, maximum pressure, error, overrange, underrange, operating hours
Operation	
On-site	With rotary knob and LCD
Setup program	Via interface
Interface	
Standard	JUMO interface ^b
For output 410 (4 to 20 mA with HART®)	JUMO interface ^b and HART® interface

^a optional; SIL version only available with display

^b The JUMO interface may not be used in a potentially explosive area! In such a case the device can be operated via the rotary knob or the HART® interface.

Input

Nominal pressure					
Nominal measuring range	-10 to +10 mbar DP ^a	-1 to +1 bar DP	0 to 1 bar DP	-1 to +6 bar DP	-1 to +100 bar DP
Nominal pressure (bar)	PN2	PN210	PN210, optionally PN420		

^a Without SIL

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Output

Analog output For output 410 (4 to 20 mA with HART®) Jump response time T60 Attenuation	4 to 20 mA, two-wire with HART® version 7 ≤ 190 ms without attenuation Adjustable 0 to 100 s
Burden For output 410 (4 to 20 mA with HART®)	$Burden \leq (U_B - 12 \text{ V}) \div 0.022 \text{ A}$; additional: min. 250 Ω, max. 1100 Ω

Voltage supply

Voltage supply	DC 12 to 36 V
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Mechanical features

Process connection Materials Membranes For process connection 20 (stainless steel) For process connection 82 (HASTELLOY®) For process connection 80 (tantalum) Flange Seal	Stainless steel 316 L HASTELLOY® C276, material-no. 2.4819 Tantalum Stainless steel 316 PTFE
Housing Housing material Cover material Control knob material For operation 0 (without control knob) For operation 1 (with control knob)	Precision casting 1.4408 Precision casting 1.4408, seal FPM - PA
Explosion protection	EC-type examination certificate SEV 10 ATEX 127 X  II 1/2G Ex d IIC T6 ... T4 Ga/Gb II 2D Ex tb IIIC T105 °C Db
Weight For extra code 694 (increased nominal pressure)	Approximately 4.0 kg The weight of the device increases by approximately 3.8 kg.

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Environmental influences

Admissible temperatures Operation	Version	Temperature class	Maximum medium temperature	Ambient temperature ^a	Expanded ambient temperature (extra code 681) ^{a, b, c}
	II 1/2G Ex d	T6	70 °C	-40 to +60 °C	-50 to +60 °C
		T5	85 °C	-40 to +70 °C	-50 to +70 °C
		T4	110 °C	-40 to +85 °C	-50 to +85 °C
	II 2D Ex tb	T105 °C	100 °C	-40 to +85 °C	-50 to +85 °C
Storage	-40 to +85 °C				
Admissible humidity					
Operation	100 % including condensation on the device outer case				
Storage	90 % without condensation				
Admissible mechanical load					
Vibration strength	2 g, 10 to 500 Hz according to DIN EN 60770-3				
Shock resistance	15 g for 6 ms according to IEC 60068-2-29				
Electromagnetic compatibility	According to EN 61326				
Interference emission	Class B ^d				
Interference immunity	Industry				
Protection type	IP66 according to DIN 60529				

^a Under -20 °C limited function: stationary use, increased danger of cable break, display without function; under -30 °C operation of the device not possible.

^b In the range from -40 to -50 °C the device must be permanently in operation. Furthermore, the lid with the device inspection glass must additionally be protected against mechanical impact and shock effects. Please contact JUMO for further details.

^c Without SIL

^d The product is suitable for industrial use as well as for households and small businesses.

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Accuracy

Including non-linearity, hysteresis, non-repeatability, zero point and final value deviation (corresponds to measurement deviations according to IEC 61298-2), calibrated at vertical installation position with the process connection at the bottom

Differential pressure					
Nominal measuring range	-10 to +10 mbar DP ^a	-1 to +1 bar DP	0 to 1 bar DP	-1 to +6 bar DP	-1 to +100 bar DP
Default measuring range	0 to 10 mbar	0 to 1 bar		0 to 6 bar	0 to 100 bar
Smallest MSP ^b	1 mbar ^c	5 mbar ^c		0.350 bar	2.5 bar
Turndown ratio (r) ^d	r ≤ 20	r ≤ 400	r ≤ 200	r ≤ 20	r ≤ 40
Non-linearity for reference conditions	0.1 % for r ≤ 2	0.07 % for r ≤ 10		0.07 % for r ≤ 5	
	r × 0.05 % for 2 ≤ r ≤ 20	r × 0.007 % for 10 ≤ r ≤ 400	r × 0.007 % for 10 ≤ r ≤ 200	r × 0.014 % for 5 ≤ r ≤ 20	r × 0.014 % for 5 ≤ r ≤ 40
Accuracy in % of the set MSP at 20 °C	0.2 % for r ≤ 2	0.1 % for r ≤ 10		0.1 % for r ≤ 5	
	r × 0.1 % for 2 ≤ r ≤ 20	r × 0.01 % for 10 ≤ r ≤ 400	r × 0.01 % for 10 ≤ r ≤ 200	r × 0.02 % for 5 ≤ r ≤ 20	r × 0.02 % for 5 ≤ r ≤ 40
Accuracy in % of the set MSP Range: 20 to 85 °C	0.5 % for r ≤ 2 (only to 60 °C)	0.2 % for r ≤ 10		0.2 % for r ≤ 5	
	r × 0.25 % for 2 ≤ r ≤ 20 (only to 60 °C)	r × 0.02 % for 10 ≤ r ≤ 400	r × 0.02 % for 10 ≤ r ≤ 200	r × 0.04 % for 5 ≤ r ≤ 20	r × 0.04 % for 5 ≤ r ≤ 40
Accuracy in % of the set MSP Range: -40 to +20 °C	1.0 % for r ≤ 2	0.6 % for r ≤ 10		0.6 % for r ≤ 5	
	r × 0.5 % for 2 ≤ r ≤ 20	r × 0.06 % for 10 ≤ r ≤ 400	r × 0.06 % for 10 ≤ r ≤ 200	r × 0.12 % for 5 ≤ r ≤ 20	r × 0.12 % for 5 ≤ r ≤ 40
Accuracy in % of the set MSP Range: 60 to 85 °C	2.0 % for r ≤ 2	2.0 % for r ≤ 2		2.0 % for r ≤ 2	
	r × 1.0 % for 2 ≤ r ≤ 20				
Influence of the static pressure P (bar) in % of the nominal measuring range	≤ 1 %	≤ P × 0.0005 %	≤ P × 0.0003 %	≤ P × 0.0025 %	≤ P × 0.001 %
Long-term stability in % of the nominal measuring range	≤ 0.6 %/year	≤ 0.1 %/year			≤ 0.2 %/year

^a Without SIL

^b MSP = measuring span

^c For the calibration certificate from JUMO the smallest MSP is 10 mbar. MSPs smaller than 10 mbar can be adjusted by the user.

^d r = span of the nominal measuring range ÷ adjusted measuring span

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Approvals and approval marks

Approval mark	Test facility	Certificates/ certification numbers	Inspection basis	Valid for
ATEX	Electrosuisse	SEV 10 ATEX 0127 X, issue 03 (2017-10-12)	EN 60079-0 EN 60079-1 EN 60079-26 EN 60079-31	403023/...
EAC TR ZU	RU	RU C-DE.HB07.B.00086/20	TR ZU 012/2011 (Ex)	Extra code 226
SIL	exida	JUMO 2203088 C001	IEC 61508:2010-1/-2/-3	Basic type extension 2

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

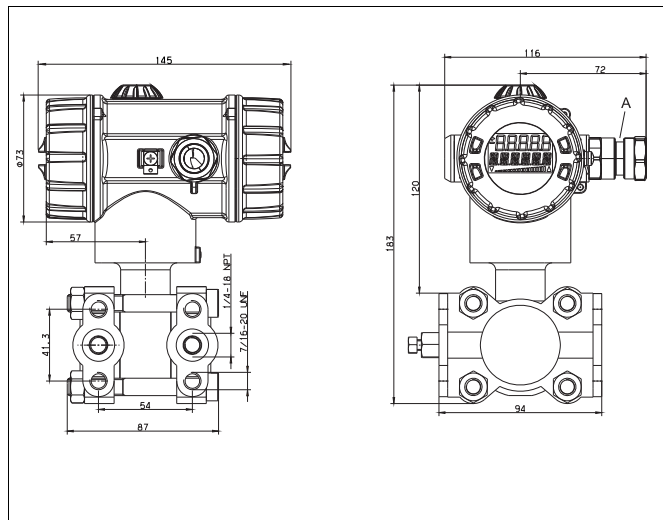
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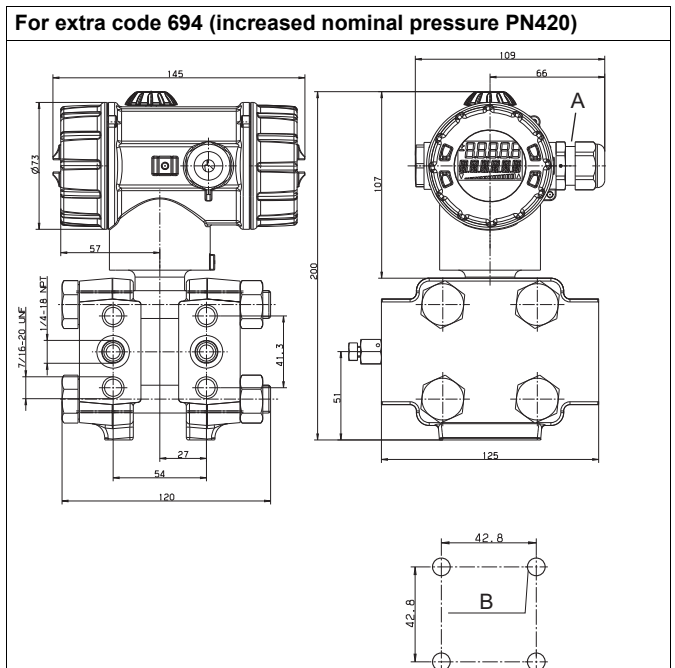
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Dimensions

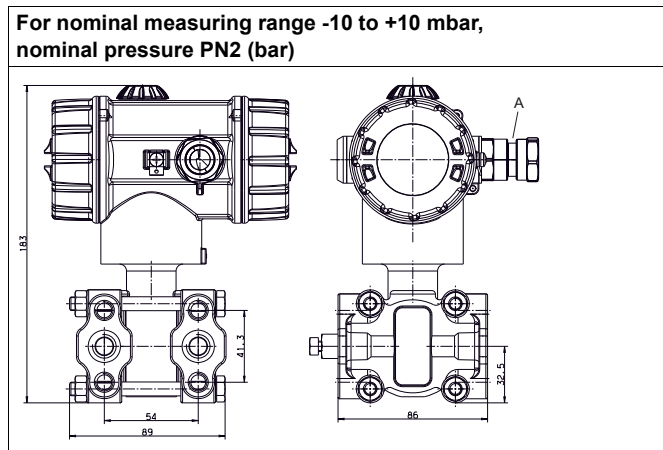


A M20 × 1.5 cable fitting



A M20 × 1.5 cable fitting

B M8 for installation



A M20 × 1.5 cable fitting

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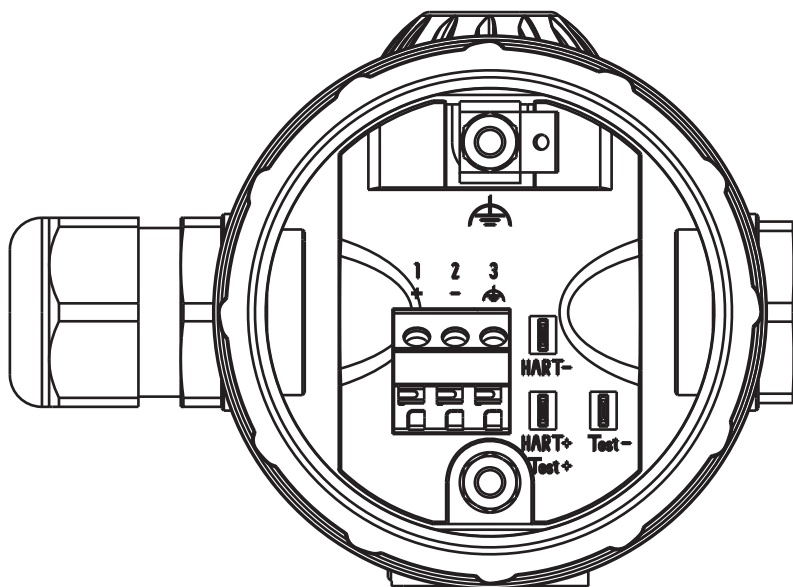
Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Connection	Terminal assignment
Voltage supply DC 12 to 36 V	1 L+ 2 L-
Output 4 to 20 mA, two-wire Load-independent current: 4 to 20 mA In voltage supply	1 L+ 2 L-
Test connection for current output Internal resistance of the ammeter $\leq 10\ \Omega$	TEST + TEST -
Test connection for HART® The burden must be present!	HART + HART -
FE (functional grounding conductor)	3
Grounding or potential equalization	Outside of the housing

Cable gland



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Accessories

Article	Part no.
PC interface with USB/TTL converter ^a	00456352
HART® modem USB ^b	00443447
Mounting kit, set includes 7/16-20UNF screws	00543777

Article	Data sheet
Manifolds	409706
Pressure separator with dairy pipe fitting DIN 11851	409772
Pressure separator with clamp connection	409774
Pressure separator with DRD flange or Varivent connection	409776
Pressure separator with ISS connection or SMS connection or RJT connection and slotted ring nut	409778
Diaphragm chemical seals 4MDV-10	409780
Pressure separator with male thread ISO 228/1 or ANSI B1.201	409782
Pressure separator with flange connection EN 1092-1 with sealing lip Form B1	409784
Pressure separator with flange connection to ANSI B 16.5 with sealing lip Form RF	409786
Ex-i Power supply/inut isolating amplifier	707530

^a The PC interface cable is the connection between the JUMO interface of the differential pressure transmitter and the USB interface of a PC.

^b The HART® modem is the connection between the HART® interface of the differential pressure transmitter and the USB interface of a PC.

Software

Description	Part no.
JUMO setup dTRANS p20 series	00537577
Device Type Manager (DTM), JUMO dTRANS p20	00738288



JUMO SIRAS P21 DP

Differential pressure transmitter

Brief description

The purpose of the device is to measure pressure and fill level, monitor minimum, maximum, and range values of gases and liquids without solids content, as well as measuring flow according to the differential pressure principle. It provides highly accurate measurements and readings, and is easy to use. The housing and sensor are manufactured from high-grade stainless steel. The device can be programmed via the rotary knob and the LCD display or via the HART® interface using a handheld device or using a PC. This enables you to adapt the device for various different types of measuring tasks. For operation via the HART® interface, there is a specially developed WindowsTM-based software that you can use.

The pressure transmitter with 4 to 20 mA and HART® protocol has been assessed in terms of functional safety and is certified by TÜV Nord according to DIN EN 61508/-1/-2/-3, edition 2.0. These measuring devices are suitable for process fill level monitoring and process pressure monitoring up to SIL 2. Please see the Safety Manual for further information on this topic.

Pressure transmitter version, see data sheet 403028.



Type 403024/0-0-1-...

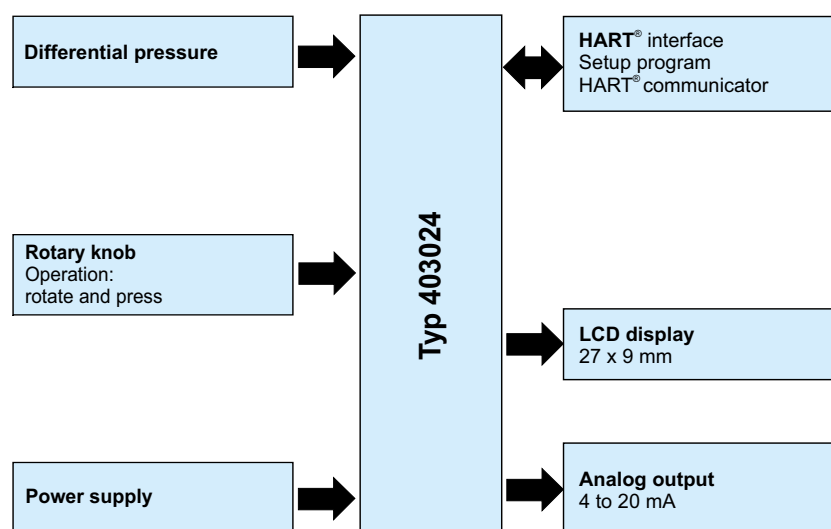


Type 403024/0-0-2-...



Type 403024/0-0-4-...

Block diagram



Special features

- Stainless steel housing
- SIL certified (TÜV Nord)
- HART® interface
- Explosion protection Ex ia (gas and dust) according to ATEX, NEPSI, and EAC – in preparation
- Linearity 0.05 %
- Turn down: 1:50
- -40 to +85 °C medium temperature
- Simple operation with rotary knob
- setup program
- LCD display with bar graph
- Display scaling with selectable measuring units
- Displays sensor temperature, minimum pressure, maximum pressure, output current, fill level, flow, (including bidirectionally), via HART® interface: electronics temperature and operating voltage

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN EN 60770 and DIN EN 61298
Ambient temperature	25 °C ±5 °C
Humidity	5 - 80 % RH ±5 %
Ambient pressure	Constant, 860 to 1060 mbar (12.47 to 15.37 psi)
Position of measuring cell	Horizontal ±1°
Voltage supply	24 V DC ±3 V DC
Sensor system	Silicon sensor with separating membrane made from stainless steel
Pressure transfer medium	
For measuring system filling medium 1	Silicon oil
For measuring system filling medium 2	Halogenized filling oil
Admissible load changes	> 10 million
Position	
Installation position	Any
Calibration position	Device upright, process connection at the side on the pressure measuring cell
Position-dependent zero offset	Relative pressure: zero point correction is possible on-site or via setup Absolute pressure: manual readjustment is possible
Display	Dotmatrix LCD with 96 x 32 pixels, 7-segment digit display for pressure and temperature, pictograms for SIL, warning triangle, configuration locking, LED backlight, bargraph with 20 segments for analog output
Languages	German; English; French; Spanish, Russian
Alignment	Horizontal, can be rotated in 90° angle increments Housing rotatable by ±160°
Large display area	27 x 9 mm, font size 9 mm, 5-digit
Font color	Black
Displayable measuring units	
Input pressure	inH ₂ O, inHG, ftH ₂ O, mmH ₂ O, mmHG, psi, bar, mbar, kg/cm ² , kPa, TORR, MPa, mH ₂ O
Measured value	% or scaled with configured pressure unit, fill level measurement unit, or flow unit
Output current	mA
Sensor temperature	°C, °F
Additional display data	Minimum pressure, maximum pressure, errors, measuring range overflow Measuring range underflow, operating hours, device parameters
Operation on site	With rotary knob and LCD
setup program	Via HART® interface
Interface	Two-wire 4 to 20 mA with overlaid HART® signal, HART® protocol version 7 HART® signal is for configuration and remote diagnosis

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Input

Nominal measuring range/ measuring range Default setting ^a	-1 to +1 bar DP	0 to 1 bar DP	-1 to +6 bar DP	-1 to +100 bar DP
Pressure measuring cell	PN210	PN210		
Smallest measuring span	5 mbar	5 mbar	60 mbar	2.5 bar
Overload capability on one side	160 bar	160 bar	200 bar	200 bar
Overload capability on both sides	240 bar	240 bar	240 bar	240 bar

^a The default setting of the measuring range corresponds to the nominal measuring range

Output

Analog output	
Output	4 to 20 mA, two-wire with HART® version 7
Step response time T63	≤ 200 ms without damping
Damping	Adjustable 0 to 100 s
Burden 4 to 20 mA with HART®	≤ (U _B - 12.5 V) / 0.024 A Min. 250 Ω, max. 1100 Ω
Output signal limits	3.6 to 24 mA
Transmission behavior	Linear, square root extraction or Characteristic line that extracts the square root on both sides for bi-directional flow calculation
Failure signal	According to NAMUR NE 43 Max. alarm: 21.6 mA Min. alarm: 3.6 mA
Reference accuracy	≤ ±0.05 % referring to 20 mA
Residual ripple	Max. ±3 % residual ripple within the admissible voltage range (without affecting the 4 to 20 mA signal)
Influence of voltage supply	≤ ±0.1 μA /V

Voltage supply

For version Explosion protection 0 (without)	DC 11.5 to 36 V
For Ex version	DC 12 to 28 V
Residual ripple	Residual ripple of voltage supply ≤3 % (without affecting the 4 to 20 mA signal)
Influence of voltage supply	≤ ±0.1 μA /V

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**Mechanical features**

Process connection, Materials of membrane	
20 (stainless steel) ^{a, b}	316 L
Flange	Stainless steel 316
Seal	PTFE
Materials of housing	
1 (short, stainless steel)	Stainless steel 1.4404
2 (long, stainless steel)	Stainless steel 1.4404, VMQ
3 (precision casting)	Precision casting 1.4408
Lid 20 (stainless steel)	Precision casting 1.4408, seal FPM
Electrical connection 36 (round plug M12 × 1)	Brass, nickel-plated
Electrical connection 93 (cable fitting, metal)	Brass, nickel-plated
Control knob	PA
Weights	
Type 403024/000-0-1 (housing, short)	Approx. 3.0 kg
Type 403024/000-0-2 (housing, long)	Approx. 3.3 kg
Type 403024/000-0-3 (housing, precision casting)	Approx. 4.0 kg

^a The device is not suitable for the heating oil medium.

^b The medium is not allowed to corrode the membrane material.

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Environmental influences

Ambient temperature range

Version	Ambient temperature range ^{a, b}
Connection 93 cable fitting (metal)	-40 to +85 °C
Connection 36 round plug M12 x 1	-25 to +85 °C

^a Operating temperature range of the LCD display: -20 to +85°C; outside of this range, the display will not work

^b It must be noted that, below -40 °C, there will be functional limitations. In safety-related applications, operation is only admissible if the ambient temperature is no lower than -40 °C.

Average temperature range

Average temperature range	
Standard	-40 to +85 °C

Protection type

Protection type	
Protection type	IP66/IP67 according to DIN EN 60529

Climate class

Climatic features according to DIN EN 60721-3-X	
Stationary use, weather-proof acc. to DIN EN 60721-3-3	from IE37: 3K7/3M3
Stationary use, not weather-proof acc. to DIN EN 60721-3-4	from IE42: 4K3/4M3
Transport acc. to DIN EN 60721-3-2	from IE23: 2K4/2M2

Electromagnetic compatibility

Electromagnetic compatibility acc. to DIN EN 61326-3-1, DIN EN 61326-2-3, DIN EN 60730-2-6 and NAMUR Recommendation NE 21	
Maximum deviation	≤ 0.5 % of span
Interference emission:	Class B
Interference immunity	Industry

Mechanical load

Admissible mechanical load:	
Vibration strength	2 G, 10 to 2000 Hz acc. to IEC 60068-2-6
Shock resistance	15 G for 6 ms acc. to IEC 60068-2-27



Accuracy

Contains the maximum measurement deviation, including non-linearity after limiting point setting, hysteresis, non-repeatability, measurement deviation of the measuring range end value and measurement deviation at the measuring range start.

Measurement deviation in the nominal measuring range	Reference accuracy ^a in % MSP ^b	Reference accuracy ^a in % MSP ^b
-1 to +1 bar	$r \leq 10 : 1 \pm 0.05$	$r > 10 : 1 \pm (0.00225 \times r + 0.0275)$
0 to +1 bar	$r \leq 5 : 1 \pm 0.075$	$r > 5 : 1 \pm (0.0095 \times r + 0.0275)$
-1 to +6 bar	$r \leq 10 : 1 \pm 0.05$	$r > 10 : 1 \pm (0.00225 \times r + 0.0275)$
-1 to +100 bar	$r \leq 5 : 1 \pm 0.10$	$r > 5 : 1 \pm 0.02 \times r$

^a r = spread – ratio of the measuring span calibrated per default to the configured measuring span

^b MSP = configured measuring spans

Influence of the ambient temperature in the nominal measuring range	In the range -10 to +60 °C ^{a,b}	In the range -30 to -10 °C and +60 to +85 °C ^{a,b}
-1 to +1 bar	$\pm (0.03 \times r + 0.017)$	$\pm (0.06 \times r + 0.034)$
0 to +1 bar	$\pm (0.03 \times r + 0.017)$	$\pm (0.06 \times r + 0.034)$
-1 to +6 bar	$\pm (0.012 \times r + 0.017)$	$\pm (0.024 \times r + 0.034)$
-1 to +100 bar	$\pm (0.042 \times r + 0.04)$	$\pm (0.084 \times r + 0.08)$

^a r = spread – ratio of the measuring span calibrated per default to the configured measuring span

^b MSP = configured measuring spans

Influence of the ambient temperature in the nominal measuring range	In the range -40 to -30 °C ^{a,b}	
-1 to +1 bar	$\pm (0.06 \times r + 0.3)$	
0 to +1 bar	$\pm (0.06 \times r + 0.2)$	
-1 to +6 bar	$\pm (0.024 \times r + 0.4)$	
-1 to +100 bar	$\pm (0.084 \times r + 0.5)$	

^a r = spread – ratio of the measuring span calibrated per default to the configured measuring span

^b MSP = configured measuring spans

The basic accuracy comprises the reference accuracy and the influence of the ambient temperature (pressure sensor and electronics error of the analog output of 0.05 %) for the temperature range of -10 to + 60 °C.

Basic accuracy in nominal measuring range	r = 1 : 1 in % MSP ^a	r = 2 : 1 in % MSP ^a	r = 3 : 1 in % MSP ^a	r = 4 : 1 in % MSP ^a	r = 5 : 1 in % MSP ^a
-1 to +1 bar	± 0.11	± 0.14	± 0.17	± 0.20	± 0.23
0 to +1 bar					
-1 to +6 bar	± 0.10	± 0.11	± 0.12	± 0.13	± 0.14
-1 to +100 bar	± 0.14	± 0.18	± 0.22	± 0.26	± 0.31

^a MSP = configured measuring spans

The long-term stability relates to the measuring span calibrated per default.

Long-term stability in the nominal measuring range	1 year in % MSP ^a	5 years in % MSP ^a	10 years in % MSP ^a
-1 to +1 bar	± 0.025	± 0.050	± 0.075
0 to +1 bar			
-1 to +6 bar	± 0.038	± 0.075	± 0.150
-1 to +100 bar	± 0.050	± 0.070	± 0.100

^a MSP = configured measuring spans

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The total deviation is calculated based on the combined measuring accuracies of the basic accuracy (reference accuracy as well as the influence of ambient temperature and static pressure and the electronics error) and the long-term stability.

The basic accuracy used here corresponds to the temperature range of -10 to +60 °C and a spread (r) of 1 : 1.

Total deviation in nominal measuring range	1 year in % MSP ^a	5 years in % MSP ^a	10 years in % MSP ^a
-1 to +1 bar	± 0.14	± 0.16	± 0.19
0 to +1 bar			
-1 to +6 bar	± 0.14	± 0.18	± 0.25
-1 to +100 bar	± 0.19	± 0.21	± 0.24

^a MSP = configured measuring spans

Device-internal accuracy specification with respect to flow as a calculated variable from the differential pressure. A level control-dependent factor conditioned by the root characteristic line is added to the potential deviation of the differential pressure.



NOTE!

As the characteristic line that extracts the square root is stored as bidirectional, this also applies for the negative axis in the case of a corresponding, symmetrical measuring range. It is only for small flows that the differential pressure principle becomes increasingly inaccurate.

Pressure adjustment in %	Flow rate error factor: differential pressure (incl. temperature drift)
≥ 50 %	≤ 0.71-fold
≥ 25 %	≤ 1.00-fold
≥ 20 %	≤ 1.12-fold
≥ 11.1 %	≤ 1.50-fold
≥ 6.25 %	≤ 2.00-fold
≥ 2.78 %	≤ 3.00-fold

Approvals and approval marks

SIL	
Test facility	TÜV Nord (German Technical Inspection Agency)
Certificate/test no.	SEBS-A.084722/14 V1.0
Inspection basis	DIN EN 61508/-1/-2/-3: 2011 DIN EN ISO 13849-1: 2016 DIN EN ISO 13849-2: 2013
Valid for	Entire JUMO SIRAS P21 device range

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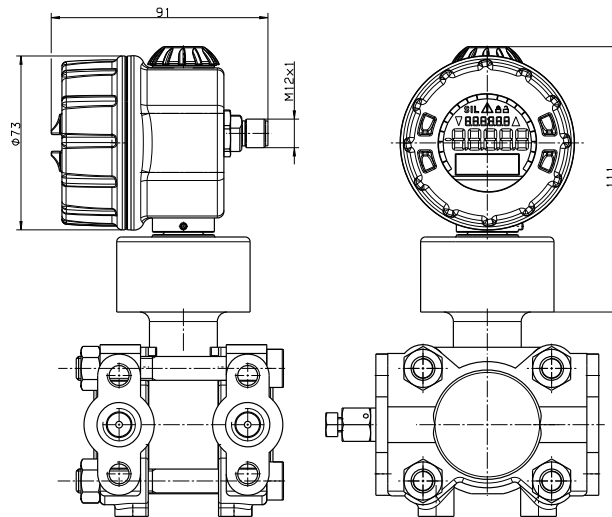
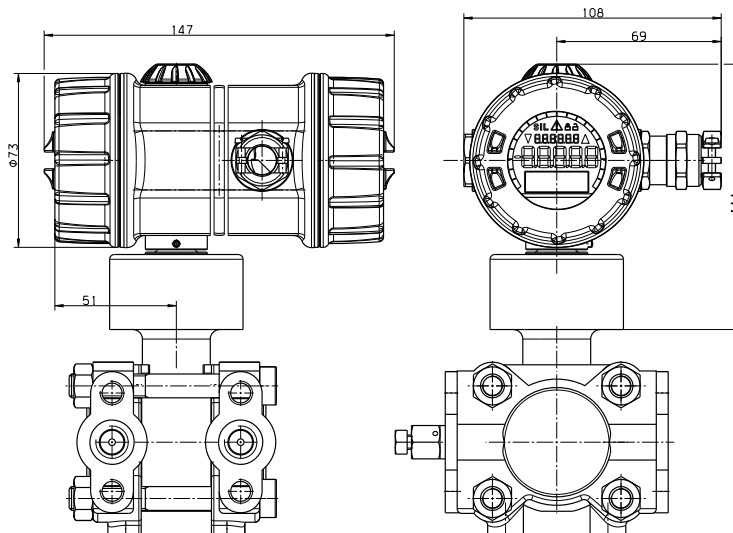
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Dimensions

Type 403024/000-0-1 (short, stainless steel, with M12 connection)

Type 403024/000-0-2 (long, stainless steel, with cable fitting)


M20 × 1.5 cable fitting

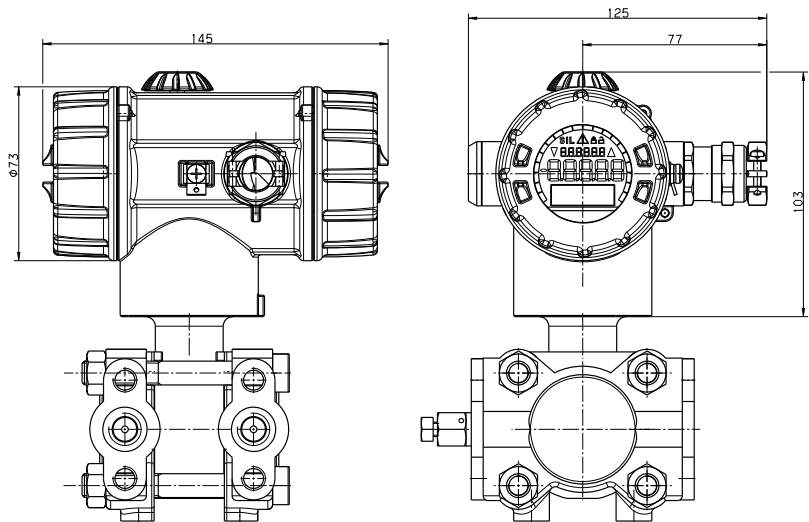
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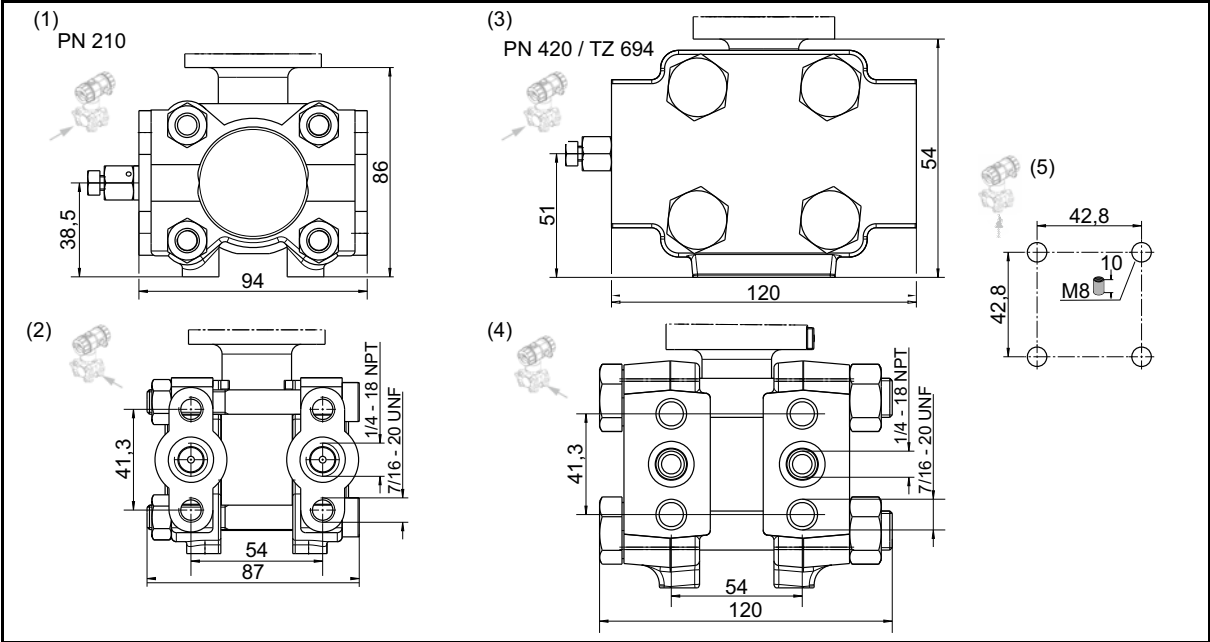
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Type 403024/000-0-3 (precision casting, with cable fitting)



Cable fitting M20 x 1.5 Ex-d version



1	Pressure measuring cell PN210, front view	2	Pressure measuring cell PN210, side view
3	Pressure measuring cell PN420, front view	4	Pressure measuring cell PN420, side view
5	Borehole diagram, fastening of all pressure measuring cells		

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Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Terminal assignment – devices with cable fitting

Connection		Terminal assignment
		93 cable fitting
Voltage supply DC 12.5 to 36 V for non-Ex version DC 12.5 to 28 V for Ex version		1 L+ 2 L-
Output 4 to 20 mA, two-wire load-independent current of 4 to 20 mA in voltage supply		1 L+ 2 L-
Test connection for current output Internal resistance of the measuring device $\leq 10 \Omega$		TEST + TEST -
Test connection for HART® The burden must be present!		HART + HART -
Functional ground		3

Terminal assignment – M12 round plug

Connection		Terminal assignment	Color assignment ^a
		36 round plug M12 × 1	
Voltage supply DC 12.5 to 36 V for non-Ex version DC 12.5 to 28 V for Ex version		1 L+ 3 L-	Brown Blue
Output 4 to 20 mA, two-wire load-independent current of 4 to 20 mA in voltage supply		1 L+ 3 L-	Brown Blue
Functional ground		4	Black

^a The color coding is only valid for A-coded standard cables!

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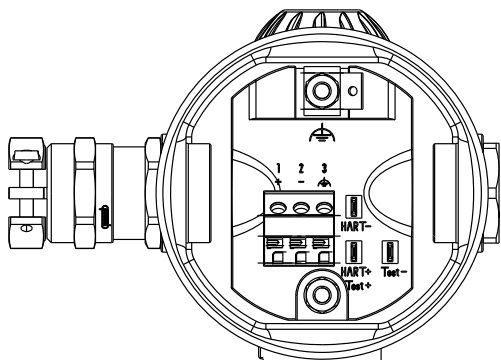
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**Cable fitting****Round plug M12 × 1**

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Order details

	(1) Basic type
403024	JUMO SIRAS P21 DP – differential pressure transmitter
	(2) Basic type extension
000	None
	(3) Explosion protection
0	None
1	ATEX, IECEx ia (in preparation)
2	ATEX, IECEx ia + d combined release (in preparation)
	(4) Housing
1	Short, stainless steel, with M12 connection ^a
2	Long, stainless steel, with cable fitting
3	Long, precision casting, with cable fitting
	(5) Electrical connection
36	Round plug M12 × 1
93	Metal cable fitting
	(6) Lid material
20	CrNi (stainless steel)
	(7) Display
1	With display (LCD)
	(8) Operation
1	With rotary knob
	(9) Input – nominal measuring range
532	0 to +1 bar DP
531	-1 to +1 bar DP
533	-1 to +6 bar DP
534	-1 to +100 bar DP
	(10) Output
410	4 to 20 mA, two-wire with HART [®] protocol
	(11) Process connection
511	2 x pressure connection 1/4-18NPT according to DIN EN 837
	(12) Process connection material
20	CrNi (stainless steel)
	(13) Measuring system filling medium
01	Silicon oil

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(14) Extra codes	
000	Without extra code
100	Customer-specific configuration ^b
624	Oil and grease-free
633	Mounting brackets for 2" pipe
634	With TAG number

^a The short housing is only available with the electrical connection round plug M12 × 1.

^b Please specify the setting you want in plain text.

Order code (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)
 [] / [] - [] - [] - [] - [] - [] - [] - [] - [] - [] - [] - [] - [] / []
 Order example 403024 / 000 - 0 - 2 - 82 - 20 - 1 - 1 - 533 - 410 - 511 - 20 - 1 / 000

Accessories

Designation	Part no.
4-pole cable box, straight, M12 × 1 with 2 m PVC cable	00404585
4-pole cable box, angled, M12 × 1 with 2 m PVC cable	00409334
5-pole cable box, straight, M12 × 1, without a cable	00419130
5-pole cable box, angled, M12 × 1, without a cable	00419133
HART® modem USB ^a	00443447
Holder for wall and pipe mounting	00543777
Ex-i repeater power supply and input isolating amplifier 707530/38	00577948
JUMO flowTRANS DP P01/P02/P03/P04 pitot tube	
JUMO flowTRANS DP R01/R02 orifice plate according to DIN EN ISO 5167-2	

^a The HART® modem is the connection between the HART® interface of the pressure transmitter and the USB interface of a PC.

Software

Designation	Part no.:
JUMO setup program SIRAS P21 series	00770008
Device Description (DD); available via the FieldComm Group website	

JUMO dTRANS p20

Process pressure transmitter

Brief description

The device with the HART® interface combines maximum precision with simple operation. It is used to measure the system pressure of gas, steam and liquids. The built-in LCD displays measured values and device data. The device can be installed up to zone 0 in the version with explosion protection "Ex ia (intrinsically safe)".

The housing and sensor are manufactured from high-grade stainless steel. Diaphragm seals can also be connected for specific process technology applications (see data sheets 409772 to 409784).

The pressure transmitter can be programmed and can therefore be flexibly adapted for various measuring tasks. There is an easy-to-use setup program available as an accessory for operation via interfaces. A rotary knob allows for quick and easy on-site manual operation.

The pressure transmitter with 4 to 20 mA and HART® protocol was evaluated with regard to functional safety and is certified by exida according to IEC 61508/-1/-2/-3. These measuring devices are suitable for monitoring process level and process pressure up to SIL2. Further details can be found in the Safety Manual.

For the "Ex d" explosion protection version, see data sheet 403026.

For the differential pressure version, see data sheet 403022.



Type 403025/0-0-1-...

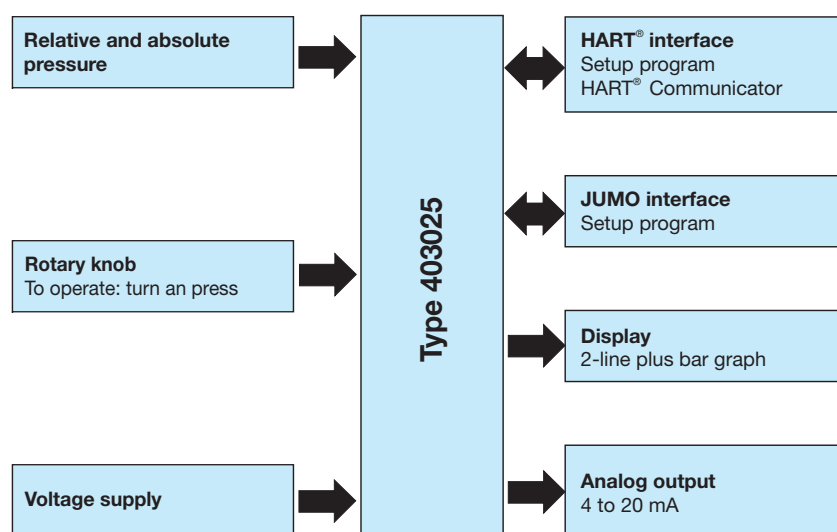


Type 403025/0-0-2-...



Type 403025/0-0-3-...

Block diagram



Special features

- Stainless steel case
- SIL certified (exida)
- HART® interface
- Explosion protection Ex ia (gas and dust) according to ATEX, NEPSI, and EAC
- Linearity 0.05 %
- Turn down: 1:50
- Up to 200 °C medium temperature
- Simple operation with rotary knob
- Setup program
- LCD display with bar graph
- Display scaling with a choice of measuring units
- Display of sensor temperature
- Display of minimum and maximum pressures
- Current-generator function

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN EN 60770 and DIN EN 61298
Ambient temperature	22 °C ±5 K
Air pressure	1000 hPa (±25 hPa)
Voltage supply	DC 24 V
Burden	50 Ω
Sensor system	Silicon sensor with stainless steel separating diaphragm/thin film sensor
Pressure transfer medium	
For measuring system filling medium 0	Without transfer medium
For measuring system filling medium 1	Silicon oil, FDA compliant
Admissible load changes	> 10 million
Position	
Mounting position	Any
Calibration position	Device upright, process connection at the bottom
Zero offset depending on position	Relative pressure: a zero offset is possible on-site or via setup. Absolute pressure: manual readjustment is possible.
For medium temperature 1 (up to 120 °C)	≤ 1 mbar
For medium temperature 2 (up to 200 °C)	≤ 10 mbar
Display ^a	LCD, two-line with bar graph
Alignment	Display unit rotatable in 90° steps Housing rotatable ±160°
Size	Display 22 × 35 mm, font size 7 mm, 5 digits
Color	Black
Portrayable measuring units	
Input pressure	mH ₂ O, inH ₂ O, inHg, ftH ₂ O, mmH ₂ O, mmHg, psi, bar, mbar, kg/cm ² , kPa, Torr, MPa
Measured value	% or scaled with freely adjustable measuring unit
Output current	mA
Sensor temperature	°C, °F
Additional display data	Minimum pressure, maximum pressure, error, overrange, underrange, operating hours, device parameters
Operation	
On-site	With rotary knob and LCD
Setup program	Via interface
Interface	
Standard	JUMO interface ^b
For output 410 (4 to 20 mA with HART®)	JUMO interface ^b and HART® interface

^a optional; SIL version only available with display

^b The JUMO interface may not be used in a potentially explosive area! In such a case the device can be operated via the rotary knob or the HART® interface.

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Input

Relative pressure				
Nominal measuring range	-600 to +600 mbar	-1 to +2.5 bar	-1 to +4 bar	-1 to +10 bar
Overload capability	6 bar	15 bar	30 bar	60 bar
Burst pressure	12 bar	30 bar	60 bar	100 bar
Relative pressure				
Nominal measuring range	-1 to +25 bar	-1 to +100 bar	-1 to +250 bar	-1 to +600 bar
Overload capability	150 bar	300 bar	600 bar	1200 bar
Burst pressure	250 bar	400 bar	700 bar	2000 bar

Absolute pressure						
Nominal measuring range	0 to 0.6 bar	0 to 2.5 bar	0 to 4 bar	0 to 10 bar	0 to 25 bar	0 to 100 bar
Overload capability	6 bar	15 bar	30 bar	60 bar	150 bar	300 bar
Burst pressure	12 bar	30 bar	60 bar	100 bar	250 bar	400 bar

Output

analog output For output 405 (4 to 20 mA) For output 410 (4 to 20 mA with HART®) Jump response time T60 Attenuation	4 to 20 mA, 2-wire 4 to 20 mA, two-wire with HART® version 7 ≤ 190 ms without attenuation Adjustable 0 to 100 s
Burden For output 405 (4 to 20 mA) For output 410 (4 to 20 mA with HART®)	$\text{Burden} \leq (U_B - 12 \text{ V}) \div 0.022 \text{ A}$ $\text{Burden} \leq (U_B - 12 \text{ V}) \div 0.022 \text{ A}$; additional: min. 250 Ω , max. 1100 Ω

Voltage supply

For version Explosion protection 0 (without) Explosion protection 1 (ATEX Ex ia)	DC 12 to 36 V DC 12 to 28 V The voltage supply must be intrinsically safe and must not exceed the following maximum values: $U_i \leq \text{DC } 28 \text{ V}$ $I_i \leq 115 \text{ mA}$ $P_i \leq 750 \text{ mW}$ $C_i = 6 \text{ nF}$ $L_i = 105 \mu\text{H}$
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Mechanical features

Process connection	
Material 20 (stainless steel)	316 L for front-flush process connections Otherwise 316 Ti
Material 82 (stainless steel)	2.4819 NiMo
Surface	Ra ≤ 0.8 µm
Process seal	
Process connection 571 G 3/4 front-flush) and process connection 652 (tank connection with grooved union nut)	FPM
Process connection 997 (JUMO PEKA)	FDA compliant, see data sheet 409711
All other process connections	No seal
Measuring membranes	
Material 20 (stainless steel)	1.4542 for -1 to +250 bar relative pressure (measuring range 508) and -1 to +600 bar relative pressure (measuring range 516)
Material 82 (stainless steel)	Otherwise 316 L
Surface	2.4819 NiMo ^a Ra ≤ 0.8 µm
Housing	
Material	
Housing 1 (short, stainless steel)	Stainless steel 1.4404
Housing 2 (long, stainless steel)	Stainless steel 1.4404, VMQ
Housing 3 (precision casting)	Precision casting 1.4408
Lid 20 (stainless steel)	Precision casting 1.4408, seal FPM
Lid 85 (plastic)	PA, seal FPM
Electrical connection 36 (round plug M12 × 1)	Brass nickel-plated
Electrical connection 82 (cable fitting, plastic)	PA
Electrical connection 93 (cable fitting, metal)	Brass nickel-plated
Operation 0 (without control knob)	-
Operation 1 (with control knob)	PA
Explosion protection	
Explosion protection 0 (without)	The device is not approved for use in an Ex-area.
Explosion protection 1 (ATEX Ex ia)	EC type examination certificate SEV 09 ATEX 0138 X  II 1/2G Ex ia IIC T6 ... T3 Ga/Gb II 1/2D Ex ia IIIC T105 °C Da/Db
Weight	
Type 403025/0-0-1 (housing short)	Approx. 550 g
Type 403025/0-0-2 (housing long)	Approx. 850 g
Type 403025/0-0-3 (housing precision casting)	Approx. 1600 g

^a Not available in high-temperature version

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Environmental influences

Admissible temperatures					
Operation	Version	Temperature class	Maximum medium temperature	Ambient temperature ^a	Expanded ambient temperature (extra code 681) ^{a, b, c}
	Standard		120 °C	-40 to +85 °C	-50 to +85 °C
	High temperature		200 °C	10 to 85 °C ^d	Not available
	II 1/2G Ex ia	T6	60 °C	-40 to +50 °C	-50 to +50 °C
		T5	70 °C	-40 to +65 °C	-50 to +65 °C
		T4	115 °C	-40 to +85 °C	-50 to +85 °C
		T3 ^e	175 °C	10 to 85 °C	Not available
	II 1/2D Ex ia	T105 °C	100 °C	-40 to +60 °C	-50 to +60 °C
Storage	-40 to +85 °C				
Admissible humidity					
Operation	100 % including condensation on the device outer case				
Storage	90 % without condensation				
Admissible mechanical load					
Vibration strength	2 g, 10 to 2000 Hz according to DIN EN 60068-2-6				
Shock resistance	15 g for 6 ms according to IEC 60068-2-27				
Electromagnetic compatibility	According to EN 61326				
Interference emission	Class B ^f				
Interference immunity	Industry				
Protection type					
For version					
Explosion protection 0 (without)	IP66/67 according to DIN 60529				
Explosion protection 1 (ATEX Ex ia)	IP66 according to DIN 60529				

^a Under -20 °C limited function: stationary use, increased danger of cable break, display without function; under -30 °C operation of the device not possible.

^b In the range from -40 to -50 °C the device must be permanently in operation. Furthermore, the lid with the device inspection glass must additionally be protected against mechanical impact and shocks. Please contact JUMO for further details.

^c Without SIL

^d Low ambient temperatures up to -40 °C are possible, but with limited accuracy.

^e Only for high-temperature version (medium temperature 2)

^f The product is suitable for industrial use as well as for households and small businesses.

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 Internet: www.jumousa.com



Accuracy

Including non-linearity, hysteresis, non-repeatability, zero point and final value deviation (corresponds to measurement deviations according to IEC 61298-2), calibrated at vertical installation position with the process connection at the bottom

Relative pressure				
Nominal measuring range	-600 to +600 mbar	-1 to +2.5 bar	-1 to +4 bar	-1 to +10 bar
Default measuring range	0 to 600 mbar	0 to 2.5 bar	0 to 4 bar	0 to 10 bar
Smallest MSP ^a	60 mbar	0.1 bar	0.1 bar	0.5 bar
Turndown ratio (r) ^b	$r \leq 20$	$r \leq 50$	$r \leq 50$	$r \leq 50$
Non-linearity for reference conditions ^c	0.06 %	0.04 %	0.04 %	0.04 %
Accuracy in % of the set MSP Range: -20 to +60 °C	$r \times 0.12 \%$ for $1 \leq r \leq 20$	$r \times 0.08 \%$ for $1 \leq r \leq 50$	$r \times 0.08 \%$ for $1 \leq r \leq 50$	$r \times 0.08 \%$ for $1 \leq r \leq 50$
Accuracy in % of the set MSP Range: -40 to -20 °C or 60 to 85 °C	$r \times 0.18 \%$ for $1 \leq r \leq 20^d$	$r \times 0.12 \%$ for $1 \leq r \leq 50$	$r \times 0.12 \%$ for $1 \leq r \leq 50$	$r \times 0.12 \%$ for $1 \leq r \leq 50$
Long-term stability in % as of the nominal measuring range	0.1 %/year			
Relative pressure				
Nominal measuring range	-1 to +25 bar	-1 to +100 bar	-1 to +250 bar	-1 to +600 bar
Default measuring range	0 to 25 bar	0 to 100 bar	0 to 250 bar	0 to 600 bar
Smallest MSP	0.5 bar	5 bar	12.5 bar	30 bar
Turndown ratio (r) ^b	$r \leq 52$	$r \leq 20$	$r \leq 20$	$r \leq 20$
Non-linearity for reference conditions ^c	0.04 %	0.04 %	0.04 %	0.08 %
Accuracy in % of the set MSP Range: -20 to +60 °C	$r \times 0.08 \%$ for $1 \leq r \leq 52$	$r \times 0.08 \%$ for $1 \leq r \leq 20$	$r \times 0.08 \%$ for $1 \leq r \leq 20$	$r \times 0.16 \%$ for $1 \leq r \leq 20$
Accuracy in % of the set MSP Range: -40 to -20 °C or 60 to 85 °C	$r \times 0.12 \%$ for $1 \leq r \leq 52$	$r \times 0.12 \%$ for $1 \leq r \leq 20$	$r \times 0.12 \%$ for $1 \leq r \leq 20$	$r \times 0.24 \%$ for $1 \leq r \leq 20$
Long-term stability in % as of the nominal measuring range	0.1 %/year			

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Absolute pressure				
Nominal measuring range	0 to 600 mbar	0 to 2.5 bar	0 to 4 bar	0 to 10 bar
Default measuring range	0 to 600 mbar	0 to 2.5 bar	0 to 4 bar	0 to 10 bar
Smallest MSP ^a	60 mbar	0.1 bar	0.1 bar	0.5 bar
Turndown ratio (r) ^b	r ≤ 10	r ≤ 20	r ≤ 40	r ≤ 20
Non-linearity for reference conditions ^c	0.12 %	0.04 %	0.04 %	0.04 %
Accuracy in % of the set MSP Range: -20 to +60 °C	r × 0.24 % for 1 ≤ r ≤ 10	r × 0.08 % for 1 ≤ r ≤ 20	r × 0.08 % for 1 ≤ r ≤ 40	r × 0.08 % for 1 ≤ r ≤ 20
Accuracy in % of the set MSP Range: -40 to -20 °C or 60 to 85 °C	r × 0.36 % for 1 ≤ r ≤ 10 ^d	r × 0.16 % for 1 ≤ r ≤ 20	r × 0.16 % for 1 ≤ r ≤ 40	r × 0.16 % for 1 ≤ r ≤ 20
Long-term stability in % as of the nominal measuring range	0.1 %/year			
Absolute pressure				
Nominal measuring range	0 to 25 bar	0 to 100 bar		
Default measuring range	0 to 25 bar	0 to 100 bar		
Smallest MSP ^a	0.5 bar	5 bar		
Turndown ratio (r) ^b	r ≤ 50	r ≤ 20		
Non-linearity for reference conditions ^c	0.04 %	0.04 %		
Accuracy in % of the set MSP Range: -20 to +60 °C	r × 0.08 % for 1 ≤ r ≤ 50	r × 0.08 % for 1 ≤ r ≤ 20		
Accuracy in % of the set MSP Range: -40 to -20 °C or 60 to 85 °C	r × 0.16 % for 1 ≤ r ≤ 50	r × 0.12 % for 1 ≤ r ≤ 20		
Long-term stability in % as of the nominal measuring range	0.1 %/year			

^a MSP = measuring span

^b r = span of the nominal measuring range ÷ adjusted measuring span

^c Reference conditions: ambient temperature 20 °C (±3 K), air pressure 1000 hPa (±25 hPa)

^d Only up to -30 °C

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Approvals and approval marks

ATEX	
Testing agency	Eurofins Electrosuisse Product Testing AG
Certificates/certification numbers	SEV 09 ATEX 0138 X
Inspection basis	EN 60079-0, EN 60079-11, EN 60079-26
Valid for	Type 403025/x-1-...
DNV-GL	
Testing agency	DNV-GL
Certificates/certification numbers	TAA00001KB
Inspection basis	DNV GL CG-0339
Valid for	Type 403025/x-1-.../880
EAC TR ZU	
Testing agency	RU
Certificates/certification numbers	RU C-DE.HB07.B.00086/20
Inspection basis	TR ZU 012/2011 (Ex)
Valid for	Extra code 226
SIL	
Testing agency	exida
Certificates/certification numbers	JUMO 2203088 C001
Inspection basis	IEC 61508/-1/-2/-3
Valid for	Basic type extension 2

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

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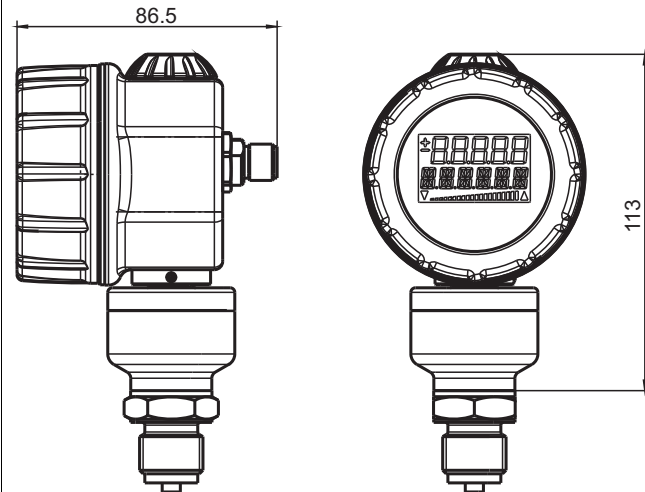
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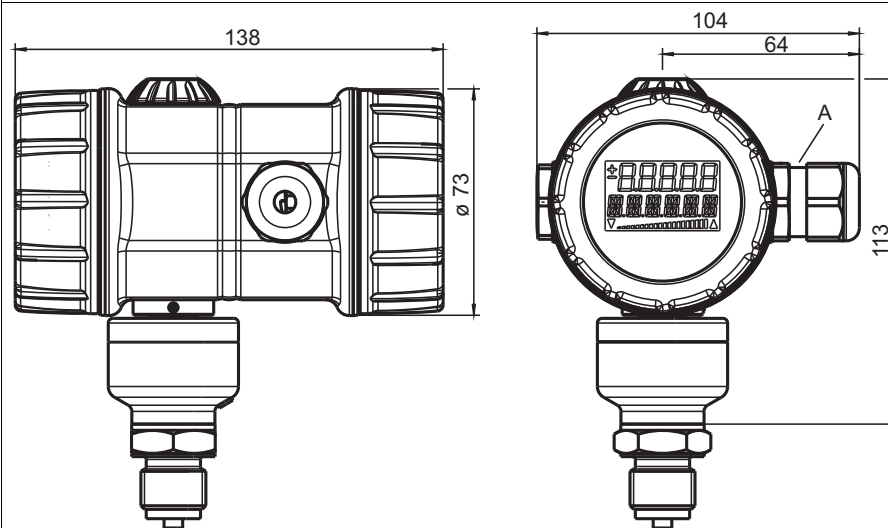


Dimensions

Type 403025/0-0-1 (short, stainless steel, with M12 connection)



Type 403025/0-0-2 (long, stainless steel, with cable fitting)



A M20 × 1.5 cable fitting

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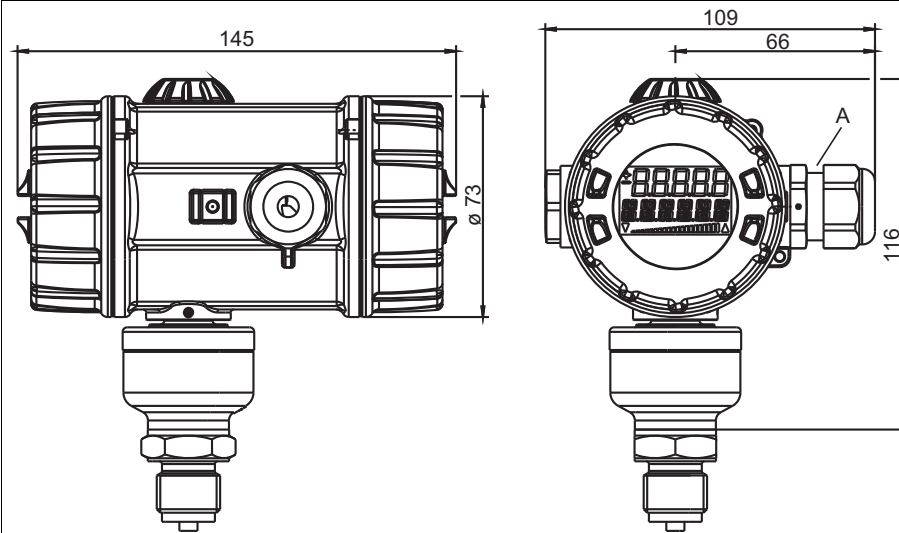
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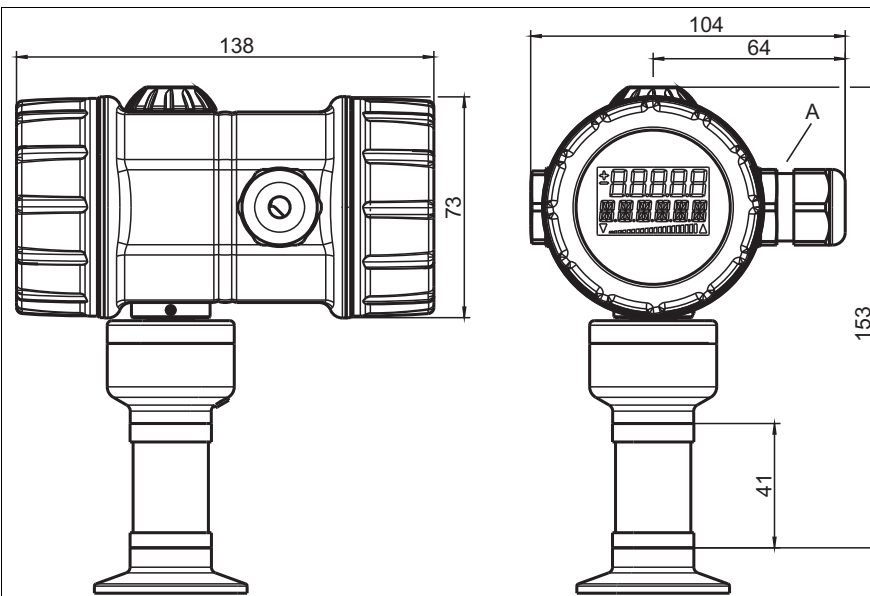
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**Type 403025/0-0-3 (precision casting, with cable fitting)**

A M20 × 1.5 cable fitting

Dimensions at medium temperature 2 (high-temperature version)

Pressure transmitters that are suitable for medium temperatures up to 200 °C have an extended shaft through which the increased temperature is discharged. The total height of all pressure transmitters in this version increases by 41 mm as shown in the following figure.



A M20 × 1.5 cable fitting

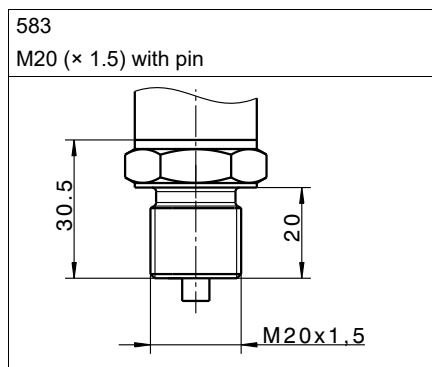
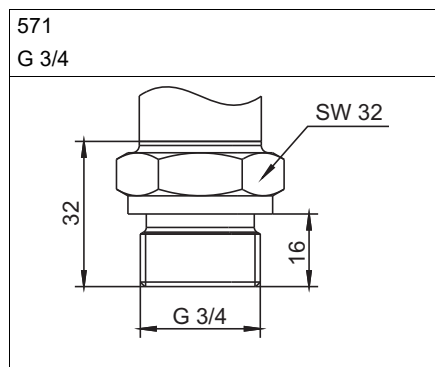
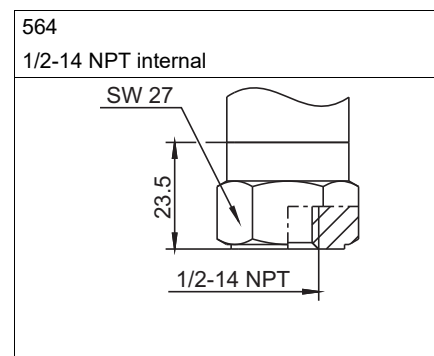
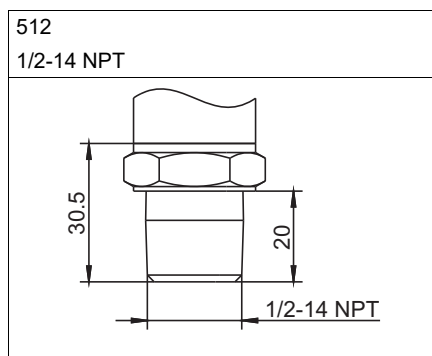
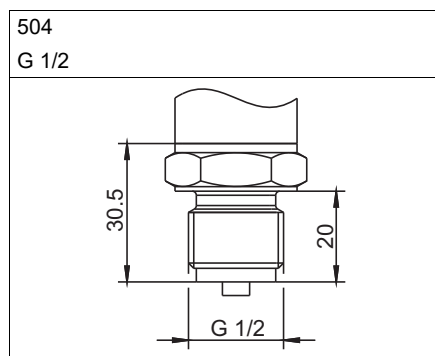
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Process connections



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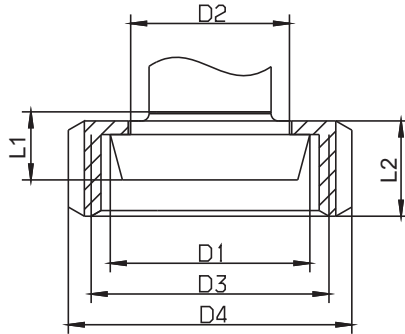
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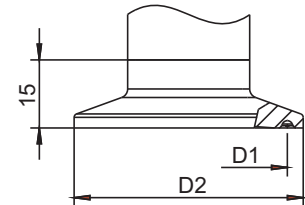
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**604 and 606**

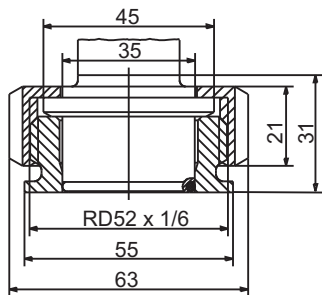
Taper socket with grooved union nut according to DIN 11851

**613 and 616**

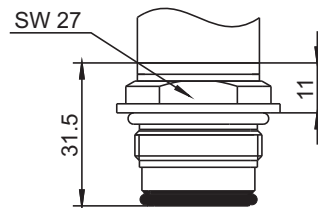
Clamp according to DIN 32676

**652**

Tank connection with grooved union nut DN 25

**997**

JUMO PEKA

**Dimensions of the process connections 604, 606, 613, and 616**

Connection	DN	D1	D2	D3	D4	L1	L2
604	25	Ø 44	Ø 35	Rd 52 × 1/6"	Ø 63	15	21
606	40	Ø 56	Ø 48	Rd 65 × 1/6"	Ø 78		
613	25	Ø 43,5	Ø 50,5				
616	50	Ø 56,5	Ø 64				

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Connection diagram

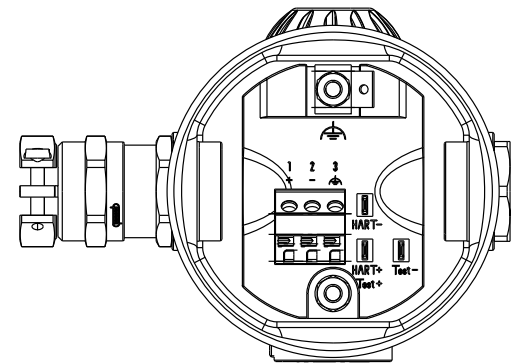
The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Connection		Terminal assignment	
		82 (plastic), 93 (metal) Cable gland	36 Round plug M12 × 1
Voltage supply DC 12 to 36 V for none Ex version DC 12 to 28 V for Ex version		1 L+ 2 L-	1 L+ 3 L-
Output 4 to 20 mA, two-wire Impressed current 4 to 20 mA in voltage supply		1 L+ 2 L-	1 L+ 3 L-
Current output test connection Inherent resistance of ammeter ≤ 10 Ω		TEST + TEST -	
HART® test connection Burden must be present!		HART + HART -	
Functional ground		3	4

Cable fitting

Round plug M12 × 1



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Order details

	(1) Basic type
403025	JUMO dTRANS p20 - process pressure transmitter
	(2) Basic type extension
0	None
2	SIL ^a
9	Special version
	(3) Explosion protection
0	None
1	ATEX Ex ia ^b
	(4) Housing
1	Short, stainless steel, with M12 connection ^c
2	Long, stainless steel, with cable fitting
3	Precision casting, with cable fitting
	(5) Electrical connection
36	Round plug M12 × 1 ^c
82	Plastic cable fitting
93	Metal cable fitting
	(6) Cover material
20	CrNi (stainless steel)
85	Plastic
	(7) Display
0	None
1	With display (LCD)
	(8) Operation
0	None
1	With control knob
	(9) Input – nominal measuring range
450	-600 to +600 mbar relative pressure
473	-1 to +2.5 bar relative pressure
513	-1 to +4 bar relative pressure
472	-1 to +10 bar relative pressure
514	-1 to +25 bar relative pressure
515	-1 to +100 bar relative pressure ^d
508	-1 to +250 bar relative pressure ^e
516	-1 to +600 bar relative pressure ^e
487	0 to 0.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
493	0 to 10 bar absolute pressure
495	0 to 25 bar absolute pressure
507	0 to 100 bar absolute pressure ^d
	(10) Output
405	4 to 20 mA, two-wire
410	4 to 20 mA, two-wire with HART® protocol

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(11) Process connection	
504	G 1/2 according to DIN EN 837
512	1/2-14 NPT according to DIN EN 837
559	M20 × 1.5 according to DIN 3852-11
564	1/2-14 NPT internal
571	G 3/4 front-flush according to DIN EN ISO 228-1
583	M20 × 1.5 with pin
604	Taper socket with union nut DN 25 according to DIN 11851 (dairy pipe fitting)
606	Taper socket with union nut DN 40 according to DIN 11851 (dairy pipe fitting)
613	Clamp connection (clamp) DN 25 according to DIN 32676
616	Clamp connection (clamp) DN 50 according to DIN 32676 (2" ISO 2852)
652	Tank connection with grooved union nut DN 25
997	JUMO PEKA – Hygienic process connection
998	Diaphragm seal version, screwed
(12) Medium temperature	
1	Up to 120 °C ^b
2	Up to 200 °C ^b
(13) Process connection material	
20	CrNi (stainless steel)
82	NiMo ^f
(14) Measuring system, filling medium	
00	None
01	Silicon oil
(15) Extra codes	
100	Customer-specific factory setting ^g
226	GOST/EAC approval ^h
374	Inspection certificate 3.1 DIN EN 10204 material
452	Electrolytically polished parts
591	Choke in the pressure channel
624	Oil and grease free
630	Enlarged pressure channel
634	TAG number
635	NACE manufacturer's declaration ⁱ
681	Expanded admissible ambient temperature
691	Improved moisture and vibration protection
880	DNV GL approval ^j

^a Only available with output 410 and display 1. Not available with input 508 and 516 and also with extra code 681.

^b Only available with output 410. Not available with electrical connection 82 and cover material 85. The medium temperature 1 is valid until 115 °C. The medium temperature 2 is valid until 175 °C.

^c The housing 1 is only available with electrical connection 82 and vice versa.

^d Not available with process connection 604, 606, 613, 616.

^e Not available with process connection 571, 604, 606, 613, 616, 997.

^f Not available with input 450, 573, 513, 572, 487, 490, 491, 493.

^g Please specify the setting you want in plain text. For default setting see "Accuracy" section in the data sheet.

^h Available upon request.

ⁱ Only available with process connection 512, 564 and process connection material 82. Not available with input 450, 487.

^j Only available with explosion protection 1. Not available with input 516.

Order code (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15)
 / - - - - - - - - - - - - - /
Order example 403025 / 0 - 0 - 2 - 82 - 85 - 1 - 1 - 514 - 405 - 504 - 1 - 20 - 1 / 000

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Accessories

Designation	Part no.
4-pole cable box, straight, M12 × 1 with 2 m PVC cable	00404585
4-pole cable box, angled, M12 × 1 with 2 m PVC cable	00409334
PC interface with USB/TTL converter ^a	00456352
HART® modem USB ^b	00443447
Ex-i repeater power supply/input isolating amplifier, data sheet 707530	00577948
Measuring device holder for wall and 2" pipe	00597711

Designation	Data sheet
Valve manifolds	409706
JUMO PEKA – Hygienic process connection	409711
Diaphragm seal with dairy pipe fitting DIN 11851	409772
Diaphragm seal with clamp connection	409774
Diaphragm seal with DRD flange or VARIVENT® socket	409776
Diaphragm seal with ISS/SMS/RJT socket and (grooved) union nut	409778
Membrane diaphragm seal 4MDV-10	409780
Diaphragm seal with screw-in thread DIN ISO 228/1 or ANSI B1.201	409782
Diaphragm seal with flange connection DIN EN 1092-1 with sealing strip form B1	409784
Diaphragm seal with flange connection according to ANSI B 16.5 with sealing strip form RF	409786
Ex-i repeater power supply/input isolating amplifier	707530

^a The PC interface cable is the connection between the JUMO interface of the differential pressure transmitter and the USB interface of a PC.

^b The HART® modem is the connection between the HART® interface of the differential pressure transmitter and the USB interface of a PC.

Software

Description	Part no.
JUMO setup dTRANS p20 series	00537577
Device Type Manager (DTM), JUMO dTRANS p20	00738288

Stock versions

Order code	Input	Part no.
403025/0-1-1-36-20-1-1-450-410-504-1-20-01/000	-600 to +600 mbar relative pressure	00563929
403025/0-1-1-36-20-1-1-513-410-504-1-20-01/000	-1 to +4 bar relative pressure	00557370
403025/0-1-1-36-20-1-1-514-410-504-1-20-01/000	-1 to +25 bar relative pressure	00572278
403025/0-1-1-36-20-1-1-491-410-504-1-20-01/000	0 to 4 bar absolute pressure	00573299

JUMO dTRANS p20 Ex d

Process pressure transmitter with explosion-proof enclosure

Brief description

The pressure transmitter with HART® interface combines maximum precision with simple operation. It is used to measure the relative or absolute pressures of gases, vapors, and liquids. The integrated LCD display shows the measured values and device data.

The pressure transmitter with flameproof enclosure can be installed up until zone 0. The housing and sensors are manufactured from high-grade stainless steel. Various flush-mounted process connections are available for applications with hygienic requirements, including PEKA connection system (see data sheet 409711).

Diaphragm seals can also be connected for specific process technology applications (see data sheets 409772 to 409784).

The transmitter is programmable and therefore readily adaptable to a variety of different measurement tasks. An easy-to-use setup program is available as an accessory to enable operation via the interfaces. A rotary knob makes manual operation on-site very convenient and quick.

The pressure transmitter with 4 to 20 mA and HART® protocol was evaluated with regard to functional safety and is certified by exida according to IEC 61508/-1/-2/-3. These measuring devices are suitable for monitoring process level and process pressure up to SIL2. Further details can be found in the Safety Manual.

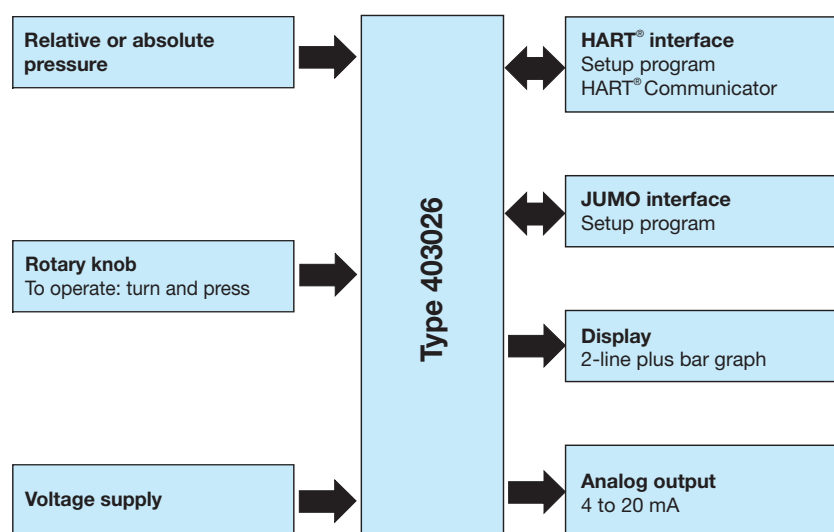
For the „Ex ia“ explosion protection version, see data sheet 403025.

For the differential pressure version, see data sheets 403022 and 403023.



Type 403026

Block diagram



Special features

- Stainless steel case
- SIL certified (exida)
- HART® interface
- Explosion protection Ex d (gas and dust) according to ATEX, NEPSI, and EAC
- Linearity 0.05 %
- Turn down: 1:50
- Simple operation with rotary knob
- Setup program
- LCD display with bar graph
- Display scaling with a choice of measuring units
- Display of sensor temperature
- Display of minimum and maximum pressures
- Current-generator function

Approvals and approval marks



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Technical data

General Information

Reference conditions	DIN EN 60770 and DIN EN 61298
Ambient temperature	22 °C ±5 K
Air pressure	1000 hPa (±25 hPa)
Voltage supply	DC 24 V
Burden	50 Ω
Sensor system	Silicon sensor with stainless steel separating diaphragm
Pressure transfer medium	
For measuring system filling medium 0	Without transfer medium
For measuring system filling medium 1	Silicon oil, FDA compliant
Admissible load changes	> 10 million
Position	
Mounting position	Any
Calibration position	Device upright, process connection at the bottom
Zero offset depending on position	A zero offset is possible on-site or via setup.
Display ^a	LCD, two-line with bar graph
Alignment	Display unit rotatable in 90° steps Housing rotatable ±160°
Size	Display 22 × 35 mm, font size 7 mm/5 digits
Color	Black
Portrayable measuring units	
Input pressure	mH ₂ O, inH ₂ O, inHg, ftH ₂ O, mmH ₂ O, mmHg, psi, bar, mbar, kg/cm ² , kPa, Torr, MPa
Measured value	% or scaled with freely adjustable measuring unit
Output current	mA
Sensor temperature	°C, °F
Additional display data	Minimum pressure, maximum pressure, error, overrange, underrange, operating hours, device parameters
Operation	
On-site	With rotary knob and LCD
Setup program	Via interface
Interface	
Standard	JUMO interface ^b
For output 410 (4 to 20 mA with HART®)	JUMO interface ^b and HART® interface

^a optional; SIL version only available with display

^b The JUMO interface may not be used in a potentially explosive area! In such a case the device can be operated via the rotary knob or the HART® interface.

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Input

Relative pressure				
Nominal measuring range	-600 to +600 mbar	-1 to +2.5 bar	-1 to +4 bar	-1 to +10 bar
Overload capability	6 bar	15 bar	30 bar	60 bar
Burst pressure	12 bar	30 bar	60 bar	100 bar
Relative pressure				
Nominal measuring range	-1 to +25 bar	-1 to +100 bar	-1 to +250 bar	-1 to +600 bar
Overload capability	150 bar	300 bar	600 bar	1200 bar
Burst pressure	250 bar	400 bar	700 bar	2000 bar

Absolute pressure						
Nominal measuring range	0 to 0.6 bar	0 to 2.5 bar	0 to 4 bar	0 to 10 bar	0 to 25 bar	0 to 100 bar
Overload capability	6 bar	15 bar	30 bar	60 bar	150 bar	300 bar
Burst pressure	12 bar	30 bar	60 bar	100 bar	250 bar	400 bar

Output

Analog output For output 410 (4 to 20 mA with HART®) Jump response time T60 Attenuation	4 to 20 mA, two-wire with HART® version 7 ≤ 190 ms without attenuation Adjustable 0 to 100 s
Burden For output 410 (4 to 20 mA with HART®)	$\text{Burden} \leq (U_B - 12 \text{ V}) \div 0.022 \text{ A}$; additional: min. 250 Ω , max. 1100 Ω

Voltage supply

Voltage supply	DC 12 to 36 V
----------------	---------------

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**Mechanical features**

Process connection Materials For process connection 20 (stainless steel) For process connection 82 (HASTELLOY®) Surface	316 L for front-flush process connections Otherwise 316 Ti 2.4819 NiMo Ra ≤ 0.8 µm
Process seal Process connection 571 G 3/4 front-flush) and process connection 652 (tank connection with grooved union nut) For process connection 997 (JUMO PEKA) For all other process connections	FPM FDA compliant: FPM, VMQ, EPDM as an option, see data sheet 409711 No seal
Measuring membranes For material lid 20 (stainless steel) For material lid 82 (plastic) Surface	1.4542 for -1 to +250 bar relative pressure (measuring range 508) and -1 to +600 bar relative pressure (measuring range 516) Otherwise 316 L 2.4819 NiMo Ra ≤ 0.8 µm
Housing Housing material Cover material Material of control knob For operation 0 (without control knob) For operation 1 (with control knob)	Precision casting 1.4408 Precision casting 1.4408, seal FPM - PA
Explosion protection	EC type examination certificate SEV 10 ATEX 0127 X  II 1/2G Ex d IIC T6 ... T4 Ga/Gb II 2D Ex tb IIIC T105 °C Db
Weight	Approximately 1.6 kg

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Environmental influences

Admissible temperatures Operation	Version	Temperature class	Maximum medium temperature	Ambient temperature ^a	Expanded ambient temperature (extra code 681) ^{a, b, c}
	II 1/2G Ex d	T6	70 °C	-40 to +60 °C	-50 to +60 °C
		T5	85 °C	-40 to +70 °C	-50 to +70 °C
		T4	115 °C	-40 to +85 °C	-50 to +85 °C
	II 2D Ex tb	T105 °C	100 °C	-40 to +85 °C	-50 to +85 °C
Storage	-40 to +85 °C				
Admissible humidity Operation	100 % including condensation on the device outer case				
Storage	90 % without condensation				
Admissible mechanical load Vibration strength	2 g, 10 to 2000 Hz according to DIN EN 60770-3				
Shock resistance	15 g for 6 ms according to IEC 60068-2-27				
Electromagnetic compatibility Interference emission	According to EN 61326 Class B ^d				
Interference immunity	Industry				
Protection type	IP66 according to DIN EN 60529				

^a Under -20 °C limited function: stationary use, increased danger of cable break, display without function; under -30 °C operation of the device not possible.

^b In the range from -40 to -50 °C the device must be permanently in operation. Furthermore, the lid with the device inspection glass must additionally be protected against mechanical impact and shock effects. Please contact JUMO for further details.

^c Without SIL

^d The product is suitable for industrial use as well as for households and small businesses.

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Accuracy

Including non-linearity, hysteresis, non-repeatability, zero point and final value deviation (corresponds to measurement deviations according to IEC 61298-2), calibrated at vertical installation position with the process connection at the bottom

Relative pressure				
Nominal measuring range	-600 to +600 mbar	-1 to +2.5 bar	-1 to +4 bar	-1 to +10 bar
Default measuring range	0 to 600 mbar	0 to 2.5 bar	0 to 4 bar	0 to 10 bar
Smallest MSP ^a	60 mbar	0.1 bar	0.1 bar	0.5 bar
Turndown ratio (r) ^b	$r \leq 20$	$r \leq 50$	$r \leq 50$	$r \leq 50$
Non-linearity for reference conditions ^c	0.06 %	0.04 %	0.04 %	0.04 %
Accuracy in % of the set MSP Range: -20 to +60 °C	$r \times 0.12 \%$ for $1 \leq r \leq 20$	$r \times 0.08 \%$ for $1 \leq r \leq 50$	$r \times 0.08 \%$ for $1 \leq r \leq 50$	$r \times 0.08 \%$ for $1 \leq r \leq 50$
Accuracy in % of the set MSP Range: -40 to -20 °C or 60 to 85 °C	$r \times 0.18 \%$ for $1 \leq r \leq 20^d$	$r \times 0.12 \%$ for $1 \leq r \leq 50$	$r \times 0.12 \%$ for $1 \leq r \leq 50$	$r \times 0.12 \%$ for $1 \leq r \leq 50$
Long-term stability in % as of the nominal measuring range	0.1 %/year			
Relative pressure				
Nominal measuring range	-1 to +25 bar	-1 to +100 bar	-1 to +250 bar	-1 to +600 bar
Default measuring range	0 to 25 bar	0 to 100 bar	0 to 250 bar	0 to 600 bar
Smallest MSP	0.5 bar	5 bar	12.5 bar	30 bar
Turndown ratio (r) ^b	$r \leq 52$	$r \leq 20$	$r \leq 20$	$r \leq 20$
Non-linearity for reference conditions ^c	0.04 %	0.04 %	0.04 %	0.08 %
Accuracy in % of the set MSP Range: -20 to +60 °C	$r \times 0.08 \%$ for $1 \leq r \leq 52$	$r \times 0.08 \%$ for $1 \leq r \leq 20$	$r \times 0.08 \%$ for $1 \leq r \leq 20$	$r \times 0.16 \%$ for $1 \leq r \leq 20$
Accuracy in % of the set MSP Range: -40 to -20 °C or 60 to 85 °C	$r \times 0.12 \%$ for $1 \leq r \leq 52$	$r \times 0.12 \%$ for $1 \leq r \leq 20$	$r \times 0.12 \%$ for $1 \leq r \leq 20$	$r \times 0.24 \%$ for $1 \leq r \leq 20$
Long-term stability in % as of the nominal measuring range	0.1 %/year			

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Absolute pressure				
Nominal measuring range	0 to 600 mbar	0 to 2.5 bar	0 to 4 bar	0 to 10 bar
Default measuring range	0 to 600 mbar	0 to 2.5 bar	0 to 4 bar	0 to 10 bar
Smallest MSP ^a	60 mbar	0.1 bar	0.1 bar	0.5 bar
Turndown ratio (r) ^b	r ≤ 10	r ≤ 20	r ≤ 40	r ≤ 20
Non-linearity for reference conditions ^c	0.12 %	0.04 %	0.04 %	0.04 %
Accuracy in % of the set MSP Range: -20 to +60 °C	r × 0.24 % for 1 ≤ r ≤ 10	r × 0.08 % for 1 ≤ r ≤ 20	r × 0.08 % for 1 ≤ r ≤ 40	r × 0.08 % for 1 ≤ r ≤ 20
Accuracy in % of the set MSP Range: -40 to -20 °C or 60 to 85 °C	r × 0.36 % for 1 ≤ r ≤ 10 ^d	r × 0.16 % for 1 ≤ r ≤ 20	r × 0.16 % for 1 ≤ r ≤ 40	r × 0.16 % for 1 ≤ r ≤ 20
Long-term stability in % as of the nominal measuring range	0.1 %/year			
Absolute pressure				
Nominal measuring range	0 to 25 bar	0 to 100 bar		
Default measuring range	0 to 25 bar	0 to 100 bar		
Smallest MSP ^a	0.5 bar	5 bar		
Turndown ratio (r) ^b	r ≤ 50	r ≤ 20		
Non-linearity for reference conditions ^c	0.04 %	0.04 %		
Accuracy in % of the set MSP Range: -20 to +60 °C	r × 0.08 % for 1 ≤ r ≤ 50	r × 0.08 % for 1 ≤ r ≤ 20		
Accuracy in % of the set MSP Range: -40 to -20 °C or 60 to 85 °C	r × 0.16 % for 1 ≤ r ≤ 50	r × 0.12 % for 1 ≤ r ≤ 20		
Long-term stability in % as of the nominal measuring range	0.1 %/year			

^a MSP = measuring span

^b r = span of the nominal measuring range ÷ adjusted measuring span

^c Reference conditions: ambient temperature 20 °C (±3 K), air pressure 1000 hPa (±25 hPa)

^d Only up to -30 °C

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Approvals and approval marks

ATEX	
Testing agency	Eurofins Electrosuisse Product Testing AG
Certificates/certification numbers	SEV 10 ATEX 0127 X
Inspection basis	EN 60079-0, EN 60079-1, EN 60079-26, EN 60079-31
Valid for	Type 403026/...
EAC TR ZU	
Testing agency	RU
Certificates/certification numbers	RU C-DE.HB07.B.00086/20
Inspection basis	TR ZU 012/2011 (Ex)
Valid for	Extra code 226
SIL	
Testing agency	exida
Certificates/certification numbers	JUMO 2203088 C001
Inspection basis	IEC 61508:2010-1/-2/-3
Valid for	Basic type extension 2

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

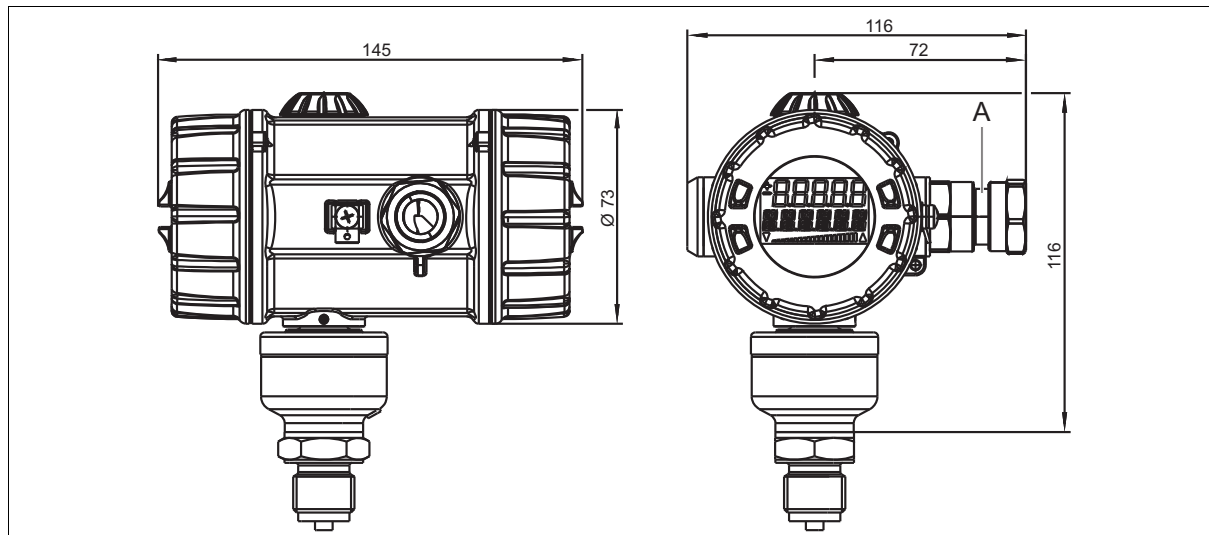
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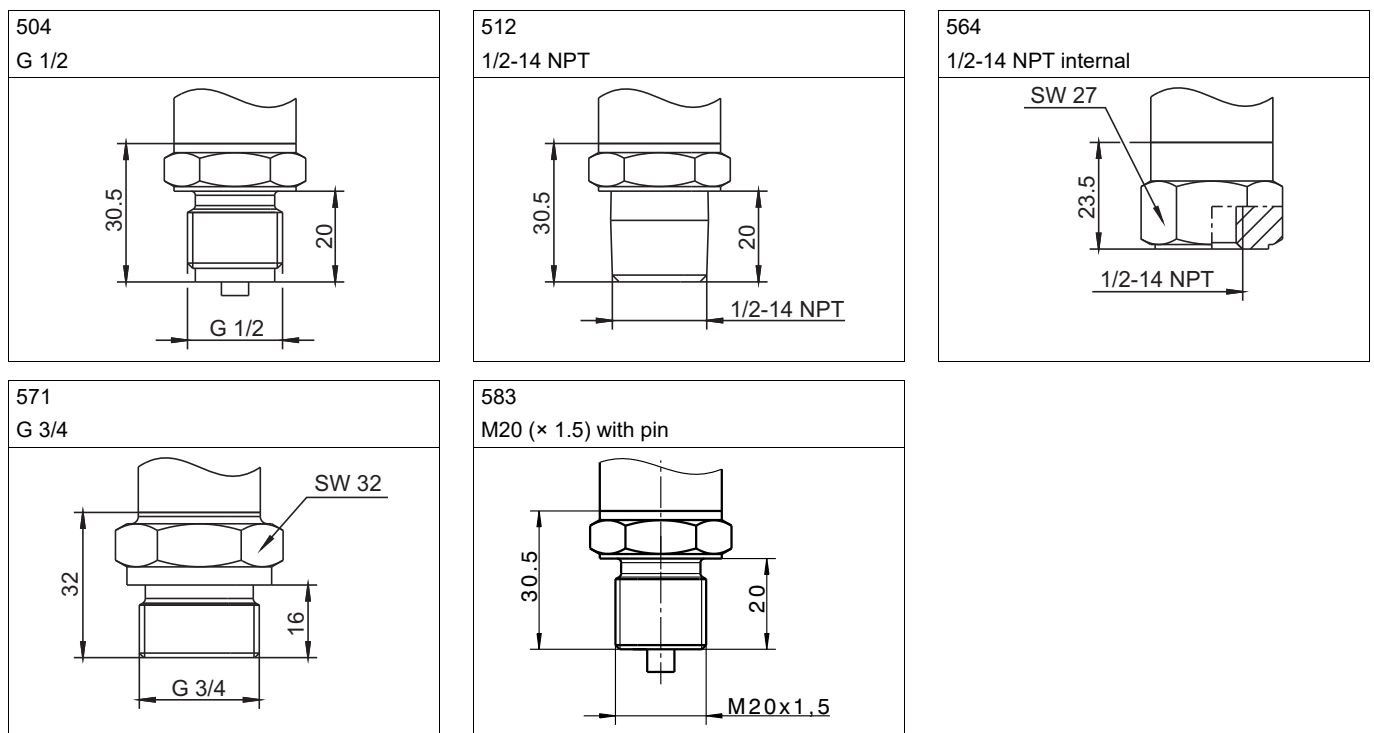


Dimensions



A Kabelverschraubung M20 × 1,5

Process connections



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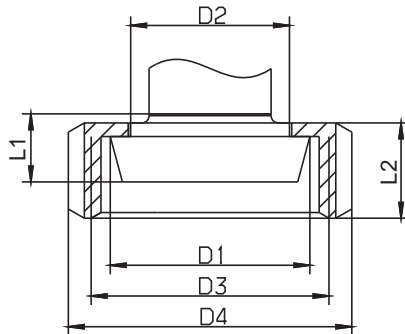
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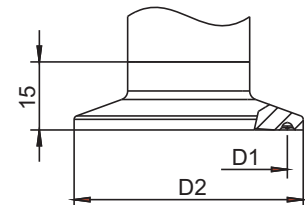
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**604 and 606**

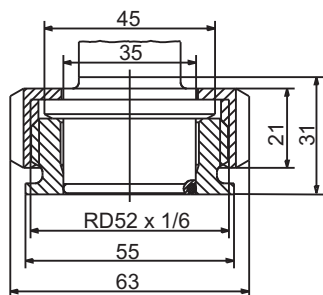
Taper socket with grooved union nut according to DIN 11851

**613 and 616**

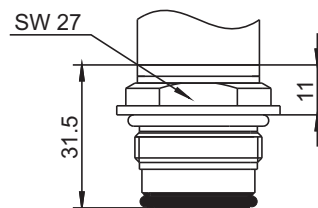
Clamp according to DIN 32676

**652**

Tank connection with grooved union nut DN 25

**997**

JUMO PEKA

**Dimensions of the process connections 604, 606, 613, and 616**

Connection	DN	D1	D2	D3	D4	L1	L2
604	25	Ø 44	Ø 35	Rd 52 × 1/6"	Ø 63	15	21
606	40	Ø 56	Ø 48	Rd 65 × 1/6"	Ø 78		
613	25	Ø 43,5	Ø 50,5				
616	50	Ø 56,5	Ø 64				

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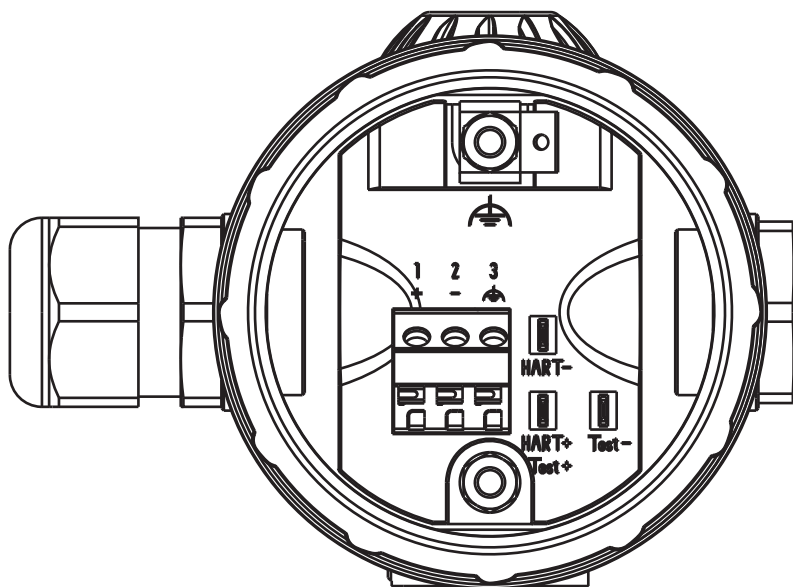
Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Connection		Terminal assignment
Voltage supply	DC 12 to 36 V	1 L+ 2 L-
Output	4 to 20 mA, two-wire Load-independent current: 4 to 20 mA In voltage supply	1 L+ 2 L-
Test connection for current output	Internal resistance of the ammeter $\leq 10 \Omega$	TEST + TEST -
Test connection for HART®	The burden must be present!	HART + HART -
FE (functional grounding conductor)		3
Grounding or potential equalization		Outside of the housing

Cable gland



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Order details

	(1) Basic type
403026	JUMO dTRANS p20 Ex d - process pressure transmitter with flameproof enclosure
	(2) Basic type extension
0	None
2	SIL ^a
9	Special version
	(3) Display
0	None
1	With display
	(4) Operation
0	None
1	With control knob
	(5) Input – nominal measuring range
450	-600 to +600 mbar relative pressure
473	-1 to +2.5 bar relative pressure
513	-1 to +4 bar relative pressure
472	-1 to +10 bar relative pressure
514	-1 to +25 bar relative pressure
515	-1 to +100 bar relative pressure ^b
508	-1 to +250 bar relative pressure ^c
516	-1 to +600 bar relative pressure ^c
487	0 to 0.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
493	0 to 10 bar absolute pressure
495	0 to 25 bar absolute pressure
507	0 to 100 bar absolute pressure
	(6) Output
410	4 to 20 mA, two-wire with HART® protocol
	(7) Process connection
504	G 1/2 according to DIN EN 837
512	1/2-14 NPT according to DIN 837
564	1/2-14 NPT internal
571	G 3/4 front-flush according to DIN EN ISO 228-1
583	M20 (× 1.5) with pin
604	Taper socket with grooved union nut DN 25 according to DIN 11851 (dairy pipe fitting)
606	Taper socket with grooved union nut DN 40 according to DIN 11851 (dairy pipe fitting)
613	Clamp connection DN 25/32/40 according to DIN 32676
616	Clamp connection DN 50 according to DIN 32676/2" ISO 2852
652	Tank connection with grooved union nut DN 25
997	JUMO PEKA hygienic process connection
998	Diaphragm seal process connection
	(8) Process connection material
20	CrNi (stainless steel)
82	NiMo ^d
	(9) Measuring system, filling medium
00	Without ^e
01	Silicon oil

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(10) Extra codes	
000	None
100	Customer-specific factory setting ^f
226	GOST/EAC approval ^g
452	Wetted, electrolytically polished parts
591	Choke in the pressure channel
624	Oil and grease free
630	Enlarged pressure channel
634	TAG number
635	NACE manufacturer's declaration ^h
681	Expanded admissible ambient temperature

^a Only available with display 1. Not available with input 508 and 516 and also extra code 681.

^b Not available with process connection 604, 606, 613, 616.

^c Not available with process connection 571, 604, 606, 613, 616, 997.

^d Not available with input 450, 573, 513, 472, 487, 490, 491, 493.

^e Only available with input 508, 516.

^f Please specify the setting you want in plain text. For default setting see "Accuracy" section in the data sheet.

^g Available upon request.

^h Only available with process connection 512, 565 and process connection material 82. Not available with input 450, 487.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)									
Order code	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
Order example	403026	/	0	-	1	-	1	-	514	-	410	-	504	-	20	-	01	/	000

Accessories

Designation	Part no.
PC interface with USB/TTL converter ^a	00456352
HART® modem USB ^b	00443447
Measuring device holder for wall and 2" pipe	00597711

Designation	Data sheet
Valve manifolds	409706
Diaphragm seal with dairy pipe fitting DIN 11851	409772
Diaphragm seal with clamp connection	409774
Druckmittler mit DRD-Flansch oder VARIVENT®-Stutzen	409776
Diaphragm seal with ISS/SMS/RJT socket and (grooved) union nut	409778
Membrane diaphragm seal 4MDV-10	409780
Diaphragm seal with screw-in thread DIN ISO 228/1 or ANSI B1.201	409782
Diaphragm seal with flange connection DIN EN 1092-1 with sealing strip form B1	409784
Diaphragm seal with flange connection according to ANSI B 16.5 with sealing strip form RF	409786

^a The PC interface cable is the connection between the JUMO interface of the differential pressure transmitter and the USB interface of a PC.

^b The HART® modem is the connection between the HART® interface of the differential pressure transmitter and the USB interface of a PC.

Software

Description	Part no.
JUMO setup dTRANS p20 series	00537577
Device Type Manager (DTM), JUMO dTRANS p20	00738288

JUMO SIRAS P21 AR

Process pressure transmitter

Brief description

The device is for measuring the system pressure of gases and liquids without solids content. It provides highly accurate measurements and readings, and is easy to use. You can use the device to safely monitor minimum and maximum ranges (pressures and fill levels). The integrated LCD display shows measured values as well as configuration and device data. The housing and sensor are manufactured from high-grade stainless steel.

The device can be programmed using the internal rotary knob and the display or via the HART® interface using a handheld device or using a PC. This enables you to adapt the device for various different types of measuring tasks. For operation via the HART® interface, there is a specially developed Windows™-based software that you can use.

The pressure transmitter with 4 to 20 mA and HART® protocol has been assessed in terms of functional safety and is certified by TÜV Nord according to DIN EN 61508/-1/-2/-3, edition 2.0. These measuring devices are suitable for process fill level monitoring and process pressure monitoring up to SIL 2. Please see the Safety Manual for further information on this topic.

For the differential pressure version, see data sheet 403024.



Type 403028/0-0-1-...

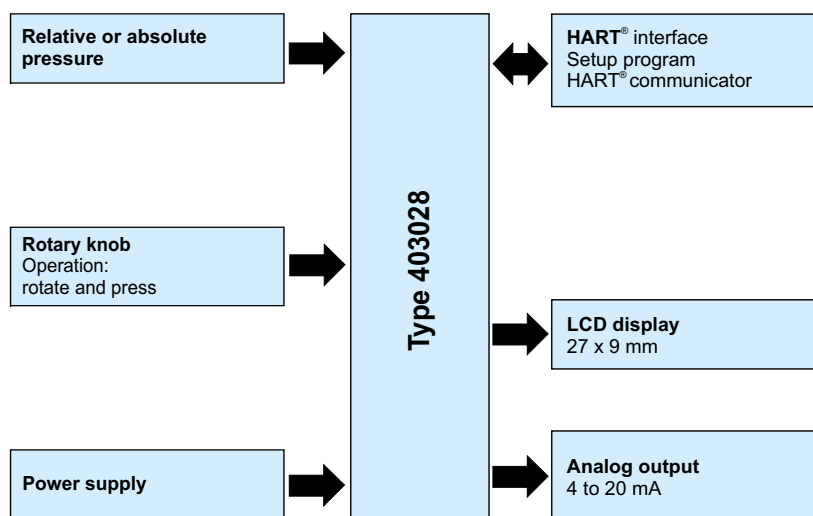


Type 403028/0-0-2-...



Type 403028/0-0-3-...

Block diagram



Special features

- Stainless steel housing
- SIL certified (TÜV Nord)
- HART® interface
- Explosion protection Ex ia (gas and dust) according to ATEX, NEPSI, and EAC – in preparation
- Linearity 0.05 %
- Turn down: 1:50
- -40 to +85 °C medium temperature
- Simple operation with rotary knob
- Setup program
- LCD display with bar graph
- Display scaling with selectable measuring units
- Displays sensor temperature, minimum pressure, maximum pressure, output current via HART® interface: electronics temperature and operating voltage

Approvals and approval marks (see technical data)



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Technical data

General Information

Reference conditions	DIN EN 60770 and DIN EN 61298
Ambient temperature	25 °C ±5 °C
Humidity	45 - 75 % RH
Ambient pressure	Constant, 860 to 1060 mbar (12.47 to 15.37 psi)
Position of measuring cell	Horizontal ±1°
Voltage supply	DC 24 V ±3 V
Sensor system	Silicon sensor with separating membrane made from stainless steel
Pressure transfer medium	Silicon oil
Admissible load changes	> 10 million
Position	
Installation position	Any
Calibration position	Device upright, process connection at the bottom
Position-dependent zero offset	Relative pressure: zero point correction is possible on-site or via setup Absolute pressure: manual readjustment is possible
Display	Dotmatrix LCD with 96 x 32 pixels, 7-segment digit display for pressure and temperature, pictograms for SIL, warning triangle, configuration locking, LED backlight, bargraph with 20 segments for analog output
Languages	German; English; French; Spanish, Russian
Alignment	Horizontal, can be rotated in 90° angle increments Housing rotatable by ±160°
Large display area	27 x 9 mm, font size 9 mm, 5-digit
Font color	Black
Displayable measuring units	
Input pressure	inH ₂ O, inHG, ftH ₂ O, mmH ₂ O, mmHG, psi, bar, mbar, kg/cm ² , kPa, TORR, MPa, mH ₂ O
Measured value	% or scaled with configured pressure or fill level measurement unit
Output current	mA
Sensor temperature	°C, °F
Additional display data	Minimum pressure, maximum pressure, errors, measuring range overflow Measuring range underflow, operating hours, device parameters
Operation on site	With rotary knob and LCD
setup program	Via HART® interface
Interface	Two-wire 4 to 20 mA with overlaid HART® signal, HART® protocol version 7 HART® signal is for configuration and remote diagnosis

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Input

Relative pressure

Nominal measuring range/ Default setting measuring range ^a	Smallest measuring span	Overload capability	Burst pressure
-600 to 600 mbar	60 mbar	6 bar	12 bar
-1 to +2.5 bar	0.1 bar	15 bar	30 bar
-1 to +4 bar	0.1 bar	30 bar	60 bar
-1 to +10 bar	0.5 bar	60 bar	100 bar
-1 to +25 bar	0.5 bar	150 bar	250 bar
-1 to +100 bar	5 bar	300 bar	400 bar

^a The default setting of the measuring range corresponds to the nominal measuring range

Absolute pressure

Nominal measuring range/ Measuring range default setting ^a	Smallest measuring span	Overload capability	Burst pressure
0 to 600 mbar	60 mbar	6 bar	12 bar
0 to 2.5 bar	0.1 bar	15 bar	30 bar
0 to 4 bar	0.1 bar	30 bar	60 bar
0 to 10 bar	0.5 bar	60 bar	100 bar
0 to 25 bar	0.5 bar	150 bar	250 bar
0 to 100 bar	5 bar	300 bar	400 bar

^a The default setting of the measuring range corresponds to the nominal measuring range

Output

Analog output	
Output	4 to 20 mA, two-wire with HART [®] version 7
Step response time T63	≤200 ms without damping
Damping (digital filter 2nd order)	Adjustable 0 to 100 s
Burden 4 to 20 mA with HART [®]	≤ (U - 11.5 V) / 0.024 A; U ≥ of the voltage supply Min. 250 Ω, max. 1100 Ω
Output signal limits	3.6 to 24 mA
Transmission behavior	Linear, square root extraction
Failure signal	According to NAMUR NE 43 Max. alarm: 21.6 mA Min. alarm: 3.6 mA
Reference accuracy	≤ ±0.05 % referring to 20 mA

Voltage supply

For version	
Explosion protection 0 (without)	DC 11.5 to 36 V
For Ex version	DC 12 to 28 V
Residual ripple	Residual ripple of voltage supply ≤3 % (without affecting the 4 to 20 mA signal)
Influence of voltage supply	≤ ±0.1 μA / V

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Mechanical features

Process connection	
Material 20 (stainless steel) ^a	316 Ti
Process seal	
521	FPM profile seal G 1/4
523	FPM profile seal G 1/2
559	FPM profile seal M20 x 1.5
504, 512, 583	No seal
Measuring membranes	
Material 20 (stainless steel) ^{a, b}	316 L
Materials of housing	
Housing 1 (short, stainless steel)	Stainless steel 1.4404
Housing 2 (long, stainless steel)	Stainless steel 1.4404, seal VMQ
Housing 3 (precision casting)	Precision casting 1.4408
Lid 20 (stainless steel)	Precision casting 1.4408, seal FPM
Electrical connection 36 (round plug M12 × 1)	Brass, nickel-plated
Electrical connection 93 (cable fitting, metal)	Brass, nickel-plated
Rotary knob	PA
Weight	
Type 403028/0-0-1 (housing, short)	Approx. 550 g
Type 403028/0-0-2 (housing, long)	Approx. 850 g
Type 403028/0-0-3 (precision casting housing)	Approx. 1600 g

^a The device is not suitable for the heating oil medium.

^b The medium is not allowed to corrode the membrane material.

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Environmental influences

Ambient temperature range

Version	Ambient temperature range ^{a, b}
Connection 93 cable fitting (metal)	-40 to +85 °C
Connection 36 round plug M12 x 1	-25 to +85 °C

^a Operating temperature range of the LCD display: -20 to +85°C; outside of this range, the display will not work

^b It must be noted that, below -40 °C, there will be functional limitations. In safety-related applications, operation is only admissible if the ambient temperature is no lower than -40 °C.

Average temperature range

Average temperature range	
Standard	-40 to +85 °C

Protection type

Protection type	
Protection type	IP66/IP67 according to DIN EN 60529

Climate class

Climatic features according to DIN EN 60721-3-X	
Stationary use, weather-proof acc. to DIN EN 60721-3-3	from IE37: 3K7/3M3
Stationary use, not weather-proof acc. to DIN EN 60721-3-4	from IE42: 4K3/4M3
Transport acc. to DIN EN 60721-3-2	from IE23: 2K4/2M2

Electromagnetic compatibility

Electromagnetic compatibility acc. to DIN EN 61326-3-1, DIN EN 61326-2-3, DIN EN 60730-2-6 and NAMUR Recommendation NE 21	
Maximum deviation	≤ 0.5 % of span
Interference emission:	Class B
Interference immunity	Industry

Mechanical load

Admissible mechanical load:	
Vibration strength	2 G, 10 to 2000 Hz acc. to IEC 60068-2-6
Shock resistance	15 G for 6 ms acc. to IEC 60068-2-27

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Accuracy

Contains the maximum measurement deviation, including non-linearity after limiting point setting, hysteresis, non-repeatability, measurement deviation of the measuring range end value and measurement deviation at the measuring range start.

Nominal measuring range Relative pressure	-600 to +600 mbar	-1 to +2.5 bar	-1 to +4 bar	-1 to +10 bar	-1 to +25 bar	-1 to +100 bar	-1 to +250 bar	-1 to +400 bar
Reference accuracy (r) ^a								
in % MSP ^b spread ≤	≤2.5 : 1 ±0.05	≤5 : 1 ±0.05	≤10 : 1 ±0.05				≤5 : 1 ±0.1	
in % MSP ^b spread >	>2.5 : 1 ±0.02 x r	>2.5 : 1 ±0.02 x r	>10 : 1 0.005 x r				>5 : 1 ±0.02 x r	
Influence of the ambient temperature in the range								
-10 to +60 °C in % MS- p _{a, b}	±(0.04 x r +0.08)			±(0.03 x r +0.03)		±(0.015 x r + 0.06)		
-30 to -10 °C and +60 to +85 °C in % MS- p _{a, b}	±(0.08 x r +0.16)			±(0.06 x r +0.06)		±(0.03 x r + 0.12)		
-40 to -30 °C in % MS- p _{a, b}	±(0.1 x r +0.2)			±(0.07 x r +0.07)		±(0.035 x r + 0.14)		
Basic accuracy ^c								
r = 1:1 in % MSP	±0.18			±0.12		±0.13	±0.16	
r = 2:1 in % MSP	±0.22			±0.15		±0.15	±0.17	
r = 3:1 in % MSP	±0.26	±0.25		±0.18		±0.16	±0.18	
r = 4:1 in % MSP	±0.30	±0.29		±0.21		±0.18	±0.20	
r = 5:1 in % MSP	±0.34	±0.33		±0.24		±0.19	±0.21	
Long-term stability in % MSP								
1 year	±0.05	±0.07	±0.05			±0.05		
5 years	±0.07	±0.12	±0.07			±0.07		
10 years	±0.10	±0.15	±0.10			±0.10		
Total deviation ^d								
1 year	±0.23	±0.25	±0.23	±0.17		±0.18	±0.21	
5 years	±0.25	±0.30	±0.25	±0.19		±0.20	±0.23	
10 years	±0.28	±0.33	±0.28	±0.22		±0.23	±0.26	

^a r = span of the nominal measuring range + adjusted measuring span

^b MSP = measuring span

^c The basic accuracy comprises the reference accuracy and the influence of the ambient temperature (pressure sensor and electronics error of the analog output of 0.05 %)

^d The total deviation is calculated based on the combined measuring accuracies of the basic accuracy (reference accuracy as well as the influence of ambient temperature and static pressure and the electronics error) and the long-term stability

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Contains the maximum measurement deviation, including non-linearity after limiting point setting, hysteresis, non-repeatability, measurement deviation of the measuring range end value and measurement deviation at the measuring range start.

Nominal measuring range Absolute pressure	0 to 0.6 bar	0 to 2.5 bar	0 to 4 bar	0 to 10 bar	0 to 25 bar	0 to 100 bar
Reference accuracy (r) ^a						
in % MSP ^b spread ≤	≤2.5 : 1 ±0.075	≤5 : 1 ±0.05	≤10 : 1 ±0.05			≤10 : 1 ±0.05
in % MSP ^b spread >	>2.5 : 1 ±0.03 x r	>2.5 : 1 ±0.02 x r	≤10 : 1 ±0.005 x r			>10 : 1 0.005 x r
Influence of the ambient temperature in the range						
-10 to +60 °C in % MSP ^{a, b}	±(0.04 x r +0.08)			±(0.03 x r +0.03)		±(0.015 x r + 0.06)
-30 to -10 °C and +60 to +85 °C in % MSP ^{a, b}	±(0.08 x r +0.16)			±(0.06 x r +0.06)		±(0.06 x r +0.06)
-40 to -30 °C in % MSP ^{a, b}	±(0.1 x r +0.2)			±(0.07 x r +0.07)		±(0.035 x r +0.14)
Basic accuracy ^c						
r = 1:1 in % MSP	±0.18			±0.12		±0.13
r = 2:1 in % MSP	±0.22			±0.15		±0.15
r = 3:1 in % MSP	±0.26	±0.25	±0.18			±0.16
r = 4:1 in % MSP	±0.30	±0.29	±0.21			±0.18
r = 5:1 in % MSP	±0.34	±0.33	±0.24			±0.19
Long-term stability in % MSP						
1 year	±0.05	±0.07	±0.05			
5 years	±0.07	±0.12	±0.07			
10 years	±0.10	±0.15	±0.10			
Total deviation ^d						
1 year	±0.23	±0.25	±0.23	±0.17		±0.18
5 years	±0.25	±0.30	±0.25	±0.19		±0.20
10 years	±0.28	±0.33	±0.28	±0.22		±0.23

^a r = span of the nominal measuring range + adjusted measuring span

^b MSP = measuring span

^c The basic accuracy comprises the reference accuracy and the influence of the ambient temperature (pressure sensor and electronics error of the analog output of 0.05 %)

^d The total deviation is calculated based on the combined measuring accuracies of the basic accuracy (reference accuracy as well as the influence of ambient temperature and static pressure and the electronics error) and the long-term stability

Approvals and approval marks

SIL	
Test facility	TÜV Nord (German Technical Inspection Agency)
Certificate/test no.	SEBS-A.084722/14 V1.0
Inspection basis	DIN EN 61508/-1/-2/-3: 2011 DIN EN ISO 13849-1: 2016 DIN EN ISO 13849-2: 2013
Valid for	Entire JUMO SIRAS P21 device range

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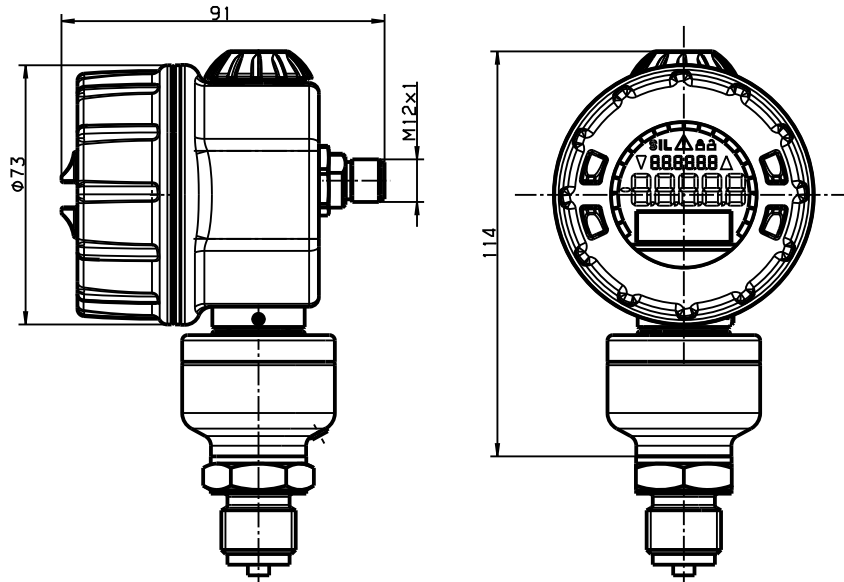
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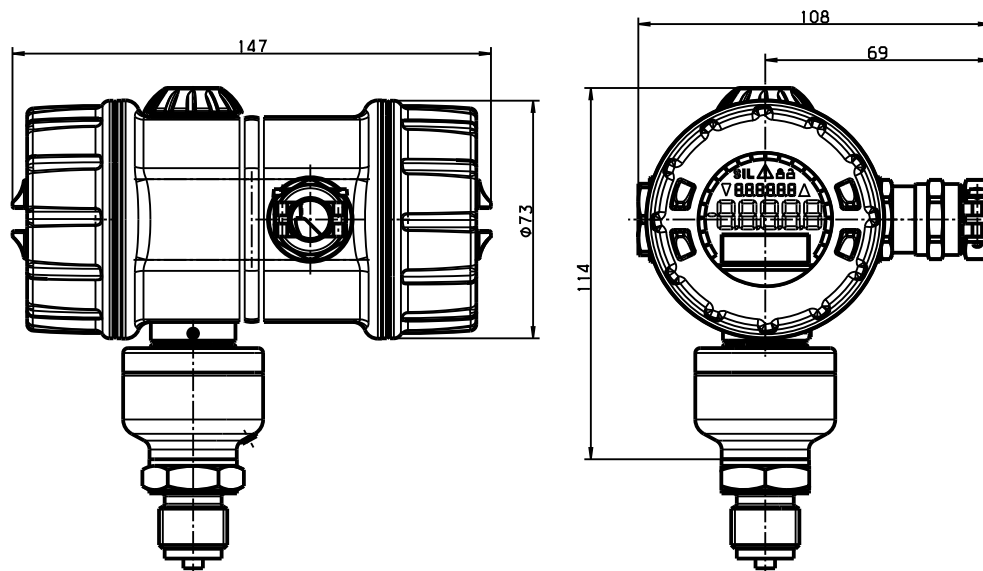


Dimensions

Type 403028/0-0-1 (short, stainless steel, with M12 connection)



Type 403028/000-0-2 (long, stainless steel, with cable fitting)



M20 × 1.5 cable fitting

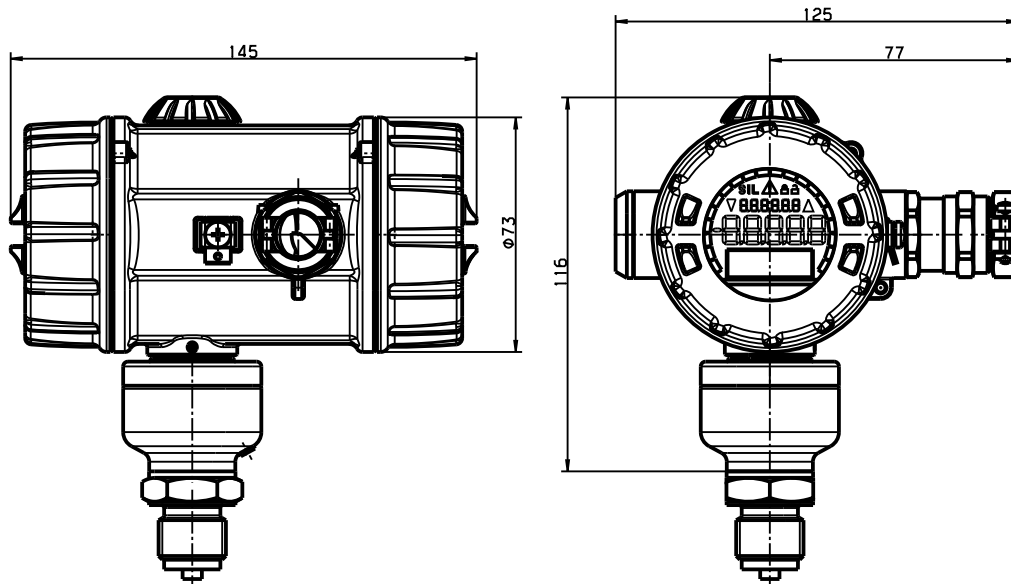
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Type 403028/000-0-3 (precision casting, with cable fitting)



Cable fitting M20 x 1.5 Ex-d version

Process connections

<p>504 G 1/2 according to DIN EN 837 --</p>	<p>512 1/2-14 NPT --</p>	<p>521 G 1/4 FPM profile seal G 1/4</p>
<p>523 G 1/2 FPM profile seal G 1/2</p>	<p>559 M20 x 1.5 DIN 3852-11 FPM profile seal M20 x 1.5</p>	<p>583 M20 x 1.5 with pin --</p>

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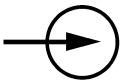
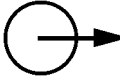



Connection diagram

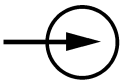
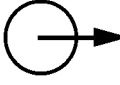

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Terminal assignment for cable fitting

Connection		Terminal assignment
		93 cable fitting
Voltage supply DC 11.5 to 36 V for non-Ex version DC 12 to 28 V for Ex version		1 L+ 2 L-
Output 4 to 20 mA, two-wire load-independent current of 4 to 20 mA in voltage supply		1 L+ 2 L-
Test connection for current output Internal resistance of the ammeter $\leq 10 \Omega$		TEST + TEST -
Test connection for HART® The burden must be present!		HART + HART -
Functional ground		3

M12 terminal assignment – short housing

Connection		Terminal assignment	Color assignment ^a
		36 round plug M12 × 1	
Voltage supply DC 11.5 to 36 V for non-Ex version DC 12 to 28 V for Ex version		1 L+ 3 L-	Brown Blue
Output 4 to 20 mA, two-wire load-independent current of 4 to 20 mA in voltage supply		1 L+ 3 L-	Brown Blue
Functional ground		4	Black

^a The color coding is only valid for A-coded standard cables!

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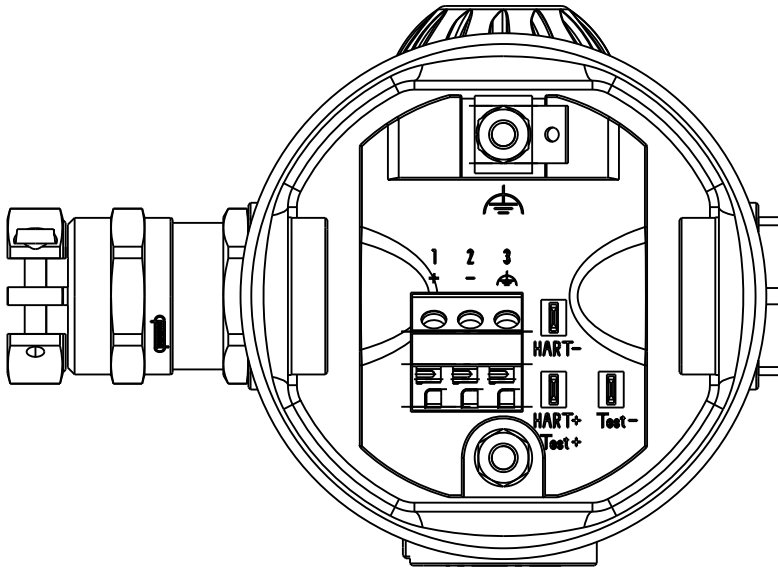
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**Connection in housing and cable fitting****Round plug M12 × 1, short design type**

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Order details

	(1) Basic type
403028	JUMO SIRAS P21 AR – process pressure transmitter
	(2) Basic type extension
000	None
	(3) Explosion protection
0	None
1	ATEX, IECEx ia (in preparation)
2	ATEX, IECEx ia + d combined release (in preparation)
	(4) Housing
1	Short, stainless steel, with M12 connection ^a
2	Long, stainless steel, with cable fitting
3	Long, precision casting, with cable fitting
	(5) Electrical connection
36	Round plug M12 × 1
93	Metal cable fitting
	(6) Lid material
20	CrNi (stainless steel)
	(7) Display
1	With display (LCD)
	(8) Operation
1	With rotary knob
	(9) Input – nominal measuring range
450	-600 to +600 mbar relative pressure
473	-1 to +2.5 bar relative pressure
513	-1 to +4 bar relative pressure
472	-1 to +10 bar relative pressure
514	-1 to +25 bar relative pressure
515	-1 to +100 bar relative pressure
508	-1 to +250 bar relative pressure (in preparation)
509	-1 to +400 bar relative pressure (in preparation)
487	0 to 0.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
493	0 to 10 bar absolute pressure
495	0 to 25 bar absolute pressure
507	0 to 100 bar absolute pressure
	(10) Output
410	4 to 20 mA, two-wire with HART [®] protocol

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(11) Process connection	
504	G 1/2 according to DIN EN 837
512	1/2-14 NPT
521	G 1/4
523	G 1/2
559	M20 x 1.5 DIN 3852-11
583	M20 x 1.5 with pin
(12) Medium temperature	
1	-40 to 85 °C
(13) Process connection material	
20	CrNi (stainless steel)
(14) Measuring system filling medium	
01	Silicon oil
(15) Extra codes	
000	Without extra code
100	Customer-specific configuration
624	Oil and grease-free
634	With TAG number

^a The short housing is only available with the electrical connection round plug M12 × 1.

Order code (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15)
 / - - - - - - - - - - - - - /
 Order example 403028 / 000 - 0 - 1 - 36 - 20 - 1 - 1 - 450 - 410 - 504 - 1 - 20 - 01 / 000

Accessories

Designation	Part no.
4-pole cable box, straight, M12 × 1 with 2 m PVC cable	00404585
4-pole cable box, angled, M12 × 1 with 2 m PVC cable	00409334
HART [®] modem USB ^a	00443447
Measuring device holder for wall and 2" pipe	00597711
Ex-i repeater power supply and input isolating amplifier 707530/38	00577948

^a The HART[®] modem forms the connection between the HART[®] interface of the pressure transmitter and the USB interface of a PC.

Software

Designation	Part no.:
JUMO setup program SIRAS P21 series	00770008
Device Description (DD); available via the FieldComm Group website	

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Pressure and differential pressure switch for air, smoke and flue gases

Adjustment range from 0.4 to 150 mbar

Brief description

Pressure and differential pressure switches Type 4 ADS are used to measure vacuum, pressure or differential pressure in HVAC and filter technology, for example. Pressure and differential pressure switches consist essentially of base, diaphragm, intermediate disc, case and protective cover. When used as pressure or vacuum switch, the base and diaphragm with disc form the pressure chamber.

When used as a differential pressure switch, the base and a second diaphragm with intermediate disc form the two pressure chambers. A pressure change in the pressure chamber causes an axial displacement of a pin linked to the diaphragm. When the selected switching point is reached, a spring-loaded contact is activated.



Type 4 ADS-82

Technical data

Case

Polycarbonate

Parts in contact with medium

Polycarbonate

Diaphragm

NBR

Pressure connection

2× tubing nipple 4.6 mm dia.

Cable entry

Pg11

Electrical connection

screw terminals for up to 2.5 mm² conductor cross-section

Type of contact

single-pole as changeover switch

fine silver (Ag)

Protection

IP54

Adjustment ranges, differential

Adjustment range mbar	Differential Δp in mbar
0.4 to 3	≤ 0.3
1 to 10	≤ 0.5
2.5 to 50	≤ 1.5
30 to 150	≤ 5

Max. operating pressure

0 to 500 mbar

Switching point accuracy

The setpoint indicated on the scale conforms to the actual value with a tolerance of $\pm 15\%$.

Rating

AC 50 to 60 Hz, 250 V, 6 A, $\varphi = 1$

AC 50 to 60 Hz, 250 V, 3 A, $\varphi = 0.6$

Permissible ambient temperature and temperature of medium

-15 to +60 °C

Switching function with rising pressure

1 n.c. opening, 2 n.o. closing

Switching function with falling pressure

1 n.c. closing, 2 n.o. opening

Operating position

The standard operating position is with the diaphragm standing vertically; with horizontal face-up mounting, the pressure monitor switches when the pressure is about 0.5 mbar higher.

With horizontal face-down mounting, the pressure monitor switches when the pressure is about 0.5 mbar lower.

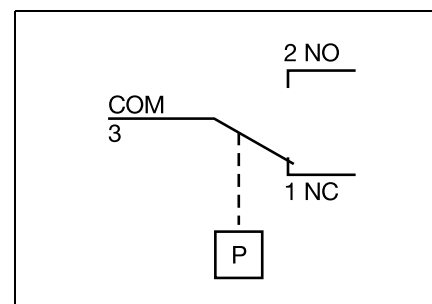
In an intermediate position, the pressure monitor will switch at a pressure that deviates by a maximum of ± 0.5 mbar from the selected setpoint.

Accessories

HVAC installation kit, consisting of:

- 2 tube connections
- 6 self-tapping screws
- 2 extension tubes
- 1 jig
- 1 fixing bracket

Electrical connection



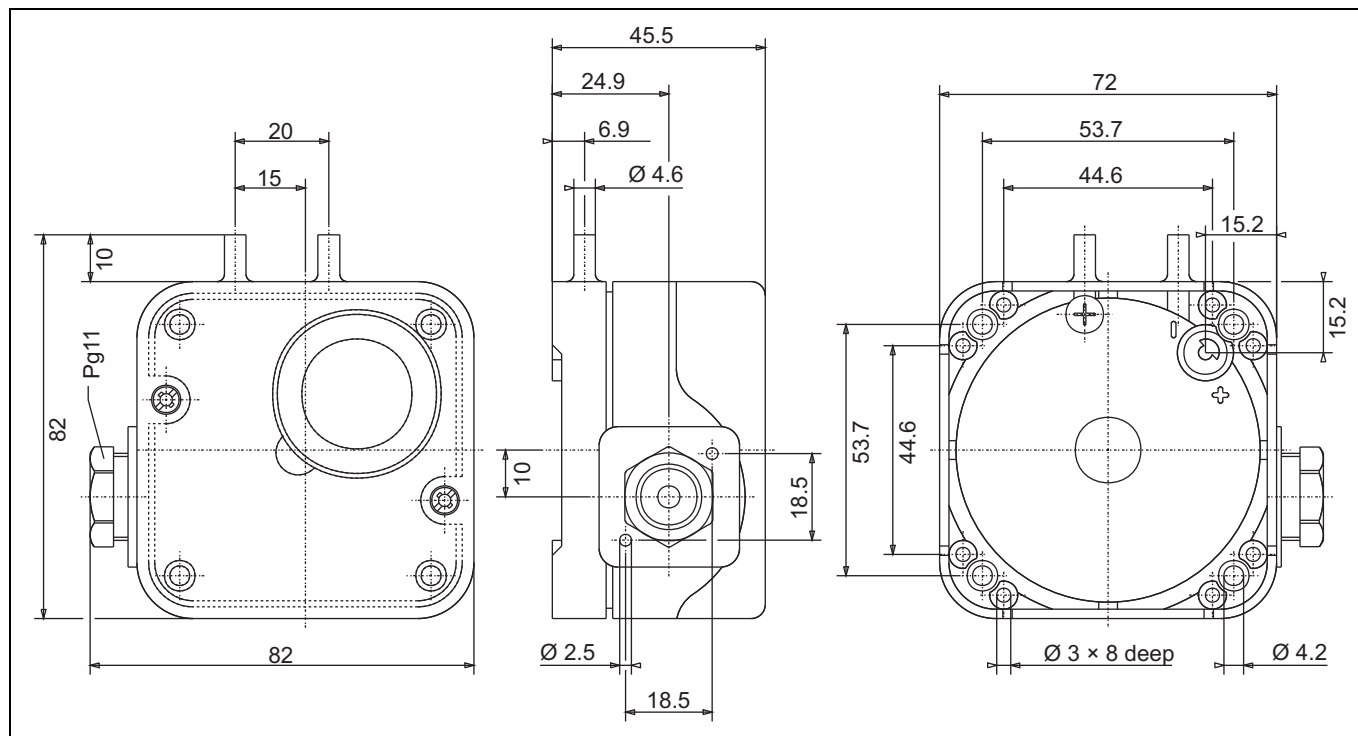
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Dimensions



Order details

(1) Basic version	
4 ADS-82	Pressure and differential pressure switch for air, smoke and flue gases in surface-mounted case 82 mm × 82 mm

Order code
 Order example 4 ADS-82

Accessories

Designation	Part no.
HVAC installation kit: Pressure and differential pressure switch for air and smoke	00381238

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Pressure and differential pressure transmitters

General application

Pressure and differential pressure transmitters Type 4304 are suitable for measuring overpressure, vacuum and differential pressure of non-corrosive gases.

Preferred areas of application are: HVAC, level measurement (bubbling-through method), flow measurement and monitoring, and filter technology.

On request, the instrument can be supplied with LC display or with LC display and limit contact(s).



Technical data

Reference conditions

to DIN 16 086 and DIN IEC 770/5.3

Measuring ranges

see ordering details

Overload limit

ranges 0 to 400 mbar
 5× full scale
 ranges above 400 mbar
 2× full scale

Maximum system pressure

(for Δp measurements)
 1 bar (on each side)

Bursting pressure

for all ranges > 2 bar

Parts in contact with medium

Ni, Al, CuBe, PU

Output

0 to 10 V, burden $\geq 2 \text{ k}\Omega$
 0/4 to 20 mA, burden $\leq 500 \Omega$
 4 to 20 mA, burden $\leq (U_B - 12 \text{ V}) + 0.02 \text{ A}$
 2-wire

Burden error

$\leq 0.2 \%$

Zero offset

$\leq 0.5 \%$ of full scale

Ambient temperature error

within range +10 to +50 °C
 (compensated temperature range)
 zero: $\leq 0.02 \text{ } \%/^{\circ}\text{C}$ typical,
 $\leq 0.05 \text{ } \%/^{\circ}\text{C}$ max.
 span: $\leq 0.02 \text{ } \%/^{\circ}\text{C}$ typical,
 $\leq 0.05 \text{ } \%/^{\circ}\text{C}$ max.

Characteristic

standard: linear
 on request: square root

Deviation from characteristic

$\leq 1 \%$ of full scale
 (limit point adjustment, incl. hysteresis and repeatability)

Response time

$\leq 20 \text{ msec}$

Stability per year

$\leq 0.5 \%$ of full scale

Supply

see ordering details

Ripple

max. 1 V_{pp}

Max. current drawn

approx. 25 mA

Supply voltage error

$\leq 0.02 \%$ per V
 (with rated supply voltage DC 24 V)

Permissible ambient temperature

-10 to +50 °C

Storage temperature

-10 to +70 °C

Permissible temperature of medium

-10 to +50 °C

Electromagnetic compatibility

to basic standards EN 50081-1 and
 EN 50082-1

Mechanical shock

10 g/0.1 msec

Mechanical vibration

5 g max. at 15 to 2000 Hz

Protection

IP65 to EN 60529
 (connecting cable dia. 5 mm min.,
 7 mm max.)

Housing

ABS

Process connection

see ordering details


Electrical connection

cable gland M12 \times 1.5;
 internal screw terminals,
 for conductor cross-sections up to 1.5 mm²

Limit contact

- contact rating: 6 A, AC 230 V
- adjustability: 0 to 100 % of full scale
- differential: adjustable,
 1 to 99 % of set limit
- output per limit contact:
 1 relay changeover contact (floating)

Nominal position

standard: vertical \perp
 on request: horizontal 
 please specify when ordering

Weight

300 g approx.
 (400 g approx. with AC supply)

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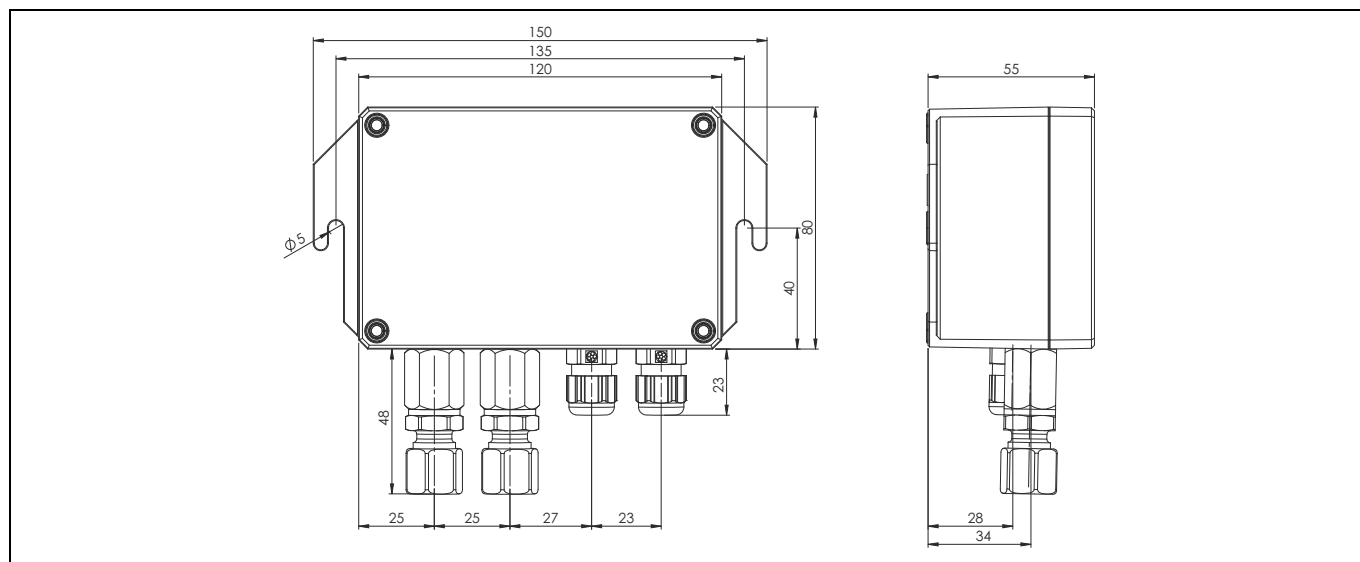


Electrical connection

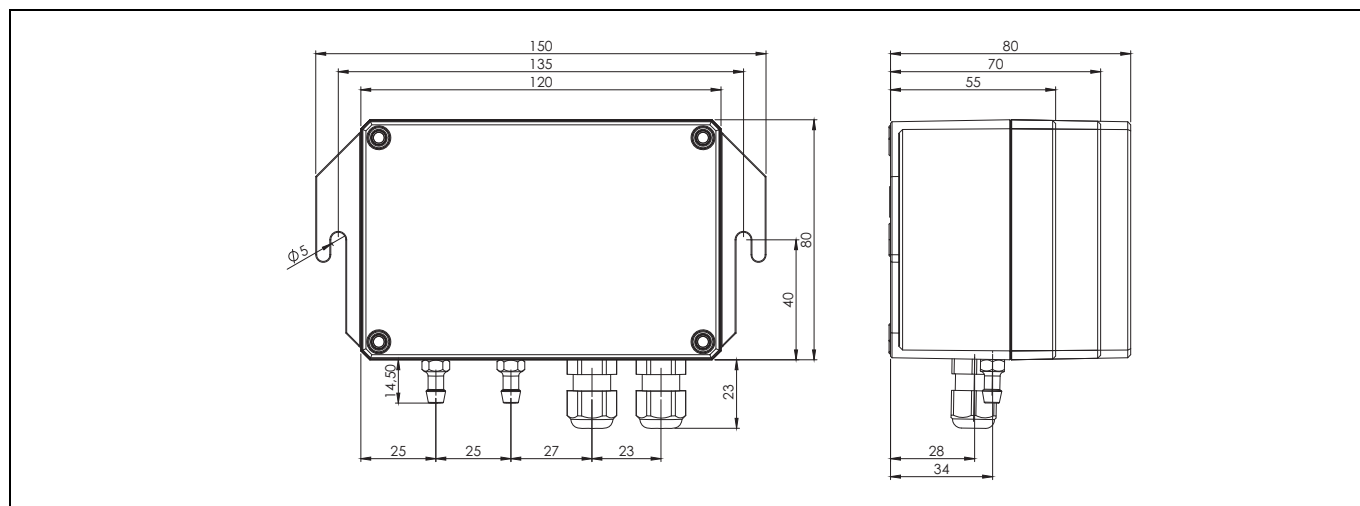
Connection			Terminals Terminal block
Voltage supply DC 19 to 31 V		L -	1
		L +	2
Voltage supply AC 230 V or AC 115 V or AC 24 V		N	1
		L 1	2
Output 0 to 10 V, 0/4 to 20 mA, 3-wire		-	3
		+	4
Output 4 to 20 mA, 2-wire proportional current in voltage supply		-	1
		+	2

Dimensions

for compression fitting 8 mm (process connection 296)



for hose connection Ø 6.6 × 11 mm (process connection 298)



* 80 for basic type extensions "011", "012", "014", "015" and square root

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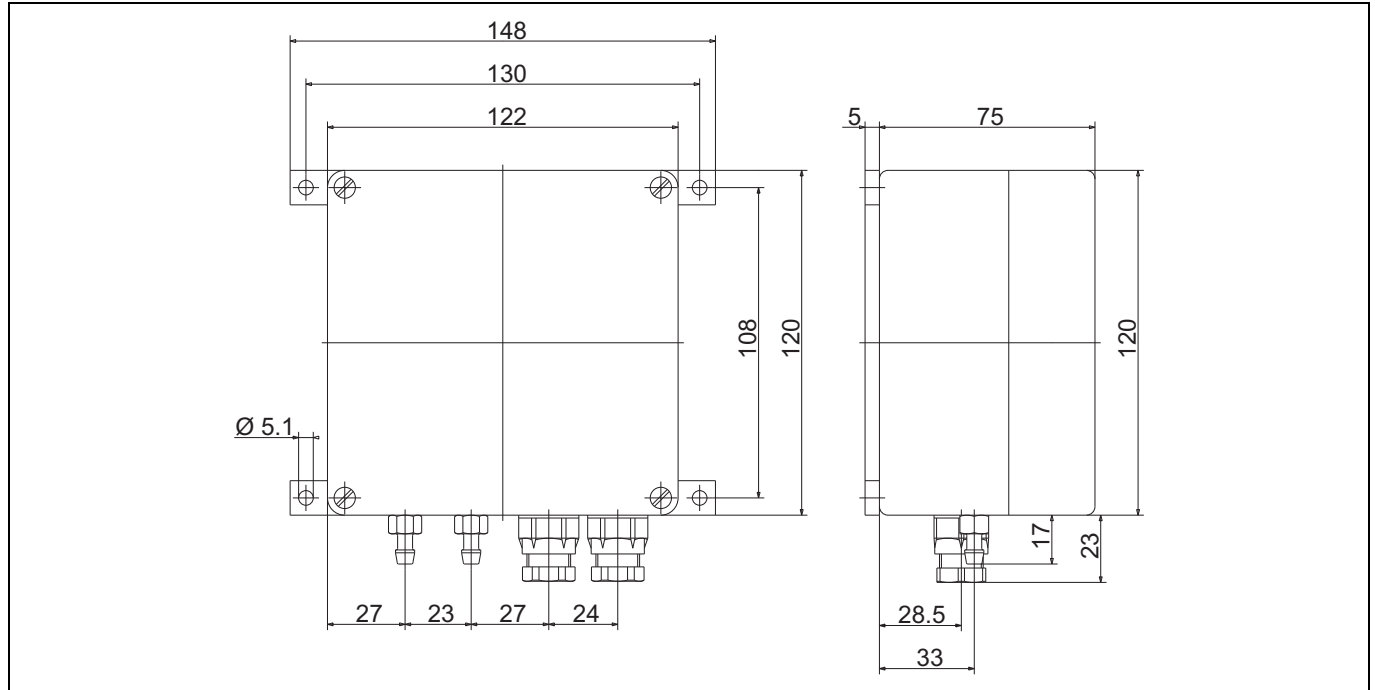
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for ranges ≤ 40 Pa (with automatic zeroing)



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Ordering details

(1) Basic type	
404304/000	Pressure and differential pressure transmitter with inductive measuring system
404304/011	Pressure and differential pressure transmitter with one limit contact ^a
404304/012	Pressure and differential pressure transmitter with two limit contacts ^a
404304/013	Pressure and differential pressure transmitter with LCD display 3 1/2-digit
404304/014	Pressure and differential pressure transmitter with one limit contact and LCD display 3 1/2-digit ^a
404304/015	Pressure and differential pressure transmitter with two limit contacts and LCD display 3 1/2-digit ^a
(2) Input	
396	0 to 10 Pa ^b
397	0 to 20 Pa ^b
398	0 to 30 Pa ^b
399	0 to 40 Pa ^b
400	0 to 0.5 mbar relative pressure
401	0 to 0.6 mbar relative pressure
402	0 to 1 mbar relative pressure
403	0 to 1.6 mbar relative pressure
404	0 to 2.5 mbar relative pressure
405	0 to 4 mbar relative pressure
406	0 to 5 mbar relative pressure
407	0 to 6 mbar relative pressure
408	0 to 10 mbar relative pressure
409	0 to 16 mbar relative pressure
410	0 to 25 mbar relative pressure
411	0 to 40 mbar relative pressure
412	0 to 50 mbar relative pressure
413	0 to 60 mbar relative pressure
414	0 to 100 mbar relative pressure
415	0 to 160 mbar relative pressure
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1.0 bar relative pressure
423	800 to 1000 mbar absolute pressure ^c
422	800 to 1200 mbar absolute pressure ^c
421	900 to 1100 mbar absolute pressure ^c
420	950 to 1050 mbar absolute pressure ^c
488	0 to 1,0 bar absolute pressure
999	Special measuring range relative pressure
(3) Output	
402	0 to 20 mA, three-wire
403	0 to 20 mA, three-wire, square root
404	4 to 20 mA, two-wire, square root
405	4 to 20 mA, two-wire
406	4 to 20 mA, three-wire
407	4 to 20 mA, three-wire, square root
415	0 to 10 V, three-wire
416	0 to 10 V, three-wire, square root
451	0 to 20 mA, three-wire, extended response time
452	0 to 20 mA, three-wire, extended response time, square root
453	4 to 20 mA, two-wire, extended response time

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454	4 to 20 mA, three-wire, extended response time
455	4 to 20 mA, three-wire, extended response time, square root
456	0 to 10 V, three-wire, extended response time
457	0 to 10 V, three-wire, extended response time, square root
(4) Voltage supply	
02	AC 230 V, -10 to +6 %, 50 to 60 Hz
05	AC 115 V, -10 to +6 %, 50 to 60 Hz
08	AC 24 V, -10 to +6 %, 50 to 60 Hz
27	DC 12 to 32 V (only with output 4 to 20 mA, 2-wire)
28	DC 19 to 31 V ± 0 %
(5) Process connection	
296	Compression fitting 8 mm
298	Hose connection 6.6 mm \times 11 mm dia.

- ^a Devices with basic type extensions shown above can not be delivered with square root outputs (403, 407, 416, 452, 455, 457) and two-wire outputs (405, 453) also not with DC 12 to 32 V (voltage supply 27).
- ^b Devices with inputs shown above can not be delivered with two-wire outputs (405, 453) and DC 12 to 32 V (voltage supply 27). The housing is 122 mm \times 120 mm \times 75 mm. An automatic zeroing is possible.
- ^c These inputs are for barometric pressure measurement (if applicable, state site altitude a.m.s.l.).

	(1)		(2)		(3)		(4)		(5)
Order code	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>
Order example	404304/000	-	414	-	405	-	27	-	298

Lagerausführungen

Article	Part no.
404304/000-408-405-27-298	00382800
404304/000-410-405-27-298	00384775

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Pressure transmitter with analog actual value display

Brief description

The pressure transmitter is available with measuring ranges from -1 to +400 bar. The device is an ideal combination of an analog on-site display and an analog standard output signal for remote transmission the measurement.

Constructed from high-grade stainless steel, this device can be used in virtually all media, even under harsh conditions. The design gives optimum safety from escaping process medium.

Application

- Chemical and process engineering

Special features

- Welded measuring system without seals
- Parts in contact with medium made of stainless steel
- Pressure gauge functionality even during voltage supply failure



Type 404312/...

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Technical data

General Information

Reference conditions	Per DIN 16086 and DIN EN 60770
Sensor	
Material	Silicon sensor with stainless steel separating diaphragm
Pressure transfer medium	Synthetic oil
Location	
Mounting location	Any
Calibration location	Device standing vertically, process connection on bottom

Input

Relative pressure								
Measuring range (bar)	0 to 0.6	0 to 1	0 to 1.6	0 to 2.5	0 to 4	0 to 6	0 to 10	0 to 16
Range of use during steady load (bar) ^a	0.6	1	1.6	2.5	4	6	10	16
Range of use during alternating load (bar) ^b	0.54	0.9	1.44	2.25	3.6	5.4	0.9	14.4
Measuring range (bar)	0 to 25	0 to 40	0 to 60	0 to 100	0 to 160	0 to 250	0 to 400	
Range of use during steady load (bar) ^a	25	40	60	100	160	250	400	
Range of use during alternating load (bar) ^b	22.5	36	54	90	144	225	360	
Measuring range (bar)	-1 to 0	-1 to +0.6	-1 to +1.5	-1 to +3	-1 to +5	-1 to +9	-1 to +15	-1 to +24
Range of use during steady load (bar) ^a	0	0.6	1.5	3	5	9	15	24
Range of use during alternating load (bar) ^b	0	0.54	1.35	2.7	4.5	8.1	13.5	21.6

^a 100 % of end of scale

^b 90 % of end of scale

Analog output

Output signal	
Current	
Output 402	0 to 20 mA, three-wire
Output 405	4 to 20 mA, two-wire
Output 406	4 to 20 mA, three-wire
Voltage	
Output 415	0 to 10 V, three-wire
Step response	
t ₉₀	≤ 5 ms
Burden	
0 to 20 mA, three-wire	$R_i \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A}$
4 to 20 mA, two-wire	$R_i \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A}$
4 to 20 mA, three-wire	$R_i \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A}$
0 to 10 V, three-wire	≥ 10 kΩ

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Measurement deviation

Accuracy ^{a, b}	Class 1.0
Characteristic curve deviation	≤ 0.5 % MSP (measuring span)
Hysteresis	≤ 0.1 % MSP
Repeatability	≤ 0.5 % MSP
Response time	≤ 3 ms

^a According to EN 837-1

^b Under an EMC-load larger deviations in the electrical signal can occur.

Mechanical features

Materials	
Process connection	Stainless steel 316
Seal	The measuring system is welded with no seals.
Sensor	Stainless steel 316 L
Measuring system	Stainless steel 316
Case	Stainless steel 304 L
Connector	PA (polyamide)
Weight	
Device with process connection 504 (G 1/2)	550 g

Environmental conditions

Permissible temperatures	
Measuring material	-20 to +60 °C
Environment	-20 to +60 °C
Storage	-20 to +60 °C
Permissible relative humidity	
Operation	100 % rel. humidity, incl. condensation on the outer sleeve of the device
Storage	90 % rel. Feuchte, no condensation
Electromagnetic compatibility ^a	
Interference emission	Class B
Interference immunity	To industrial requirements
Protection type ^b	
As standard	IP54
For extra code 473	IP65

^a According to EN 61326

^b According to EN 60529/ICE 529

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Voltage supply

Auxiliary power	
Terminal assignment	See connection diagram
Voltage supply U_B	
For output 402 (0 to 20 mA)	DC 11.5 to 30 V, nominal voltage DC 24 V
For output 405 (4 to 20 mA)	DC 10 to 30 V, nominal voltage DC 24 V
For output 406 (4 to 20 mA)	DC 11.5 to 30 V, nominal voltage DC 24 V
For output 415 (0 to 10 V)	DC 11.5 to 30 V, nominal voltage DC 24 V
Residual ripple	Peak voltages must not exceed or fall below the values specified for the voltage supply.
Reverse polarity protection	Yes
Power consumption	≤ 25 mA
Electrical connection 65 (terminal box)	DIN 175301 form A ^a

^a Conductor cross-section $\leq 1.5 \text{ mm}^2$

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Connection diagram

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Connection			Terminal assignment
			65
			Junction box
Devices with three-wire output			
Voltage supply DC 11.5 to 30 V for output 402 (0 to 20 mA) for output (4 to 20 mA) for output (0 to 10 V)		U_B 0 V	1 L+ 2 L-
Output 402 (0 to 20 mA) Output 406 (4 to 20 mA) Output 415 (0 to 10 V)		S- S+	2 - 3 +
Devices with two-wire output			
Voltage supply DC 10 to 30 V for output 405 (4 to 20 mA)		U_B 0 V	1 L+ 2 L-
Output 4 to 20 mA, two-wire for output 405 Impressed current 4 to 20 mA in voltage supply		S- S+	1 + 2 -
Functional bonding conductor FB ^a			-

^a The pressure transmitter has to be connected to the potential equalization system of the plant through the electrical connection or process connection.

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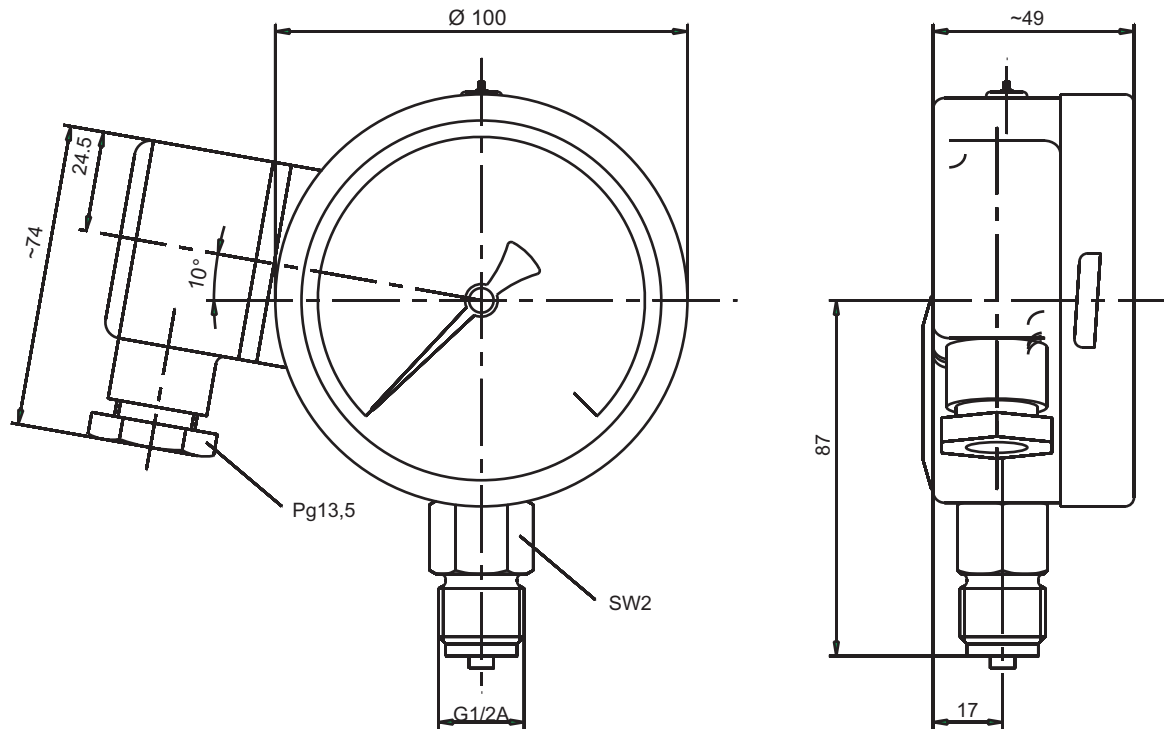
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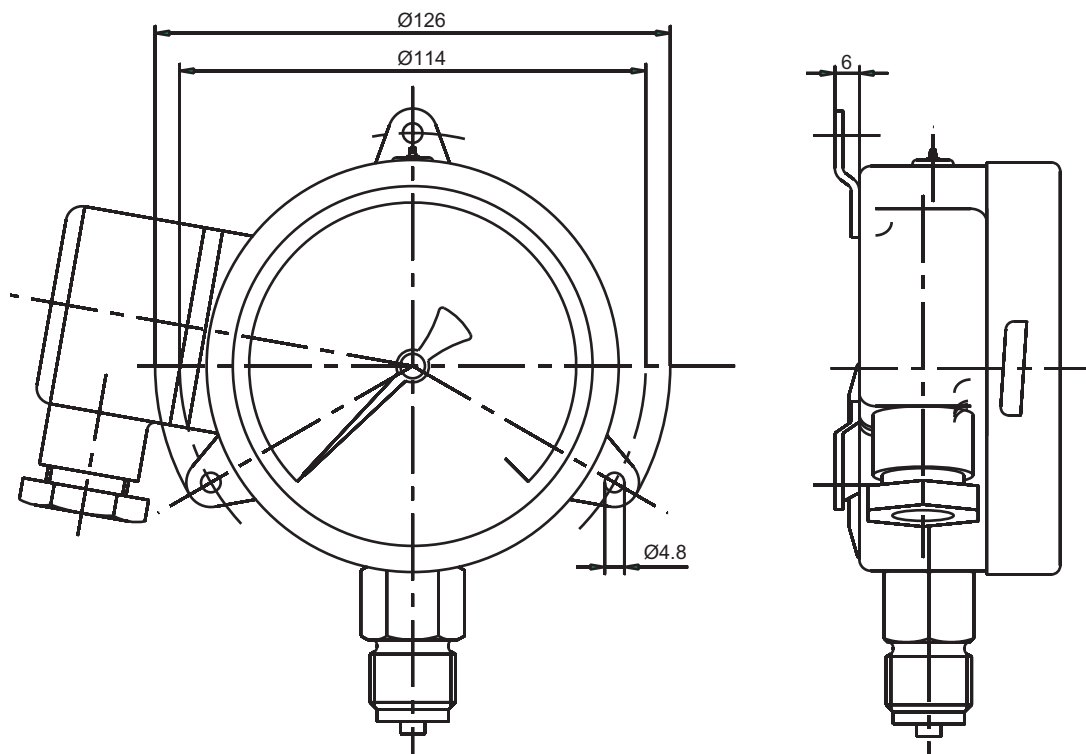


Dimensions

Type 404312/000-....



Type 404312/000-.... with mounting bracket behind (extra code 421)



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Order details

(1) Basic type	
404312	Pressure transmitter with analog actual value display
(2) Basic type extension	
000	None
999	Special version
(3) Input	
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
464	0 to 100 bar relative pressure
465	0 to 160 bar relative pressure
466	0 to 250 bar relative pressure
467	0 to 400 bar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
999	Special measuring range relative pressure
(4) Output	
402	0 to 20 mA, three-wire
405	4 to 20 mA, two-wire
406	4 to 20 mA, three-wire
415	0 to 10 V, three-wire
(5) Process connection (not front-flush)	
504	G 1/2 according to DIN EN 837
(6) Material of process connection	
20	CrNi (stainless steel)
(7) Electrical connection	
65	Junction box (general version)
(8) Extra code	
000	None
421	Rear fastening brackets of stainless steel
462	Inverting output signal
473	Case with damping fluid
591	Throttle in pressure channel

Order code	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)							
Order example	404312	/	000	-	459	-	405	-	504	-	20	-	65	/	000

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Pressure transmitter for short ranges

Brief description

Pressure transmitters are used for evaluating pressures in liquids and gases. The pressure transmitter incorporates a capacitive ceramic sensor. The pressure is converted into an electrical signal.

Technical data

Reference conditions

To DIN 16086 and IEC 770/5.3

Ranges

See ordering data

Overload limit

Code	Range	Overload
412	0 to 50 mbar	-0.3/4 bar
414	0 to 100 mbar	-0.3/4 bar
415	0 to 160 mbar	5 bar
451	0 to 0.25 bar	6 bar
452	0 to 0.4 bar	6 bar
453	0 to 0.6 bar	10 bar
454	0 to 1.0 bar	10 bar

Bursting pressure

150 bar

Wetted components

Normally aluminium oxide Al_2O_3 (99.9%)
 stainless steel Mat. Ref. 1.4571

FPM

others to special order

Output

0.5 to 4.5 V min. burden 10 k Ω

4 to 20 mA max. burden ($U_B - 12$ V) \div 0.02A

Burden error

< 0.15 %

Zero error

\leq 0.3 % MSP¹

Output span tolerance

\leq 1.0 % MSP

Ambient temperature error

Within the range -20 to +80 °C

(compensated temperature range)

zero: less than 0.1 %/10 °C typical

less than 0.3 %/10 °C max.

span: less than 0.1 %/10 °C typical

less than 0.2 %/10 °C max.

Deviation from characteristic

\leq 0.2 % MSP

(after full-scale calibration)

Response time

\leq 10 msec

Stability per year

\leq 0.2 % MSP

Supply

DC 12 to 30 V (with output 4 to 20 mA)

DC 5 V \pm 0.5 V (with output 0.5 to 4.5 V)

Residual ripple: The voltage peaks must not go above or below the values specified for the supply.

Max. current consumption:

for DC 5 V: 2 mA max.

for DC 24 V: 25 mA max.

Supply voltage error

\leq 0.01 %/V

(nominal supply voltage DC 24 V)

ratiometric for voltage supply

DC 5 V (\pm 0.5 V)

Permitted ambient temperature

-20 to +80 °C

Storage temperature

-20 to +125 °C

Permitted medium temperature

-20 to +80 °C

Electromagnetic compatibility

DIN EN 61326-1 and DIN EN 61326-2-3

Interference emission: Class B²

Interference immunity: Industrial requirement

Mechanical shock

100 g/1 msec

Mechanical vibration

20 g max. at 15 to 2000 Hz

Protection

With cable socket IP65 to EN 60529

(connecting cable diameter 5 mm min.,

7 mm max.)

with attached cable IP67 to EN 60529



Housing

Stainless steel, Mat. Ref. 1.4571
 polycarbonate GF

Pressure connection

See ordering data,
 other connections to special order

Electrical connection

See ordering data

The connection variants with cable are fitted with 2 m PVC cable (other lengths to special order)

cable socket to DIN EN 175301-803, Form A, max. conductor cross-section 1.5 mm²;

or

attached PVC cable

or

terminal head

Nominal position

flat horizontal (pressure connection to the side)

Weight

0.35 to 0.55 kg (depending on version)

¹ MSP = measuring span

² The product is suitable for industrial use as well as for households and small businesses.

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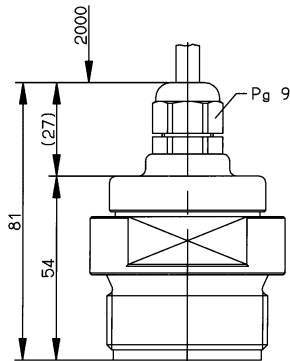
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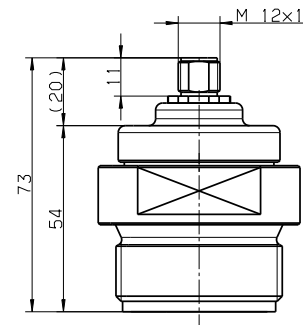
Dimensions

Elektrical connection

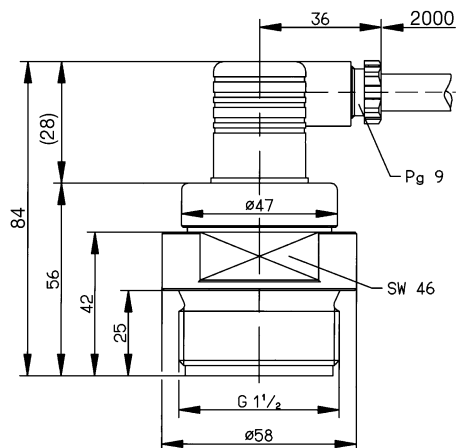
Type 404327/.....-570-12



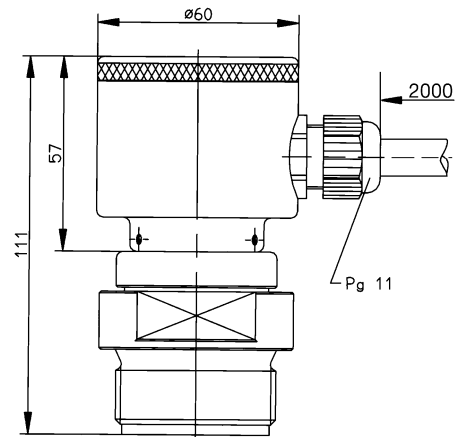
Type 404327/.....-570-36



Type 404327/.....-570-61



Type 404327/.....-570-75



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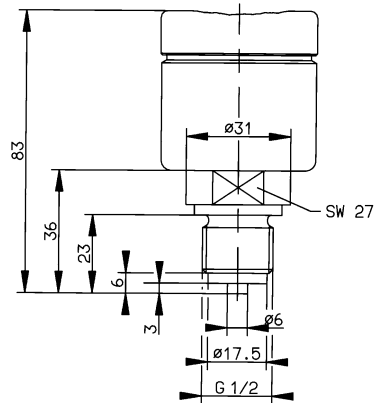
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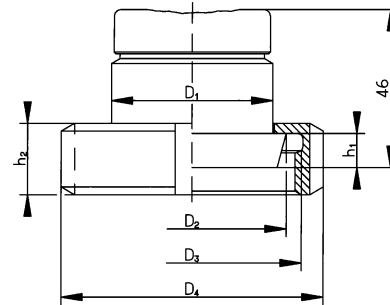


Process connection

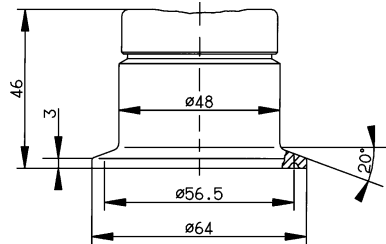
504
G 1/2 according to EN 837



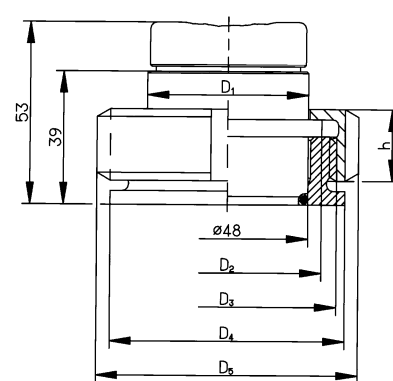
606/607
Taper socket with union nut DN 40/DN 50



616
Clamping socket (clamp) DN 50



653/654
Tank connection with slotted union nut DN 40/DN 50



Pos.	DN	D ₁	D ₂	D ₃	D ₄	h ₁	h ₂
606	40	Ø 48	Ø 48	RD 65 × 1/6	Ø 78	10	21
607	50	Ø 61	Ø 68.5	RD 78 × 1/6	Ø 92	11	22

Pos.	DN	D ₁	D ₂	D ₃	D ₄	D ₅	h
653	40	Ø 48	Ø 56	RD 65 × 1/6	Ø 70	78	21
654	50	Ø 61	Ø 68.5	RD 78 × 1/6	Ø 84	92	22

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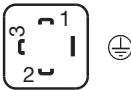
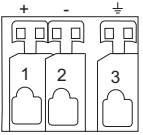







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Connection diagram

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Connection		Terminal assignment			
					
		12 Attached cable	61 Cable socket	75 Terminal head	36 Round plug M12 × 1
Voltage supply DC 12 to 30 V DC 5 V		White Grey	1+ 2-	1+ 2-	1+ 3-
Output 0.5 to 4.5 V		Yellow Grey	3+ 2-		4+ 3-
Output 4 to 20 mA, two-wire		White Grey Proportional current 4 to 20 mA in voltage supply	1+ 2-	1+ 2-	1+ 3-
Protection conductor				3 	2
Screen		Black			
Warning: Earth the device (pressure connection and/or screen)!					

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Order details

(1)	Basic type
404327	Pressure transmitter with capacitive ceramic sensor
(2)	Input
412	0 to 50 mbar relative pressure
414	0 to 100 mbar relative pressure
415	0 to 160 mbar relative pressure
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
999	Special input range relative pressure
(3)	Output
405	4 to 20 mA, two-wire
412	0.5 to 4.5 V, three-wire
(4)	Process connection
504	G 1/2 according to DIN EN 837
570	G 1 1/2 front-flush DIN EN ISO 228-1
606	Taper socket with union nut DN 40 DIN 11851 (dairy pipe fitting)
607	Taper socket with union nut DN 50 DIN 11851 (dairy pipe fitting)
616	Clamping socket (clamp) DN 50 DIN 32676 (2" ISO 2852)
653	Tank connection with slotted union nut DN 40
654	Tank connection with slotted union nut DN 50
(5)	Material process connection
26	CrNi (stainless steel), mat.-ref. 1.4571
(6)	Electrical connection
12	Attached cable
36	Round plug M12 × 1
61	Cable socket DIN EN 175301-803, form A ^a
75	Terminal head ^b

^a The cable socket is supplied with 2 m cable as standard.

^b The terminal head is supplied with 2 m cable as standard and is only available with 4 to 20 mA (output 405).

	(1)		(2)		(3)		(4)		(5)		(6)
Order code	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>
Order example	404327	/	...	-	...	-	...	-	26	-	..

Accessories

Description	Part No.
Socket M12, 4-pole, with 5 m control cable	00512341

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JUMO dTRANS p30

Pressure Transmitter

General application

Pressure transmitters are used to measure the relative (gauge) and absolute pressures in liquids or gases. The measuring device for the transmitter is a piezo-resistive element or a thin-film strain gauge. The pressure is converted into an electrical signal.

The device is certified according to EHEDG in the versions with process connections (clamp) DN 25, 32, 40 and 50 as well as JUMO PEKA.

Technical data

Reference conditions
 as per DIN 16086 and DIN 60770

Ranges
 see order details

Overload limit
 ranges 0 to 25 bar
 3 x full scale
 ranges "0 to 40 bar" up to
 "0 to 250 bar"
 2 x full scale
 ranges "0 to 400 bar" up to
 "0 to 600 bar"
 1.5 full scale

Bursting pressure
 ranges 0 to 40 bar
 ≤ 4 x full scale
 ranges "0 to 60 bar" up to
 "0 to 100 bar"
 8 x full scale
 ranges "0 to 160 bar" up to
 "0 to 400 bar"
 5 x full scale
 ranges 0 to 600 bar
 3 x full scale

Parts in contact with medium
 normally:
 Stainless steel 316 Ti/316 L
 for range ≥ 60 bar:
 Stainless steel 316 Ti/630

Output
 0 to 20 mA, three-wire,
 burden ≤ (U_B-12 V) ÷ 0.02 A
 4 to 20 mA, two-wire,
 burden ≤ (U_B-10 V) ÷ 0.02 A
 4 to 20 mA, three-wire,
 burden ≤ (U_B-12 V) ÷ 0.02 A
 0.5 to 4.5 V, burden ≥ 50 kΩ
 1 to 6 V, burden ≥ 10 kΩ
 0 to 10 V, burden ≥ 10 kΩ

Burden error
 < 0.5 % max.

Zero offset
 ≤ 0.3 % MSP (measuring span)

Thermal hysteresis
 ≤ ± 0.5 % max. MSP
 (within compensated temperature range)
 ≤ ± 1 % max. for ranges
 0 to 0.25 bar
 0 to 0.4 bar
 0 to 0.6 bar

Ambient temperature error
 within range 0 to 100 °C
 (compensated temperature range)
 for ranges 0.25 and 0.4 bar
 zero: ≤ 0.03 %/°C typical,
 ≤ 0.05 %/°C max.
 measuring span: ≤ 0.02 %/°C typical,
 ≤ 0.04 %/°C max.
 for ranges above 0.6 bar
 zero: ≤ 0.02 %/°C typical,
 ≤ 0.04 %/°C max.



Type 404366 with terminal box

span: ≤ 0.02 %/°C typical,
 ≤ 0.04 %/°C max.
 with basic type extension 024:
 zero: ≤ 0.01 %/°C

Deviation from characteristic
 ≤ 0.5 % MSP (limit point adjustment)
 with basic type extension 023:
 ≤ 0.2 % MSP (limit point setting)

Hysteresis
 ≤ 0.1 % MSP

Repeatability
 ≤ 0.05 % MSP

Response time
 with current output
 (output 402, 405 or 406):
 ≤ 3 msec max.
 with voltage output
 (output 412, 415, 418 or 420):
 ≤ 10 msec max.

Stability per year
 ≤ 0.5 % MSP

Approval and approval marks (see Technical Data)



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Voltage supply

DC 10 to 30 V (output 4 to 20 mA and 1 to 6 V)

DC 5 V (output 0.5 to 4.5 V)

DC 11.5 to 30 V (output 0 to 10 V)

DC 11.5 to 30 V (output 0(4) to 20 mA)

Ripple: the voltage spikes must not go above or below the values specified for the voltage supply

Requirements: The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

max. current drawn: approx. 25 mA

Supply voltage error

≤ 0.02 % per V

(nominal supply voltage DC 24 V)

in proportion for voltage supply

DC 5 V (±0.5 V)

Permissible ambient temperature

-20 to +100 °C

Storage temperature

-40 to +125 °C

Permissible temperature of medium

-30 to +120 °C

Electromagnetic compatibility

EN 61326

interference emission: Class B¹

noise immunity: industrial requirements

Mechanical shock

(to IEC 68-2-27)

100 g/1 msec

Mechanical vibration

(to IEC 68-2-6)

20 g max. at 15 to 2000 Hz

Protection

with terminal box

IP65 to EN 60529

(connecting cable diameter 5 mm min., 7 mm max.)

with connecting cable

IP67 to EN 60529

with circular connector M12 × 1

IP67 to EN 60529

¹ The product is suitable for industrial use as well as for households and small businesses.

Housing

Stainless steel 304

Polycarbonate GF

Pressure connection

see order details;

other connections on request

Electrical connection

see order details

terminal box to DIN 43650, Form A,

conductor cross-section up to 1.5 mm²; or

attached 4-core PVC cable, length 2 m

other lengths on request

Nominal position

unrestricted

Weight

200 g

Approval and approval marks

<p>EHEDG</p> <p>Test facility</p> <p>Certificate/Certification number</p> <p>Inspection basis</p> <p>Valid for</p>	<p>Research Center Weihenstephan for Brewing and Food Quality</p> <p>EL Class 1/EHEDG-C2000058</p> <p>EHEDG design specifications (Doc. 8 – Hygienic Design Principles)</p> <p>EHEDG tests for verifying ease of cleaning (Doc. 2, Third Edition, July 2004, updated June 2007)</p> <p>Process connection 613 (Clamp DN 25, 32, 40),</p> <p>Process connection 616 (Clamp DN 50),</p> <p>Process connection 997 (JUMO PEKA hygienic process connection)</p>
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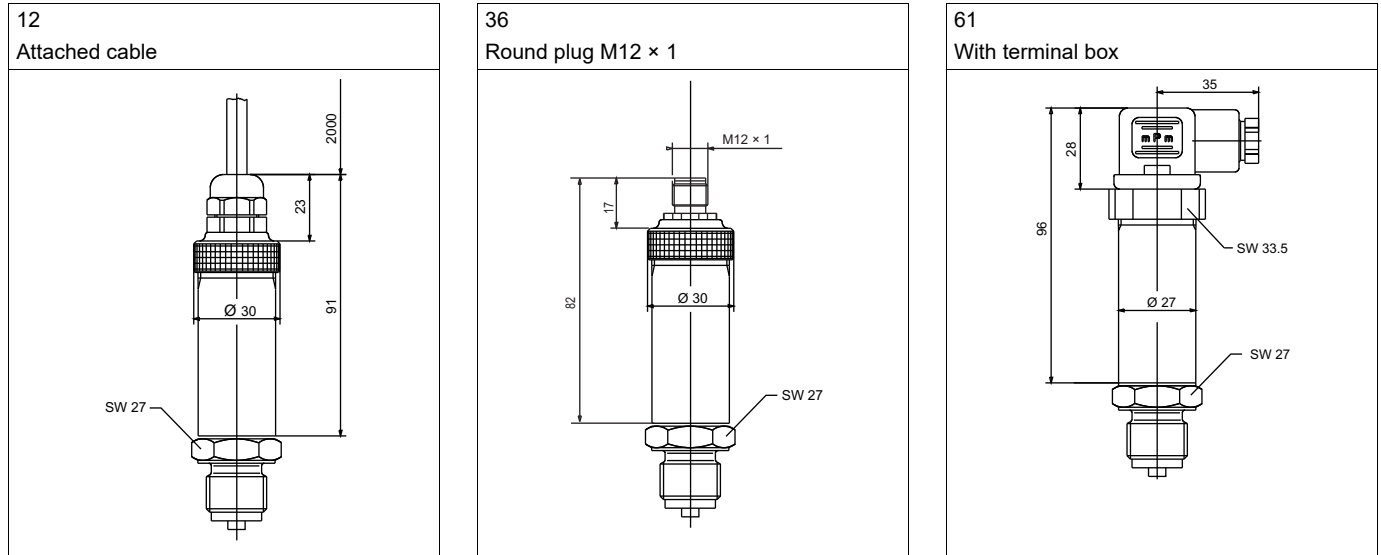
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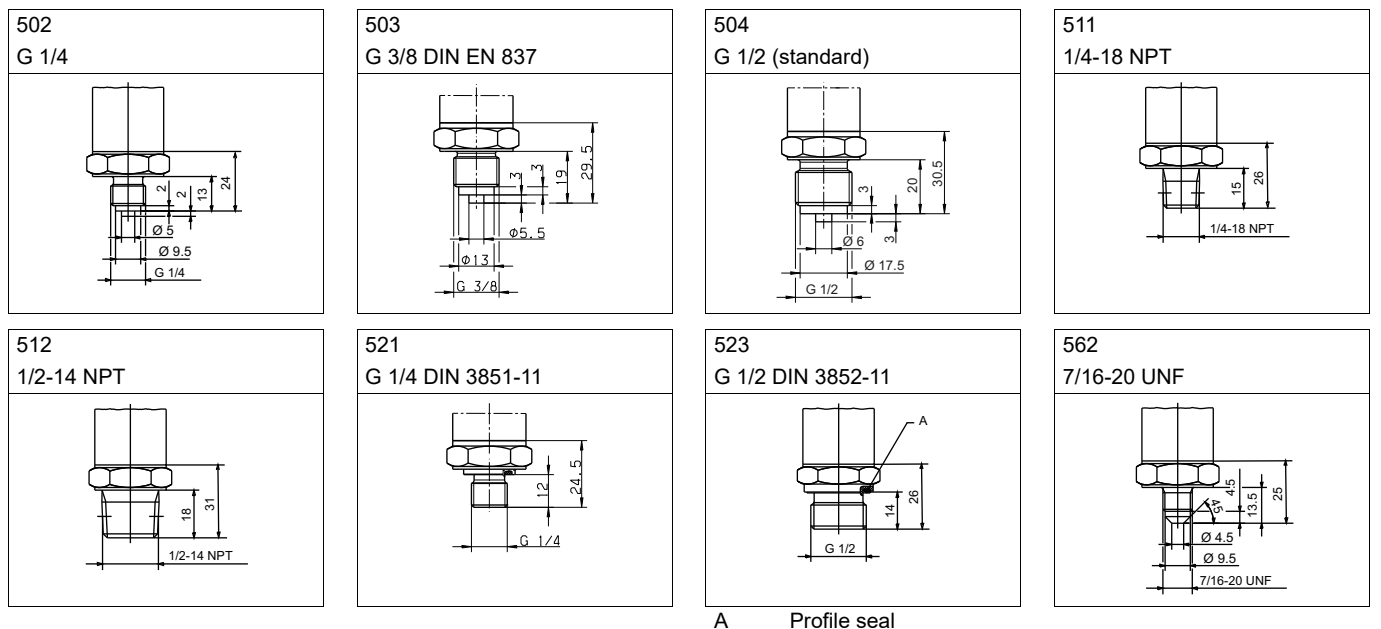


Dimensions

Electrical connection



Process connections, not front-flush



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Process connections, front-flush

570 G 1 1/2 	571 G 3/4 	574 G 1/2 with double gasket 	575 G 3/4 with double gasket 	576 G 1 with double gasket
	A Profile seal	A Profile seal B O-ring 14 × 1.78	A Profile seal B O-ring 20.35 × 1.78	A Profile seal B O-ring 26.7 × 1.78

603 to 607 Taper socket with union nut 	612 to 616 Clamping socket 	652 Tank connection with slotted union nut 	997 JUMO PEKA hygienic process connection^a
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^a certified according to EHEDG

Process connection	DN	Ø D ₁	Ø D ₂	Ø D ₃	Ø D ₄	Ø L ₁	Ø L ₂
603	20	36.5	30	RD44 × 1/6	54	13	21
604	25	44	35	RD52 × 1/6	63	15	
605	32	50	41	RD58 × 1/6	70		
606	40	56	48	RD65 × 1/6	78		
607	50	68.5	61	RD78 × 1/6	92	16	22

^a certified according to EHEDG

Process connection	DN DIN 32676	DN (Zoll)	Nominal size ISO 2852	Ø D ₁	Ø D ₂
612	10 15 20		18 10 15	27.5	34
613 ^a	25 32 40	1 1.5	20 25 32	43.5	50.5
616 ^a	50	2	40	56.5	64

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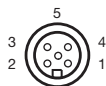
Electrical connection

Connection		Terminals Plug	Cable	M12 × 1
Voltage supply DC 10 to 30 V DC 11.5 to 30 V DC 5 V		1 L+ 2 L-	white grey	1+ 3-
Output 1 to 6 V 0 to 10 V 0.5 to 4.5 V		2 - 3 +	grey yellow	3- 4+
Output 4 to 20 mA, two-wire		1 + 2 - Proportional current 4 to 20 mA in voltage supply	white grey	1+ 3-
Output 0(4) to 20 mA, three-wire		2 - 3 +	grey yellow	3- 4+
Protective conductor				
Screen			black	2
Caution: Earth device (pressure connection and/or or screen)				

Pin assignment M12 × 1



Cable box M12 × 1



Color assignment: Cable box	1 WH 2 BN 3 GN 4 YE 5	White Brown Green Yellow Pressure compensation
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**Order details**

(1)	Basic type
404366/000	JUMO dTRANS p30 – Pressure Transmitter
404366/023	JUMO dTRANS p30 – Pressure Transmitter with reduced deviation of characteristic line ^a
404366/024	JUMO dTRANS p30 – Pressure Transmitter with reduced influence of ambient temperature ^b
404366/999	JUMO dTRANS p30 – Pressure Transmitter, special version
(2)	Input
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
464	0 to 100 bar relative pressure
465	0 to 160 bar relative pressure
466	0 to 250 bar relative pressure
467	0 to 400 bar relative pressure
468	0 to 600 bar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
487	0 to 600 mbar absolute pressure
488	0 to 1 bar absolute pressure
489	0 to 1,6 bar absolute pressure
490	0 to 2,5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
998	Special range absolute pressure
999	Special range relative pressure
(3)	Output
402	0 to 20 mA, three-wire
405	4 to 20 mA, two-wire
406	4 to 20 mA, three-wire
412	0,5 to 4,5 V, three-wire
415	0 to 10 V, three-wire
418	1 to 5 V, three-wire
420	1 to 6 V, three-wire

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(4) Process connection	
502	G 1/4 DIN EN 837
503	G 3/8 DIN EN 837
504	G 1/2 DIN EN 837
511	1/4-18 NPT DIN EN 837
512	1/2-14 NPT DIN EN 837
521	G 1/4 DIN 3851-11
523	G 1/2 DIN 3852-11
562	7/16-20 UNF
570	G 1 1/2 front-flush DIN EN ISO 228-1 ^c
571	G 3/4 front-flush DIN EN ISO 228-1 ^c
574	G 1/2 front-flush, with double gasket ^d
575	G 3/4 front-flush, with double gasket ^c
576	G 1 front-flush, with double gasket ^c
603	Taper socket with union nut DN 20 DIN 11851 (dairy pipe fitting) ^c
604	Taper socket with union nut DN 25 DIN 11851 (dairy pipe fitting) ^c
605	Taper socket with union nut DN 32 DIN 11851 (dairy pipe fitting) ^c
606	Taper socket with union nut DN 40 DIN 11851 (dairy pipe fitting) ^c
607	Taper socket with union nut DN 50 DIN 11851 (dairy pipe fitting) ^c
612	Clamping socket DN 10/15/20 DIN 32676 ^c
613	Clamping socket DN 25/40 DIN 32676 ^{c, e}
616	Clamping socket DN 50 (2") DIN 32676 ^{c, e}
652	Tank connection with union nut DN 25
996	Diaphragm seal version, welded
997	JUMO-PEKA hygienic process connection ^{f, e}
998	Diaphragm seal version, screwed
(5) Material of process connection	
20	CrNi (stainless steel)
(6) Electrical connection	
12	Fixed connecting cable shielded 2 m (further length on request)
36	Round plug M12 × 1
61	Cable socket DIN EN 175301-803, Form A
(7) Extra code	
000	None
452	Parts in contact with the medium electro-polished, surface roughness Ra ≤ 0.8 µm
591	Restrictor in pressure channel
624	Free of oil and grease
630	Enlarged pressure channel
631	Higher humidity and vibration protection
634	TAG-number

^a Measuring devices with reduced deviation from characteristic line are not available with process connection 574, they are only available with output 405 and only for measuring spans between 0.6 to 40 bar.

^b Measuring devices with ambient temperature influence are not available with process connection 574, they are only available with outputs 402, 405, 406, 415 and only for measuring spans between 4 to 25 bar.

^c Process connections 570, 571, 575, 576, 603, 604, 605, 606, 607, 612, 613, 616 are only available for measuring spans up to 25 bar.

^d Process connection 574 is only available for measuring spans between 1 to 400 bar.

^e certified according to EHEDG

^f Suitable process connection adapters can be found on data sheet or price sheet 409711.

Order code (1) (2) (3) (4) (5) (6) (7)
 Order example 404366/000 - 461 - 405 - 504 - 20 - 61 / 000

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**Stock versions**

Order code	Part no.
404366/000-451-405-504-20-61/000	43006500
404366/000-451-405-571-20-61/000	43007916
404366/000-452-405-504-20-61/000	43006493
404366/000-453-405-504-20-61/000	43008131
404366/000-454-405-504-20-61/000	00392193
404366/000-454-405-571-20-61/000	43007917
404366/000-455-405-504-20-61/000	43008069
404366/000-456-405-504-20-61/000	00394352
404366/000-457-405-504-20-61/000	43006501
404366/000-458-405-504-20-61/000	43007816
404366/000-459-405-504-20-61/000	00391647
404366/000-459-405-604-20-61/000	43008066
404366/000-459-405-571-20-61/000	43008095
404366/000-459-405-574-20-61/000	43008164
404366/000-459-405-613-20-61/000	43008621
404366/000-459-415-504-20-61/000	43006543
404366/000-460-405-504-20-61/000	00391650
404366/000-461-405-504-20-61/000	43006495
404366/000-464-405-504-20-61/000	43006496
404366/000-466-405-504-20-61/000	43006498
404366/000-467-405-504-20-61/000	43006511
404366/000-478-405-504-20-61/000	43006494
404366/000-481-405-504-20-61/000	43006531
404366/000-488-405-504-20-61/000	43008096
404366/000-488-406-504-20-61/000	43007910
404366/000-488-415-504-20-61/000	43007892
404366/000-489-405-504-20-61/000	43008058
404366/024-491-405-504-20-61/000	43008375
404366/024-491-402-504-20-61/000	43006756

Accessories

Designation	Part no.
Line socket, 4-pole, M12 × 1, straight, 2 m	00404585
Line socket, 4-pole, M12 × 1, angled, 2 m	00409334
Line socket, 4-pole, M12 × 1, pressure compensation, 5 m	00512341

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JUMO dTRANS p02 DELTA

Pressure transmitter

 II 1/2 G Ex ia IIC T6 Ga/Gb

General application

The JUMO dTRANS p02 DELTA pressure transmitter measures the differential pressure in both corrosive and non-corrosive gases, vapors and liquids. The pressure transmitter makes use of the piezo-resistive effect to make the measurement. The output signal is a DC current which is linearly proportional to the input pressure. With flow-through measurements, it is possible to set up the output signal to be proportional to the square-root of the input pressure.

In the version "with Ex protection Ex II 1/2 G Ex ia IIC T6 Ga/Gb", the transmitter can be mounted within the hazardous area Zone 1, for connection to Zone 0.

A wide spectrum of pressure separators is available for special applications such as level measurements, or for corrosive media.

Display options:

- Pressure with choice of 13 different units
- Measurement in % or scaled with freely selectable dimensional unit
- Output current in mA
- Sensor temperature in °C or °F
- Measurement error, out-of-range measurement
- Minimum and maximum pressures (peak-reading pointer)
- Pressure and sensor temperature can be shown simultaneously (2 lines)

Setting options via keys:

- Start and end of measurement with pressure input
- Start and end of measurement without pressure input (blind setting)
- Damping or time constant
- Current generator function
- Output signal on error
- Key inhibit
- Reset min. and max. measured value (peak-reading pointer)
- Square-root characteristic (adjustable starting point), or linear
- Density correction for different measurement media
- Display of temperature of medium in °C or °F

The JUMO dTRANS p02 DELTA pressure transmitter can also be used with a HART® communicator or a PC in conjunction with a HART® modem and the JUMO setup program running under Windows®.



Type 404382

Approvals/marks of conformity



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Technical data

Explosion protection (only with type 404382/1)

 II 1/2 G Ex ia IIC T6 Ga/Gb
PTB 98 ATEX 2194

The supply must be intrinsically safe and must not exceed the following maximum values:

$U_i = DC\ 30\ V$

$I_i = 100\ mA$

$P_i = 750\ mW$

Reference conditions

as per DIN 16086 and IEC 770/5.3

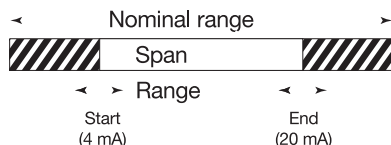
Nominal input range

see Order details

Range setting

The measurement range can be set from the transmitter keys, by using the setup program or a HART® communicator as described below:

Start and end of the measurement range can be continuously adjusted within the nominal range. The span should not go below 10 % of the nominal range.



Displayable units

mH_2O , inH_2O , $inHg$, ftH_2O , mmH_2O , $mm\ Hg$,
psi, bar, mbar, kg/cm^2 , kPa, Torr, MPa;
Measurement: % or scaled with freely adjustable unit

Output current: mA

Additional displays

indication of sensor temperature, minimum pressure, maximum pressure.
Indication on overrange and on error.

Density correction

adjustable within the range from 0.100 to 5.000 kg/dm^3

Nominal pressure

PN 160

option: PN 420

Parts in contact with medium

as standard:

stainless steel, mat. ref. 1.4401, 1.4404

flanges: stainless steel, mat. ref. 1.4408

O ring: FPM

option: NiMo, mat. ref. 2.4819

Pressure connection

see order details

Output

4 to 20 mA burden $\leq (U_B - 11.5\ V)/0.022\ A$
burden with HART® max. 1100 Ω , min. 250 Ω
with HART® protocol V 5.3.

Complies with the Directives of the HCF
(HART® Communication Foundation)

Characteristic

linear or square-root. Adjustable starting point
with square-root characteristic (exfactory is
linear up to 9.4 %).

Burden error

$< 0.1\ \%$

Zero offset / adjustment accuracy

$\leq 0.01\ mA$

Effect of static pressure

zero: $\leq 0.015\ \%/10\ bar$

span: $\leq 0.020\ \%/10\ bar$

Ambient temperature error

within range -20 to $+85\ ^\circ C$

(compensated temperature range)

zero: $\leq 0.005\ \%$ per $^\circ C$ typical,

$\leq 0.01\ \%$ per $^\circ C$ max.

span: $\leq 0.005\ \%$ per $^\circ C$ typical,

$\leq 0.01\ \%$ per $^\circ C$ max.

Deviation from characteristic

limit point adjustment:

$\leq 0.1\ \%$ of full scale of nominal range;

as per DIN 16086

Hysteresis

$\leq 0.02\ \%$ of full scale; as per DIN 16086

Reproducibility

$\leq 0.02\ \%$ of full scale; as per DIN 16086

Response time

150 msec approx., no damping

Damping

adjustable from 0 to 100 sec

Stability per year

$\leq 0.1\ \%$ of full scale (for nominal range at reference conditions as per IEC 770)

Supply

DC 11.5 to 36 V for type 404382/0

DC 11.5 to 30 V for type 404382/1

DC 11.5 to 36 V for type 404382/5

Supply unit for output signal transmission
with or without HART® communication, in
intrinsically safe version, see Data Sheet
404757.

Note: Minimum DC 17 V (250 Ω) for communication via HART® protocol.

Supply voltage error

$\leq 0.1\ \%$ of full scale per 10 V change

(nominal supply voltage DC 24 V)

Permissible temperature of medium

-40 to $+120\ ^\circ C$

Permissible ambient temperature

to DIN 16086

-40 to $+85\ ^\circ C$ for type 404382/0

-40 to $+60\ ^\circ C$ for type 404382/1

-40 to $+85\ ^\circ C$ for type 404382/5

(the LCD display may not be readable at temperatures below $-20\ ^\circ C$)

Storage temperature

-40 to $+85\ ^\circ C$

Electromagnetic compatibility (EMC)

as per EN 61326

Mechanical shock

50 g/11 msec

Mechanical vibration

5 g max. at 10 to 2000 Hz

Protection

with connecting cable

IP65 to EN 60529

Insulation resistance

100 M Ω ; DC 50 V

Breakdown strength

$\geq 500\ V_{eff}$.

Housing

aluminium die-casting GDAI Si 12

Flange screws

steel, yellow-chromed

option: stainless steel

Climatic conditions

$\leq 80\ \%$ rel. humidity with condensation,
annual mean

Electrical connection

clamping case with screw cover, 2-pole and
earthing terminal, plastic cable gland
M20 \times 1.5 for cable diameters 6 to 12 mm

Nominal position

ex-factory: upright vertical

(pressure cell below)

any operating position

Weight

3.9 kg approx.

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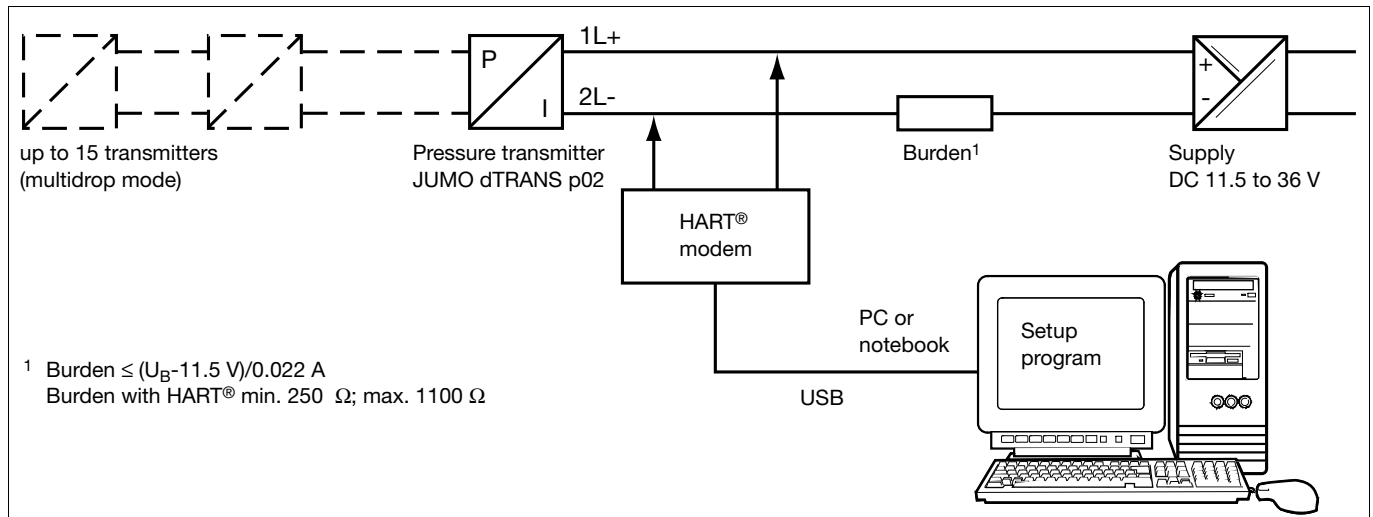
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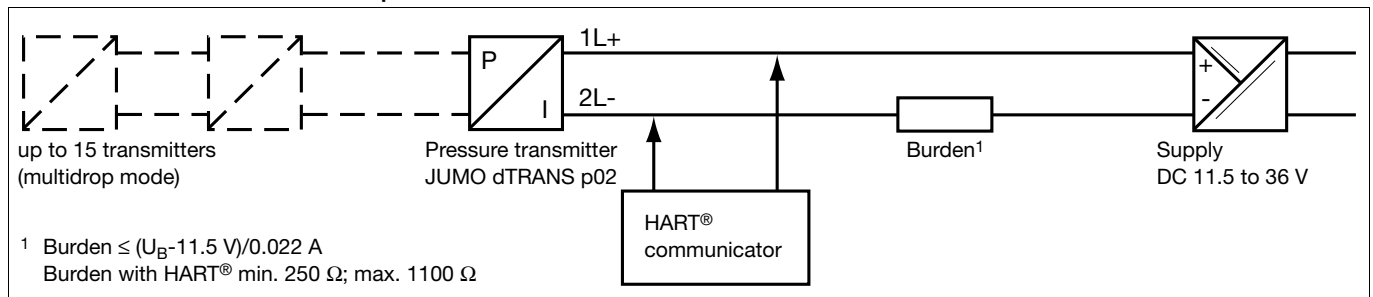


HART® communication

between PC and pressure transmitter



between HART® communicator and pressure transmitter



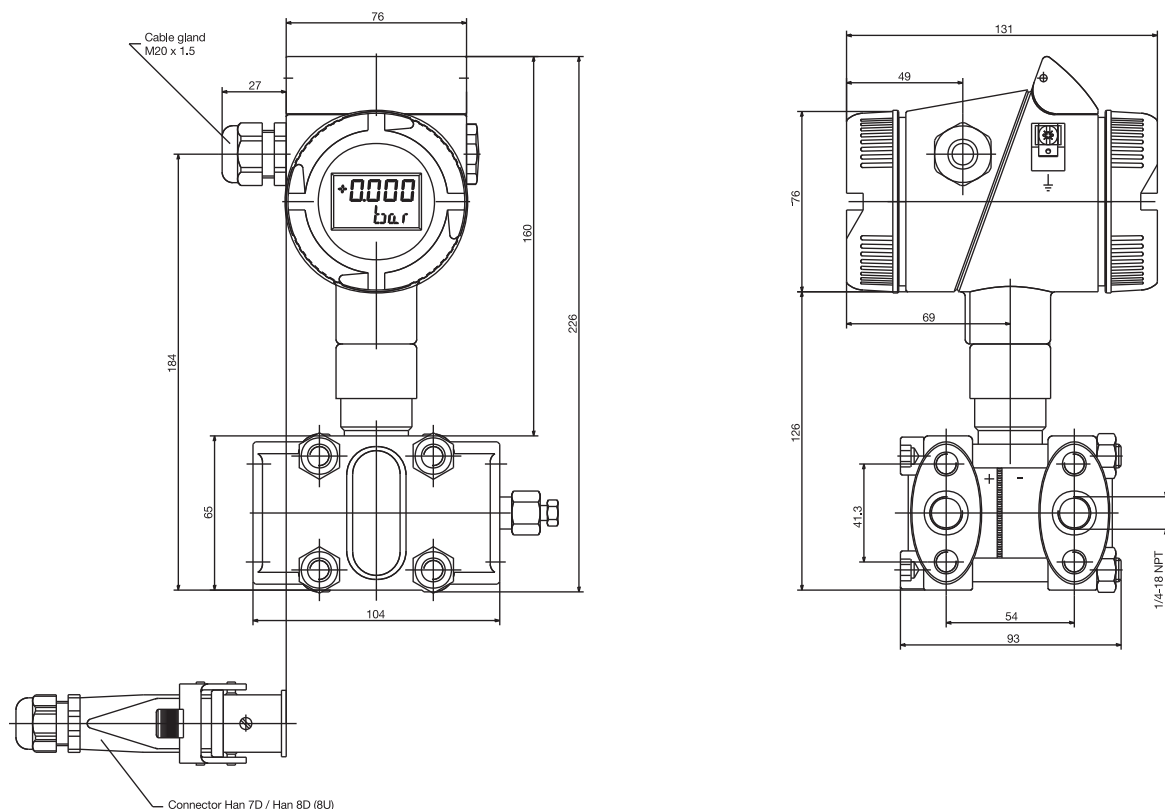
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Dimensions



Electrical connection

Connection		Terminals	
Supply DC 11.5 to 36 V		1 L+ 2 L-	
Output 4 to 20 mA, 2-wire		1 L+ 2 L-	Proportional current 4 to 20 mA in supply
Test connection for current output	Internal resistance of ammeter $\leq 10 \Omega$	TEST + TEST -	
Test connection for HART®	Burden must be present!	TEST + HART®	
Potential equilibration (for intrinsically safe circuit)			
Shielding			
Caution: Ground the device! (Pressure connection and shielding)			

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Accessories

Type	Part no.
Setup program for all instruments of the JUMO dTRANS p02 series	00365072
HART® modem USB	00443447
Mounting bracket for fastening thread M10	00314729
Mounting bracket for fastening thread 7/16-20 UNF	00543777
Triple valve block to DIN 19213, stainless steel, PN 400, for fastening thread M10	00308191
Triple valve block to DIN 19213, stainless steel, PN 400, for fastening thread 7/16-20 UNF	00552040
Oval flange 1/2" NPT to DIN 19213, stainless steel, for fastening thread M10, set of 2, with screws	00398914
Oval flange 1/2" NPT to DIN 19213, stainless steel, for fastening thread 7/16-20 UNF, set of 2, with screws	00543775

	Data sheet
Ex-i Power supply/input isolating amplifier	707530
Manifolds	409706
Pressure separator with milk pipe fitting DIN 11851	409772
Pressure separator with clamp connection	409774
Pressure separator with DRD flange or Varivent connection	409776
Pressure separator with ISS connection or SMS connection or RJT connection and slotted ring nut	409778
Diaphragm chemical seals 4MDV-10	409780
Pressure separator with male thread ISO 228/1 or ANSI B 1.201	409782
Pressure separator with flange connection EN 1092-1 with sealing lip Form B1	409784
Pressure separator with flange connection to ANSI B 16.5 with sealing lip Form RF	409786

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JUMO dTRANS p02

Pressure transmitter

 II 1/2G Ex ia IIC T6 Ga/Gb

General application

The pressure transmitter Type JUMO dTRANS p02 is used to measure the gauge (relative) and absolute pressures of corrosive and non-corrosive gases, vapours and liquids. The measuring device for the pressure transmitter is a piezo-resistive element or thin-film strain gauge. The output signal is a proportional DC current which is linearly proportional to the input pressure. In the version "with **Ex** protection Ex II 1/2G Ex ia IIC T6 Ga/Gb", the pressure transmitter can be mounted within the hazardous Zone 1, for connection to Zone 0. For special applications, e.g. for measuring highly viscous media, the JUMO dTRANS p02 is available with flush pressure connections in various styles. Suitable pressure connections are also available for applications involving media temperatures of up to 200 °C.

The display visualises

- the pressure in 13 different units, measurement in % or scaled with a freely adjustable dimensional unit, output current in mA
- the sensor temperature in °C
- measurement error, out-of-range measurement
- minimum and maximum pressures (peak-reading indicator)
- pressure and sensor temperature can be displayed simultaneously (on two lines)

The operating keys can be used to set

- start and end of range with pressure input
- start and end of range without pressure input (blind setting)
- damping or time constant
- current generator function
- output signal on error
- key inhibit
- reset minimum and maximum measured value (peak-reading indicator)
- density correction for different media being measured
- display of the temperature of the medium, in °C or °F

The pressure transmitter JUMO dTRANS p02 can also be operated using a HART® communicator or a PC in connection with a HART® modem and the JUMO setup program running under Windows®.



Type 404385

Approvals/marks of conformity



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Technical data

Explosion protection (only with typ 404385/1)

II 1/2G Ex ia IIC T6 Ga/Gb
PTB 98 ATEX 2194

The supply must be intrinsically safe and must not exceed the following maximum values:

$U_i = DC\ 30V$
 $I_i = 100mA$
 $P_i = 750mW$

Reference conditions

to DIN 16086 and IEC 770/5.3

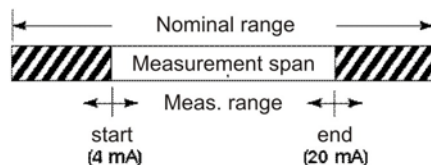
Nominal ranges

see ordering details

Range setting

The measurement range can be set from the transmitter keys, by using the setup program or a HART® communicator as described below:

Start and end of range can be continuously adjusted within the nominal range. The span should not be less than 10 % of the nominal range.



Units that can be visualised

Input pressure:
in mH₂O, inH₂O, inHg, ftH₂O, mmH₂O, mm-Hg, psi, bar, mbar, kg/cm², kPa, Torr, MPa
Measurement:

in %, or scaled with a freely adjustable dimensional unit

Output current:
in mA

Additional displays

Indication of the sensor temperature, minimum pressure, maximum pressure, indication of overrange and on error

Density correction

adjustable within the range from 0.100 to 5.000 kg/dm³

Overload limit

to DIN 16086
-1 bar and 4× full scale or
-1 bar and 2× full scale with ranges ≥ 100 bar

Bursting pressure

to DIN 16086
10× full scale; 2 000 bar max.

Parts in contact with the medium

standard:

stainless steel, mat. ref. 1.4435, 1.4571

optional:

NiMo, mat. ref. 2.4819

for range ≥ 100 bar:

stainless steel, mat. ref. 1.4571, 1.4542

Pressure connection

see ordering details

Output

4 to 20mA max. burden ($U_B - 11.5V$)/22mA
burden with HART® 1100 Ω max., 250 Ω min.
with HART® protocol V 5.3.
Complies with the guidelines of the HCF
(HART® Communication Foundation)

Burden error

< 0.1 %

Zero offset/adjustment accuracy

≤ 0.01 mA

Ambient temperature error

within range -20 to +85 °C

(compensated temperature range)

zero: 0.005 %/°C typical,
0.01 %/°C max.

span: 0.005 %/°C typical,
0.01 %/°C max.

Deviation from characteristic

for limit setting:
not exceeding 0.1 % of full scale of nominal range; to DIN 16086

Hysteresis

For nominal ranges ≥ 100 bar
 ≤ 0.05 % of full scale; to DIN 16086
For nominal ranges ≤ 25 bar
 ≤ 0.02 % of full scale; to DIN 16086

Repeatability

For nominal ranges ≥ 100 bar
 ≤ 0.05 % of full scale; to DIN 16086
For nominal ranges ≤ 25 bar
 ≤ 0.02 % of full scale; to DIN 16086

Response time

approx. 150msec, without damping

Damping

adjustable 0 to 100 s

Stability per year

≤ 0.1 % of full scale (for nominal range with reference conditions to IEC 770)

Supply

DC 11,5 to 36 V for type 404385/0
DC 11,5 to 30 V for type 404385/1
DC 11,5 to 36 V for type 404385/4
Supply units for output signal transmission with or without HART® communication, in intrinsically safe version, see Data Sheet 404757.

Note: At least DC 17 V (250 Ω) for communication via HART® protocol.

Supply voltage error

≤ 0.1 % of full scale per 10 V change
(nominal supply voltage DC 24 V)

Permitted temperature of medium

-40 to +120 °C for type 404385/0

-40 to +120 °C for type 404385/1

-40 to +200 °C for type 404385/4

Permitted ambient temperature

to DIN 16086

-40 to +85 °C for type 404385/0

-40 to +60 °C for type 404385/1

-40 to +85 °C for type 404385/4

(the LCD display cannot be read at temperatures below -20 °C)

Storage temperature

-40 to +85 °C

Electromagnetic compatibility

to EN 61326

Mechanical shock

50 g/11 msec

Mechanical vibrations

5 g max. at 10 to 2000 Hz

Protection

with connecting cable
IP65 to EN 60529

Isolation resistance

100 M Ω ; DC 50 V

Breakdown strength

≥ 500 V_{eff}.

Housing

aluminium die-casting GDAI Si 12

Climatic conditions

≤ 80 % rel. humidity annual mean,
with condensation

Electrical connection

clamping case with screw cover, 2-pole and earth terminal, plastic cable gland M20 \times 1.5 for cable cross-section 6 to 12 mm

Nominal position

factory set upright vertical
(pressure connection below)
operating position is unrestricted

Weight

approx. 1.3 kg

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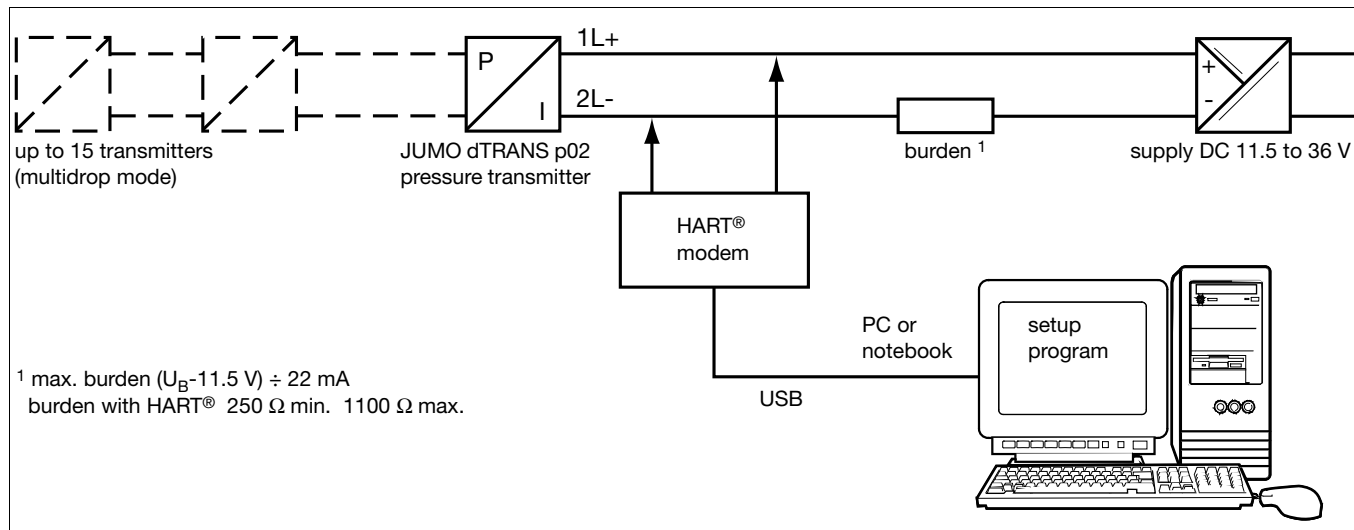
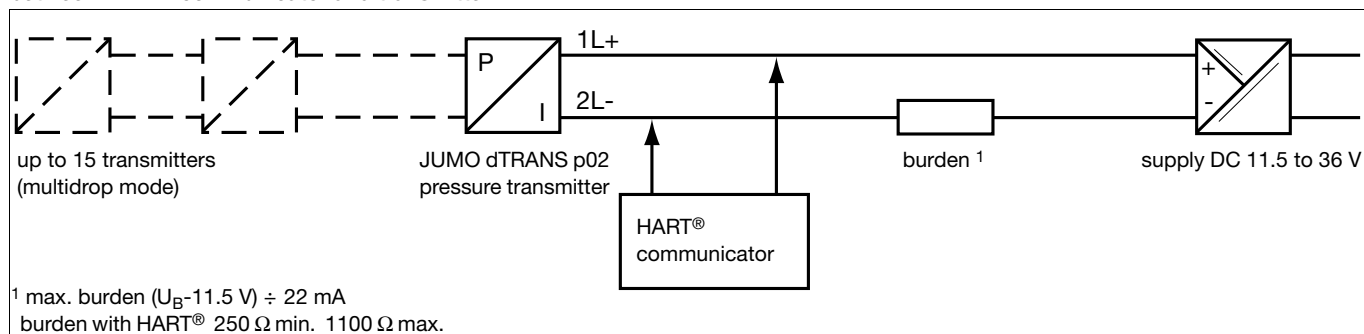
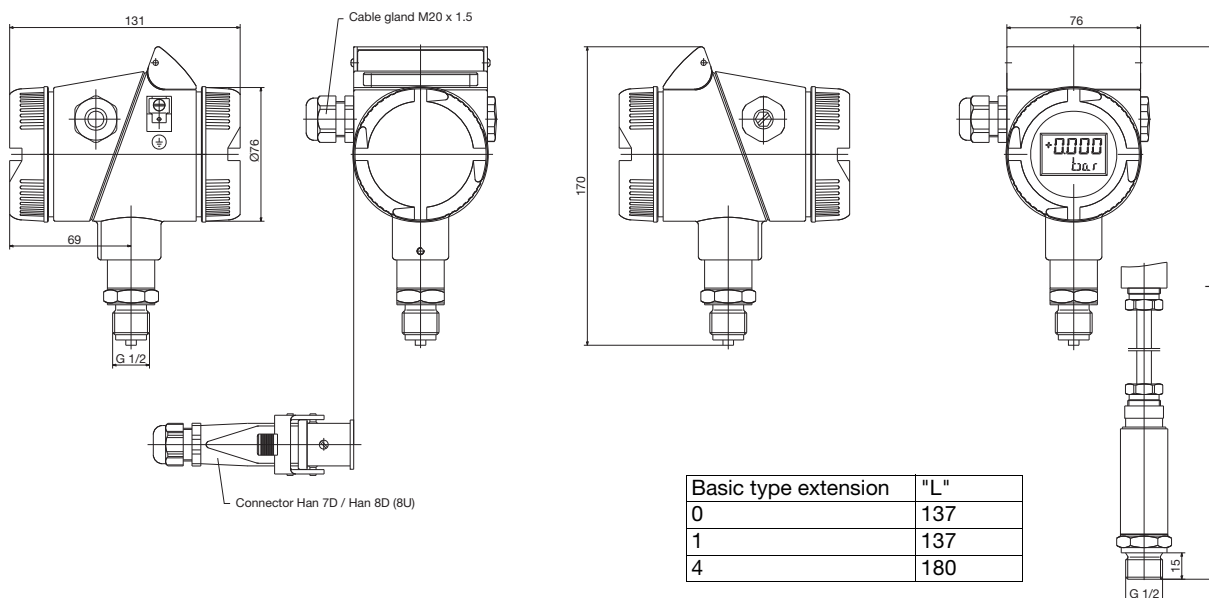
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**HART® communication****between PC and transmitter****between HART® communicator and transmitter****Dimensions**

NTS 527

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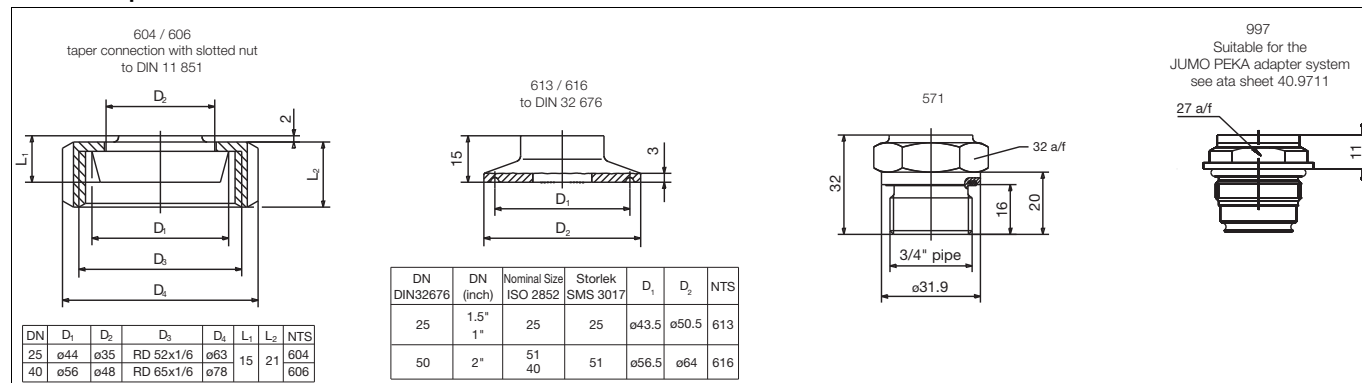
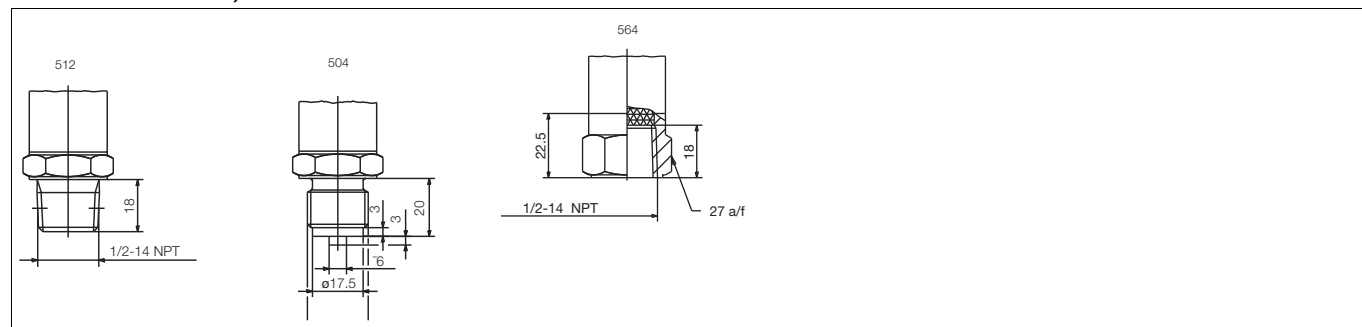
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**Front-flush pressure connections****Pressure connections, not front-flush****Electrical connection**

Connection		Terminals
Supply DC 11.5 to 36 V DC 11.5 to 30 V for intrinsically safe version		1 L+ 2 L-
Output 4 to 20 mA 2-wire		1 L+ proportional current 4 to 20 mA 2 L- in supply
Test connection Current output	internal resistance of the ammeter $\leq 10 \Omega$	TEST + TEST -
Test connection HART®		TEST + HART®
Potential equilibration (for intrinsically safe circuit)		
Screen		
Warning: Ground the device! (Pressure connection and screen)		

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Order details

(1) Basic type	
404385/0	JUMO dTRANS p02 - Pressure transmitter
404385/1	JUMO dTRANS p02 - Pressure transmitter with Ex protection Ex II 1/2 G Ex ia IIC T6 Ga/Gb
404385/4	JUMO dTRANS p02 - Pressure transmitter for increased temperature of medium up to 200 °C ^a
(2) Nominal range input	
414	-100 to +100 mbar gauge pressure
453	-0,6 to +0,6 bar gauge pressure
457	-1 to +4 bar gauge pressure
461	-1 to +25 bar gauge pressure
464	-1 to +100 bar gauge pressure ^b
468	-1 to +600 bar gauge pressure ^b
487	0 to +0,6 bar absolute pressure
491	0 to 4 bar absolute pressure
495	0 to 25 bar absolute pressure
(3) Output	
405	4 to 20 mA with HART [®] protocol
(4) Process connection	
504	1/2" pipe to EN 837
512	1/2-14 NPT to EN 837
564	1/2-14 NPT internal
571	3/4" pipe flush to EN 837 ^a
583	M20 (× 1,5) with tap
604	Taper connection with slotted nut DN 25 to DIN 11851 ^c
606	Taper connection with slotted nut DN 40 to DIN 11851 ^c
613	Clamp connection DN 25 to DIN 32676 ^c
616	Clamp connection DN 50 to DIN 32676 ^c
997	JUMO PEKA ^d
(5) Material for process connection	
20	CrNi (stainless steel)
82	NiMo
(6) Electrical connection	
06	Screw terminals
99	Special connection ^e
(7) Filling medium for measuring system	
0	None
1	Silicone oil
(8) Extra code	
000	None
452	Parts in contact with the medium electro-polished, surface roughness Ra ≤ 0.8 µm

^a Measuring instruments for increased measuring material temperatures are not available with nominal ranges 464 and 468; they are only available with process connections 571, 604, 613, and without protection class Ex ia IIC.

^b Measuring instruments with nominal ranges 464 and 468 are available with process connections 504, 512, 564 and 997.

A filling of measuring systems with silicone oil is not possible.

^c The a. m. process connections are not suitable for protection class Ex ia IIC.

^d Suitable process connection adapter, see data sheet 409711.

^e Please specify in plain text.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)							
Order code	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>				
Order example	404385/0	-	453	-	405	-	613	-	20	-	06	-	1	/	000

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Accessories

Type	Part no.
Setup program for all instruments in the JUMO dTRANS p02 series	00365072
HART® modem USB	00443447
Ex-i Power supply/input isolating amplifier	00577948
2-valve manifold, PN 420, DN 5, version 1/2-NPT or 1/2-NPT	00561605
2-valve manifold, PN 420, DN 5, version 1/2-NPT or G 1/2	00550362

	Data Sheet
Pressure separator with milk pipe fitting DIN 11851	409772
Pressure separator with clamp connection	409774
Pressure separator with DRD flange or Varivent connection	409776
Pressure separator with ISS connection or SMS connection or RJT connection and slotted ring nut	409778
Diaphragm chemical seals 4MDV-10	409780
Pressure separator with male thread ISO 228/1 or ANSI B 1.201	409782
Pressure separator with flange connection EN 1092-1 with sealing lip Form B1	409784
Pressure separator with flange connection to ANSI B 16.5 with sealing lip Form RF	409786

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Pressure transmitter JUMO dTRANS p02 CERAMIC

Type 404387

General application

The JUMO dTRANS p02 CERAMIC pressure transmitter measures the gauge (relative) or absolute pressure in both corrosive and non-corrosive gases, vapors and liquids. The ceramic-based measuring system in this pressure transmitter operates on the principle of capacitive measurement. The output signal is a DC current that is proportional to the input pressure.

The display can show:

- pressure in 13 different dimensional units, measurement in % or scaled with a freely selectable unit, output current in mA
- sensor temperature in °C or °F
- measurement error, out-of-range measurement
- minimum and maximum pressures (peak-reading indicator)
- pressure and sensor temperatures can be shown simultaneously (on 2 lines)

The keys can be used to set up:

- start and end of measurement, with pressure input
- start and end of measurement, without pressure input (blind setting)
- damping or time constant
- current generator function
- output signal on error
- key inhibit
- reset min. and max. measurements (peak-reading indicator)
- density correction for different measurement media
- display of the media temperature in °C or °F

The JUMO dTRANS p02 CERAMIC pressure transmitter can also be operated through a HART® communicator, or a PC in conjunction with a HART® modem and the JUMO setup program running under Windows®.



Accessories

Setup program

Sales No. 40/00365072

The setup program for all instruments in the JUMO dTRANS p02 series has been created according to the VDI/VDE 2187 user interface. In conjunction with the HART® modem, the program enables convenient operation and parameter setting of the pressure transmitter from a PC.

HART® modem

Sales No. 40/00345666

The HART® modem forms the link between the JUMO dTRANS p02 pressure transmitter and the serial interface of a PC.

Technical data

Reference conditions

as per DIN 16086 and IEC 770/5.3

Nominal input range

see Order details

Range setting

The measurement range can be set from the keys on the pressure transmitter, by using the setup program or a HART® communicator as described below:

Start and end of the measurement range can be continuously adjusted within the nominal range. The span of the measurement should not be less than 10% of the nominal range.



Displayable units

Input pressure:

mH₂O, inH₂O, inHg, ftH₂O, mmH₂O, mm Hg, psi, bar, mbar, kg/cm², kPa, Torr, MPa; Measurement:

% or scaled with freely adjustable dimensional unit

Output current:

mA

Additional displays

Indication of the sensor temperature, minimum pressure, maximum pressure. Indication of overrange or error

Density correction

adjustable over the range from 0.100 to 5.000 kg/dm³

Overload limits

see Order details

Bursting pressure

for all ranges: 150 bar

Parts in contact with the medium

standard:

stainless steel, Mat. Ref. 1.4571
aluminium oxide Al_2O_3 (99.9%),
FPM,
others on request

Pressure connection

see Order details

Output

$4 - 20\text{mA}$ burden $\leq (U_B - 11.5\text{V}) / 0.022\text{A}$
burden with HART® : max. 1100Ω ,
min. 250Ω with HART® protocol V 5.3.
Complies with the guidelines of the HCF
(HART® Communication Foundation)

Burden error $< 0.1\%$ **Zero offset / adjustment accuracy** $\leq 0.01\text{mA}$ **Ambient temperature error**

over the compensated temperature range
from -20 to $+85^\circ\text{C}$

zero: $\leq 0.005\%$ per $^\circ\text{C}$ typical,
 $\leq 0.01\%$ per $^\circ\text{C}$ max.
span: $\leq 0.005\%$ per $^\circ\text{C}$ typical,
 $\leq 0.01\%$ per $^\circ\text{C}$ max.

Deviation from characteristic

for limit point adjustment:

$\leq 0.1\%$ of full scale of nominal range;
as per DIN 16086

Hysteresis $\leq 0.02\%$ of full scale**Reproducibility** $\leq 0.02\%$ of full scale**Response time**approx. 150msec without damping**Damping**adjustable from $0 - 100\text{ sec}$ **Stability over 1 year**

$\leq 0.1\%$ of full scale (for nominal range, and
under reference conditions as per IEC 770)

Supply voltage $11.5 - 36\text{V DC}$ **Note:**

at least 17V DC (250Ω) for communication
using the HART® protocol.

Supply voltage error

$\leq 0.1\%$ of full scale per 10V change
(nominal supply voltage 24V DC)

Permissible ambient temperature

-40 to $+85^\circ\text{C}$; as per DIN 16086
(it may be impossible to read the LCD
display at temperatures below -20°C)

Storage temperature -40 to $+85^\circ\text{C}$ **Permissible temperature of medium** -40 to $+120^\circ\text{C}$ **Electromagnetic compatibility (EMC)**

as per EN 61 326

Mechanical shock $50\text{g}/11\text{msec}$ **Mechanical vibration**max. 5g over $10-2000\text{Hz}$ **Protection**

with connecting cable
IP65 to EN 60529

Insulation resistance $100\text{M}\Omega$; 50V DC **Breakdown strength** $\geq 500\text{V}_{\text{eff}}$.**Housing**

aluminium die-casting GDAISi12

Climatic conditions

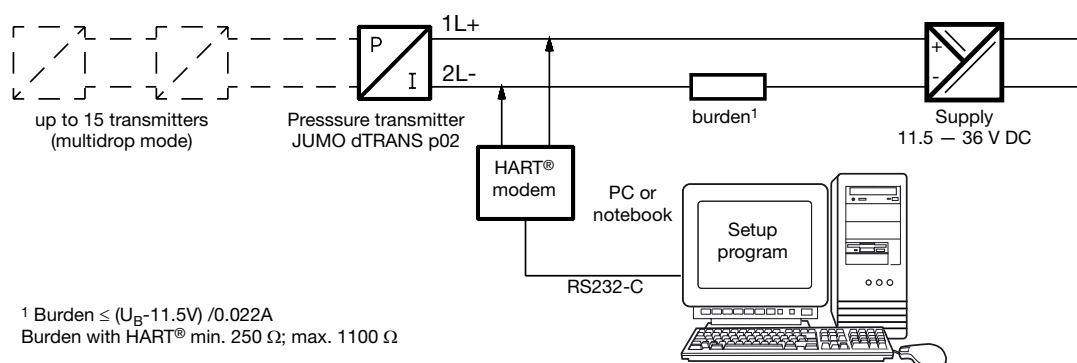
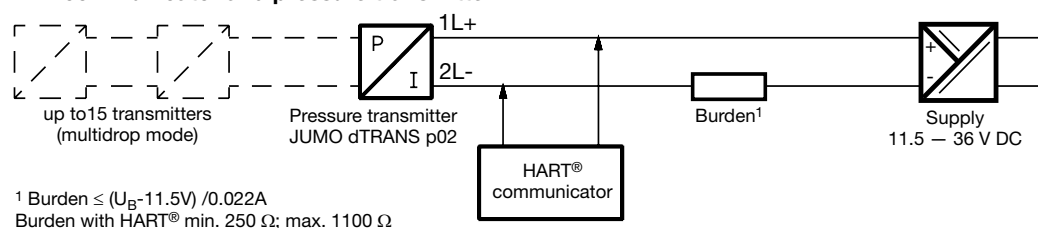
$\leq 80\%$ rel. humidity with condensation,
annual mean

Electrical connection

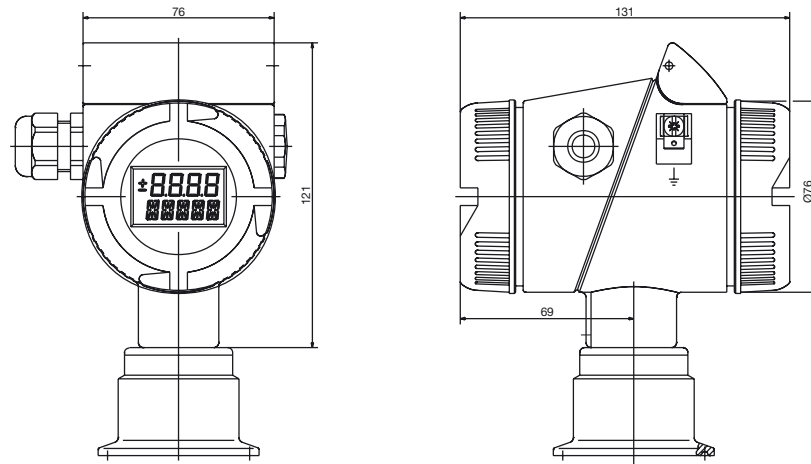
clamping case with screwed cover, 2 poles
and earthing terminal, plastic cable gland
 $\text{M}20 \times 1.5$ for cable diameters 6 to 12mm

Nominal position

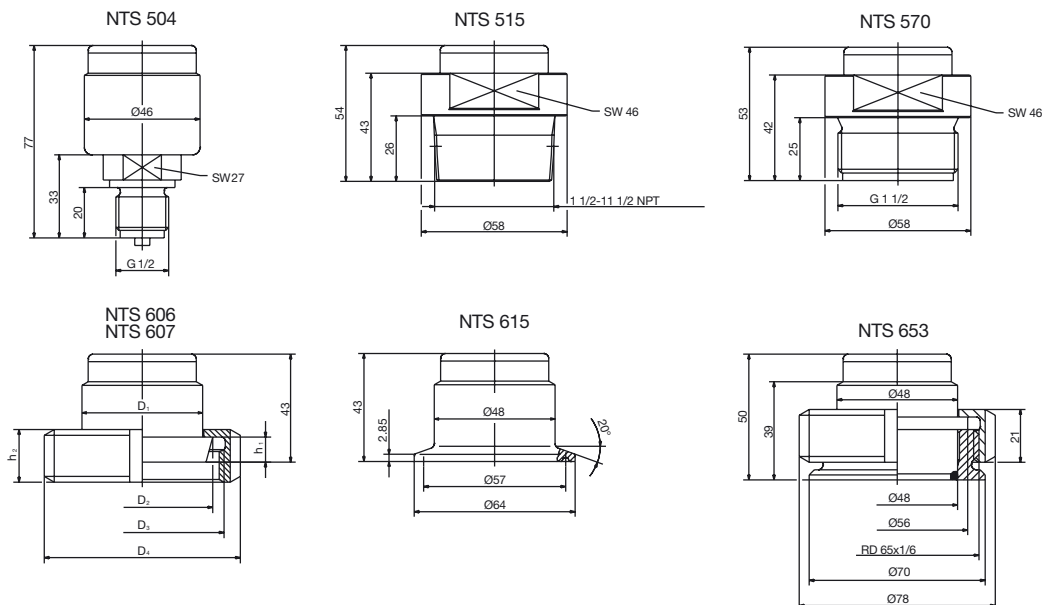
ex-factory, upright vertical
(pressure connection below)
any operating position

Weightapprox. 1.5kg **HART® communication****between PC and pressure transmitter****between HART® communicator and pressure transmitter**

Dimensions



SW = a/f in mm
G = pipe fitting in "



NTS	DN	D ₁	D ₂	D ₃	D ₄	h ₁	h ₂
606	40	Ø48	Ø56	RD 65 x 1/6	Ø78	10	21
607	50	Ø61	Ø68.5	RD 78 x 1/6	Ø92	11	22

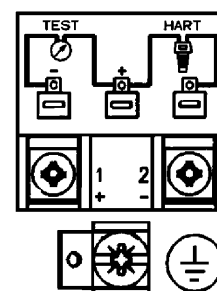
Electrical connection

Connection		Terminals
Supply 11.5 — 36 V DC, 11.5 — 30 V DC for intrinsically safe version		1 L+ 2 L-
Output 4 — 20 mA 2-wire		1 L+ proportional current 4 — 20 mA 2 L- in supply
Test connection, current output	internal resistance of ammeter ≤ 10 Ω	TEST + TEST -
Test connection, HART®		TEST + HART®
Shielding		

Caution:

Earth the instrument!
(pressure connection and shielding)

Terminals



Order details

Basic type

404387 Pressure transmitter dTRANS p02 CERAMIC with capacitive-ceramic measuring system

Basic type extensions

0 none

Nominal input range

414	-100 to 100	mbar	gauge pressure	(overload limits -1 and 6 bar)
453	-0.6 to 0.6	bar	gauge pressure	(overload limits -1 and 10 bar)
457	-1 to 4	bar	gauge pressure	(overload limits -1 and 40 bar)
461	-1 to 25	bar	gauge pressure	(overload limits -1 and 60 bar)
487	0 to 0.6	bar	absolute pressure	(overload limits -1 and 10 bar)
491	0 to 4	bar	absolute pressure	(overload limits -1 and 40 bar)
495	0 to 25	bar	absolute pressure	(overload limits -1 and 60 bar)

Output

405 4 — 20 mA with HART® protocol

Process connection

504	1/2" pipe to EN 837
515	1 1/2 - 1 1/2 NPT
570	1 1/2" pipe to DIN 3852
606	taper connection with ring nut DN40 to DIN 11851
607	taper connection with ring nut DN50 to DIN 11851
616	clamp connection DN50 to DIN 32676
653	tank connection with ring nut DN40

Material for process connection

20	stainless steel, Mat. Ref. 1.4571
99	special material for process connection

Seal

601	FPM
604	FFPM on request

Electrical connection

06	screw terminals
99	special electrical connection

404387 / 0 - - 405 - - - - - Order code

Factory setting:

Please specify the range to be set and the dimensional unit in plain text.

JUMO MAERA F27

Level probe

Application

Level and filling level measurement in¹

- water and sewage water management
- aggressive mediums, acids, lyes
- in electroplating baths

Brief description

The JUMO MAERA F27 level probe is used for the continuous hydrostatic level measurement of liquids. Filling heights between 0.5 mWS and 16 mWS (water column) can be achieved in ventilated tanks.

When the level probe is immersed into a liquid, a liquid column emerges above the probe. The liquid column increases as the probe is immersed deeper into the liquid and creates a hydrostatic pressure on the measuring system by the force of its weight. The measured pressure is transferred as a standard signal. The signal is linearly proportional to the rising liquid column.

The surrounding pressure is realized using a special cable with an integrated pressure equalization hose. Any variations in air pressure are therefore automatically compensated for and the surrounding pressure is taken into account. The installation can be performed in both indoor and outdoor areas.

A variant with integrated overvoltage protection is available for outdoor installations, which protects the level probe against damage in the event of lightning strikes in surrounding water. The version with a PTFE case is suitable for applications in aggressive mediums. With regard to the temperature-dependent density of a liquid, the medium temperature can be recorded with an integrated temperature sensor Pt100 during level measurement. This temperature value is then used to compensate.

Further information on our level probes from the JUMO MAERA series can be found in the brochure "Limit Level Measurement and Level Measurement" in the documentation.

Customer benefits

- **Process-reliable**
The combination of a mechanically highly stress-resistant membrane with a stainless steel or PTFE case offers excellent chemical resistance against aggressive mediums. A reverse-polarity protection mechanism protects the measuring instrument against damage, ensuring maximum safety during startup.
- **Versatile and uncomplicated**
The simultaneous measurement of level and temperature may be optionally achieved with a Pt100 temperature sensor. As the measuring range already starts from 50 mbar (0.5 mWS), even low level filling heights can be reliably monitored. A further temperature range of 80 K enables the use of many applications.

¹ These recommendations are based on many years of experience; however, in individual cases they may not be fully applicable. We would be happy to provide further information, including regarding additional applications.

Approvals and approval marks (see technical data)



Type 404391/000..., Type 404391/022...

Special features

- Measuring ranges: 50 mbar to 1.6 bar (-20 to +60 °C)
- Medium temperature: -20 to +60 °C
- Capacitive ceramic sensor
- Accuracy: 0.2 % MSP² (linearity)
- Ultra-precise measuring cell
- Excellent long-term stability
- Membrane withstands high mechanical loading
- High chemical resistance
- Integrated overvoltage protection for stainless steel version
- Reverse-polarity protection mechanism
- Optionally available with integrated temperature probe Pt100
- Suitable for indoor and outdoor installations

² MSP = measuring span

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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor system	Capacitive ceramic sensor
Mounting position	Vertical/hanging from the cable

Measuring range and accuracy

Case: stainless steel (standard)

Measuring range	Linearity ^a	Accuracy at			Long term stability ^b	Overload capability	Burst pressure
bar	% MSP ^e	20 °C ^c % MSP	0 to 40 °C ^d % MSP	-20 to +60 °C ^d % MSP	% MSP per year	bar	bar
0 to 0.05 bar relative pressure	0.2	0.4	0.9	1.3	≤ 0.2	-0.3/4	150
0 to 0.1 bar relative pressure	0.2	0.4	0.9	1.3		-0.3/4	
0 to 0.16 bar relative pressure	0.2	0.4	0.9	1.3		5	
0 to 0.25 bar relative pressure	0.2	0.4	0.9	1.3		6	
0 to 0.4 bar relative pressure	0.2	0.4	0.9	1.3		6	
0 to 0.6 bar relative pressure	0.2	0.4	0.9	1.3		10	
0 to 1 bar relative pressure	0.2	0.4	0.4	0.6		10	
0 to 1.6 bar relative pressure	0.2	0.4	0.4	0.6		10	

Case: PTFE (basic type extension 022)

0 to 0.05 bar relative pressure	0.2	0.4	0.9	1.3	≤ 0.2	-0.3/2	150
0 to 0.1 bar relative pressure	0.2	0.4	0.9	1.3		-0.3/2	
0 to 0.16 bar relative pressure	0.2	0.4	0.9	1.3		2	
0 to 0.25 bar relative pressure	0.2	0.4	0.9	1.3		2	
0 to 0.4 bar relative pressure	0.2	0.4	0.9	1.3		2	
0 to 0.6 bar relative pressure	0.2	0.4	0.9	1.3		2	
0 to 1 bar relative pressure	0.2	0.4	0.4	0.6		2	
0 to 1.6 bar relative pressure	0.2	0.4	0.4	0.6		2	

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

^e MSP = measuring span

Output

Analog output Current Voltage	4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire, ratiometric 10 to 90 % of the voltage supply
Step response T ₉₀	≤ 10 ms
Burden Current 4 to 20 mA, two-wire Voltage DC 0.5 to 4.5 V, three-wire	$R_L \leq (U_B - 12 \text{ V}) \div 0.02 \text{ A } (\Omega)$ $R_L \geq 10 \text{ k}\Omega$

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Electrical data

Voltage supply U_B^a 4 to 20 mA, two-wire DC 0.5 to 4.5 V, three-wire Nominal voltage	DC 12 to 30 V DC 5 V DC 24 V
Reverse voltage protection	Yes (except DC 0.5 to 4.5 V, three-wire)
Max. current consumption	For DC 24 V \leq 25 mA For DC 5 V \leq 2 mA
Electrical circuit Requirements	SELV The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

Electrical connection

6-wire, shielded cable with integrated pressure compensation hose, AWG 24 with ferrules

Outer diameter	Approx. 8.4 mm
Conductor cross section	0.25 mm ²
Bending radius Moving Fixed	160 mm 120 mm It is vital to take into account that if the protective hose is kinked or pinched, this will prevent ambient pressure compensation.
Tensile force	Up to 400 N
Admissible medium temperatures	-40 to +70 °C (depending on the medium)

Mechanical features

Ensure the medium durability of the material!

Materials Process connection Sensor Case, standard Case made of plastic Seals Protective cap Outer sheath Pressure compensation hose	Stainless steel 316 Ti Ceramic Al ₂ O ₃ (99.9 %) Stainless steel 316 Ti PTFE FPM (standard), EPDM PA PE (black), PUR (peppel gray), FEP (black) PA
Weight PE cable PUR cable FEP cable	200 g (without cable) Approx. 63 g/m, 115 g/m with additional temperature sensor (extra code 007) Approx. 115 g/m Approx. 90 g/m
UV resistance PE, PUR cable FEP cable	according to VDE 0207, test method EN 60811 part 2-1, section 8 cable according to DIN ISO 4892-2
Diameter Stainless steel version PTFE version	41 mm 50 mm

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Environmental influences

Admissible temperatures	
Medium, environment	-20 to +60 °C The device must not freeze in the medium! A restriction may be required depending on the medium.
With case made of plastic	0 to 40 °C The device must not freeze in the medium! A restriction may be required depending on the medium.
Storage	-20 to +100 °C, dry
Electromagnetic compatibility (EC)	According to DIN EN 61326-1, DIN EN 61326-2-3
Interference emission	Class B ^a
Interference immunity	Industrial requirements
Overvoltage protection	Integrated overvoltage protection, according to DIN EN 61000-4-5
Rated leakage current	1 kA
Protection type	IP68, according to DIN EN 60529, submersible to 16 m

^a The product is suitable for industrial use as well as for households and small businesses.

Approvals and approval marks

EAC	
Testing agency	«Промтехконтроль»
Certificates/certification numbers	EAЭC N RU Д-DE.PA01.B.80830/21
Inspection basis	TR TS 020/2011
Valid for	Type 404391

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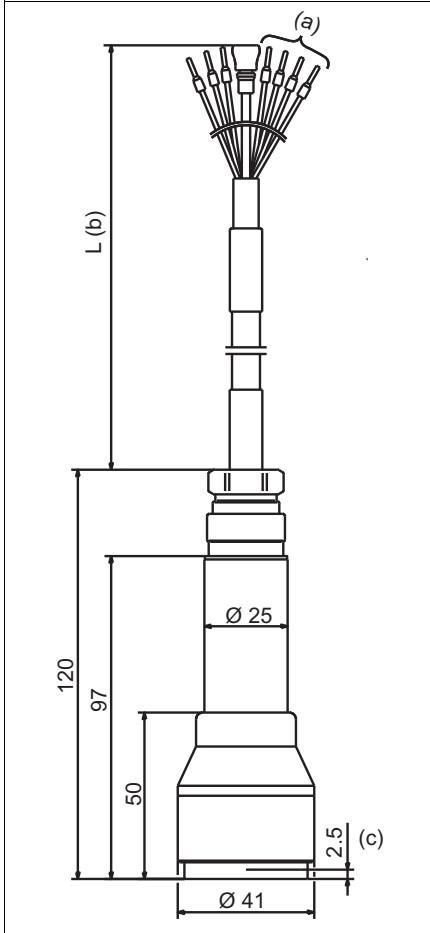
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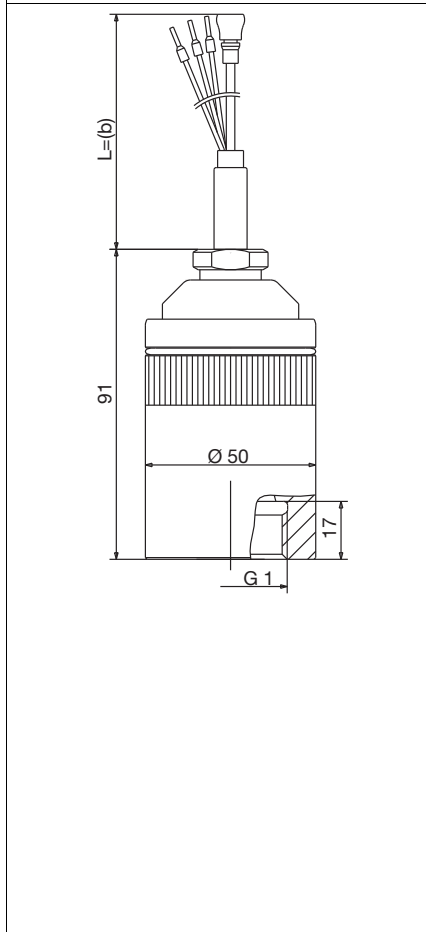
Dimensions

Type 404391/000-... or
 type 404391/007-...
 with process connection 659



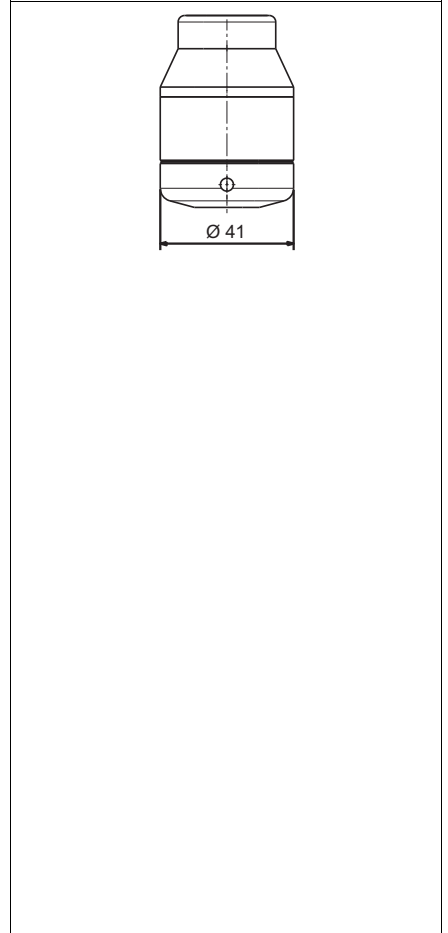
- (a) Only for version with integrated temperature probe Pt100
- (b) Cable length according to customer preference
- (c) Dimension up to surface sensor

Type 404391/022-...
 with process connection 568



- (b) Cable length according to customer preference

Type 404391/000-... or
 type 404391/007-...
 with process connection 658



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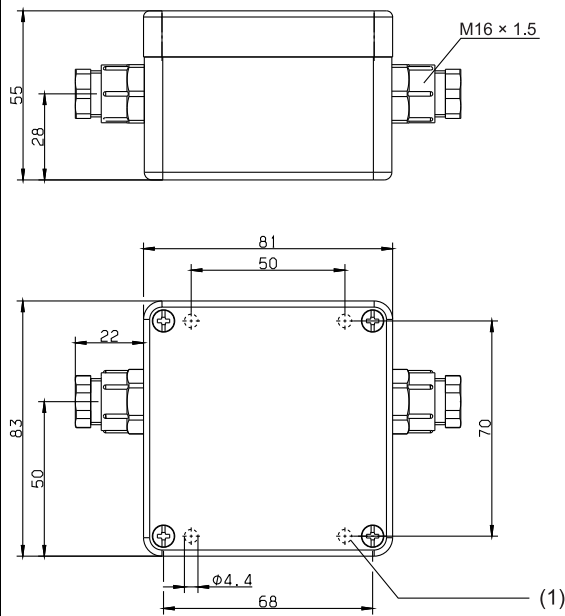
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**Accessories**

Terminal box with pressure compensation

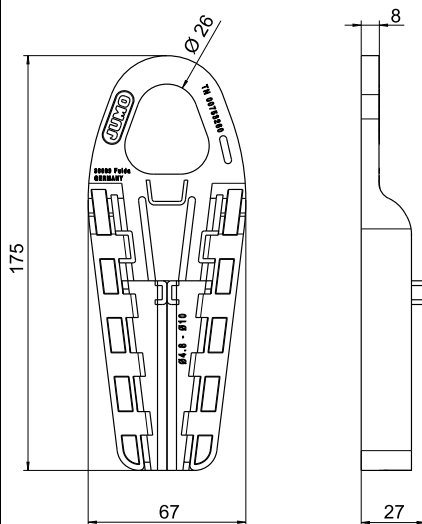
Part no. 00061206



(1) Fastening hole

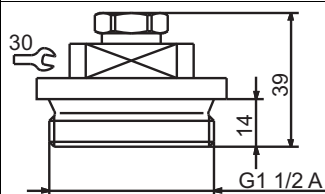
Cable clamp

Part no. 00753260



Sealing screw

Part no. 00333329



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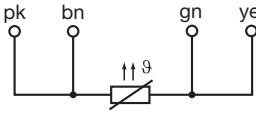
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Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Connection		Terminal assignment
		
		Cable ^a
4 to 20 mA, two-wire		
Voltage supply DC 12 to 30 V Rated voltage supply DC 24 V	$U_{B/S+}^b$ 0 V/S-	White Gray
DC 0.5 to 4.5 V, ratiometric		
Voltage supply DC 5 V Rated voltage supply DC 5 V	U_B 0 V/S- S+	White Gray Yellow
Shielding		
Caution: Ground the device! Ground all connected devices (such as pumps and valves) to the same potential!		Black
Integrated temperature probe (with basic type extension 007)^c		
		Pink (pk) Brown (bn) Green (gn) Yellow (ye)

^a For cable specifications, see installation instructions B 401015.4, chapter 6 "Installation and mounting".

^b The voltage peaks must not exceed or fall below the specified voltage supply value!

^c Level probes in free-field applications without integrated overvoltage protection must be protected against electrical discharge. In addition, it is recommended that external overvoltage protection is used upstream and downstream of the display or processing unit.

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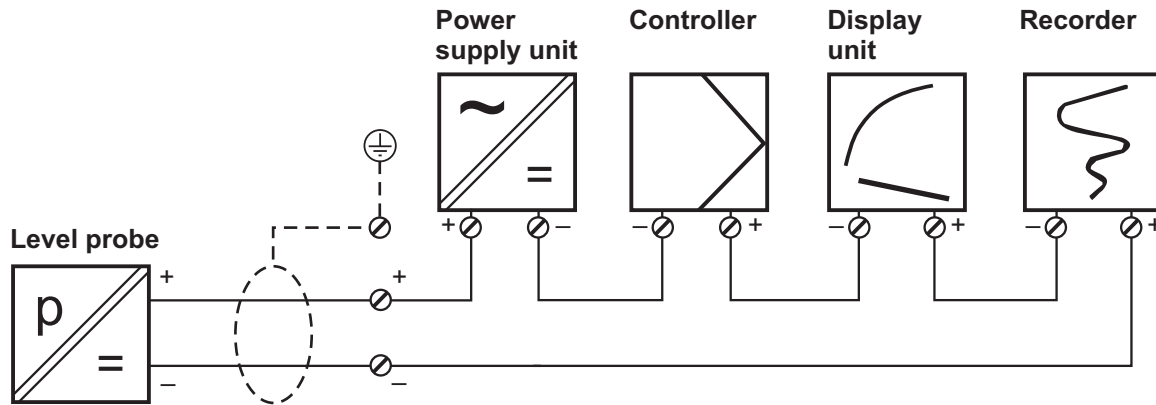
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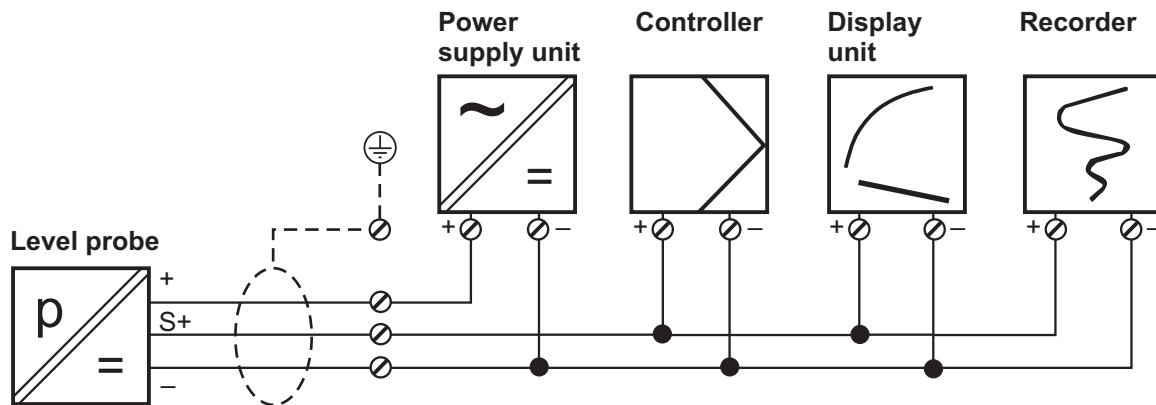


Connection example

Current output



Voltage output



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Order details

(1) Basic type	
404391/000	JUMO MAERA F27 – Level probe with ceramic measuring cell ^a
404391/007	JUMO MAERA F27 – Level probe with ceramic measuring cell with integrated temperature probe Pt100 ^{b, a}
404391/022	JUMO MAERA F27 – Level probe with ceramic measuring cell with case made of plastic PTFE ^c
(2) Input	
412	0 to 50 mbar relative pressure
414	0 to 100 mbar relative pressure
415	0 to 160 mbar relative pressure
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
999	Special measuring range
(3) Output	
405	4 to 20 mA, two-wire
412	0.5 to 4.5 V, three-wire
(4) Process connection	
568	G 1" inside ^d
658	Connection closed at the bottom
659	Connection open at the bottom
(5) Electrical connection	
14	PUR cable, pebble gray, shielded, UV-resistant
15	PE-LD cable, black, shielded, UV-resistant
25	FEP cable, black, shielded, UV-resistant
(6) Length of the connecting cable	
005	5 m
010	10 m
...	...
100	100 m
999	Special length
(7) Extra codes	
000	None
593	Cutting ring fitting (preparation for protection tube) ^e
917	EPDM seal

^a Integrated overvoltage protection only possible in connection with output 4 to 20 mA.

^b The basic type 404391/007 is only available with output 4 to 20 mA, and process connection closed or open at the bottom.

^c The basic type 404391/022 is only available with process connection G 1 inside.

^d The process connection G 1 inside is only available with basic type 404391/022.

^e The extra code cutting ring fitting is only available in connection with basic type 404391/000 or 404391/007.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Order code	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
Order example	404391/000	-	452	-	405	-	659	-	15 - 010 / 000




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Accessories

Item	Description	Part no.
Terminal box with pressure compensation element 	<p>The terminal box is used for secure installation of the level probe cable. The end of the pressure equalization hose is always protected from precipitate and condensation (IP65). The remaining distribution can be performed with a cable without a pressure equalization hose.</p> <p>The terminal case should be mounted as close as possible to the medium surface while still outside the medium to ensure the system is implemented cost-effectively and in the best possible way.</p>	00061206
Cable clamp 	<p>The cable clamp holds the probe in the liquid at a defined depth and provides strain relief. Use of the cable clamp ensures that the cable is not deformed in an unacceptable manner.</p> <p>The cable clamp is compatible with all JUMO level probes.</p> <p>The clamping range is 4.8 mm to 10 mm. The maximum tensile strength is 390 N. The cable clamp is made of UV-resistant, corrosion-free and fiberglass-reinforced polyamide. The central elongated holes are provided for optional, application-dependent fixing of the cable to prevent the clamping jaws from sliding upwards. The side elongated hole is provided for fixing additional cable length.</p>	00753260
Sealing screw 	<p>For closed containers or water wells with a well head, the cable should be guided through and fastened by a sealing screw.</p> <p>The sealing screw is made up of a G 1 1/2" thread and is used to route the cable.</p>	00333329
Pressure compensation filter for cable	<p>The pressure compensation filter is a breathable filter that ensures aeration and exhaust-air ventilation without moisture penetrating. It is fitted at the end of the special cable.</p>	00382632



JUMO MAERA S28

Level probe

Applications

Level and filling level measurement in¹

- Water and sewage water management
- Hydroelectric power stations
- Well and surface water

Brief description

The JUMO MAERA S28 level probe is used for the continuous hydrostatic level measurement of liquids. Filling heights between 2.50 mWS and 100 mWS (water column) can be achieved in ventilated tanks.

When the level probe is immersed into a liquid, a liquid column emerges above the probe. The liquid column increases as the probe is immersed deeper into the liquid and creates a hydrostatic pressure on the measuring system by the force of its weight. The measured pressure is transmitted as a standard signal. The signal is linearly proportional to the rising liquid column.

The surrounding pressure is realized using a special cable with an integrated pressure equalization hose. Any variations in air pressure are therefore automatically compensated for and the surrounding pressure is taken into account. The installation can be performed in both indoor and outdoor areas.

The level probe is equipped as standard with an integrated overvoltage protection, which protects the level probe against damage in the event of lightning strikes in surrounding water. With regard to the temperature-dependent density of a liquid, the medium temperature can be recorded with an integrated temperature sensor Pt100 during level measurement. This temperature value can then be used to compensate.

The level probe is approved for use in drinking water.

Further information on our level probes from the JUMO MAERA series can be found in the brochure "Limit Level Measurement and Level Measurement" in the documentation.

Customer benefits

- **Process-reliable**
The core of the level probe is a piezoresistive measuring cell, which features high overload resistance, and is particularly stable in the long term, reliable, and temperature-resistant. An integrated overvoltage protection prevents the effects of lightning that could lead to destruction of the level probe, thereby offering maximum process reliability. A reverse-polarity protection mechanism protects the measuring instrument against damage, ensuring maximum safety during startup.
- **Versatile**
The simultaneous measurement of level and temperature may be optionally achieved with a Pt100 temperature sensor. Costs are minimized as a result of very simple installation and startup. An optimized variant of the level probe is available for use in "deep wells".

¹ These recommendations are based on many years of experience; however, in individual cases they may not be fully applicable. We would be happy to provide further information, including regarding additional applications.

Approvals and approval marks (see technical data)



Type 404392/...
with process connection 658

Special features

- Measuring ranges: 0.25 bar to 10 bar (2.5 to 100 mWS)
- Medium temperature: 0 °C to 50 °C
- Piezoresistive silicon sensor
- Accuracy: 0.3% MSP² (linearity)
- Excellent long-term stability
- High overload resistance
- Integrated overvoltage protection
- Reverse-polarity protection mechanism
- Optionally available with integrated temperature sensor Pt100
- Suitable for indoor and outdoor installations

² MSP = measuring span

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Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Measuring principle	Piezoresistive sensor with stainless steel separating membrane
Pressure transfer means	Synthetic oil
Admissible load changes	> 10 million, 0 to 100 % measuring range
Mounting position	Vertical/hanging from the cable

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at		Long-term stability ^b	Overload capability	Burst pressure
bar	% MSP ^e	20 °C ^c % MSP	0 to 50 °C ^d % MSP	% MSP per year	bar	bar
0 to 0.25 bar relative pressure	0.3	0.5	1.6	≤ 0.2	0.75	1
0 to 0.4 bar relative pressure	0.3	0.5	1.6		1.2	1.6
0 to 0.6 bar relative pressure	0.3	0.5	1.3		1.8	2.4
0 to 1 bar relative pressure	0.3	0.5	1.1		3	4
0 to 1.6 bar relative pressure	0.3	0.5	1.1		4.8	6.4
0 to 2.5 bar relative pressure	0.3	0.5	1.1		7.5	10
0 to 4 bar relative pressure	0.2	0.3	0.8		12	16
0 to 6 bar relative pressure	0.2	0.3	0.8		18	24
0 to 10 bar relative pressure	0.2	0.3	0.8		30	40

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

^e MSP = measuring span

Output

Analog output	
Current	4 to 20 mA, two-wire
Step response T ₉₀	≤ 10 ms
Burden	
Current	$R_L \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A } (\Omega)$

Electrical data

Voltage supply U _B ^a	DC 10 V to 30 V
Nominal voltage	DC 24 V
Reverse voltage protection	Yes
Max. current consumption	30 mA
Electrical circuit	SELV
Requirements	The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

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Electrical connection

for level probe (basic type 404392/000)

6-core, shielded cable with integrated pressure compensation hose, AWG 24 with ferrules

Outer diameter	Approx. 8.4 mm
Conductor cross section	0.25 mm ²
Bending radius	
Moving	160 mm
Fixed	120 mm
	It is vital to take into account that if the protective hose is kinked or pinched, this will prevent ambient pressure compensation.
Tensile force	Up to 400 N
Admissible medium temperatures	-40 to +70 °C (depending on the medium)

for level probe in the deep well version (basic type 404392/025)

2-core cable without pressure compensation with ferrules

Outer diameter	Approx. 8.3 mm
Conductor cross section	1 mm ²
Bending radius	
Moving	40 mm
Fixed	30 mm
Tensile force	Up to 400 N
Admissible medium temperatures	-40 to +60 °C

Mechanical features

Ensure the medium durability of the materials!

Materials	
Process connection	Stainless steel 316 Ti
Measuring membrane	Stainless steel 316 L
Case	Stainless steel 316 Ti
Seals	FPM, EPDM
Outer sheath	Basic type 404392/000: PE (black), PUR (pepple gray), FEP (black) Basic type 404392/025: EPR (blue)
Pressure compensation hose	Basic type 404392/000: PA
Weight	400 g (without cable) plus 1500 g for process connection with mounted protective cage (without cable)
PE cable	Approx. 63 g/m, 115 g/m with additional temperature sensor (extra code 007)
PUR cable	Approx. 115 g/m
FEP cable	Approx. 90 g/m
EPR cable	Approx. 92 g/m
UV resistance	
PE, PUR cable	According to VDE 0207, test method EN 60811 part 2-1, section 8
FEP cable	According to DIN ISO 4892-2
Diameter	25 mm

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Environmental influences

Admissible temperatures	
Medium, environment	0 to 50 °C The device must not freeze in the medium! A restriction may be required depending on the medium.
Storage	-20 to +80 °C, dry
Electromagnetic compatibility (EC)	
Interference emission	Class B ^a , according to EN 61326-2-3
Interference immunity	Industrial requirements, according to EN 61326-1
Overvoltage protection	Integrated overvoltage protection according to 61000-4-5
Rated leakage current	1 kA
Protection type	IP68, according to EN 60529, submersible to 100 m

^a The product is suitable for industrial use as well as for households and small businesses.

Approvals and approval marks

ACS	
Testing agency	Eurofins Expertises Environnementales
Certificates/certification numbers	22 ACC NY 044
Inspection basis	DGS/SD7A 2002 n° 571
Valid for	Extra code 881
EAC	
Testing agency	«Промтехконтроль»
Certificates/certification numbers	ЕАЭС N RU Д-DE.PA01.B.80830/21
Inspection basis	TR TS 020/2011
Valid for	Type 404392

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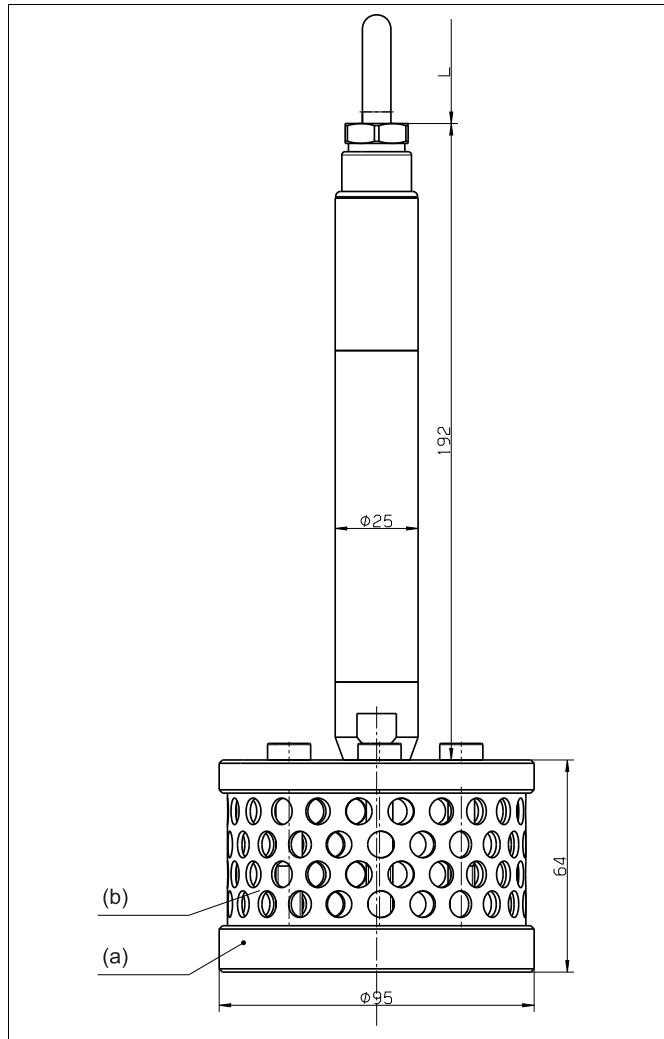
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Dimensions

With mounted cage



L Cable length according to customer preference

(a) Protective cage

(b) Perforated metal grid ϕ 8 mm

The stainless steel version with mounted protective cage is designed for difficult level measurements where sludge, turbulence or currents may be present (e.g. pumping stations, wastewater lifting stations).

The additional weight reduces effects on the output signal with strongly moving media.

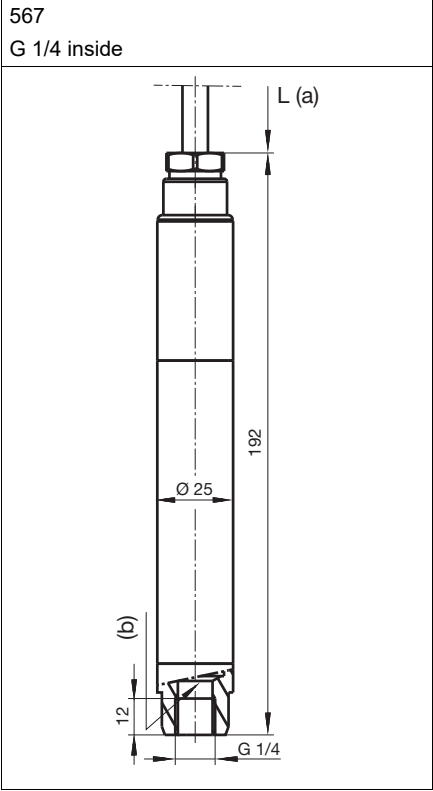
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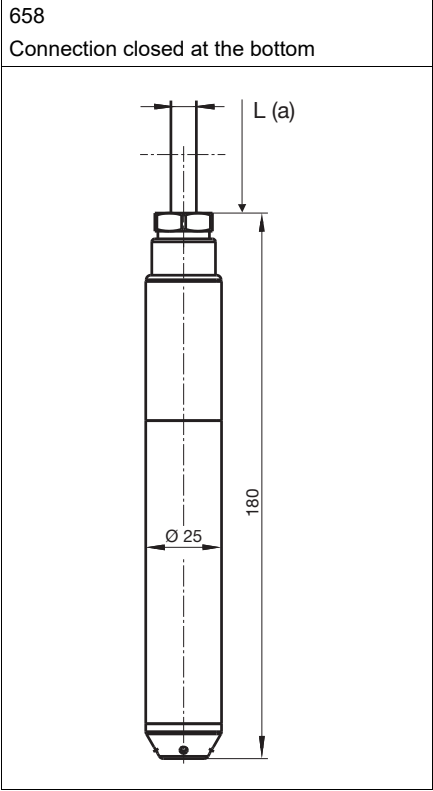
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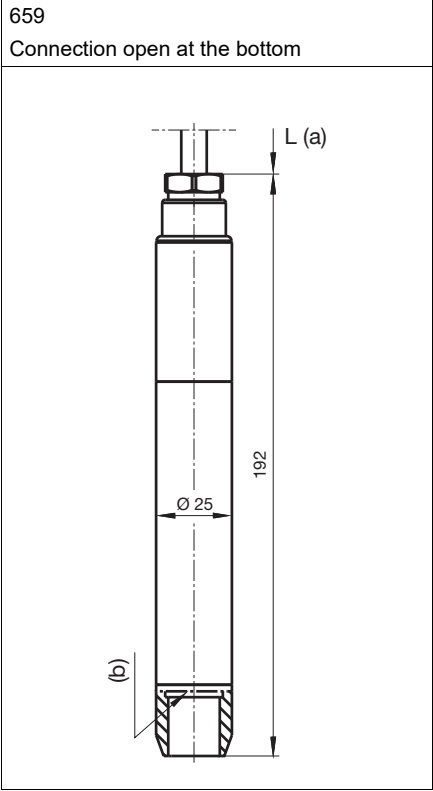
Process connection



- (a) Cable length according to customer preference
- (b) Sensitive membrane



- (a) Cable length according to customer preference
- (b) Sensitive membrane



- (a) Cable length according to customer preference
- (b) Sensitive membrane

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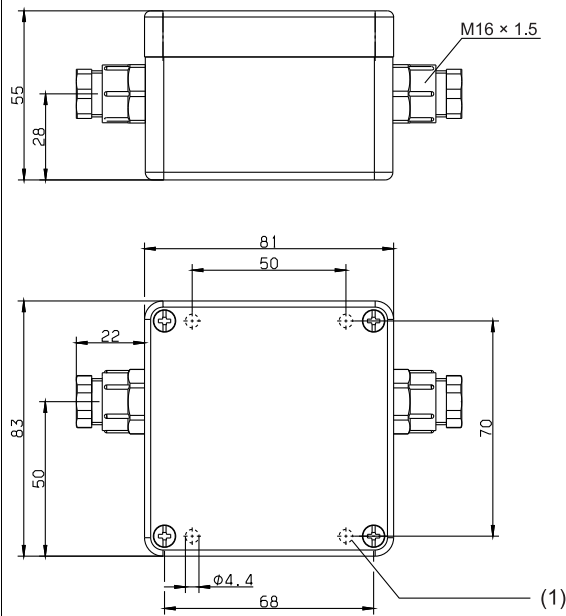
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**Accessories**

Terminal box with pressure compensation

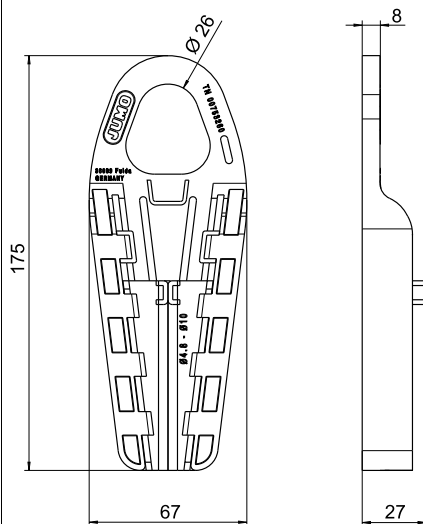
Part no. 00061206



(1) Fastening hole

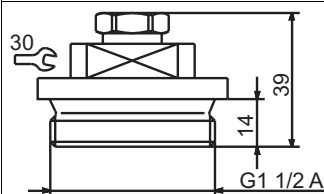
Cable clamp

Part no. 00753260



Sealing screw

Part no. 00333329



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Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

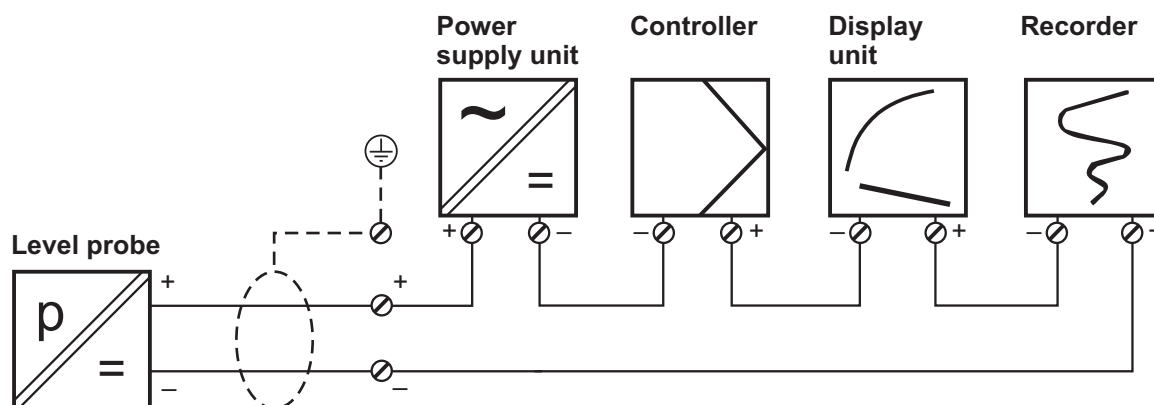
Connection		Terminal assignment
		Cable ^a
4 to 20 mA, two-wire (with basic type 404392/000)		
Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V	$U_B/S+^b$ 0 V/S-	White Gray
Shielding		
Caution: Ground the device! Ground all connected devices (such as pumps and valves) to the same potential!		Black
4 to 20 mA, two-wire (with basic type 404392/025)		
Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V	$U_B/S+^b$ 0 V/S-	Brown Blue
Integrated temperature probe (with basic type extension 007)		
		Pink (pk) Brown (bn) Green (gn) Yellow (ye)

^a For cable specifications, see installation instructions B 401015.4, chapter 6 "Installation and mounting".

^b The voltage peaks must not exceed or fall below the specified voltage supply values!

Connection example

Current output



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Order details

(1) Basic type	
404392/000	JUMO MAERA S28 – Level probe
404392/025	JUMO MAERA S28 – Level probe, deep well version ^a
(2) Input	
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar sealed gauge
458	0 to 6 bar sealed gauge
459	0 to 10 bar sealed gauge
999	Special measuring range for relative pressure
(3) Output	
405	4 to 20 mA, two-wire
(4) Process connection	
567	G 1/4" inside
658	Connection closed at the bottom
659	Connection open at the bottom
759	Mounted protective cage Ø 95 mm
(5) Process connection material	
20	CrNi (stainless steel)
(6) Electrical connection	
14	PUR cable, pebble gray, shielded, UV-resistant
15	PE-LD cable, black, shielded, UV-resistant
25	FEP cable, black, shielded, UV-resistant
26	Submersible motor cable, EPR cable, blue
(7) Cable length of the connecting cable	
005	5 m
010	10 m
...	...
100	100 m
(8) Extra codes	
000	None
007	Integrated temperature probe Pt100
593	Cutting ring fitting (preparation for protection tube)
631	Improved moisture and vibration protection
881	Drinking water approval ^b
917	EPDM seal

^a The deep-well version was designed for use in measuring ranges from 0 to 4 bar up to 0 to 10 bar with a free-hanging cable length of up to 100 m. With regard to the area of application, the version is only available with a closed process connection, and an EPR cable without pressure compensation and without a temperature probe. Another benefit is the improved moisture and vibration protection. The user must always bear in mind that a stainless-steel version is not suitable for use in media containing chlorine, such as seawater.

^b Only available with EPDM seal, PE-LED cable, or submersible motor cable, EPR cable.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)							
Order code	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>				
Order example	404392/000	-	454	-	405	-	659	-	20	-	15	-	020	/	007, 631

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Stock versions

Order code	Part no.
404392/000-453-405-658-20-15-010/000	00558887

Accessories

Item	Description	Part no.
Terminal box with pressure compensation element 	<p>The terminal box is used for secure installation of the level probe cable. The end of the pressure equalization hose is always protected from precipitate and condensation (IP65). The remaining distribution can be performed with a cable without a pressure equalization hose.</p> <p>The terminal case should be mounted as close as possible to the medium surface while still outside the medium to ensure the system is implemented cost-effectively and in the best possible way.</p>	00061206
Cable clamp 	<p>The cable clamp holds the probe in the liquid at a defined depth and provides strain relief. Use of the cable clamp ensures that the cable is not deformed in an unacceptable manner.</p> <p>The cable clamp is compatible with all JUMO level probes.</p> <p>The clamping range is 4.8 mm to 10 mm. The maximum tensile strength is 390 N. The cable clamp is made of UV-resistant, corrosion-free and fiberglass-reinforced polyamide. The central elongated holes are provided for optional, application-dependent fixing of the cable to prevent the clamping jaws from sliding upwards. The side elongated hole is provided for fixing additional cable length.</p>	00753260
Sealing screw 	<p>For closed containers or water wells with a well head, the cable should be guided through and fastened by a sealing screw.</p> <p>The sealing screw is made up of a G 1 1/2" thread and is used to route the cable.</p>	00333329
Pressure compensation filter for cable	<p>The pressure compensation filter is a breathable filter that ensures aeration and exhaust-air ventilation without moisture penetrating. It is fitted at the end of the special cable.</p>	00382632

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JUMO MAERA S29 SW

Titanium or stainless steel level probe

Applications

Level and level measurements

- In tank and storage systems
- Of clarification, settling and rainwater retention basis
- In sewage lifting and pumping stations
- In splash water containers for swimming pools
- In a ballast water tank for ship building

Special features

- Measuring ranges from 100 mbar relative pressure and 600 mbar absolute pressure are available
- Explosion protection according to ATEX
- Shipbuilding approval according to DNV (titanium)
- Highly resistant to chemical (titanium)
- Proven piezoresistive silicon sensor

Description

The JUMO MAERA S29 SW level probe is used for the continuous hydrostatic level measurement in ventilated tanks. Measuring is carried out unaffected by electrical medium features or any foam formation.

Approvals are needed for particular ship building requirements (exclusively titanium) and explosion protection.

The level probe can be readily used in depths from as low as 1 mWS. The titanium version has been designed for application in liquids with media containing chlorides. These may be found in ship building, swimming pools, or water and sewage water management.

The cost-optimized level probe made of titanium or stainless steel with a front-flush membrane offers an alternative in highly viscous media. The screwable protective cap protects the membrane.

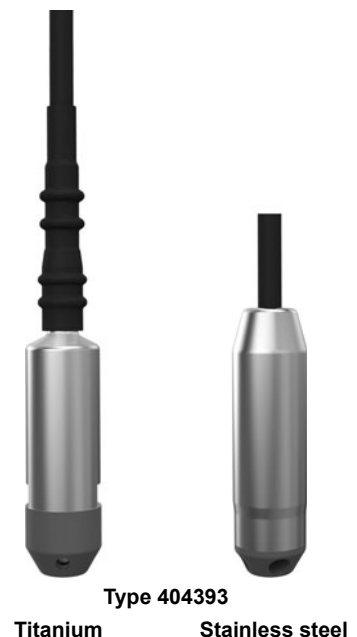
The level probe is equipped with a reverse-polarity protection mechanism, which prevents incorrect polarity during startup.

Another benefit to the measuring system is the extensive range of accessories for an optimum design.

Further information on our level probes from the JUMO MAERA series can be found in the brochure "Limit Level Measurement and Level Measurement" in the documentation.

Customer benefits

- Improved plant availability
- Standardized signal processing
- Resistant to climate due to improved moisture and vibration protection
- Measurements in very harsh and highly viscous media thanks to the front-flush membrane
- Prevention of build up of resistance
- A complete solution for measurement points thanks to the extensive range of accessories
- Reverse-polarity protection mechanism



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Approvals

	Designation	ATEX
	Testing agency	Eurofins Electrosuisse Product Testing AG
	Certificate no.	SEV 17 ATEX 0136 X
	Inspection basis	EN 60079-0, EN 60079-11
	Valid for	Type 404393/362, Type 404393/662
	Designation	UKEX
	Testing agency	Bureau Veritas
	Certificate no.	EPS 22 UKEX 1 087 X
	Inspection basis	EN IEC 60079-0, EN 60079-11
	Valid for	Type 404393/.../085
	Designation	IECEx
	Testing agency	Eurofins Electrosuisse Product Testing AG
	Certificate no.	IECEx SEV 20.0010X
	Inspection basis	IEC 60079-0, IEC 60079-11
	Valid for	Type 404393/362, Type 404393/662
	Designation	DNV
	Testing agency	DNV
	Certificate no.	TAA00001TH
	Inspection basis	DNV GL CG-0339
	Valid for	Type 404393/062, Type 404393/662
	Designation	EAC Ex ^a
	Testing agency	Sertium (Сертиум)
	Certificate no.	RU C-DE.ME92.B.01703
	Inspection basis	Standard TR TS 012/2011
	Valid for	Type 404393/363-.../240, Type 404393/662-.../240

^a Russian documentation available upon request.

For the special conditions for use, observe the examination certificate, which is available for download on the Internet on the respective product page.

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Technical data

General Information

Reference conditions	According to DIN 16086 and DIN 61298
Measuring principle	Piezoresistive sensor with separating membrane
Pressure transfer medium	Synthetic oil
Admissible load changes	> 10 million, 0 % to 100 % measuring range
Mounting position	Vertical/hanging from the cable

Input

Measuring range and accuracy

Measuring range	Accuracy at		Long-term stability ^a % MSP per year	Overload capacity	Burst pressure
	20 °C ^b % MSP ^d	10 to 50 °C ^c % MSP			
0 to 1 mH ₂ O	1.2	1.9	≤ 0.4	3	4
0 to 1.6 mH ₂ O	0.8	1.8		4.8	6.4
0 to 2.5 mH ₂ O	0.8	1.7		7.5	10
0 to 4 mH ₂ O	0.7	1.7	≤ 0.3	12	16
0 to 6 mH ₂ O	0.7	1.6		18	24
0 to 10 mH ₂ O	0.6	1.3		30	40
0 to 100 mbar relative pressure	1.2	1.9	≤ 0.4	0.3	0.4
0 to 160 mbar relative pressure	0.8	1.8		0.48	0.64
0 to 250 mbar relative pressure	0.8	1.7		0.75	1
0 to 400 mbar relative pressure	0.7	1.7	≤ 0.3	1.2	1.6
0 to 600 mbar relative/absolute pressure	0.7	1.6		1.8	2.4
0 to 1 bar relative/absolute pressure	0.6	1.3		3	4
0 to 1.6 bar relative/absolute pressure	0.5	1.3	≤ 0.2	4.8	6.4
0 to 2.5 bar relative/absolute pressure	0.5	1.2		7.5	10
0 to 4 bar sealed gauge/absolute pressure	0.5	1.2		12	16
0 to 6 bar sealed gauge/absolute pressure	0.5	1.2		18	24
0 to 10 bar sealed gauge/absolute pressure	0.5	1		30	40

^a Reference conditions EN 61298-1

^b Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset), and measuring range end

^c Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset) and measuring range end, thermal influences on measuring range start (offset), and measuring span

^d MSP = measuring span

Output

Analog output	
Current	
Output 405	4 to 20 mA, 2-wire
Step response t_{90}	2 ms
Burden	
Current	
4 to 20 mA, 2-wire	$R_L \leq (U_B - 16 \text{ V}) \div 0.022 \text{ A } (\Omega)$

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Electrical data

Voltage Supply U_B	The voltage peaks must not exceed the specified voltage supply values!
For basic type extension 000	DC 16 to 28 V (nominal 24 V)
For basic type extension 062	DC 21 to 24 V (nominal 24 V)
For basic type extension 362	DC 16 to 28 V (nominal 24 V)
For basic type extension 662	DC 21 to 24 V (nominal 24 V)
Reverse voltage protection	Yes
Max. current consumption	23 mA
Electrical circuit	SELV
Requirement	The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to „Limited-energy circuits“.

Cable

Cable

	6-core, shielded cable with integrated pressure compensation hose, AWG 24 with ferrules	3-core, remote cable with integrated pressure compensation hose, AWG 24 with ferrules
Material		
Outer sheath	FEP	PUR
Compensation hose	PA	PA
Color	Black	Black
Outer diameter	Approx. 8.4 mm	Approx. 7.5 mm
Conductor cross section	0.25 mm ²	0.25 mm ²
Bending radius		
Moving	min. 140 mm	min. 75 mm
Fixed	min. 70 mm	min. 37.5 mm
Tensile force	4000 N	880 N
Mass	≈ 90 g/m	Approx. 60 g/m
Admissible temperatures	-10 to +70 °C	-10 to +70 °C
UV resistance	Yes, according to DIN ISO 4892-2	Yes, according to DIN ISO 4892-2

Mechanical features

Ensure the medium durability of the material!

	Titanium	Stainless steel	Stainless steel with mounted protective cage
Material			
Protective cap	PVC	PVC	-
Process connection	Titanium grade 2	Stainless steel 316 L	Stainless steel 316 L
Measuring membranes	Titanium grade 2	Stainless steel 316 L	Stainless steel 316 L
Case	Titanium grade 2	Stainless steel 316 L	Stainless steel 316 L
Shrink tubing	Polyolefin	-	-
Mass (without cable)	109 g	200 g	1700 g (max. freely suspended cable 100 m)
Diameter	27 mm	27 mm	95 mm

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Environmental influences

Reference conditions	DIN 16086, DIN 61298	
Admissible temperatures Medium	-10 to +60 °C The level probe must not freeze in the medium! A restriction may be required depending on the medium.	
	Ignition protection type Gb	
	Temperature class	Ambient temperature T _A
	T4	-40 to +85 °C
	T5	-40 to +70 °C
	T6	-40 to +55 °C
	Ignition protection type Db	
	Temperature class	Ambient temperature T _A
	T100 °C	-40 to +85 °C
	T85 °C	-40 to +70 °C
	T70 °C	-40 to +55 °C
	Storage	-25 to +70 °C, dry
Electromagnetic Compatibility (EC)	DIN EN 61326-2-3:2022	
Interference emission	Class B ^a	
Interference immunity	Industrial requirements	
Protection type	IP68, DIN EN 60529	
Measuring principle	Piezoresistive sensor with separating membrane	
Pressure transfer medium	Synthetic oil	
Admissible load changes	> 10 million, 0 to 100 % measuring range	
Mounting position	Vertical/hanging from the cable	

^a The product is suitable for industrial use as well as for households and small businesses.

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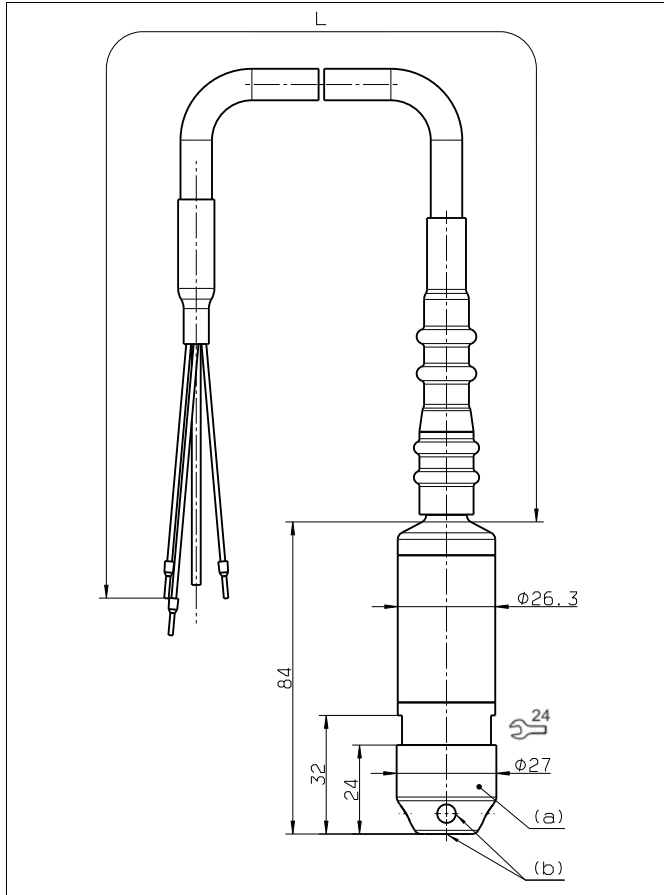
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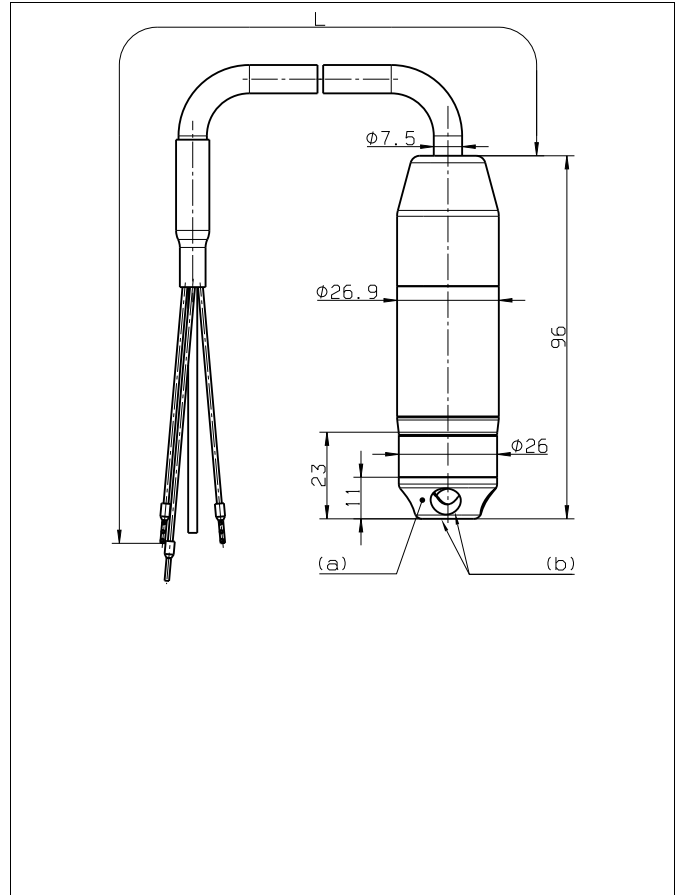
Dimensions

Titanium



- L Cable length according to customer preference
(a) Protective cap
(b) 5 bore holes for every Ø 5 mm

Stainless steel



- L Cable length according to customer preference
(a) Protective cap
(b) 5 bore holes for every Ø 5 mm

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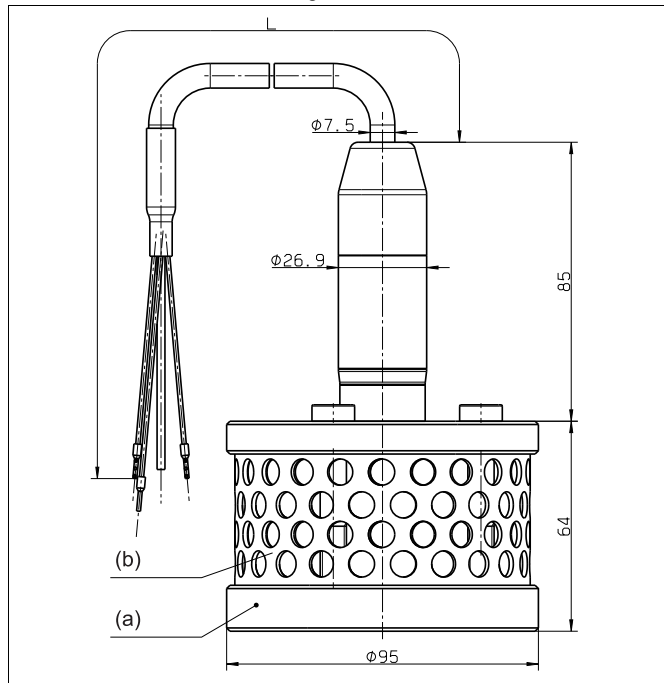
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Stainless steel with mounted cage



L Cable length according to customer preference

(a) Protective cage

(b) Perforated metal grid Ø 8 mm

The stainless steel version with mounted protective cage is designed for difficult level measurements where sludge, turbulence or currents may be present (e.g. pumping stations, wastewater lifting stations).

The additional weight reduces effects on the output signal with strongly moving media.

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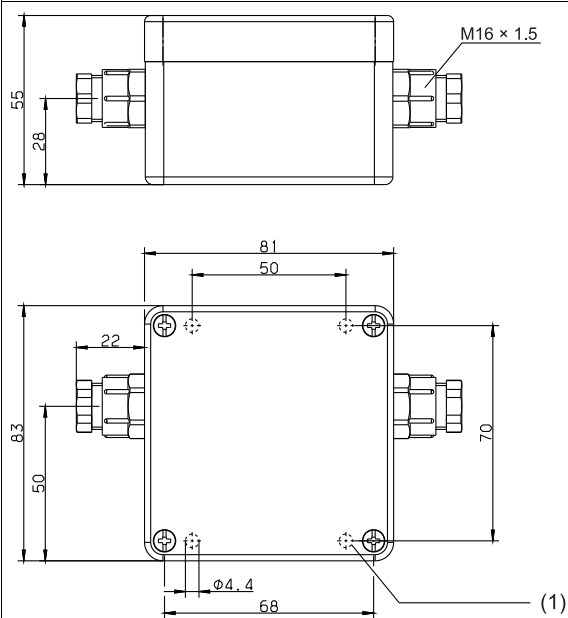
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**Accessories**

Terminal box with pressure compensation

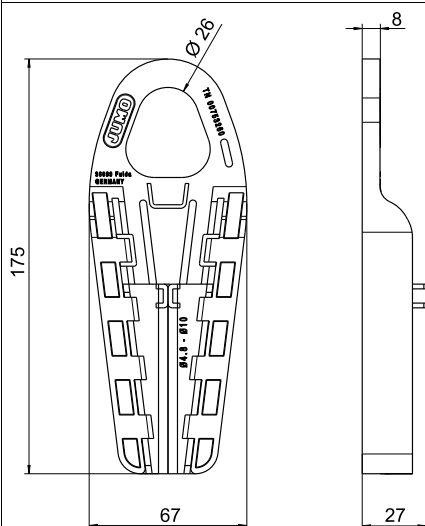
Part no. 00061206



(1) Fastening hole

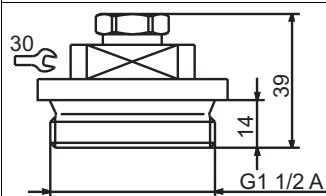
Cable clamp

Part no. 00753260



Sealing screw

Part no. 00333329



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Connection diagram

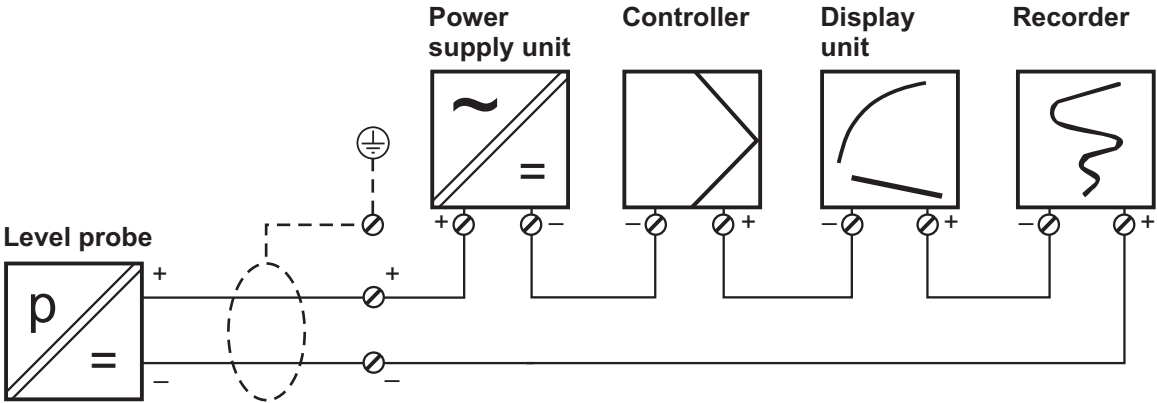
The connection diagram in the data sheet provides information on product selection.
For the electrical connection, only use the installation instructions or the operating manual.

Connection		Terminal assignment	
Cable		FEP (electrical connection 25)	PUR (electrical connection 16)
4 to 20 mA, 2-wire			
Rated voltage supply DC 24 V	U_B/S^{+a}	White	White
	0 V/S-	Gray	Brown
Shielding			
Caution: Ground the device! Ground all connected devices (such as pumps and valves) to the same potential!		Black	Black

^a The voltage peaks must not exceed or fall below the specified voltage supply values!

Connection example

Current output



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Order details

	(1) Basic type
404393	JUMO MAERA S29 SW – Level probe made of titanium or stainless steel
	(2) Basic type extension
000	None
062	Shipbuilding approval (only available in titanium version)
362	Explosion protection
662	Shipbuilding approval and explosion protection, intrinsically safe, Ex i (only available in titanium version)
	(3) Input
302	0 to 1.6 mH ₂ O
303	0 to 2.5 mH ₂ O
304	0 to 4 mH ₂ O
305	0 to 6 mH ₂ O
306	0 to 10 mH ₂ O
414	0 to 100 mbar relative pressure
415	0 to 160 mbar relative pressure
417	0 to 250 mbar relative pressure
424	0 to 400 mbar relative pressure
419	0 to 600 mbar relative pressure
454	0 to 1 bar relative pressure
455	0 bar to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
535	0 to 4 bar sealed gauge
536	0 to 6 bar sealed gauge
537	0 to 10 bar sealed gauge
487	0 bar to 0.6 bar absolute pressure
488	0 to 1 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
997	Special measuring range for sealed gauge
998	Special measuring range for absolute pressure ^a
999	Special measuring range for relative pressure ^a
	(4) Output
405	4 to 20 mA, 2-wire
	(5) Process connection
759	Mounted protection cage Ø 95 mm ^b
770	Front-flush process connection with protective cap
	(6) Process connection material
20	CrNi (stainless steel) (only available with PUR cable)
60	Ti (titanium) (only available with FEP cable)
	(7) Electrical connection
16	Cable shielded, fixed, PUR, black, UV-resistant (only available in stainless steel version)
25	Cable shielded, fixed, FEP, black, UV-resistant (only available in titanium version)
	(8) Connecting cable length^c
002	2 m
005	5 m
010	10 m

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020	20 m
030	30 m
040	40 m
050	50 m
060	60 m
070	70 m
080	80 m
090	90 m
100	100 m
(9) Extra codes	
000	None
085	UKEX approval
240	EAC Ex approval

^a The special measuring range is specified in plain text.

^b Only available in conjunction with process connection material 20.

^c Other cable length available on request.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)
Order code		/		-		-		-		-		-		-		/	
Order example	404393	/	000	-	417	-	405	-	770	-	60	-	25	-	005	/	000

Stock versions

Order code	Part no.
404393/000-414-405-770-60-25-005/000	00640023
404393/000-417-405-770-60-25-005/000	00640030
404393/000-424-405-770-60-25-010/000	00644175

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Accessories

The accessories are not checked according to DNV requirements.

Item	Description	Part no.
Terminal box with pressure compensation element 	<p>The terminal case, is used for secure installation of the level probe cable. The end of the pressure compensation tube is always protected from deposits and condensation (IP65). The remaining distribution can be performed with a standard cable without a pressure equalization hose.</p> <p>The terminal case should be mounted as close as possible to the medium surface while still outside the medium to ensure the system is implemented cost-effectively and in the best possible way.</p>	00061206
Cable clamp 	<p>The cable clamp holds the probe in the liquid at a defined depth and provides strain relief. Use of the cable clamp ensures that the cable is not deformed in an unacceptable manner.</p> <p>The cable clamp is compatible with all JUMO level probes.</p> <p>The clamping range is 4.8 mm to 10 mm. The maximum tensile strength is 390 N. The cable clamp is made of UV-resistant, corrosion-free and fiberglass-reinforced polyamide. The central elongated holes are provided for optional, application-dependent fixing of the cable to prevent the clamping jaws from sliding upwards. The side elongated hole is provided for fixing additional cable length.</p>	00753260
Sealing screw 	<p>For closed containers or water wells with a well head, the cable should be guided through and fastened by a sealing screw.</p> <p>The sealing screw is made up of a G 1 1/2" thread and is used to route the cable.</p>	00333329
Pressure compensation filter for cable	<p>The pressure compensation filter is a breathable filter that ensures aeration and exhaust-air ventilation without moisture penetrating. It is fitted at the end of the special cable.</p>	00382632
Ex-i supply/input isolating amplifier 	<p>The Ex-i repeater power supply / input isolating amplifier is designed for operating intrinsically safe transmitters (Ex-i) and mA current sources installed in potentially explosive (Ex) areas.</p> <p>Two-wire transmitters are supplied with energy and analog 0/4 to 20 mA measured values are transmitted from the Ex-area to the non-Ex-area. The output of the module can be operated actively or passively. Further technical data and the relevant safety requirements are available in the operating manual B 707530.0.</p>	00577948

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JUMO MIDAS S21 Ex

Pressure transmitter for use in Ex-areas



II 2G Ex ib IIC T6 ... T4 Gb
II 2D Ex ib IIIC T70 °C ... T100 °C Db

Applications

- Oil, fuel, natural gas
- Painting plants/robots
- Process technology and process engineering
- Plant engineering
- Testing and laboratory technology
- Chemical industry

These recommendations are based on many years of experience; however, in individual cases they may not be fully applicable. We would be happy to provide further information, including regarding additional applications.

Brief description

The JUMO MIDAS S21 Ex pressure transmitter measures the pressure of gases, vapors, and liquids. The device operates according to the piezoresistive measuring principle. The output signal is a load-independent direct current which is linearly proportional to the input pressure.

The pressure transmitter type 404710 meets the requirements:

- Off device group II in the potentially explosive area of zones 1 and 2
- Of device group III in the potentially explosive area of zones 21 und 22

The EC-type examination certificate of the pressure transmitter reads: SEV 09 ATEX 0101 X.

Customer benefits

- **Cost saving**
Type pressure transmitter is based on the already well-proven sensor technology of the JUMO MIDAS pressure transmitter series. A high level of automation on the production line ensures consistently high quality and low production costs.
- **Process reliability**
The measuring device was designed and certified according to ATEX directives. Set quality standards ensure a full final inspection within the fully automated measuring and calibration system. High burst pressures up to 400 bar (10 times the measuring span) ensure that the process will operate safely even in the event of damage.
- **Versatility**
A broad spectrum of measuring ranges and a multitude of process connections ensure many variants, which can be specifically adapted to any application.



Type 404710

Special features

- Measuring ranges of 0.25 to 100 bar relative and absolute pressure rating
- ATEX approval
- Welded system
- Compact design type
- Static and dynamic measurements

Approvals and approval marks



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Technical data

General Information

Reference conditions	According to DIN EN 60770-1 and DIN IEC 61298-1
Sensor	
Material	Silicon sensor with stainless steel separating membrane
Pressure transfer medium	Synthetic oil
Admissible load changes	> 10 million
Mounting position	Any
Calibration position	Device upright, process connection at the bottom

Input

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at		Long-term stability ^b	Overload capacity ^c	Burst pressure
bar	% MSP ^f	20 °C ^d % MSP	-20 °C to +85 °C ^e % MSP	% MSP per year	bar	bar
0 to 0.6 bar relative/absolute pressure	0.3	0.5	1.2	< 0,2	2.4	6
0 to 1 bar relative/absolute pressure	0.3	0.5	1.2		4	10
0 to 1.6 bar relative/absolute pressure	0.3	0.4	1.0		6.4	16
0 to 2.5 bar relative/absolute pressure	0.3	0.4	1.0		10	25
0 to 4 bar relative/absolute pressure	0.3	0.4	1.0		16	40
0 to 6 bar relative/absolute pressure	0.3	0.4	1.0		24	60
0 to 10 bar relative/absolute pressure	0.3	0.4	1.0		40	100
0 to 16 bar relative/absolute pressure	0.3	0.4	1.0		64	160
0 to 25 bar relative/absolute pressure	0.3	0.4	1.0		100	250
0 to 0.25 bar relative pressure	0.3	0.5	1.2		1	2.5
0 to 0.4 bar relative pressure	0.3	0.5	1.2		1.6	4
0 to 40 bar relative pressure	0.3	0.4	1.0		300	400
0 to 60 bar relative pressure	0.3	0.4	1.0		300	400
0 to 100 bar relative pressure	0.3	0.4	1.0		300	400
-0.25 to 0 bar relative pressure	0.3	0.5	1.2		1	2.5
-0.4 to 0 bar relative pressure	0.3	0.5	1.2		1.6	4
-0.6 to 0 bar relative pressure	0.3	0.5	1.2		2.4	6
-1 to 0 bar relative pressure	0.3	0.5	1.2		4	10
-1 to +0.6 bar relative pressure	0.3	0.4	1.0		6.4	16
-1 to +1.5 bar relative pressure	0.3	0.4	1.0		10	25
-1 to +3 bar relative pressure	0.3	0.4	1.0		16	40
-1 to +5 bar relative pressure	0.3	0.4	1.0		24	60
-1 to +9 bar relative pressure	0.3	0.4	1.0		40	100
-1 to +15 bar relative pressure	0.3	0.4	1.0		64	160
-1 to +24 bar relative pressure	0.3	0.4	1.0		100	250

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c All pressure transmitters are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value (offset), and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value (offset) and measuring range end value, thermal effect on measuring range start (offset), and measuring span

^f MSP = Measuring span

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Output

Output signal	
Current	4 to 20 mA, two-wire
Step response T_{90}	≤ 2 ms
Burden	
4 to 20 mA, two-wire	$R_B \leq (U_B - 16 \text{ V}) \div 0.022 \text{ A } (\Omega)$
Burden influence	$\leq 0.004 \%$ per 100 Ω

Mechanical features

Material	
Process connection	316 Ti Exception: 316 L for process connection according to customer specifications
Membrane	316 L
Case	304
Electrical connection	Round plug M12 \times 1: PA, nickel-plated zinc diecast, Attached cable: Silicone, Loose stranded wires: Silicone, Cable socket: PA 66 GF, PA6-GF30, EPDM, Special version: PUR
Weight	170 g with process connection G 1/2
Explosion protection	II 2G Ex ib IIC T6 ... T4 Gb II 2D Ex ib IIIC T70°C ... T100°C Db ^a

^a Certification in the area of dust not possible in connection with electrical connection line socket.

Environmental influences

Ambient temperature	Equipment Protection Level Gb temperature class T4: -40 to +85 °C T5: -40 to +70 °C T6: -40 to +55 °C Equipment Protection Level Db maximum surface temperature T100 °C: -40 to +85 °C T85 °C: -40 to +70 °C T70 °C: -40 to +55 °C
Medium temperature	-40 to +85 °C
Storage temperature	-40 to +100 °C
Protection type ^a	IP65, according to DIN EN 60529
Electromagnetic compatibility (EC)	According to EN 61326
Interference emission	Class B ^b
Interference immunity	Industrial requirement
Mechanical load	
Shock resistance	100 g/1 ms, according to DIN EN 60068-2-27
Vibration resistance	20 g at 15 to 2000 Hz, according to DIN EN 60068-2-6

^a The protection type is only achieved with a suitable mounted counter piece. The connecting cable diameter for cable socket is minimum 4,5 mm, maximum 7 mm.

^b The product is suitable for industrial use as well as for households and small businesses.

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**Electrical data**

Voltage supply U_B^a 4 to 20 mA, two-wire	DC 16 to 28 V
Current consumption	≤ 23 mA
Electrical circuit	Intrinsically safe

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

Approvals and approval marks

ATEX	
Testing agency	Eurofins Electrosuisse Product Testing AG
Certificates/certification numbers	SEV 09 ATEX 0101 X
Inspection basis	DIN EN 60079-0:12 + A11:13, DIN EN 60079-11:12
Valid for	Type 404710

NOTE!

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

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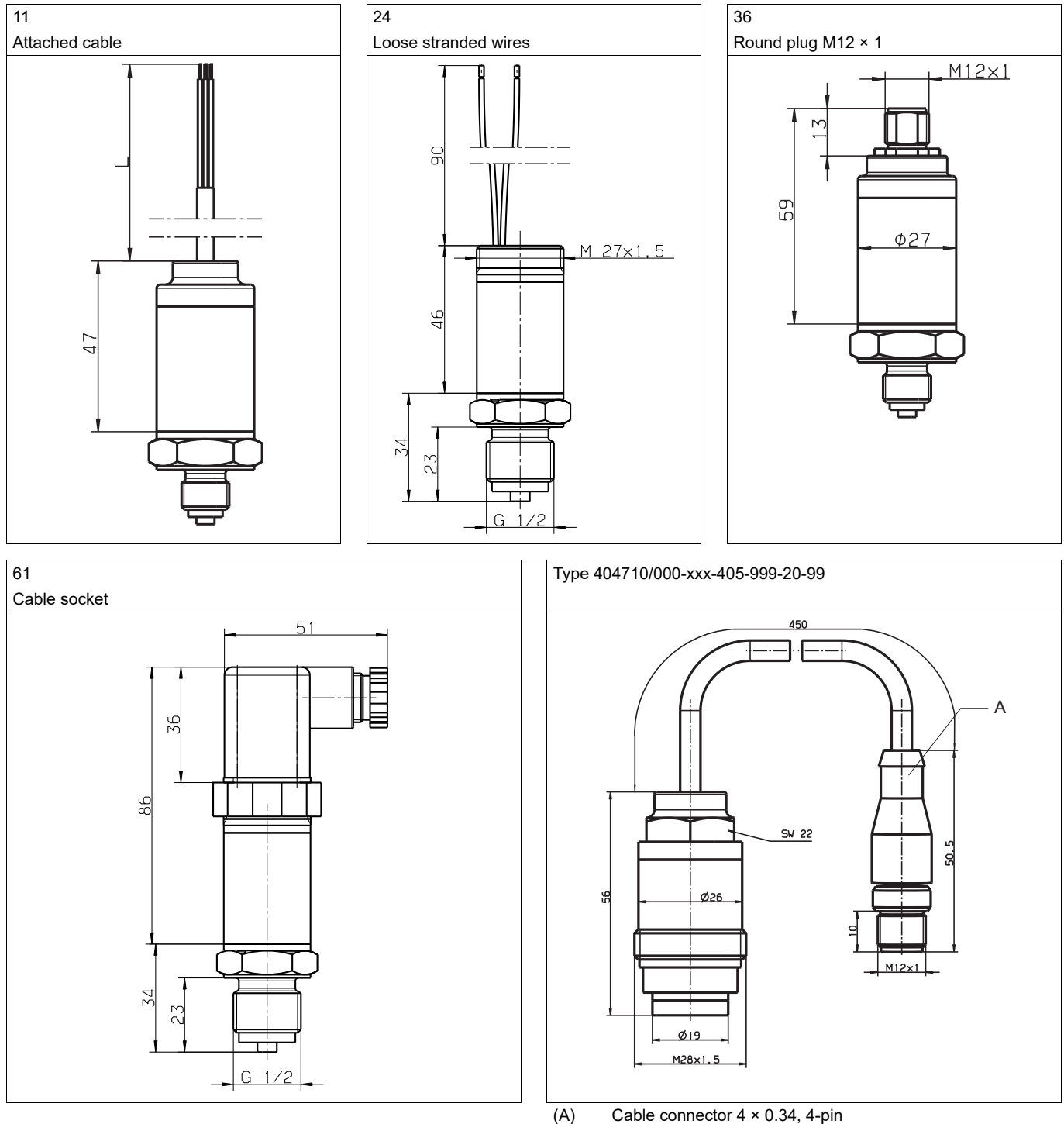
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Dimensions

Electrical connection



(A) Cable connector 4 × 0.34, 4-pin

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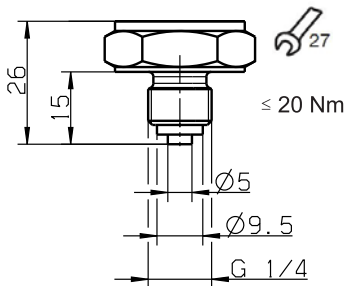
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Process connections, not front-flush

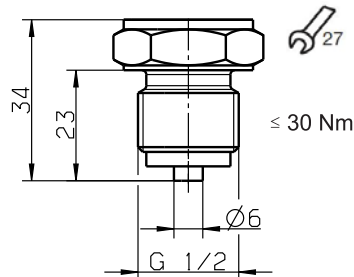
502

G 1/4 according to DIN EN 837



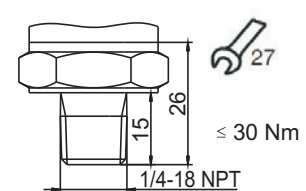
504

G 1/2 according to DIN EN 837 (standard)



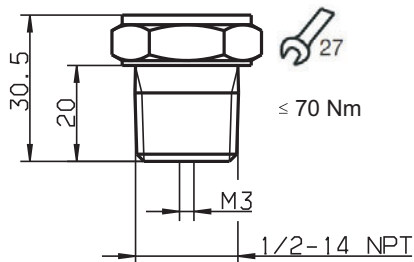
511

1/4-18 NPT according to DIN EN 837



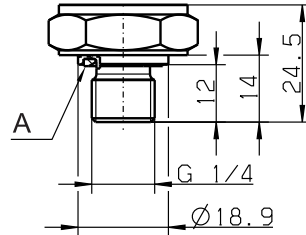
512

1/2-14 NPT according to DIN EN 837



521

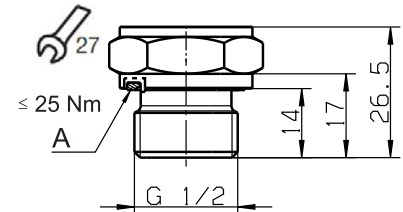
G 1/4 according to DIN 3852-11



A Profile seal G 1/4

523

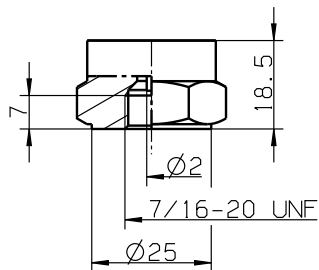
G 1/2 according to DIN 3852-11



A Profile seal G 1/2

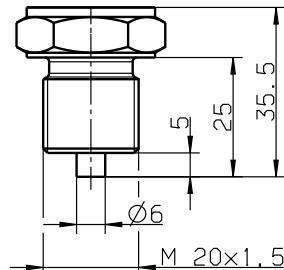
563

7/16-20 UNF interior with valve core handle



583

M20 × 1.5 with pin





Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

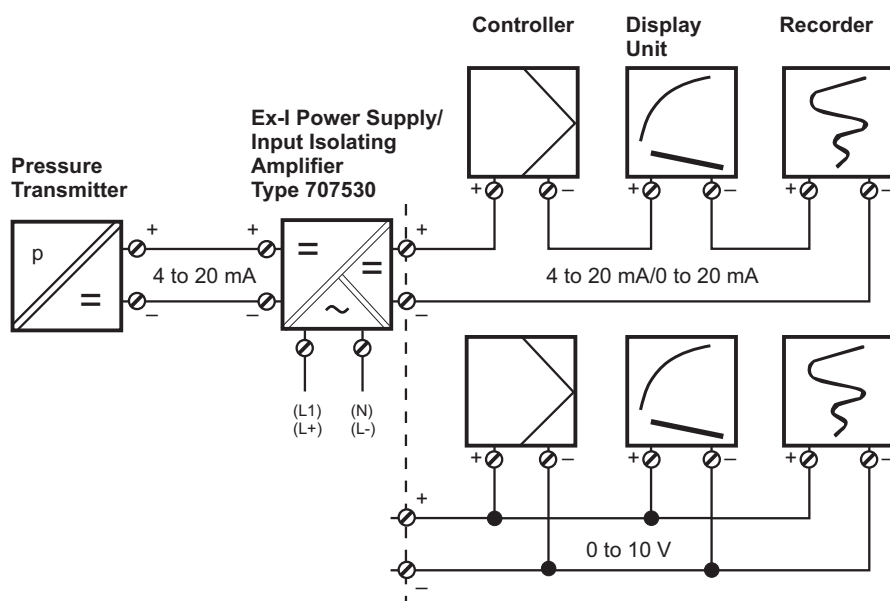
Connection		Terminal assignment (Figure: connection to the pressure transmitter)			
		11 Attached cable	24 Loose stranded wires	36 Round plug M12 x 1	61 Cable socket
4 to 20 mA, two-wire (output 405)					
Voltage supply DC 16 to 28 V	U _B /S+ 0 V/S-	BU BK	BU BK	1 BN 3 BU	1 2
Functional bonding conductor FB ^a		-	-	-	-

^a The pressure transmitter has to be connected to the potential equalization system of the plant via the process connection.

Color coding: connecting cable round plug M12 x 1		1 BN	Brown
		2 WH	White
		3 BU	Blue
		4 BK	Black

The color coding is **only** valid for A-coded standard cables!

Connection example



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Order details

	(1) Basic type
404710/000	JUMO MIDAS S21 Ex – Pressure transmitter for use in Ex-areas
	(2) Input – nominal measuring range
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
432	0 to 30 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
464	0 to 100 bar relative pressure
475	-0.25 to 0 bar relative pressure
476	-0.4 to 0 bar relative pressure
477	-0.6 to 0 bar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
487	0 to 0.6 bar absolute pressure
488	0 to 1 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
998	Special measuring range for absolute pressure
999	Special measuring range for relative pressure
	(3) Output
405	4 to 20 mA, 2-wire
	(4) Process connection
502	G 1/4 according to DIN EN 837
504	G 1/2 according to DIN EN 837 (standard)
511	1/4-18 NPT according to DIN EN 837
512	1/2-14 NPT according to DIN EN 837
521	G 1/4 according to DIN 3852-11
523	G 1/2 according to DIN 3852 T11

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563	7/16-20 UNF interior with valve core handle
583	M20 × 1.5 with pin
999	According to customer specifications
(5)	Process connection material
20	CrNi (stainless steel)
(6)	Electrical connection
11	Attached cable
24	Loose stranded wires
36	Round plug M12 × 1
61	Cable socket DIN EN 175301-803 Form A ^a
99	Special electrical connection
(7)	Extra code
000	None
462	Inverted output signal
591	Restrictor in pressure channel
624	Free from oil and grease
630	Enlarged pressure duct

^a Only certified for gas application.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
Order example	404710/000	-	459	-	405	-	504	-	20	-	11	/	000




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Accessories

Description	Description	Part no.
<p>Ex-i repeater power supply / input isolating amplifier</p> 	<p>The Ex-i repeater power supply / input isolating amplifier is designed for operating intrinsically safe transmitters (Ex-i) and mA current sources installed in potentially explosive (Ex) areas.</p> <p>Two-wire transmitters are supplied with energy and analog 0/4 to 20 mA measured values are transmitted from the Ex-area to the non-Ex-area. The output of the module can be operated actively or passively. Further technical data and the relevant safety requirements are available in the operating manual B 707530.0.</p>	00577948
<p>Cable box, straight</p> 	<p>The PVC connecting cable is 2 m long and has a 4-pin, straight M12 × 1 connector with gold-plated contacts on the device side.</p>	00404585
<p>Cable box, angled</p> 	<p>The PVC connecting cable is 2 m long and has a 4-pin, angled M12 × 1 connector with gold-plated contacts on the device side.</p>	00409334

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JUMO MIDAS S22 Ex

Miniature pressure transmitters for Ex-areas

Applications

- Oil, fuel, natural gas
- Painting plants/robots
- Process technology and process engineering
- Plant engineering
- Testing and laboratory technology
- Chemical industry

These recommendations are based on many years of experience; however, in individual cases they may not be fully applicable. We would be happy to provide further information, including regarding additional applications.

Brief description

The miniature pressure transmitters measures the pressure of gases, vapors, and liquids. The device operates according to the piezoresistive measuring principle. The output signal is a load-independent direct current which is linearly proportional to the input pressure.

The type 404720 meets the requirements:

- of device group II in the potentially explosive area of zones 1 and 2
- of device group III in the potentially explosive area of zones 21 und 22

The test certificate number of the EU type examination certificate is:

SEV 21 ATEX 0537 X

The certificate number of the IECEx certificate of conformity is:

IECEx SEV 21.0011X

Customer benefits

- **Cost saving**
Type pressure transmitter is based on the already well-proven sensor technology of the JUMO MIDAS pressure transmitter series. A high level of automation on the production line ensures consistently high quality and low production costs.
- **Process reliability**
The measuring device was designed and certified according to ATEX directives. Set quality standards ensure a full final inspection within the fully automated measuring and calibration system. High burst pressures up to 400 bar (10 times the measuring span) ensure that the process will operate safely even in the event of damage.
- **Versatility**
A broad spectrum of measuring ranges and a multitude of process connections ensure many variants, which can be specifically adapted to any application.



Type 404720

Special features

- Measuring ranges of 2.5 to 100 bar relative and absolute pressure rating
- ATEX approval
- Welded system
- Compact design type
- Static and dynamic measurements

Approvals and approval marks



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Technical data

General Information

Reference conditions	According to DIN EN 60770-1 and DIN IEC 61298-1
Sensor	
Material	Silicon sensor with stainless steel separating membrane
Pressure transfer medium	Synthetic oil
Admissible load changes	> 10 million
Position	
Mounting position	Any
Calibration position	Device upright, process connection at the bottom

Measuring range and accuracy

Measuring range	Linearity ^a	Accuracy at		Long-term stability ^b	Overload capability ^c	Burst pressure
bar	% MSP ^f	20 °C ^d % MSP	-20 to +80 °C ^e % MSP	% MSP per year	bar	bar
-1 to +1.5 bar relative pressure	0.3	0.5	1.3	≤ 0.2	10	24
-1 to +3 bar relative pressure	0.3	0.5	1.2		20	50
-1 to +5 bar relative pressure	0.3	0.5	1.2		40	60
-1 to +9 bar relative pressure	0.3	0.5	1.0		50	60
0 to 2.5 bar relative pressure	0.3	0.5	1.3		10	24
0 to 4 bar relative pressure	0.3	0.5	1.2		20	50
0 to 6 bar relative pressure	0.3	0.5	1.2		40	60
0 to 10 bar relative pressure	0.3	0.5	1.0		50	60
0 bar to 16 bar relative pressure	0.3	0.5	1.0		100	150
0 bar to 25 bar relative pressure	0.3	0.5	1.0		120	180
0 bar to 40 bar relative pressure	0.3	0.5	1.0		300	400
0 bar to 60 bar relative pressure	0.3	0.5	1.0		300	400
0 bar to 100 bar relative pressure	0.3	0.5	1.0		300	400
0 to 2.5 bar absolute pressure	0.3	0.5	1.3		10	24
0 to 4 bar absolute pressure	0.3	0.5	1.2		20	50
0 to 6 bar absolute pressure	0.3	0.5	1.2		40	60
0 to 10 bar absolute pressure	0.3	0.5	1.0		50	60
0 to 16 bar absolute pressure	0.3	0.5	1.0		100	150
0 to 25 bar absolute pressure	0.3	0.5	1.0		120	180
0 to 40 bar absolute pressure	0.3	0.5	1.0		300	400
0 to 60 bar absolute pressure	0.3	0.5	1.0		300	400
0 to 100 bar absolute pressure	0.3	0.5	1.0		300	400

^a Linearity according to limit point setting = 2 × BFSL (best fit straight line)

^b Reference conditions EN 61298-1

^c All pressure transmitters are vacuum proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value (offset), and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value (offset), measuring range end value, thermal effect on measuring range start (offset), and measuring span

^f MSP = measuring span

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Output

Output signal	
Current	4 to 20 mA, 2-wire
Step response T_{90}	≤ 3 ms
Burden	
4 to 20 mA, 2-wire	$R_B \leq (U_B - 16 \text{ V}) \div 0.022 \text{ A } (\Omega)$
Burden influence	$\leq 0.01 \%$ pro 100 Ω

Mechanical features

Material	
Process connection	316Ti
Protective cap	PVC (for M12 \times 1 with protective cap)
Membrane	316L
Housing	304
Electrical connection	304, PA (for round plug M12 \times 1) 304, PUR (for attached cable)
Cable	PUR
Conductor cross section	0.22 mm ²
Bending radius	Max. 35 mm
Weight	Approx. 55 g
Explosion protection	ATEX: II 2G Ex ib IIC T6 ... T4 Gb ATEX: II 2D Ex ib IIIC T70°C ... T100°C Db IEC Ex: Ex ib IIC T6 ... T4 Gb IEC Ex: Ex ib IIIC T70°C ... T100°C Db

Environmental influences

Admissible temperatures		
Ambient temperature range	Front-flush 10 to 40 °C	Not front-flush -20 °C to +85 °C
Storage temperature range	10 to 40 °C	-20 °C to +85 °C
Medium temperature range	10 to 40 °C	-20 °C to +85 °C
Protection type	IP68 according to DIN EN 60529	
Electromagnetic compatibility ^a		
Interference emission	Class B ^b	
Interference immunity	Industrial requirement	
Mechanical load		
Shock resistance ^c	20 g/11 ms, 50 g for 1 ms	
Vibration resistance ^d	10 g at 10 to 2000 Hz	

^a EN 61326

^b The product is suitable for industrial use as well as for households and small businesses.

^c DIN EN 60068-2-27

^d DIN EN 60068-2-6

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**Electrical data**

Voltage supply U_B^a 4 to 20 mA, 2-wire (output 405)	DC 16 to 28 V
Current consumption	≤ 23 mA
Electrical circuit	Intrinsically safe

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

Approvals and approval marks

ATEX	
Testing agency	Eurofins Electrosuisse Product Testing AG
Certificates/certification numbers	SEV 21 ATEX 0537 X
Inspection basis	DIN EN 60079-0, DIN EN 60079-11
Valid for	Type 404720
IEC Ex	
Testing agency	Eurofins Electrosuisse Product Testing AG
Certificates/certification numbers	IECEX SEV 21.0011X
Inspection basis	IEC 60079-0, IEC 60079-11
Valid for	Type 404720

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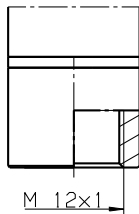
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Process connections

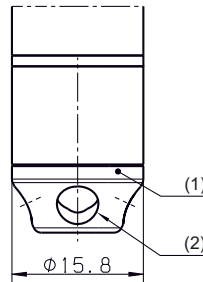
480

M12 × 1 internal



481

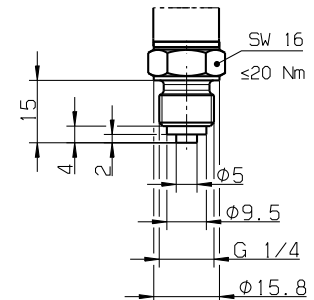
M12 × 1 with protective cap



- (1) Protective cap
- (2) 5× drilled hole Ø 5 mm

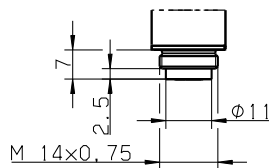
502

G 1/4 according to DIN EN 837



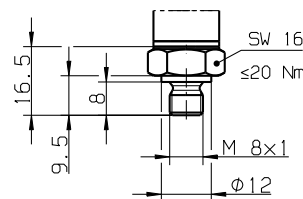
507 (upon request)

M14 × 0.75 front-flush



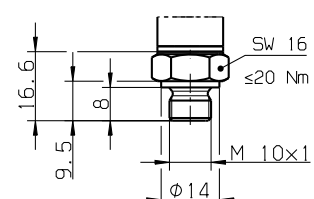
530

M8 (× 1) DIN 3852-1



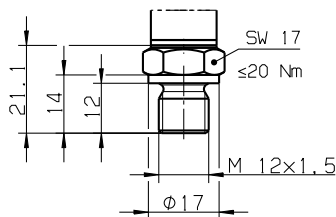
531

M10 (× 1) DIN 3852-1



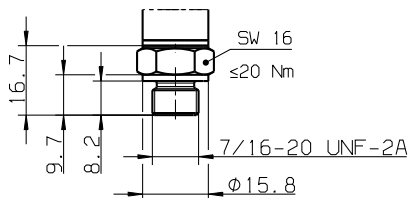
532

M12 (× 1.5) DIN 3852-1



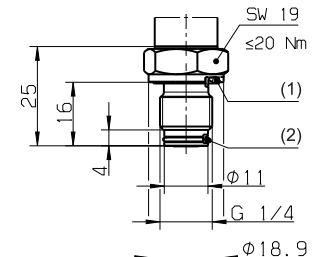
544

7/16-20 UNF-2A



561

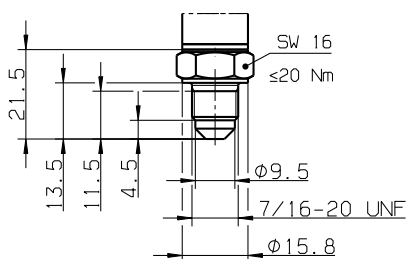
G 1/4 front-flush, double seal



- (1) Profile seal G 1/4
- (2) O-ring 9×1

562

7/16-20 UNF SAE J514



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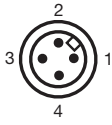


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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment ^a			
					
		11 Attached cable	36 Round plug M12 × 1	Accessories Cable box angled/straight	
				PVC	PUR
4 to 20 mA, 2-wire (output 405)					
Voltage supply DC 16 to 28 V	U _B /S+ 0 V/S-	WH BU	1 3	BN BU	WH BU
Shielding					
Caution: ground the device! Ground all connected devices (such as pumps and valves) to the same potential!		BK	-	-	-

^a Figure: Connection to the pressure transmitter

CAUTION!

Ground (functional grounding) the housing of the pressure transmitter using the process connection to protect against electromagnetic fields and electromagnetic charges!

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Order details

	(1) Basic type
404720	JUMO MIDAS S22 Ex - Miniature Pressure Transmitter for Use in Ex-Areas
	(2) Basic type extension
000	None
	(3) Input – nominal measuring range
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 bar to 16 bar relative pressure
461	0 bar to 25 bar relative pressure
462	0 bar to 40 bar relative pressure
463	0 bar to 60 bar relative pressure
464	0 bar to 100 bar relative pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
505	0 to 40 bar absolute pressure
506	0 to 60 bar absolute pressure
507	0 to 100 bar absolute pressure
998	Special measuring range for absolute pressure
999	Special measuring range for relative pressure
	(4) Output
405	4 to 20 mA, 2-wire
	(5) Process connection
480	M12 × 1 internal
481	M12 × 1 with protective cap
502	G 1/4 according to DIN EN 837
507	M14 × 0.75 front-flush (upon request)
530	M8 (× 1) DIN 3852-1
531	M10 (× 1) DIN 3852-1
532	M12 (× 1.5) DIN 3852-1
544	7/16-20 UNF-2A
561	G 1/4 front-flush, double seal
562	7/16-20 UNF SAE J514

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(6) Process connection material	
20	CrNi (stainless steel)
(7) Electrical connection	
11	Attached blue cable ^a
36	Round plug M12 × 1
(8) Extra codes	
000	None
462	Inverted output signal
591	Choke in the pressure channel
624	Oil and grease free
630	Enlarged pressure channel

^a The standard cable length is 2 m. Further lengths are available upon request.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
Order code		/		-		-		-		-		-		/	
Order example	404720	/	000	-	459	-	405	-	502	-	20	-	11	/	000

Accessories

Designation	Description	Part no.
Ex-i repeater power supply/input isolating amplifier 	The Ex-i repeater power supply/input isolating amplifier is designed for operating intrinsically safe transmitters (Ex-i) and mA current sources installed in potentially explosive (Ex) areas. Two-wire transmitters are supplied with energy and analog 0/4 to 20 mA measured values are transmitted from the Ex-area to the non-Ex-area. The output of the module can be operated actively or passively. Further technical data and the relevant safety requirements are available in the operating manual B 707530.0.	00577948
Cable box, straight 	The gray PVC connecting cable is 2 m in length and has a 4-pole, straight M12 × 1 connector with gold-plated contacts on the device side. The blue PUR connecting cable is 2 m in length and has a 4-pole, straight M12 × 1 connector with gold-plated contacts on the device side. A pressure equalization hose that is used for versions with a relative pressure range is included in the cable.	00404585 00693035
Cable box, angled 	The gray PVC connecting cable is 2 m in length and has a 4-pole, angled M12 × 1 connector with gold-plated contacts on the device side. The blue PUR connecting cable is 2 m in length and has a 4-pole, angled M12 × 1 connector with gold-plated contacts on the device side. A pressure equalization hose that is used for versions with a relative pressure range is included in the cable.	00409334 00693038

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JUMO dTRANS p33

Pressure Transmitter or Level Probe for use in hazardous areas

Description

The pressure transmitter measures the pressure in both corrosive and non-corrosive gases, vapors, liquids and dusts. It operates on the piezoresistive measuring principle. The output signal is a DC current that is proportional to the input pressure.

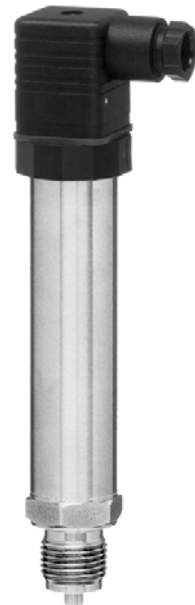
The pressure transmitter fulfills the following requirements for equipment group II:

- In zone 1 and 2 areas with an explosion hazard arising from gas (**Gas**).
The pressure connection (process connection) may, however, also be mounted on to zone 0.
- In zone 21 and 22 areas with an explosion hazard arising from dust (**Dust**).
The pressure connection (process connection) may, however, also be mounted on to zone 20.

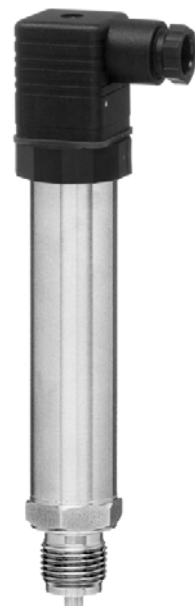
The pressure transmitter can also be used as a level probe.

- Explosion group II, category 2G with extra code 406
- Explosion group II, category 1G with extra code 407

The device is certified according to EHEDG in the versions with process connections (clamp) DN 25, 32, 40 and 50 as well as VARIVENT.



Type 404753/000-xxx-405-504-20-61-1/000



Type 404753/000-xxx-405-504-20-61-1/000

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Approvals

	Designation	ATEX
	Testing agency	Eurofins Electric & Electronic Product Testing AG
	Certificate no.	SEV 09 ATEX 0140 X
	Inspection basis	EN IEC 60079-0:2018, EN 60079-11:2012, EN 60079-26:2015
	Mark	II 1/2G Ex ia IIC T6...T4 Ga/Gb (without extra code 406 and 407), II 1/2D Ex ia IIIC T60 °C...T100 °C Da/Db (without extra code 406 and 407), II 2G Ex ia IIC T6...T4 Gb (with extra code 406), II 1G Ex ia IIB T6...T4 Ga (with extra code 407)
	Valid for	Type 404753
	Designation	UKEX
	Testing agency	Bureau Veritas
	Certificate no.	EPS 22 UKEX 1 371 X
	Inspection basis	EN IEC 60079-0:2018, EN 60079-11:2012, EN 60079-26:2015
	Mark	II 1/2G Ex ia IIC T6...T4 Ga/Gb (without extra code 406 and 407), II 1/2D Ex ia IIIC T60 °C...T100 °C Da/Db (without extra code 406 and 407), II 2G Ex ia IIC T6...T4 Gb (with extra code 406), II 1G Ex ia IIB T6...T4 Ga (with extra code 407)
	Valid for	Type 404753
	Designation	EACEx
	Testing agency	ПрофиТест/ProfiTest
	Certificate no.	RU C-DE.HB07.B.00659/22
	Inspection basis	TP TC 012/2011
	Valid for	Type 404753 with extra code 240
	Designation	EHEDG
	Testing agency	Research Center Weihenstephan for Brewing and Food Quality
	Certificate no.	EL Class 1/EHEDG-C2000058
	Inspection basis	EHEDG design specifications (Doc. 8 – Hygienic Design Principles) EHEDG tests for verifying ease of cleaning (Doc. 2, Third Edition, July 2004, updated June 2007)
	Valid for	Process connection 613 Clamping socket DN 25, DN 32, DN 40, with Tri-Clamp seal Combifit International B.V. Process connection 616 Clamping socket DN 50, with Tri-Clamp seal Combifit International B.V. Process connection 685 VARIVENT, type F, DN 32/25, with EPDM O-ring

Observe "Special conditions for safe use" in hazardous areas.

Certificates for approved device versions are available for download on the manufacturer's website.

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Technical data

Electrical data

Voltage supply	
Current	4 to 20 mA, two-wire
Voltage	DC 11 to 28 V (from intrinsically safe circuit) ^a $U_{\max} \leq 28 \text{ V}$ $I_{K \max} \leq 120 \text{ mA}$ Residual ripple: The voltage peaks must not go above or below the limits specified for the voltage supply.
Voltage supply influence	$\leq 0.03 \text{ %/V}$
Max. current consumption	$\leq 45 \text{ mA}$ (at DC 24 V)

^a Intrinsically safe circuit in conjunction with Ex-i Power supply/input isolating amplifier, type 707530

Measuring range and accuracy

Ambient temperature influence for measuring range 0.25 and 0.4 bar	
Zero point	$\leq 0.03 \text{ %/K}$ typical, $\leq 0.05 \text{ %/K}$ max.
Measuring span (MSP)	$\leq 0.02 \text{ %/K}$ typical, $\leq 0.04 \text{ %/K}$ max.
For measuring ranges from 0.6 bar	
Zero point	$\leq 0.02 \text{ %/K}$ typical, $\leq 0.04 \text{ %/K}$ max.
Measuring span	$\leq 0.02 \text{ %/K}$ typical, $\leq 0.04 \text{ %/K}$ max.
Deviation from characteristic line	$\leq 0.5 \text{ % MSP}$ (limit point setting)
Hysteresis	$\leq 0.1 \text{ % MSP}$
Stability per year	$\leq 0.5 \text{ % MSP}$
Zero signal offset	$\leq 0.3 \text{ % MSP}$
Thermic hysteresis	
For measuring ranges $\leq 0.6 \text{ bar}$	$\leq \pm 1 \text{ % MSP}$
For measuring ranges $> 0.6 \text{ bar}$	$\leq \pm 0.5 \text{ % MSP}$
Overload limit	
For measuring ranges $< 100 \text{ bar}$	4 times the measuring range end value
For measuring ranges $\geq 100 \text{ bar}$	2 times the measuring range end value
Burst pressure	10 times the measuring range end value, 2000 bar max.

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Environmental influences

Ambient temperature	-40 to +85 °C
Medium temperature	
Standard	-40 to +85 °C
For type 404753/004	-40 to +200 °C ^a
With extra code 406	-40 to +70 °C
With extra code 407	-40 to +70 °C
Storage temperature	-40 to +85 °C
Vibration resistance	DIN IEC 68-2-6, DIN IEC 68-2-27
Mechanical vibration	Max. 10 g at 15 to 2000 Hz
Mechanical shock	100 g for 1 ms
Protection type	DIN EN 60529
With connector screwed on	IP65
With extra code 406	IP68
With extra code 407	IP68
Electromagnetic compatibility (EC)	DIN EN 61326-1:2013, DIN EN 61326-2-3:2013
Interference emission	Class B ^b
Interference immunity	Industrial requirements

^a For temperature specifications, see process connections front-flush.

^b The product is suitable for industrial use as well as for households and small businesses.

Mechanical features

Reference conditions	DIN 16086, DIN IEC 770/5.3
Material	
Housing	Stainless steel 304
Parts in contact with medium	
Standard	Stainless steel 316 L, 316 Ti
For range ≥ 60 bar	Stainless steel 316 Ti, 630
With extra code 406	Cable material PE (polyethylene), standard
Weight	350 g with process connection G 1/2"
Rated position	
Level probe	Vertical hanging
Pressure transmitter	Vertical standing
Mounting position	
Pressure transmitter	Any

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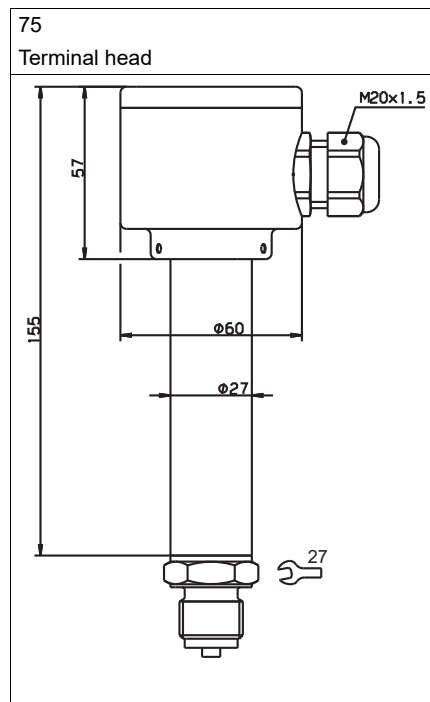
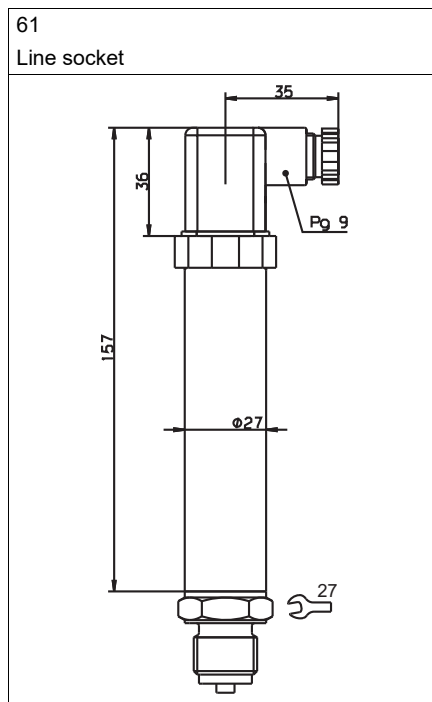
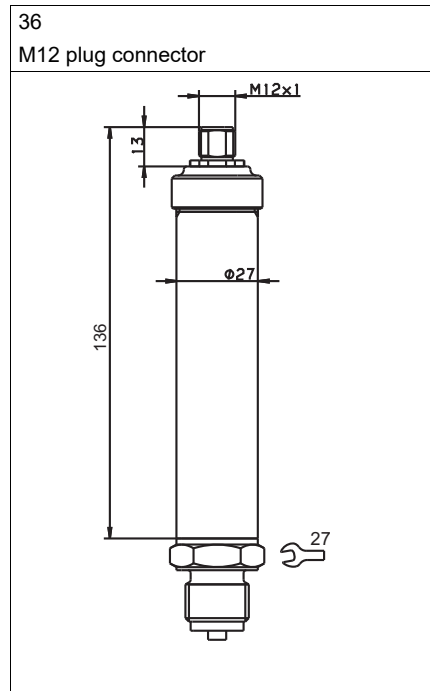
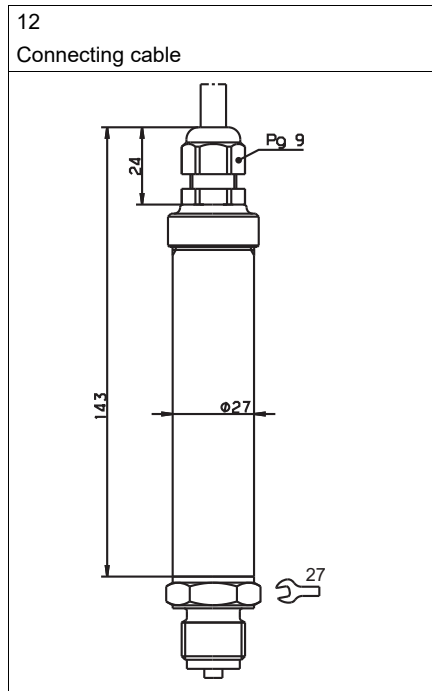
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Dimensions

Device



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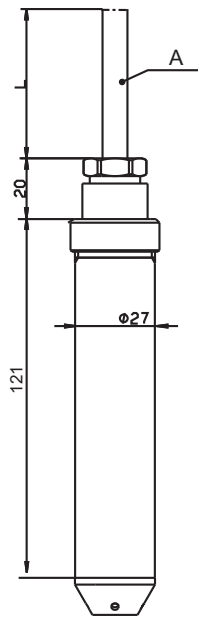
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**Extra code 406**

Level probe: IP68 protection,
attached connecting cable,
class 2G, zone 1

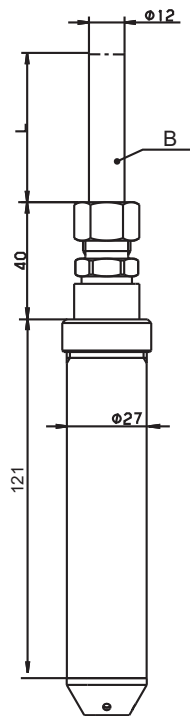


A Attached connecting cable

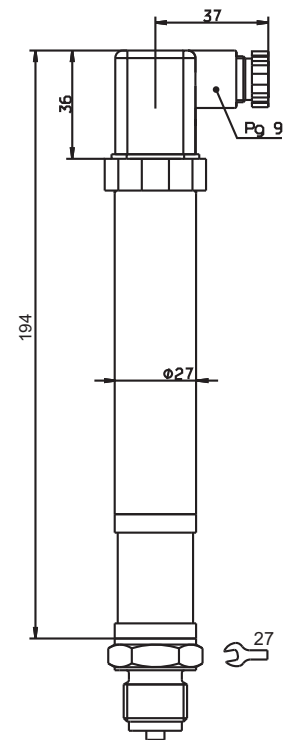
B Customer-supplied protection tube, see Operating Instructions

Extra code 407

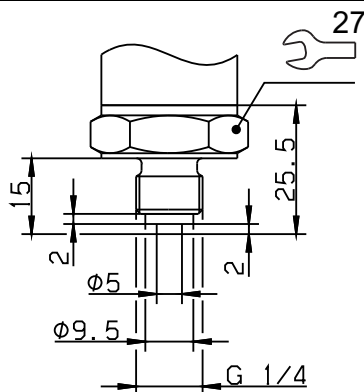
Level probe: IP68 protection,
attached connecting cable,
class 1G, zone 0

**Basic type extension 004**

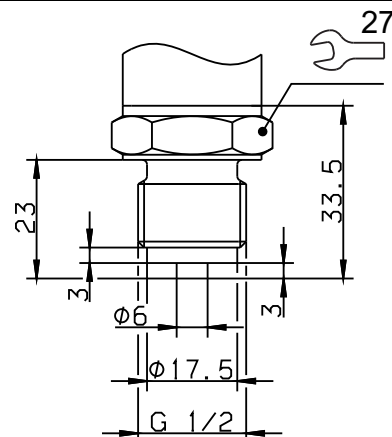
for elevated temperature of medium

**Process connections****Not front-flush****Process connection 502**

G 1/4"

**Process connection 504**

G 1/2"



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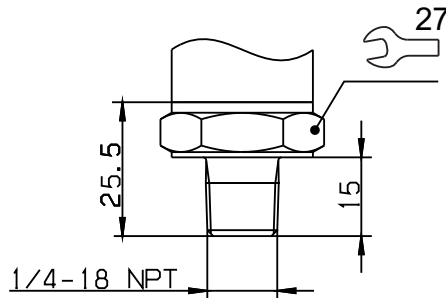
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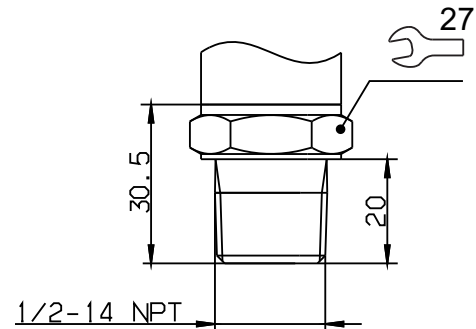
Process connection 511

1/4-18 NPT



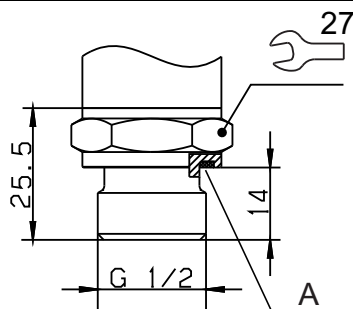
Process connection 512

1/2-14 NPT



Process connection 23

G 1/2"

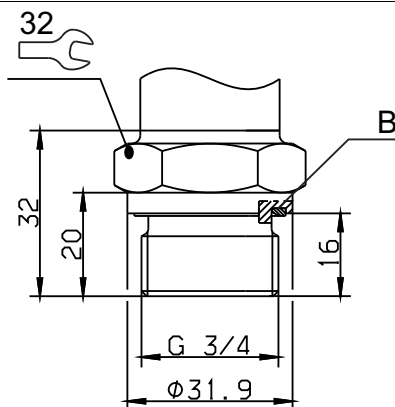


A Profile seal ring DN G 1/2"

Front-flush

Process connection 571

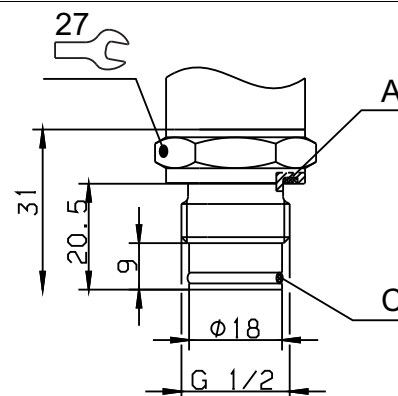
G 3/4"



B Profile seal DN G 3/4"

Process connection 574

G 1/2" with double seal



A Profile seal DN G 1/2"

C O-ring 14 × 1.78

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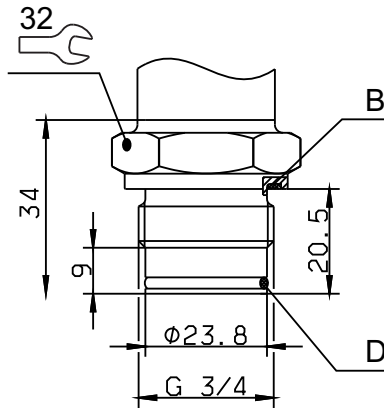
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Process connection 575

G 3/4" with double seal

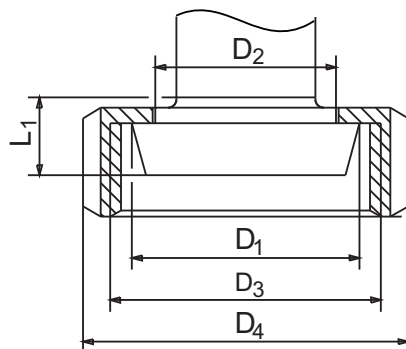


B Profile seal DN G 3/4"

D O-ring 20.35 × 1.78

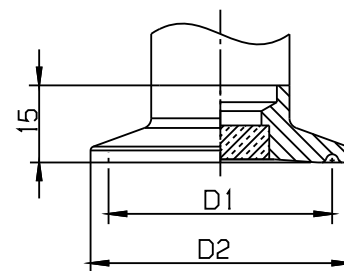
Process connection 603 to 607

Taper socket



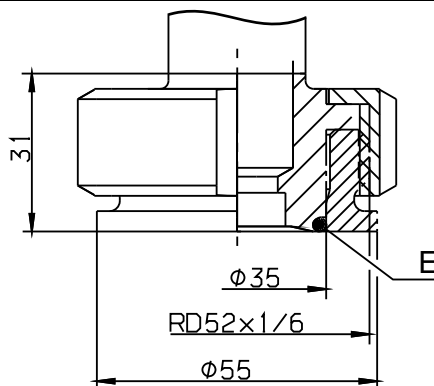
Process connection 612, 613, 616

Clamping socket



Process connection 652

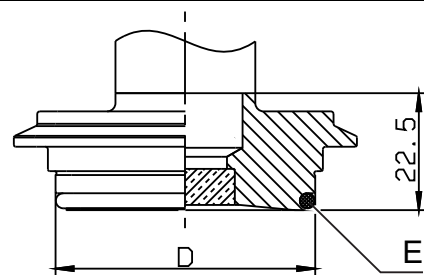
Tank connection with grooved union nut



E O-ring 29.82 × 2.62

Process connection 685

VARIVENT connection



D O-ring 44 × 2.5

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Process connection	DN	Ø D ₁	Ø D ₂	Ø D ₃	Ø D ₄	L ₁
603	20	36.5	30	RD 44 × 1/6	54	13
604	25	44	35	RD 52 × 1/6	63	15
605	32	50	41	RD 58 × 1/6	70	15
606	40	56	48	RD 65 × 1/6	78	15
607	50	68.5	61	RD 78 × 1/6	92	16

Process connection	DN	Ø D ₁	Ø D ₂
612	20	27.5	34
613 ^a	25	43.5	50.5
616 ^a	50	56.5	64

^a Certified according to EHEDG

Process connection	DN	Ø D
685 ^a	25 to 30	50

^a Certified according to EHEDG

Process connection	Designation	Max. pressure	Temperature
571	G 3/4" front-flush DIN EN ISO 228.1	25 bar	-10 to +150 °C
		40 bar	-10 to +100 °C
574	G 1/2" front-flush with souble seal	25 bar	-10 to +150 °C
		40 bar	-10 to +100 °C
575	G 3/4" front-flush with souble seal	25 bar	-10 to +150 °C
		40 bar	-10 to +100 °C
576	G 1" front-flush with souble seal	40 bar	-10 to +100 °C
603	Taper socket DN 20 DIN 11851 form SC/SD	40 bar	-10 to +140 °C
604	Taper socket DN 25 DIN 11851 form SC/SD	40 bar	-10 to +140 °C
605	Taper socket DN 32 DIN 11851 form SC/SD	40 bar	-10 to +140 °C
606	Taper socket DN 40 DIN 11851 form SC/SD	40 bar	-10 to +140 °C
607	Taper socket DN 50 DIN 11851 form SC/SD	25 bar	-10 to +140 °C
612	Clamp DN 10/15/20 DIN 32676 row A	25 bar	-10 to +140 °C
613	Clamp DN 25/32/40 DIN 32676 row A	25 bar	-10 to +140 °C
616	Clamp DN 50 DIN 32676 row A	16 bar	-10 to +140 °C
652	Tank connection with grooved union nut DN 25	25	Up to 150 °C
		40	Up to 100 °C
685	VARIVENT connection DN 32/25	25	Depends on seal material

Data for pressure and temperature range according to DIN standard. The temperature range depends on the sealing material and the pressure range.

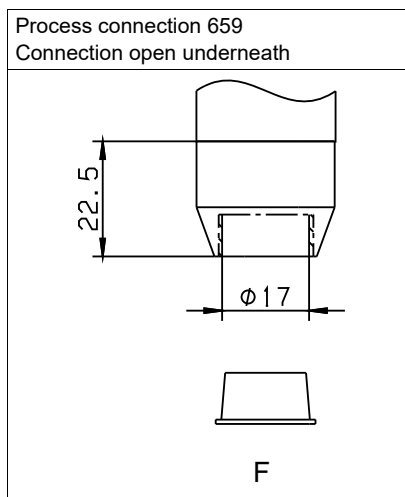
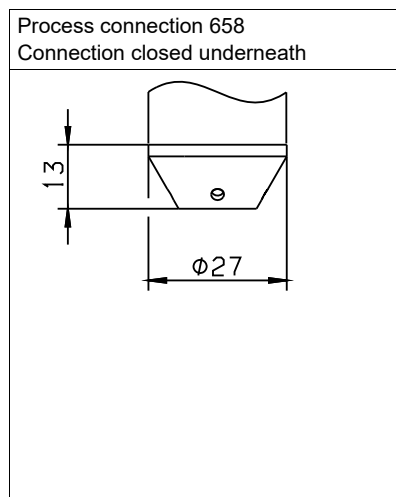
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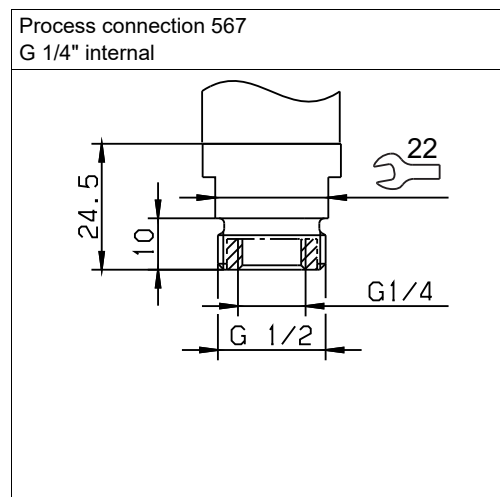
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Level probe



F Protective cap



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Connection elements

The connection elements in the data sheet provide information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

	Connecting cable	M12 plug connector	Line socket	Terminal head

Terminal assignment

Designation	Description	Assignment ^a			
4 to 20 mA, two-wire, voltage supply DC 11 to 28 V intrinsically safe	U _B /S+ 0 V/S-	WH (White) GY (Grey)	1 BN (Brown) 3 BU (Blue)	1 2	1 2
Potential equilibration (FE)			2	^b	3
Screen: A shielded cable must be used for the connection! The shield must be grounded on both sides!		BK			

^a The color coding is only valid for A-coded standard cables!

^b Symbol on line socket

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Order details

(1) Basic type	
404753/000	JUMO dTRANS p33 – Pressure transmitter or level probe for use in hazardous areas
404753/004	JUMO dTRANS p33 – Pressure transmitter or level probe for use in hazardous areas, for elevated medium temperatures up to 200 °C ^a
(2) Input	
451	0 to 0.25 bar relative pressure
452	0 to 0.4 bar relative pressure
453	0 to 0.6 bar relative pressure
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 to 16 bar relative pressure
461	0 to 25 bar relative pressure
462	0 to 40 bar relative pressure
463	0 to 60 bar relative pressure
464	0 to 100 bar relative pressure
465	0 to 160 bar relative pressure
466	0 to 250 bar relative pressure
467	0 to 400 bar relative pressure
468	0 to 600 bar relative pressure
475	-0.25 to 0 bar relative pressure
476	-0.4 to 0 bar relative pressure
477	-0.6 to 0 bar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
487	0 to 0.6 bar absolute pressure
488	0 to 1 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
998	Special range absolute pressure
999	Special range relative pressure
(3) Output	
405	4 to 20 mA, two-wire
(4) Process connection	
502	G 1/4" to DIN EN 837
504	G 1/2" to DIN EN 837

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511	1/4-18 NPT to DIN EN 837
512	1/2-14 NPT to DIN EN 837
523	G 1/2" to DIN 3852-11
567	Level probe: G 1/4" internal ^{b, c}
571	G 3/4" front-flush to DIN EN ISO 228-1 ^d
574	G 1/2" front-flush with double seal ^e
575	G 3/4" front-flush with double seal ^f
576	G 1" front-flush with double seal ^f
603	Taper socket with union nut to DIN 11851, DN 20 (dairy pipe fitting) ^g
604	Taper socket with union nut to DIN 11851, DN 25 (dairy pipe fitting) ^g
605	Taper socket with union nut to DIN 11851, DN 32 (dairy pipe fitting) ^g
606	Taper socket with union nut to DIN 11851, DN 40 (dairy pipe fitting) ^g
607	Taper socket with union nut to DIN 11851, DN 50 (dairy pipe fitting) ^h
612	Clamping socket DN 10, DN 15, DN 20, DIN 32676 ^h
613	Clamping socket DN 25, DN 32, DN 40, with Tri-Clamp seal Combifit International B.V., certified according to EHEDG ^h
616	Clamping socket DN 50, with Tri-Clamp seal Combifit International B.V., certified according to EHEDG ⁱ
652	Tank connection with union nut, DN 25 ^j
658	Level probe: connection closed underneath ^{b, k}
659	Level probe: connection open underneath ^{b, k}
685	VARIVENT, type F, DN 32/25, with EPDM O-ring, certified according to EHEDG ⁱ
(5) Material of process connection	
20	CrNi (stainless steel)
(6) Electrical connection	
12	Connecting cable, screened
36	M12 plug connector
61	Line socket to DIN EN 175301-803, form A
75	Terminal head
(7) Filling medium for measurement system	
0	None
1	Silicone oil
(8) Calibration certificate	
j	With
n	None (standard)
(9) Extra code	
085	UKCA Ex approval
240	EAC Ex approval
406	Level probe: IP68 protection, attached cable, class 2G, zone 1 ^m
407	Level probe: IP68 protection, attached cable, class 1G, zone 0 ^{m, n}
452	Parts in contact with the medium electro-polished
624	Free of oil and grease
634	TAG number
954	Technical passport

^a The basic type 404753/004 is not available with inputs 451, 452, 453, 454, 465, 466, 467, 468, 475, 476, 477, 487, 488, and process connections 571, 574, 575, 603, 604, 605, 606, 607, 612, 613, 616, 652.

^b The process connections 567, 658, 659 are only available with inputs 451, 452, 453, 454, 455, 456, 457, 458, 459.

^c The process connection 567 is not available in conjunction with extra code 407.

^d The process connection 571 is not available with inputs 463, 464, 465, 466, 467, 468 (up to 40 bar and temperature range -10 to +100 °C).

^e The process connection 574 is not available with inputs 451, 452, 453, 463, 464, 465, 466, 467, 468, 475, 476, 477, 487 (up to 40 bar and temperature range -10 to +100 °C).

^f The process connection 574 is not available with inputs 451, 452, 453, 463, 464, 465, 466, 467, 468, 475, 476, 477, 487 (up to 40 bar and temperature range -10 to +100 °C).

^g The process connections 603, 604, 605, 606 are not available with inputs 463, 464, 465, 466, 467, 468 (up to 40 bar and temperature range -10 to +140 °C).





JUMO DELOS SI

Precision pressure transmitter with switching contacts and display

Application

- Food & pharma
- CIP/SIP systems
- Machine and system construction
- Air conditioning and refrigeration system construction

Brief description

The JUMO DELOS SI high-precision, electronic pressure switch with analog output meets technical requirements relevant to hygiene. In a readily cleanable design and with a front-flush, seal-free measuring system, it is specifically geared to hygienic process safety standards. The nominal measuring ranges set at the factory extend from 400 mbar to 60 bar. They can be rescaled in the ratio 1:4, allowing the user to perform several measurement tasks with just one measuring instrument.

The following output variants are available, depending on the application: 1× PNP or 2× PNP switching outputs or 1× PNP switching output and an analog output signal.

The process pressure is visualized by a large, positively lit LC display.

Configuration can simply be performed on the measuring instrument, or by using the more convenient setup program. The enclosure can be rotated $\pm 160^\circ$ to make it easier to read, and the display can be rotated 180° for overhead mounting.

A high-temperature variant is available for hot media up to 200°C (CIP and SIP cleaning systems).

The device is certified according to EHEDG in the versions with process connections (clamp) DN 25, 32, 40, and 50 as well as JUMO PEKA.



Type 405052

Customer benefits

- **Process safety**
An hygienic design, with parts in contact with the medium made from stainless steel. The system has no dead zones, which prevents microbial contamination and ensures maximum process safety for hygienic processes.
- **Uncomplicated and time-saving**
Save time with easy, local measuring instrument configuration or configuration via a more convenient setup program.
- **Flexible**
The enclosure can be turned $\pm 160^\circ$ and the display rotated 180° for user-friendly and individual alignment of the measuring instrument for optimum readability, configuration and electrical installation in any mounting position, as well as for running an auto-zero function.

Special features

- Linearity from 0.1 % of MSP (measuring span)
- Scaling of measuring range 1:4
- Large, brilliant two-color display with alarm function
- Time-saving and simple configuration on the instrument or via a more convenient setup program
- Flexible mounting variance by rotating the display (180°), followed by auto zeroing
- Enclosure can be turned ($\pm 160^\circ$) to improve readability
- Option for increased medium temperature up to 200°C (SIP and CIP capability)

Approvals and approval marks (see "Technical data")



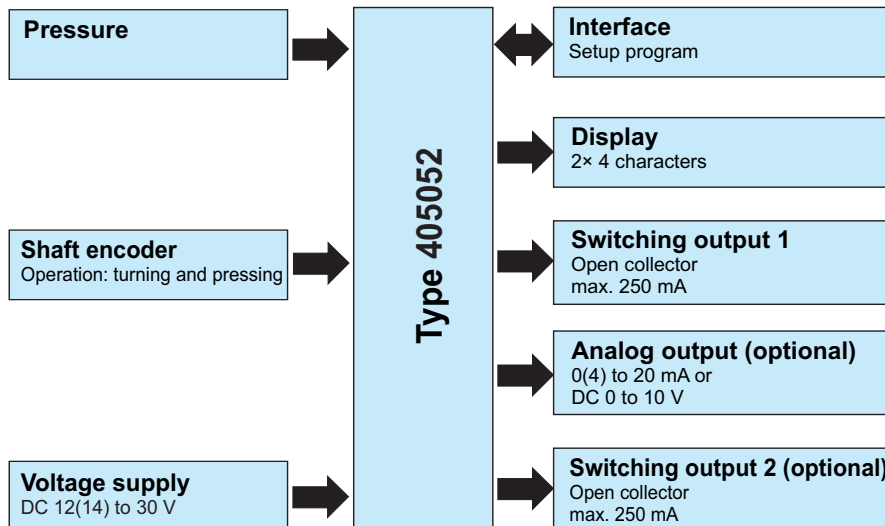
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Block diagram



Technical data

General Information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor system	Silicon sensor with stainless steel separating diaphragm
Pressure transfer means	Synthetic oil (silicon oil), FDA-compliant oil
Permissible load changes	> 10 million
Location	
Mounting position	Any
Position-dependent zero point offset	Device standing upright, process connection on bottom
Basic type 000 standard	≤ 1 mbar
Basic type 004 high-temperature design	≤ 10 mbar
Display	Positively lit display
Alignment	Display can be rotated 180° via software Enclosure rotatable ±160° (use the combination tool supplied)
Size	Display field 16 × 26 mm, font size 7 mm, 2× 4-digit
Color	Normal operation: amber-colored
Switching state display	K1, K2
Measuring unit	mbar, bar, kPa, MPa, psi, %
Operation	
Local	Via control element under the screw plug with combination tool or 0.5 × 3 screwdriver or 2AF hex key
Setup interface	Pin 5 of the M12 × 1 round plug

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Measuring range and accuracy

Nominal measuring range bar	Linearity ^a % MSP	Accuracy at 20 °C ^d -20 to +75 °C ^e		Long-term stability ^b % MSP per year	Overload capacity ^c bar	Burst pres- sure bar
0 to 0.4 bar relative pressure	0.15	0.35	0.7	≤ 0.2	1.6	2
0 to 1 bar relative pressure	0.15	0.3	0.6		4	5
0 to 4 bar relative pressure	0.1	0.25	0.5		16	20
0 to 10 bar relative pressure	0.1	0.25	0.5		40	50
0 to 25 bar relative pressure	0.1	0.25	0.5		100	125
0 to 60 bar relative pressure	0.1	0.25	0.5		240	300
-0.4 to +0.4 bar relative pressure	0.15	0.35	0.7		1.6	2
-1 to +1 bar relative pressure	0.15	0.3	0.6		4	5
-1 to +3 bar relative pressure	0.1	0.25	0.5		16	20
-1 to +9 bar relative pressure	0.1	0.25	0.5		40	50
-1 to +24 bar relative pressure	0.1	0.25	0.5		100	125
0 to 0.4 bar absolute pressure	0.15	0.35	0.7		1.6	2
0 to 1 bar absolute pressure	0.15	0.3	0.6		4	5
0 to 4 bar absolute pressure	0.1	0.25	0.5		16	20
0 to 10 bar absolute pressure	0.1	0.25	0.5		40	50
0 to 25 bar absolute pressure	0.1	0.25	0.5		100	125
0 to 60 bar absolute pressure	0.1	0.25	0.5		240	300

^a Linearity according to limit point setting

^b Reference conditions DIN EN 61298-1

^c All pressure transmitters are vacuum-proof.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^e Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

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 Internet: www.jumousa.com



Outputs

All analog outputs in 3-wire technology/Switching outputs: open collector, PNP switching

Attenuation	0 to 99.99 s
Analog output	
Current	
Output 475	4 to 20 mA (and 1× PNP switching output)
Output 476	0 to 20 mA (and 1× PNP switching output)
Voltage	
Output 477	0 to 10 V (and 1× PNP switching output)
Setting range	Measurement range scaling (turn down) 1:4
Switching point	Configurable in the nominal measuring range (> release point)
Release point	Configurable in the nominal measuring range (< switching point)
Hysteresis	Configurable in the nominal measuring range
Input delay	0 to 99.99 s
Burden	
Current	
4 to 20 mA, three-wire (output 475)	$RL \leq (U_B - 6.5 \text{ V}) \div 0.022 \text{ A } (\Omega)$
0 to 20 mA, three-wire (output 476)	$RL \leq (U_B - 6.5 \text{ V}) \div 0.022 \text{ A } (\Omega)$
Voltage	
DC 0 bis 10 V, three-wire (output 477)	$RL \geq 10 \text{ k}\Omega$
Step response time (analog input)	
T_{90}	$\leq 100 \text{ ms}$
Switching output	
Output 470, 475, 476 or 477	1× PNP switching output
Output 471	2× PNP switching outputs
Switching type	Break contact/make contact
Switching function	Window/hysteresis
Switching capacity	
Voltage drop from U_B	$PNP \leq 2 \text{ V}$
Contact rating	$ON \leq 250 \text{ mA/OFF} \leq 1 \text{ mA}$
Switching cycles	> 10 million
Response time	$\leq 20 \text{ ms}$
Short-circuit proof	Yes
Current load check	
Pulse period	2 s; $T_{ON} 40 \text{ ms}$
Periodic protective circuit with overcurrent	$f = 0.5 \text{ Hz}$ Display: Err3 switching output K 1, Err4 switching output K 2

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Mechanical features

Process connection	
Material	Stainless steel 316 L
Surface	Ra ≤ 0.8 µm
Process seal	All flange connections are welded and therefore have no seals!
Process connection 521, 523, 571, 576, 652	FPM as standard
Process connection 575	FPM as standard, O-ring at front
Process connection 997 (JUMO PEKA)	FPM, VMQ, silicon EPDM; FDA-compliant, options see data sheet 409711
Measuring diaphragm	
Material	Stainless steel 316 L
Surface	Ra ≤ 0.8 µm
Housing	
Material	Stainless steel 316 L
Surface	Ra ≤ 0.8 µm
Threaded sleeve M12 × 1	Stainless steel 316 L
Housing seal	VMQ silicon; FDA-compliant
Display	PA (polyamide)
Control element screw plug	
Material	Aluminum 3.2315
Surface	Eloxal coating
Seal	VMQ silicon; FDA-compliant
Weight	200 g with G 1/2 (process connection 504)

Environmental influences

Permissible temperatures	
Medium	-25 to +100 °C (135 °C max 1 hour/day; no function here)
For basic type extension 004	-25 to +200 °C
Environment	-25 to +75 °C
Ambient temperature -50 °C	Restricted function: stationary use only, danger of broken cable, display does not function
Storage	-40 to +85 °C
Permissible relative humidity	
In operation	100 % rel. humidity, including condensation of instrument outer sleeve
Storage	90 % rel. humidity, no condensation
Permissible mechanical loading	According to IEC 60068-2-6, IEC 60068-2-27
Vibration resistance	20 g, 10 to 2000 Hz
Shock resistance	50 g for 11 ms/100 g for 1 ms
Electromagnetic compatibility	According to DIN EN 61326-2-3, with 4-pin connecting cable and grounded enclosure only!
Interference emission	Class B ^a
Interference immunity	Industrial requirements
Protection	IP67, according to DIN EN 60529 (with suitable mating piece when connected)

^a The product is suitable for industrial use as well as for households and small businesses.

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Electrical data

Voltage supply U_B^a 0 to 20 mA, three-wire 4 to 20 mA, three-wire 0 to 10 V, three-wire Less than the permitted voltage supply Reverse polarity protection	Nominal voltage DC 24 V DC 12 to 30 V DC 12 to 30 V DC 14 to 30 V Display Err 5 YES
Power consumption	≤ 45 mA without load, ≤ 545 mA with load 2× PNP
Electrical connection	Round plug M12 × 1, 4-pin, A-coded (for assignment see chapter "Connection diagram", Page 10)
Circuit Requirements	SELV The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

^a Residual ripple: Peak voltages must not exceed or fall below the values specified for the voltage supply!

Approvals and approval marks

EHEDG Test facility Certificate/Certification number Inspection basis Valid for	Research Center Weihenstephan for Brewing and Food Quality EL Class 1/EHEDG-C2000058 (2020-11-06) EHEDG design specifications (doc. 8 – Hygienic Design Principles) EHEDG tests for verifying ease of cleaning (doc. 2, Third Edition, July 2004, updated June 2007) Process connection 613 (Clamp DN 25, 32, 40), Process connection 616 (Clamp DN 50), Process connection 997 (JUMO PEKA hygienic process connection)
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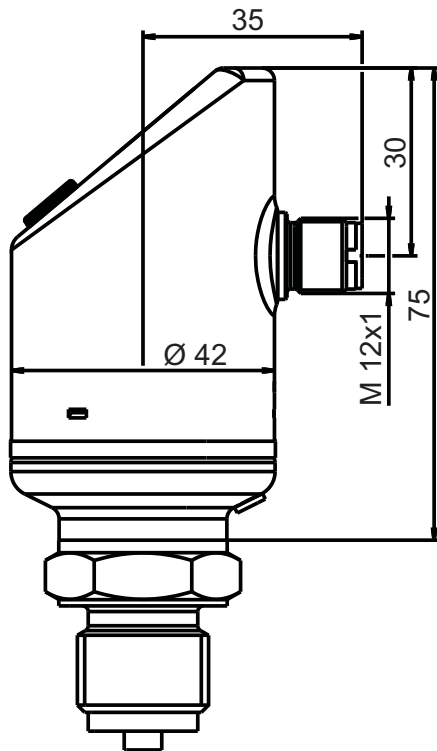
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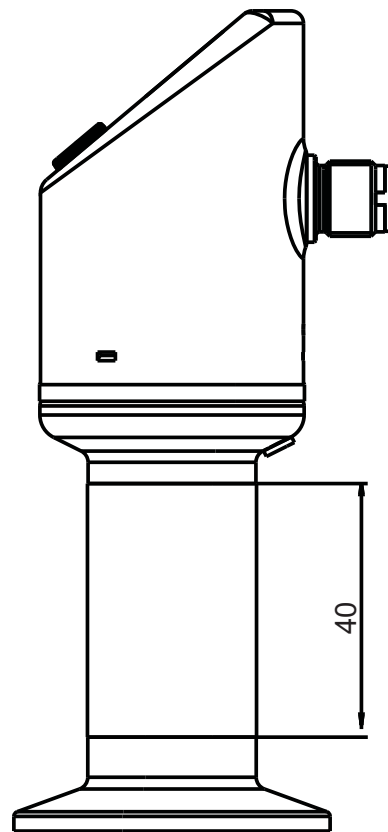
Dimensions

Type 405052/000-...



Type 405052/004-...

for increased measuring material temperatures



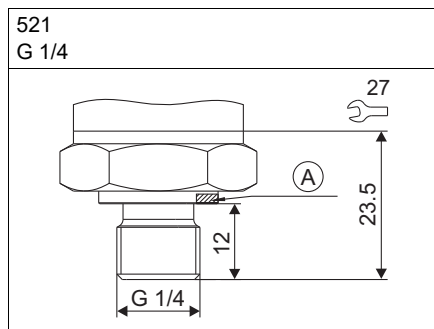
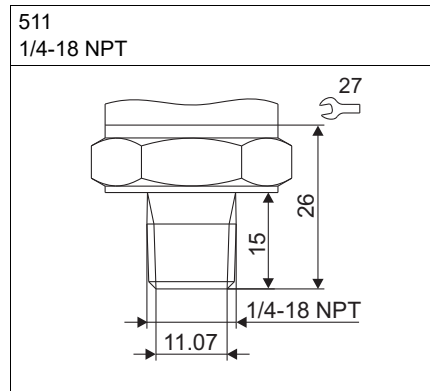
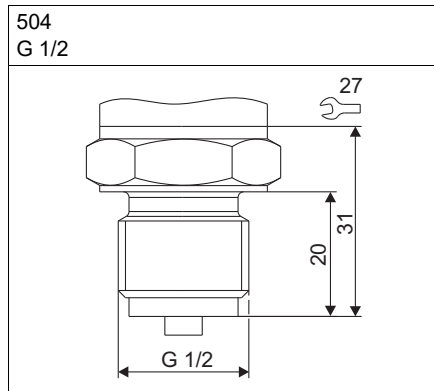
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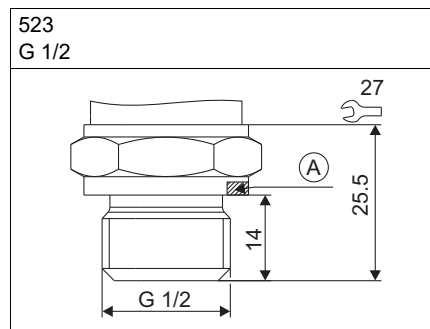
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Process connections, not front-flush

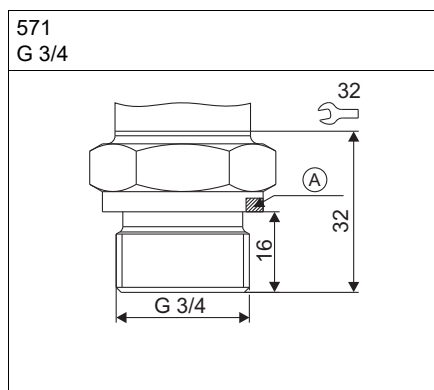


A Profile seal DN G 1/4

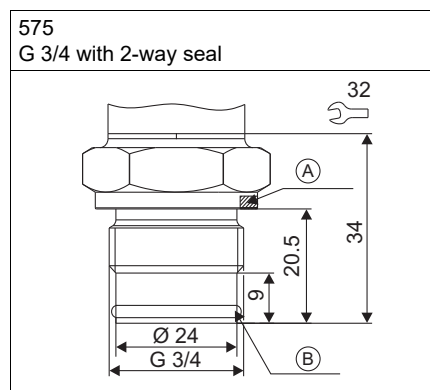


A Profile seal DN G 1/2

Process connections, front-flush

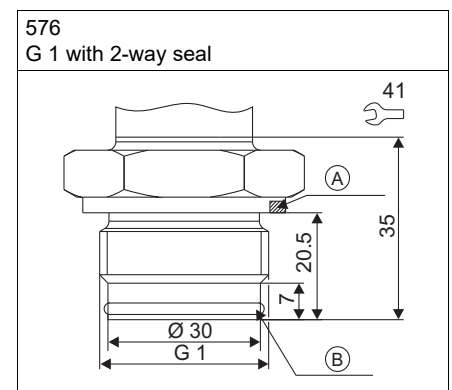


A Profile seal DN G 3/4



A Profile seal DN G 3/4

B O-ring 20.35 × 1.78



A Profile seal DN G 1

B O-ring 26.7 × 1.78

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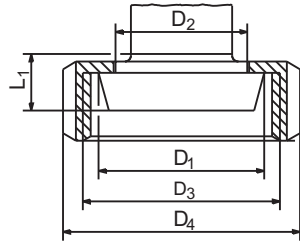
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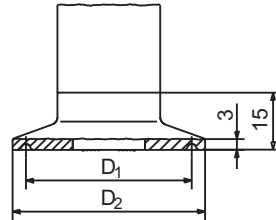


603 to 607
Taper socket with union nut



Process connection	DN	Ø D ₁	Ø D ₂	Ø D ₃	Ø D ₄	L ₁
603	20	36.5	30	RD 44 × 1/6	54	13
604	25	44	35	RD 52 × 1/6	63	15
606	40	56	48	RD 65 × 1/6	78	15
607	50	68.5	61	RD 78 × 1/6	92	16

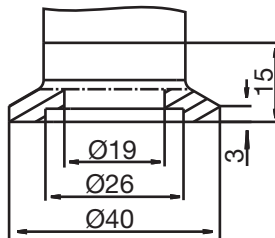
612 to 616
Clamp



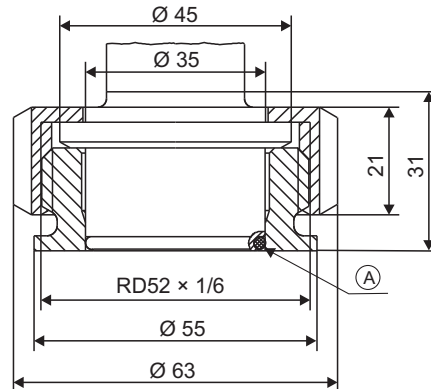
Process connection	DN DIN 32676	DN (inch)	DN ISO 2852	Ø D ₁	Ø D ₂
612	10 15 20		8 10 15	27.5	34
613 ^a	25 32 40	1 1.5	20 25 32	43.5	50.5
616 ^a	50	2	40	56.5	64

^a certified according to EHEDG

623
Small flange



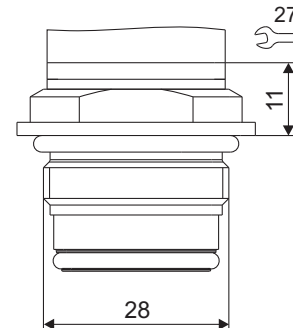
652
Tank connection with grooved union nut



A O-ring 29.82 × 2.62

^a certified according to EHEDG

997
JUMO PEKA^a



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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Output 470		Output 471		Output 475 - 477	
1 PNP switching output		2 PNP switching outputs		1 PNP switching output + 1 analog output	
Voltage supply		Voltage supply		Voltage supply	
1 L+	DC 12(14) to 30 V	1 L+	DC 12(14) to 30 V	1 L+	DC 12(14) to 30 V
3 L-	(GND)	3 L-	(GND)	3 L-	(GND)
Output		Output		Output	
4 K1	Highside open collector max. 250 mA	2 K2	Highside open collector max. 250 mA	2 analog	0(4) to 20 mA/0 to 10 V
2	nc	4 K1		4 K1	Highside open collector max. 250 mA
5	Interface	5	Interface	5	Interface

Color assignment: Connecting cable round plug M12 × 1

1 BN	Brown
2 WH	White
3 BU	Blue
4 BK	Black
5 GY	Grey

The color assignment is **only** apply for A-coded standard cables!

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Order details

(1) Basic type	
405052/000	JUMO DELOS SI – Precision pressure transmitter with switching contacts and display ^a
405052/004	JUMO DELOS SI – Precision pressure transmitter with switching contacts and display for increased measuring material temperatures up to 200 °C ^b
405052/999	JUMO DELOS SI – Precision pressure transmitter with switching contacts and display, special version
(2) Input	
452	0 to 0.4 bar relative pressure
454	0 to 1 bar relative pressure
457	0 to 4 bar relative pressure
459	0 to 10 bar relative pressure
461	0 to 25 bar relative pressure
463	0 to 60 bar relative pressure
447	-400 to +400 mbar relative pressure
449	-1 to +1 bar relative pressure
481	-1 to +3 bar relative pressure
483	-1 to +9 bar relative pressure
485	-1 to +24 bar relative pressure
486	0 to 400 mbar absolute pressure
488	0 to 1 bar absolute pressure
491	0 to 4 bar absolute pressure
493	0 to 10 bar absolute pressure
495	0 to 25 bar absolute pressure
506	0 to 60 bar absolute pressure
(3) Output	
470	1× PNP switching output
471	2× PNP switching outputs
475	1× PNP switching output and 1× analog output 4 to 20 mA ^c
476	1× PNP switching output and 1× analog output 0 to 20 mA ^c
477	1× PNP switching output and 1× analog output 0 to 10 V ^c
(4) Process connection	
504	G 1/2 EN 837
511	1/4-18 NPT EN 837
521	G 1/4 DIN 3852-11
523	G 1/2 DIN 3852-11
571	G 3/4 front-flush EN ISO 228-1
575	G 3/4 front-flush with 2-way seal
576	G 1 front-flush with 2-way seal
603	Taper socket with union nut DN 20 DIN 11851 (dairy screw connection) ^d
604	Taper socket with union nut DN 25 DIN 11851 (dairy screw connection) ^d
606	Taper socket with union nut DN 40 DIN 11851 (dairy screw connection) ^d
607	Taper socket with union nut DN 50 DIN 11851 (dairy screw connection) ^d
612	Clamp DN 10, 15, 20 DIN 32676
613	Clamp DN 25, 32, 40 DIN 32676 ^e
616	Clamp DN 50 DIN 32676, 2" ISO 2852 ^e
623	Small flange DN 25 DIN 28403
652	Tank connection with grooved union nut DN 25 ^f
653	Tank connection with grooved union nut DN 40
997	JUMO PEKA hygienic process connection ^{e, g}
998	Diaphragm seal, version with screw connection

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(5) Process connection material	
20	CrNi (stainless steel)
(6) Electrical connection	
36	Round plug M12 × 1
(7) Measuring system filling medium	
01	Silicon oil
12	FDA-compliant oil
(8) Extra codes	
000	None
100	Customized setting (specify required setting in plain text)
374	Inspection certificate 3.1 Material DIN EN 10204
452	Parts in contact with the medium are electropolished
591	Restrictor in pressure channel
624	Free of oil and grease
634	TAG-number
691	Improved humidity/vibration protection
769	Calibration certificate
871	Inspection certificate 3.1 Accuracy DIN EN 10204

^a This JUMO product is licensed under United States and Canadian patents. Purchasers of the JUMO product outside of the United States and Canada should advise JUMO of any planned sales of products incorporating the JUMO product into the United States and Canada.

^b Measuring devices for increased measuring material temperatures can only be delivered with process connection 571, 575, 576, 603, 604, 606, 607, 612, 613, 623, 652, 997.

^c Per default: The analog output is freely configurable.

^d The grooved union nut is included in scope of delivery.

^e certified according to EHEDG

^f Welding socket, seal and grooved union nut are included in scope of delivery.

^g Suitable adapter for process connection see data sheet 409711.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)							
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Order example	405052/000	-	459	-	471	-	504	-	20	-	36	-	01	/	000

Stock versions

Order code	Part no.
405052/000-452-475-504-20-36-01/000	00528746
405052/000-454-475-504-20-36-01/000	00527029
405052/000-457-475-504-20-36-01/000	00528156
405052/000-459-475-504-20-36-01/000	00520630
405052/000-461-475-504-20-36-01/000	00528994
405052/000-449-475-504-20-36-01/000	00523317

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Accessories

Article	Part no.
PC interface cable including USB/TTL converter ^a	00456352
Y transmitter cable, 5 pole ^a	00507861
Combination tool	00526614
Cable connector, straight, 4 pole, M12 × 1, 2 m PVC cable	00404585
Cable connector, angled, 4 pole, M12 × 1, 2 m PVC cable	00409334
Cable socket, 5 pole, M12 × 1, straight, without connecting cable, assembly by customer	00419130
Measuring device holder for wall and 2" pipe	00597711
CD-setup program ^a	00522384

^a The setup program can only be used for configuration in conjunction with these accessories.

Software

Designation	Part no.
Setup JUMO DELOS 405050 ^a	00522384

^a The setup program can only be used for configuration in conjunction with these accessories.

JUMO DELOS HP

Precision Pressure Transmitter with Switching Contacts and Display

Application

- Hydraulic plants
- Machine and plant engineering
- Test benches
- Laboratory equipment

Brief description

The JUMO DELOS HP high-precision electronic pressure switch with analog output is predestined for use on test benches, with laboratory equipment, and for construction of special machines. These areas frequently demand precise measurement and a configuration adapted to the measurement task.

The stainless steel sensor welded to the process connection features a high burst safety, which is in part as much as 5x the measuring range. Consequently, the plant is reliably protected against medium leaks in the event of a malfunction.

Default nominal measuring ranges of 160 and 600 bar are available. These can be rescaled with a ratio of 1:4 allowing the user to conduct a variety of measurement tasks with only a single measuring device. Depending on the application, the following output versions are available: 1x PNP or 2x PNP switching outputs or 1x PNP switching output and an analog output signal.

The process pressure is visualized by a large and positively-lit LCD display.

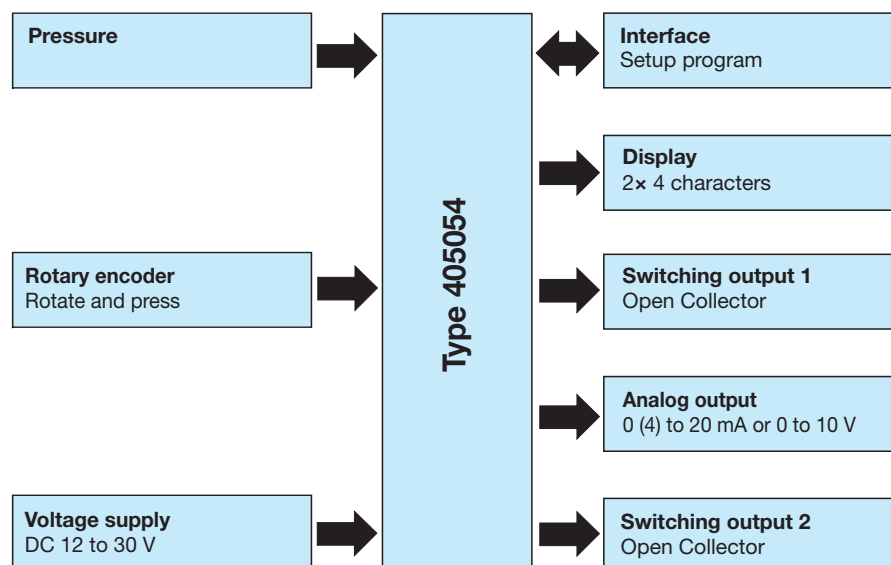
Configuration is easy to perform either on the device itself or via the easy-to-use setup program.

For enhanced legibility, the case can be rotated by $\pm 160^\circ$ and the display can be mirror-imaged by 180° during installation. The JUMO DELOS HP also features an auto-zero function for subsequent zero point adjustment.



Type 405054

Block diagram



Special features

- Linearity 0.1 %
- Measuring range scaling 1:4
- Large, vibrant display
- Easy configuration on the device or using the setup program
- Any installation position possible with rotatable case ($\pm 160^\circ$)
- Available with flush-mounted process connection
- Units of measurement can be selected
- Software display rotatable by 180°

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Technical data

General information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor system	Thin film on metal body (piezo-resistive)
Admissible load changes	> 10 million
Position	
Mounting orientation	Any
Calibration position	Device upright, process connection at the bottom
Zero point correction	Possible on-site or through setup (20 % of nominal measuring range)
Display	Positively-lit display
Alignment	Display rotatable by 180° with software Case rotatable by ±160° (use supplied combined tool)
Size	Display 16 mm x 26 mm, font size 7 mm, 2x 4-digit
Color	Standard operation: amber-colored Malfunction: amber-colored (text "Err", error code 1 to 9 flashing) Setup interface occupied: red
Switching status display	K1, K2
Unit of measurement	bar, kPa, MPa, psi, %
Operation	
On device	With the control element beneath the sealing screw with combination tool or screwdriver 0.5 x 3 or Allen key af 2
Setup interface	Pin 5 of the M12 x 1 round plug

Input – nominal measuring range

Relative pressure	Nominal measuring ranges begin at 0 bar.		
Nominal measuring range	160	600	bar
Overload capability ^a	320	900	bar
Burst pressure	800	1800	bar

^a All measuring ranges can be overloaded up to -1 bar (vacuum resistant).

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Output

All analog outputs in three-wire connection/switching outputs: open collector, PNP switching

Analog output Current Output 475 Output 476 Voltage Output 477	4 to 20 mA and 1x PNP switching output 0 to 20 mA and 1x PNP switching output 0 to 10 V and 1x PNP switching output
Measuring range scaling (turn down)	1:4
Step response time (analog input) T90	≤ 100 ms
Switching output Output 470, 475, 476, or 477 Output 471 Switching type Switching function Switching point Release point Hysteresis Input attenuation Input delay	1x PNP switching output 2x PNP switching output N/C contact / N/O contact Window / hysteresis Can be configured within nominal measuring range (> release point) Can be configured within nominal measuring range (< switching point) Can be configured within nominal measuring range 0 to 99.99 s 0 to 99.99 s
Contact rating Voltage drop from U_B Switching capacity Switching cycles Response time Short-circuit proof	PNP ≤ 2 V In ≤ 250 mA, out ≤ 1 mA > 10 million ≤ 20 ms Yes
Load check, current Pulse period Periodic protective circuit for overcurrent	2 s; T_{ON} 40 ms f = 0.5 Hz Display: Err3 switching output K 1, Err4 switching output K 2
Burden Current 4 to 20 mA, three-wire 0 to 20 mA, three-wire Voltage DC 0 to 10 V, three-wire	$R_L \leq (U_B - 6.5 \text{ V}) \div 0.022 \text{ A } (\Omega)$ $R_L \leq (U_B - 6.5 \text{ V}) \div 0.022 \text{ A } (\Omega)$ $R_L \geq 10 \text{ K}\Omega$

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Mechanical features

Process connection	
Material	Stainless steel 316L
Process seal	The measuring system is welded and therefore entirely free of seals ^a .
Sensor	
Material	Stainless steel 630
Case	
Material	Stainless steel 316L
Threaded sleeve M12 x 1	Stainless steel 316L
Case seal	VMQ silicone; FDA-compliant
Display	PA (polyamide)
Sealing screw of control element	
Material	Aluminum 3.2315
Surface	Anodized surface
Seal	VMQ silicone; FDA-compliant
Weight	200 g with process connection 504 (G 1/2)

^a Pressure transmitters with process connection 521 and 523 are supplied with external FPM seals.
 Note the medium resistance of the sealing material!

Ambient conditions

Admissible temperatures	
Medium	-25 to +100 °C
Ambient	-25 to +75 °C
Ambient temperature -50 °C	Restricted function: only stationary use, risk of cable break, display without function
Storage	-40 to +85 °C
Admissible humidity	
Operation	100 % rel. humidity incl. condensation on the device outer case
Storage	90 % rel. humidity without condensation
Admissible mechanical load	
Vibration resistance ^a	20 g, 10 to 2000 Hz
Shock resistance ^b	50 g for 11 ms, 100 g for 1 ms
Electromagnetic compatibility	Only with 4-pin connecting cable and grounded case!
Interference emission ^c	Class B
Interference immunity ^c	Industrial requirement
Protection type ^d	IP67

^a IEC 60068-2-6

^b IEC 60068-2-27

^c EN 61326-2-3

^d EN 60529 (in mated condition with suitable counterpart)

Accuracy

Relative pressure	Nominal measuring ranges begin at 0 bar.		
Nominal measuring range	160	600	bar
Linearity ^a	0.1	0.1	% of the measuring span of the nominal measuring range
Accuracy at +20 °C ^b	0.25	0.25	% of the measuring span of the nominal measuring range
Accuracy at -20 to +75 °C ^c	0.5	0.5	% of the measuring span of the nominal measuring range
Long-term stability ^d	0.2 % of the measuring span of the nominal measuring range per year		

^a Linearity after limit point setting

^b Includes: linearity, hysteresis, repeatability, deviation from measuring range start and measuring range end

^c Includes: linearity, hysteresis, repeatability, deviation from measuring range start and measuring range end, thermal influence on measuring range start and measuring span

^d EN 61298-1

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Auxiliary energy

Voltage supply U_B^a 0 to 20 mA, three-wire, output 476 4 to 20 mA, three-wire, output 475 0 to 10 V, three-wire, output 477 Admissible voltage supply not reached Maximum voltage supply exceeded > DC 34 V	Nominal voltage DC 24 V DC 12 to 30 V DC 12 to 30 V DC 14 to 30 V Display: Err 5 The specified features are no longer met.
Reverse voltage protection	Yes
Power consumption	≤ 45 mA without load, ≤ 545 mA with load 2x PNP
Electrical connection	Round plug M12 x 1, 4-pin, A-coded (for assignment see "Connection diagram", page 6)
Electrical circuit	SELV

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

Connection diagram

Output 470		Output 471		Output 475 - 477	
1x PNP switching output		2x PNP switching outputs		1x PNP switching output + 1x analog output	
Voltage supply		Voltage supply		Voltage supply	
1 L+	DC 12 to 30 V	1 L+	DC 12 to 30 V	1 L+	DC 12(14) to 30 V
3 L-	GND	3 L-	GND	3 L-	GND
Output		Output		Output	
4 K1	Highside Open Collector max. 250 mA	2 K2	Highside Open Collector max. 250 mA	2 analog	0(4) to 20 mA/DC 0 to 10 V
2	nc	4 K1		4 K1	Highside Open Collector max. 250 mA
5	Interface	5	Interface	5	Interface

Color coding: M12 x 1 round plug	1 BN	Brown	4 BK	Black	The color coding is valid for A-coded standard cables only !
	2 WH	White	5 GY	Gray	
	3 BU	Blue			

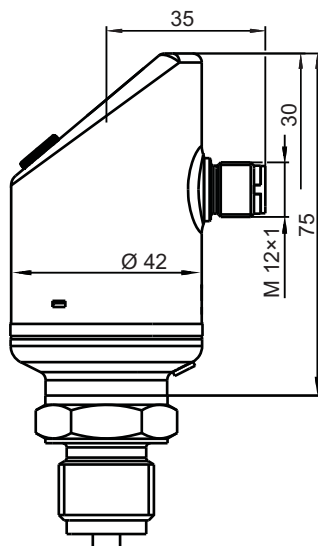
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Dimensions



Type 405054/000-...

Process connections, not flush-mounted

504	511	521	523

A = Profile seal DN G 1/4

B = Profile seal DN G 1/2

E = af 27

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Order details

(1) Basic type	
405054/000	JUMO DELOS HP - Precision Pressure Transmitter with Switching Contacts and Display ^a
405054/999	JUMO DELOS HP - Precision Pressure Transmitter with Switching Contacts and Display, Special Design
(2) Input – nominal measuring range	
465	0 to 160 bar relative pressure
468	0 to 600 bar relative pressure
(3) Output	
470	1x PNP switching output
471	2x PNP switching output
475	1x PNP switching output and 1x analog output, 4 to 20 mA, configurable ^b
476	1x PNP switching output and 1x analog output, 0 to 20 mA, configurable ^a
477	1x PNP switching output and 1x analog output, 0 to 10 V, configurable ^a
(4) Process connection	
504	G 1/2 DIN EN 837
511	1/4-18 NPT DIN EN 837
521	G 1/4 DIN 3852-11
523	G 1/2 DIN 3852-11
(5) Process connection material	
20	CrNi (stainless steel)
(6) Electrical connection	
36	Round plug M12 x 1
(7) Extra codes	
000	None
100	Customer-specific default setting (specify parameters in plain text)
591	Choke in the pressure channel
624	Oil and grease free

^a This JUMO product is licensed under United States and Canadian patents. Purchasers of the JUMO product outside of the United States and Canada should advise JUMO of any planned sales of products incorporating the JUMO product into the United States and Canada.

^b Factory setting – the analog output can be configured by the user.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Order code		-		-		-	/
Order example	405054/000	-	465	-	471	-	521 - 20 - 36 / 100

Stock version

Delivery within 3 working days after receipt of order

Type	Version	Part no.
405054/000-468-475-504-20-36/000	0 to 600 bar rel., 1x PNP switching output and 4 to 20 mA, G 1/2	00573780

Accessories

Item	Part no.
Cable socket, straight, 4-pin, M12 x 1, with 2 m PVC cable	00404585
Cable socket, angled, 4-pin, M12 x 1, with 2 m PVC cable	00409334
JUMO DELOS CD setup program 405050 ^a	00522384
PC interface with USB/TTL converter ^a	00456352
Y transmitter cable, 5-pin ^a	00507861
Combination tool	00526614
Measuring device holder for wall and 2" pipe	00597711

^a Configuration with the setup program can only take place in conjunction with these accessory parts.

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JUMO CEROS S01 M

Digital pressure measuring cell

Applications

- Module for the production of pressure transmitters or level probes
- Installation in valve blocks, pumps, and additional compact devices
- For hygienic applications (front-flush installation)

Brief description

The digital pressure measuring cell is used to measure the pressure of liquid and gaseous media. In contrast to conventional pressure measuring cells, it is an active component that supplies a temperature-compensated and calibrated digital/analog output signal. The piezoresistive sensing element with integrated signal processing is hermetically encapsulated and ensures stable and precise linearity and accuracy values even under adverse conditions.

The basic variants of digital pressure measuring cells use standard measuring ranges for relative or absolute pressure measurements. In addition, individual adjustments of the measuring range or the temperature compensation tailored to the relevant measurement task can be taken into consideration.

The compact design type of the digital pressure measuring cell opens up the potential of use as a module in a pressure transmitter, a level probe, or for use directly customer applications, such as valve blocks, pumps etc. For electric connection to downstream electronic components, versions with a PIN connection, stranded wires, or plug contacts are possible. Customized connection options and direct mounting onto a circuit board are also viable.

The pressure measuring cell can be accessed using an I²C interface and setup program. The setup program visualizes the actual process values. In addition, various configurations and offset correction in the event of environmental influences or in the working point can also be carried out. The clear digital signature of the pressure measuring cell enables traceability right up to the process level.

High level of accuracy, compact design, and the possibility for setup configuration reduces subsequent production steps to a minimum.



Type 405101
(rear view)



Type 405101
(front view)



Customer benefits

- Prealigned and temperature-compensated
- Zero point correction possible via setup software (e.g. after installation)
- Pressure and temperature values as a digital signal
- Direct mounting on circuit board possible (without additional connector)
- Customer-specific configuration options (signal limitation, limit values)
- Traceability of the sensor with a clear digital signature

Special features

- Measuring range from 100 mbar (1.45 psi) up to 100 bar (1450 psi)
- Operating temperature from -40 to +125 °C
- Surface roughness Ra < 0.8 µm (optional)
- High signal resolution with 15 bit
- High electric strength of ±40 V

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Technical data

General Information

Reference conditions	DIN 16086, DIN EN 60770
Measuring principle	Piezoresistive (absolute pressure sensor, relative pressure sensor)
Admissible load changes	> 10 million
Mounting position	Any
Calibration position	Measuring cell vertically upright, membrane downwards

Measuring range and accuracy

Pressure input

The reference conditions according to EN 61298-1 apply. Observe the calibration position!

Measuring range	Linearity ^a	Accuracy at		Long-term stability	Overload capability ^b	Burst pressure
bar	% MSP ^e	20 °C ^c % MSP	-20 to +100 °C ^d % MSP	% MSP per year	bar	bar
0 to 100 mbar relative pressure	0.3	0.5	1.4	<0.2	0.4	0.6
0 to 160 mbar relative pressure					0.6	1
0 to 250 mbar relative pressure					1	1.5
0 to 400 mbar relative pressure					2.4	3.6
0 to 600 mbar relative pressure					1.6	2.4
-400 to +400 mbar relative pressure			4		6	
-600 to +600 bar relative pressure						
0 bar to 1 bar relative/absolute pressure						
0 bar to 1.6 bar relative/absolute pressure	0.2	0.4	1.1		6	10
0 bar to 2.5 bar relative/absolute pressure					10	15
0 bar to 4 bar relative/absolute pressure					16	24
0 bar to 6 bar relative/absolute pressure					24	36
0 bar to 10 bar relative/absolute pressure					40	60
0 bar to 16 bar relative/absolute pressure			60		100	
0 bar to 25 bar relative/absolute pressure			0.9		100	150
0 bar to 40 bar relative/absolute pressure						
0 bar to 60 bar relative/absolute pressure						
0 bar to 100 bar relative/absolute pressure						
0 bar to 100 bar relative/absolute pressure						
-1 to 0 bar relative pressure	0.3	0.5	1.2		4	6
-1 to +0.6 bar relative pressure					6	10
-1 bar to +1 bar relative pressure					10	15
-1 to +1.5 bar relative pressure					16	24
-1 to +3 bar relative pressure					24	36
-1 to +5 bar relative pressure					40	60
-1 to +9 bar relative pressure	0.2	0.4	0.9		40	60
-1 to +15 bar relative pressure					60	100
-1 to +24 bar relative pressure				100	150	

^a According to limit point setting.

^b All pressure measuring cells are vacuum proof.

^c Includes: linearity, hysteresis, repeatability, deviation from measuring range initial value and measuring range end value.

^d Includes: linearity, hysteresis, repeatability, deviation from measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span.

^e MSP = measuring span.

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Temperature input

Measuring range	-40 to +125 °C
Accuracy	±1,5 K

Temperature values can only be read out via the digital interface I²C.

Output

Possible outputs	Analog output 412	Digital output 525
	DC 0.5 to 4.5 V, three-wire ^a , ratiometric 10 to 90 % of the voltage supply	I ² C, DC 5 V, four-wire
Burden	$R_L \geq 5 \text{ k}\Omega$	-
Voltage DC 0.5 to 4.5 V		
Pull-up resistor	-	$R_{\text{pull-up}}$ 1 to 10 k Ω
Bit rate	-	$\leq 400 \text{ MHz}$ (15 bit)
Operational readiness time	< 5 ms	
Conversion time	< 0.5 ms	
Step response t ₉₀	< 3 ms	
Maximum current consumption	< 7 mA	

^a With nominal voltage DC 5 V.

Electrical data

Voltage supply	DC 5 V ±10 % nominal voltage
----------------	------------------------------

Interface

Details for communication ⇒ [JUMO CEROS S01 M - Interface Description](#).

Bus type	I ² C (NXP trademark)
Transmission type	Serial transmission (master-slave communication)
Standard address	0x28

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Mechanical features

Materials

Membrane ^a	AISI 316 L (1.4435)
Welding ring ^a	AISI 316 L (1.4404)
O-ring ^a	FPM, EPDM, VMQ ^b
Filling oil	Silicon oil (FDA compliant)

^a Observe the media resistance of the materials.

^b Compliant according to FDA 21 CFR 177.2600, BfR recommendation XV silicone.

Environmental influences

Admissible medium temperature	-40 °C to +125 °C
Admissible ambient temperature	-40 to +125 °C (for electrical connections 05 and 24) ^a -25 to +85 °C (for electrical connection 39) ^a
Admissible storage temperature	-40 to +125 °C (for electrical connections 05 and 24) ^a -25 to +85 °C (for electrical connection 39) ^a
Admissible humidity Storage ^b	90 %
Electromagnetic compatibility (EMC) of the integrated ICs: EMC protection ^c GND, U _B , A _{out} SCL, SDA Latch-up immunity (EIA/JESD 78) Emission Cable-bound interference immunity	According to ESD human body model (MIL883, method 3015.7) ≥ 4 kV ≥ 2 kV > ±100 mA Requirements according to IEC 61967 Requirements according to IEC 62132-4 1 to 1000 MHz, error band < ±1 %
Vibration resistance ^d	20 g for 5 to 2000 Hz
Shock resistance ^e	75 g for 11 ms and 100 g for 1 ms
Overvoltage	±40 V
Insulation voltage	AC 500 V
Insulation resistance	> 10 MΩi at DC 50 V

^a ⇒ "Electrical connection ", Page 7.

^b Without condensate formation.

^c If necessary, further measures must be taken in a terminal device to meet the application-specific EMC requirements.

^d IEC 60068-2-6.

^e IEC 60068-2-27.

Placing onto market

The component not meet the requirements of "equipment with safety function" according to Pressure Equipment Directive 2014/68/EU.

The pressure measuring cell is a component and not an end device and is therefore not subject to application-specific EMC requirements.

Placing the resulting end product onto the market in the European Economic Area (EEA) means that testing according to with standards mentioned, a declaration of conformity, and affixing CE marking can be carried out independently.

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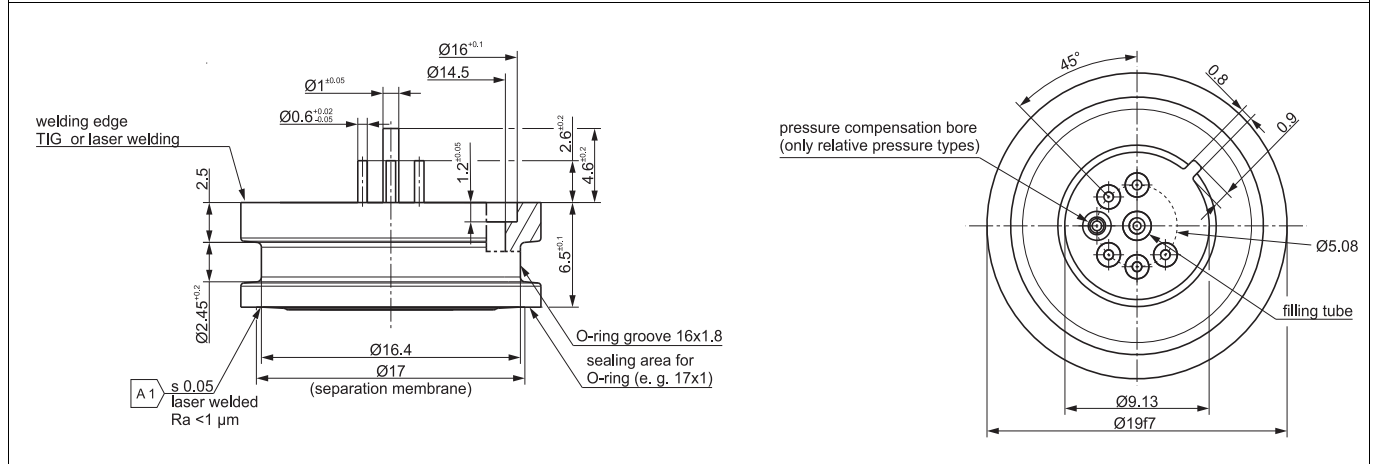


Dimensions

Pressure measuring cell

210, 211, 212, 213

Pressure measuring cell for welding in, with O-ring (EPDM, FPM, VQM)



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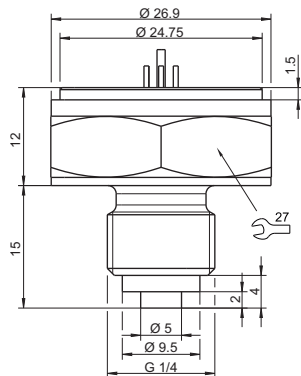
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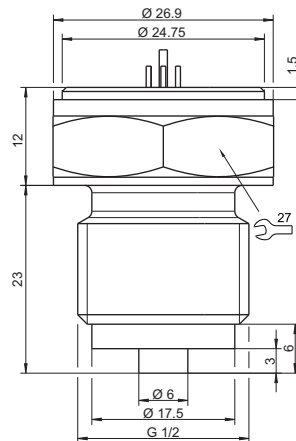


Process connections

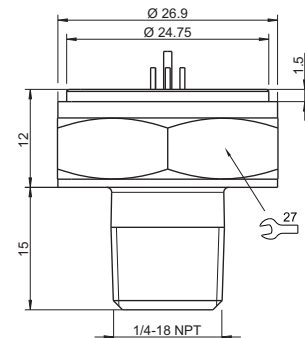
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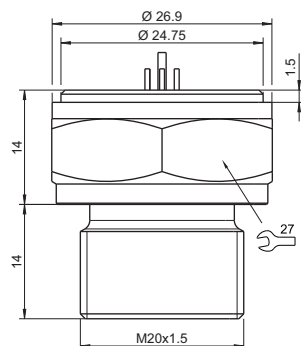
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 G 1/2 DIN EN 837



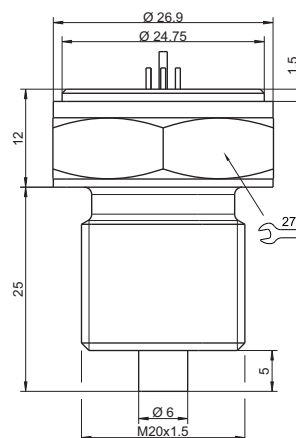
511
 1/4-18 NPT DIN EN 837



559
 M20 × 1.5 DIN 3852-11



583
 M20 × 1.5 with pins



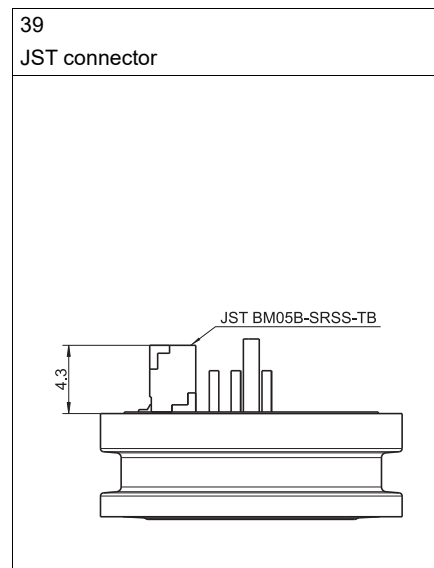
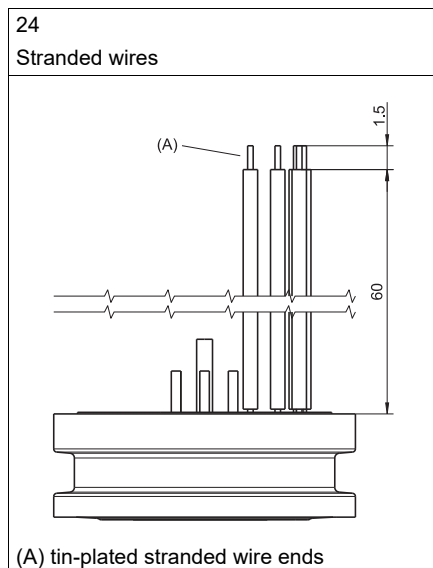
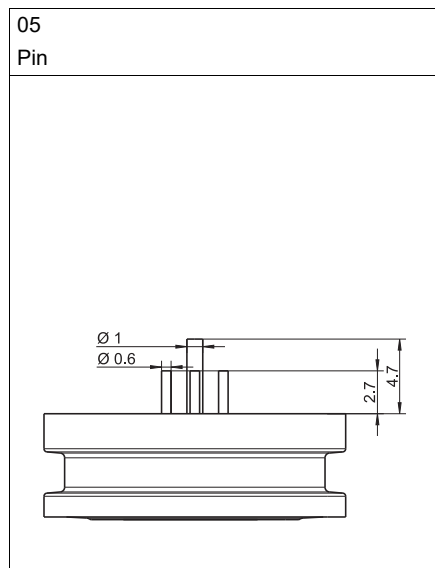
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Electrical connection



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Connection diagram

412			
Electrical connection	05 Pins	24 Stranded wires	39 JST connector (type BM05B-SRSS-TB)
A _{out}	2	Ye	5
GND	3	Bk	4
U _B	4	Rd	3
SCL	6	Wh	2
SDA	7	Bu	1

525			
Electrical connection	05 Pins	24 Stranded wires	39 JST connector (type BM05B-SRSS-TB)
GND	3	Bk	4
U _B	4	Rd	3
SCL	6	Wh	2
SDA	7	Bu	1



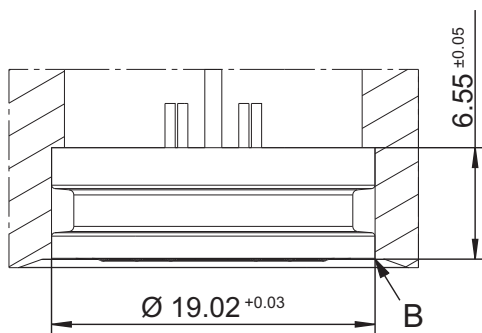
Installation notes

Avoid influencing the signal due to installation errors.

- Do not exert any tension on the membrane during installation.
- Avoid mechanical damage to the membrane.
- Wet O-rings with a suitable lubricant before use.

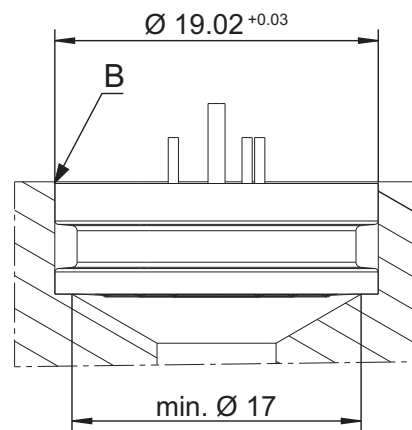
Assembly examples

Front-flush



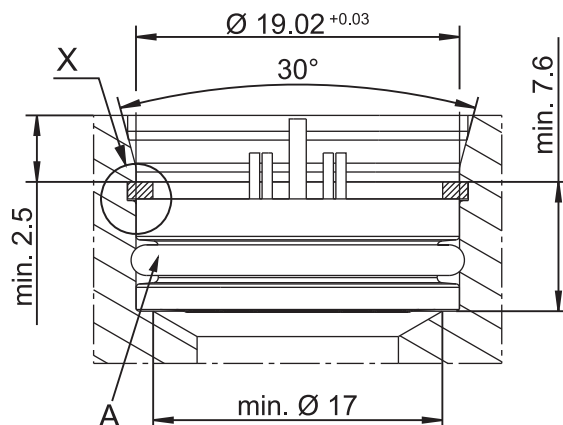
(B) Weld seam

Recessed

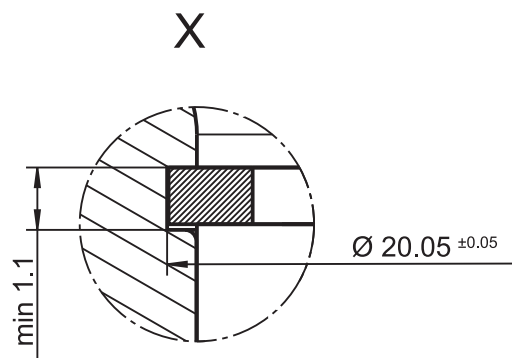


(B) Weld seam

With circlip according to DIN 472



(A) O-ring 16x1.8



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Order details

	(1) Basic type
405101	JUMO CEROS S01 M – digital pressure measuring cell
	(2) Basic type extension
000	None
	(3) Input
414	0 to 100 mbar relative pressure ^a
415	0 to 160 mbar relative pressure ^a
417	0 to 250 mbar relative pressure ^a
424	0 to 400 mbar relative pressure ^a
419	0 to 600 mbar relative pressure ^a
447	-400 to +400 mbar relative pressure ^a
450	-600 to +600 mbar relative pressure ^a
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 bar to 16 bar relative pressure
461	0 bar to 25 bar relative pressure
462	0 bar to 40 bar relative pressure
463	0 bar to 60 bar relative pressure
464	0 bar to 100 bar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
449	-1 bar to +1 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
488	0 to 1 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
505	0 to 40 bar absolute pressure
506	0 to 60 bar absolute pressure
507	0 to 100 bar absolute pressure
	(4) Measuring cell
210	Measuring cell for welding in
211	Measuring cell with O-ring, EPDM
212	Measuring cell with O-ring, FPM
213	Measuring cell with O-ring, VMQ

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(5) Process connection	
000	None
502	G 1/4 according to DIN EN 837
504	G 1/2 according to DIN EN 837
511	1/4-18 NPT according to DIN EN 837
559	M20 × 1.5 DIN 3852-11
583	M20 × 1.5 with pins
(6) Output	
412	0.5 to 4.5 V, 3-wire
525	I ² C, 4-wire, 5 V supply
(7) Electrical connection	
05	Pin
24	Stranded wires
39	JST connector
(8) Extra codes	
374	Inspection certificate 3.1 DIN EN 10204 material
624	Oil and grease free
982	Surface roughness of parts in contact with media Ra ≤ 0.8 µm
983	Test report

^a Can only be ordered with a process connection.

Order code (1) (2) (3) (4) (5) (6) (7) (8) , ...^a
 Order example 405101 / 000 - 464 - 210 - 000 - 525 39 / 624

^a List extra codes in sequence and separate using commas.

NOTE!

The packaging unit for JUMO CEROS pressure measuring cells is specified as 40 pieces.

Accessories

Designation	Part no.
JUMO CEROS S01 M PC setup program	00698970
Software for extracting process values for calibration and parameterization of the pressure measuring cell	
PC-Interface with Converter USB/I ² C 5V TO39	00695325

Further information and downloads



qr-405101-en.jumo.info



JUMO CEROS S02 M

Digital Low Energy pressure measuring cell

Applications

- Module for the production of pressure transmitters, level probes, data loggers, digital manometers, valve blocks and pumps.
- Battery-powered low-energy applications, e.g. handheld or wireless devices.
- Also suitable for hygienic applications (front-flush installation).

Brief description

The digital pressure measuring cell is used to measure the pressure of liquid and gaseous media. In contrast to conventional pressure measuring cells, it is an active component that supplies a factory temperature-compensated and calibrated digital output signal (I²C). The piezoresistive sensing element with integrated signal processing is hermetically encapsulated and provides stable and precise linearity and accuracy values even under adverse conditions.

The digital pressure measuring cells use standard measuring ranges for relative or absolute pressure measurements. In addition, individual adjustments of the measuring range can be taken into consideration.

The compact design type of the digital pressure measuring cell and the low current consumption open up applications as a module of a pressure transmitter, a level probe or the direct integration into customer applications such as handheld devices or battery operated devices of any kind. For electric connection to downstream electronic components, versions with a PIN connection, stranded wires, or JST connector are possible.

The pressure measuring cell can be accessed using an I²C interface and setup program. The setup program visualizes the actual process values. In addition, various configurations and offset correction can also be carried out.

A digital signature can be read out, enabling unambiguous traceability.



Type 405104
(rear view)



Type 405104
(front view)



Customer benefits

- Suitable for battery operation.
- Factory calibrated and temperature compensated.
- Simple zero point correction possible by using the setup program (e.g. after welding-in process).
- Pressure and temperature values as a digital signal.
- Direct mounting on circuit board possible (without additional connector).
- Traceability of the sensor with a clear digital signature.

Special features

- Measuring ranges from 250 mbar (3.63 psi) up to 100 bar (1450 psi)
- Operating temperature from -40 to +120 °C
- High signal resolution with up to 16 bit
- Low current consumption (operating mode < 1 mA, sleep mode < 50 nA)
- Low input voltage of 1.68 to 3.6 V.
- Fast wake-up time <1 ms
- Digital output signal (I²C)

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Technical data

Input

Measuring range and accuracy

Pressure

The reference conditions according to DIN EN 61298-1 apply. Observe the calibration position ⇒ "Mechanical features", Page 3.

Measuring range	Linearity ^a	Accuracy at 20 °C ^c		Long-term sta- bility	Overload capacity ^b	Burst pressure
	% MSP ^e	% MSP	-20 to +100 °C ^d % MSP	% MSP per year	bar	bar
0 to 250 mbar relative pressure	0.3	0.5	1.4	< 0.2	1	1.5
0 to 400 mbar relative pressure					1.6	2.4
0 to 600 mbar relative pressure					2.4	3.6
0 bar to 1 bar relative/absolute pressure					4	6
0 bar to 1.6 bar relative/absolute pressure	0.2	0.4	1.1		6	10
0 bar to 2.5 bar relative/absolute pressure					10	15
0 bar to 4 bar relative/absolute pressure					16	24
0 bar to 6 bar absolute pressure					24	36
0 bar to 10 bar absolute pressure			0.9		40	60
0 bar to 16 bar absolute pressure					60	100
0 bar to 25 bar absolute pressure					100	150
0 bar to 40 bar absolute pressure						
0 bar to 60 bar absolute pressure						
0 bar to 100 bar absolute pressure						
-1 to 0 bar relative pressure	0.3	0.5	1.2		4	6
-1 bar to +1 bar relative pressure					6	10
-1 to +3 bar relative pressure					16	24
-1 to +6 bar relative pressure					24	36
-1 to +10 bar relative pressure	0.2	0.4	0.9		40	60
-1 to +16 bar relative pressure					60	100
-1 to +25 bar relative pressure					100	150
-1 to +40 bar relative pressure					120	200
-1 to +60 bar relative pressure						
-1 to +100 bar relative pressure						

^a According to limit point setting.

^b All pressure measuring cells are vacuum proof.

^c Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value, and measuring range end value.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value, and measuring range end value, thermal effect on measuring range start and measuring span.

^e MSP = measuring span

Temperature

The integrated temperature sensor maps the internal temperature of the pressure measuring cell and provides indications of the medium temperature.

Measuring range	-20 to +80° C
Accuracy	±2 K

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Interface

Communication details ⇒ [JUMO CEROS Series 02 - Interface Description](#).

Digital output 523	I ² C, DC 3.3 V
Transmission type	Serial transmission (master-slave communication)
Standard address	0x2C in 7-bit addressing, 0x58 including R / W bit
I ² C signal level	
Low level input for SCL and SCD	< 25 % V _{DD}
High level input for SCL and SCD	> 75 % V _{DD}
Pull-up resistor	R _{Pull-up} 1 to 10 kΩ
Signal resolution	up to 16 bit
I ² C clock frequency	max. 3.4 MHz
Operational readiness time	< 2.5 ms
Conversion time ^a	< 3 ms
Response time t _{0,9} ^b	3 up to max. 6 ms

^a Time from signal acquisition via signal processing to signal output.

^b Time required for the output signal to reach 90% of an instantaneous full scale pressure change.

Electrical data

Voltage supply	DC 1,68 to 3,6 V
Current consumption	
Operating mode	< 1 mA
Sleep mode	< 50 nA

Mechanical features

Reference conditions	DIN 16086, DIN EN 60770
Measuring principle	Piezoresistive (absolute pressure sensor, relative pressure sensor)
Admissible load changes	> 10 million
Mounting position	Any
Calibration position	Measuring cell vertically upright, membrane downwards

Materials

Components in contact with the medium ^a	
Membranes	AISI 316 L (1.4435)
Welding ring	AISI 316 L (1.4404)
O-ring	FPM, EPDM, VMQ ^b
Process connection	AISI 316 TI (1.4571)
Filling oil	Silicon oil (FDA compliant)

^a Observe the resistance of the components in contact with the medium.

^b Compliant according to FDA 21 CFR 177.2600, BfR recommendation XV silicone.

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Environmental influences

Admissible operating temperature ^a	
Electrical connection	
05 Pin	-40 to +120 °C
24 Stranded wires	-40 to +120 °C
39 JST connector	-25 to +85 °C
Admissible humidity	
Storage	< 90 % relative humidity, without condensate formation
Electromagnetic compatibility (EMC) of the integrated ICs:	
EMC protection ^b	According to ESD human body model (MIL883, method 3015.7)
GND, U _B	≥ 4 kV
Vibration resistance	DIN EN 60068-2-6, DIN EN 60068-2-27
Vibration resistance	20 g for 5 to 2000 Hz
Shock resistance	75 g for 11 ms, 100 g for 1 ms
Insulation voltage	DC 500 V
Insulation resistance	> 50 MΩ at DC 500 V

^a Medium temperature, ambient temperature, storage temperature.

^b Further measures must be taken in a terminal device in order to fulfil application-specific EMC requirements.

Placing onto market

The component does not meet the requirements of "equipment with safety function" according to Pressure Equipment Directive 2014/68/EU.

The pressure measuring cell is a component and not an end device and is therefore not subject to application-specific EMC requirements.

Placing the resulting end product onto the market in the European Economic Area (EEA) means that testing according to the standards mentioned, a declaration of conformity, and affixing CE marking can be carried out independently.

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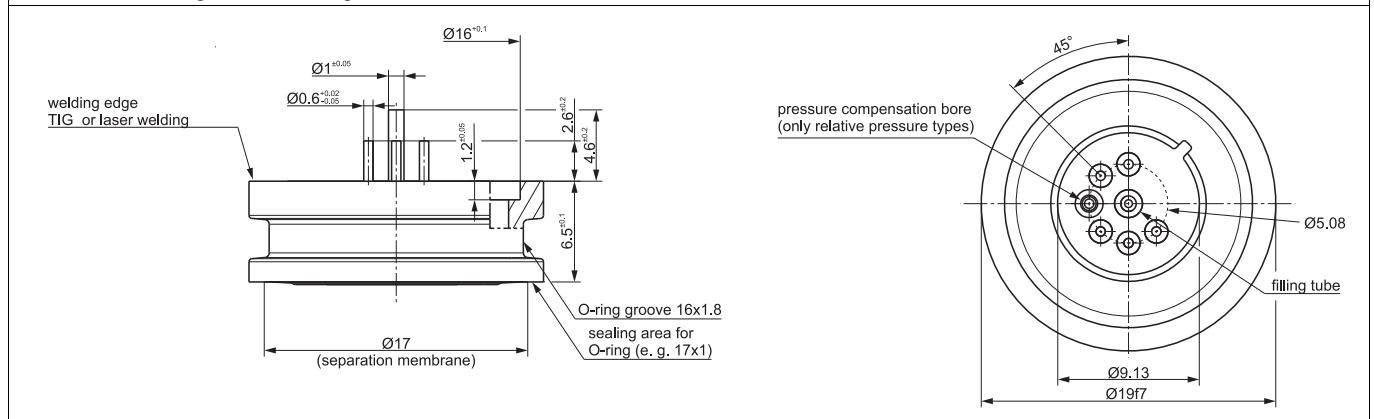
Dimensions

General tolerances for linear and angular dimensions without individual tolerance indications according to DIN ISO 2768-m.

Pressure measuring cell

210, 211, 212, 213

Pressure measuring cell for welding in



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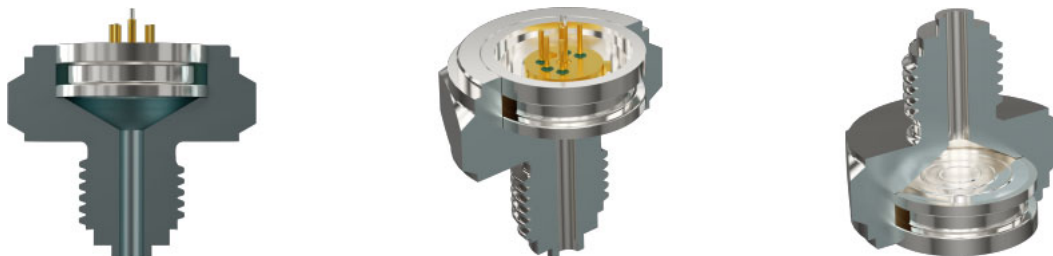
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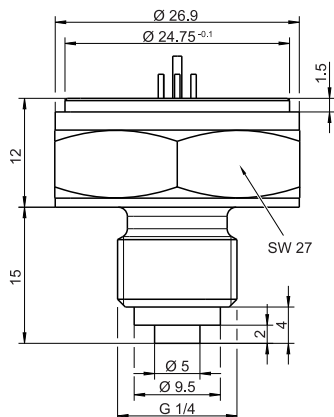
Process connections

502 – Section views (examples)



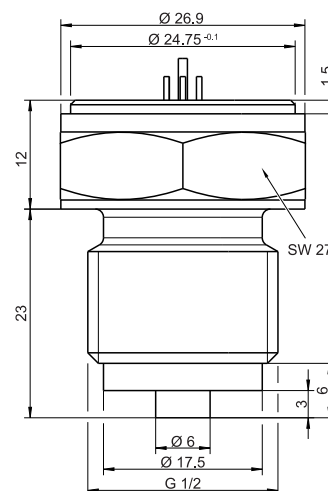
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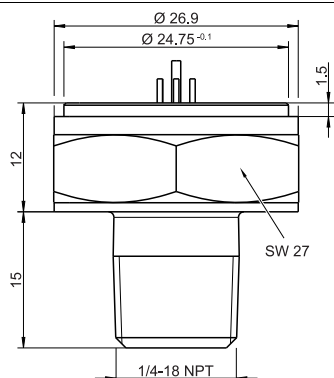
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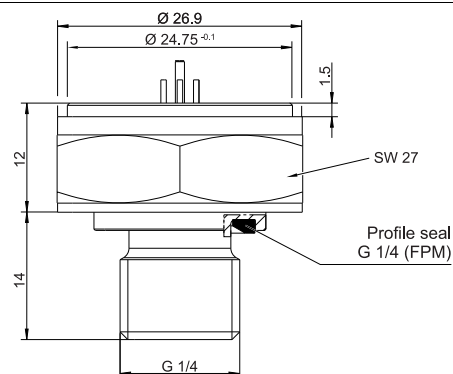
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521

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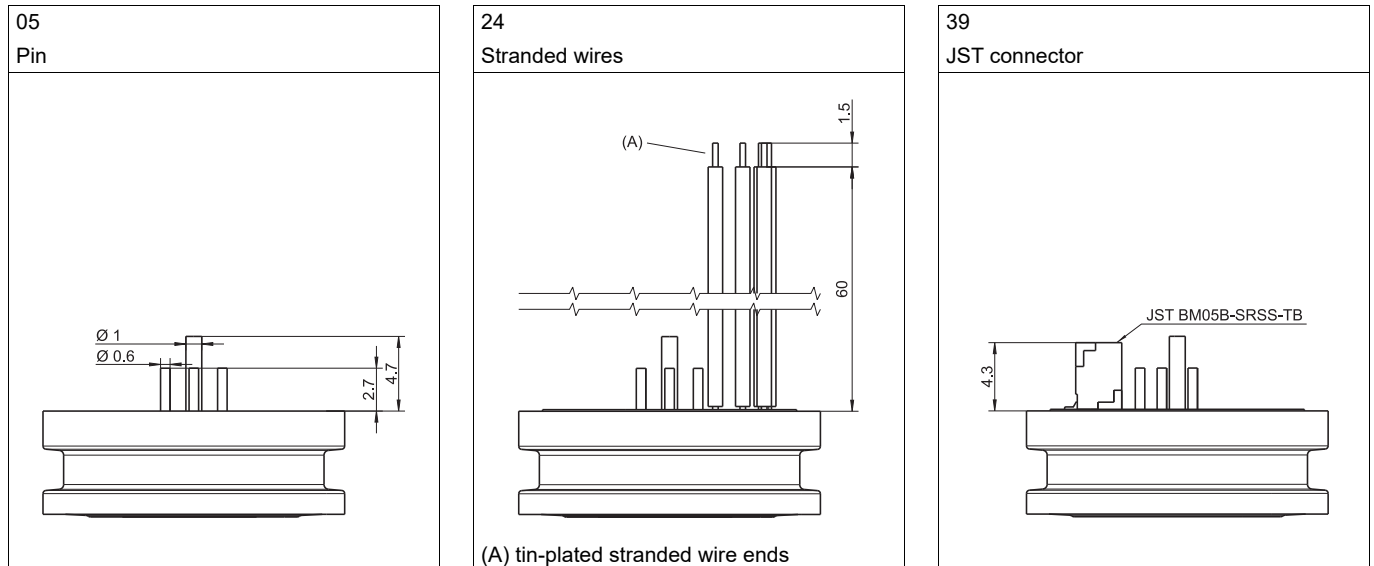
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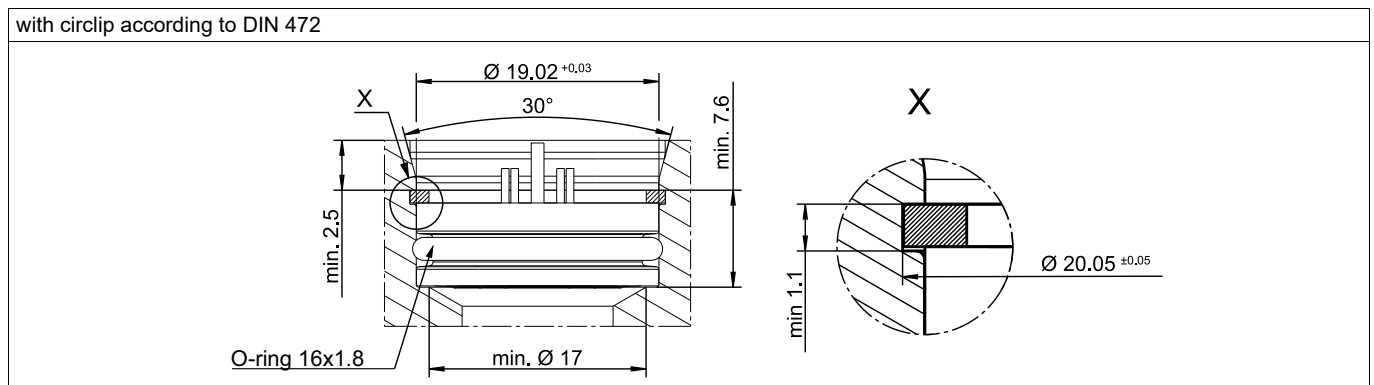
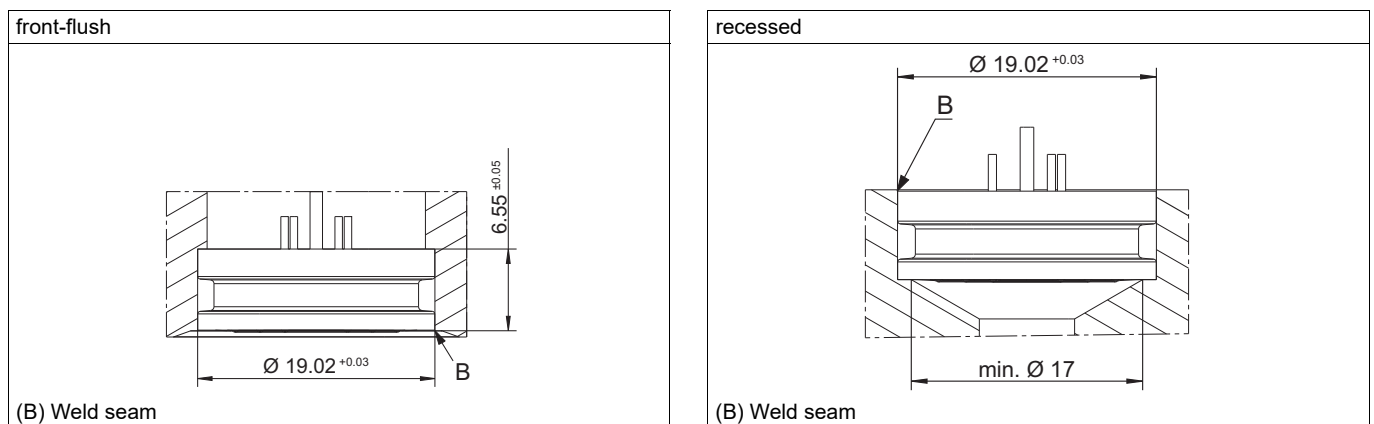
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Electrical connection



Installation examples



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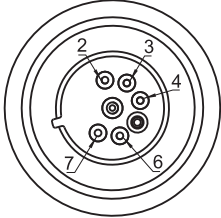
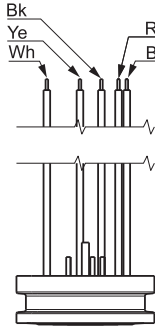
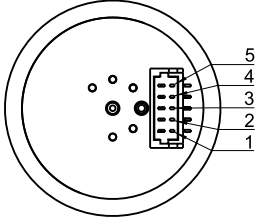
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Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Electrical connection	05 Pin	24 Stranded wires	39 JST connector (type BM05B-SRSS-TB)
			
EOC	2	Ye	5
GND	3	Bk	4
U _B	4	Rd	3
SCL	6	Wh	2
SDA	7	Bu	1

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Email: info.us@jumo.net
Internet: www.jumousa.com



Order details

	(1) Basic type
405104	JUMO CEROS S02 M – digital pressure measuring cell
	(2) Basic type extension
000	None
	(3) Input
417	0 to 250 mbar relative pressure ^a
424	0 to 400 mbar relative pressure ^a
419	0 to 600 mbar relative pressure ^a
454	0 to 1 bar relative pressure
488	0 to 1 bar absolute pressure
455	0 to 1.6 bar relative pressure
489	0 to 1.6 bar absolute pressure
456	0 to 2.5 bar relative pressure
490	0 to 2.5 bar absolute pressure
457	0 to 4 bar relative pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
505	0 to 40 bar absolute pressure
506	0 to 60 bar absolute pressure
507	0 to 100 bar absolute pressure
478	-1 to 0 bar relative pressure
449	-1 bar to +1 bar relative pressure
481	-1 to +3 bar relative pressure
545	-1 to +6 bar relative pressure
472	-1 to +10 bar relative pressure
434	-1 to +16 bar relative pressure
514	-1 to +25 bar relative pressure
546	-1 to +40 bar relative pressure
547	-1 to +60 bar relative pressure
515	-1 to +100 bar relative pressure
	(4) Measuring cell
210	Measuring cell for welding in
211	Measuring cell with O-ring, EPDM
212	Measuring cell with O-ring, FPM
213	Measuring cell with O-ring, VMQ
	(5) Process connection
000	No process connection
502	G 1/4 according to DIN EN 837
504	G 1/2 according to DIN EN 837
511	1/4-18 NPT according to DIN EN 837
521	G 1/4 DIN 3852-11
	(6) Output
523	I ² C, 3.3 V supply

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(7)	Electrical connection
05	Pin
24	Stranded wires
39	JST connector
(8)	Extra codes
374	Inspection certificate 3.1 DIN EN 10204 material
624	Oil and grease free
983	Test report

^a Can only be ordered with a process connection.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Order code	<input type="text"/>	/ <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	/ <input type="text"/> , ... ^a
Order example	405104	/ 000	- 489	- 210	- 000	- 523	- 39	/ 983

^a List extra codes in sequence and separate using commas.

Accessories

Designation	Part no.
Setup JUMO CEROS Series 02 (PC setup software)	00759752
PC-Interface with Converter USB/I ² C 3.3 V TO39 (for connection to PIN version)	00764642
PC-Interface with Converter USB/I ² C 3.3 V JST (for connection to JST version)	00772261

Further information and downloads



qr-405104-en.jumo.info



JUMO CEROS C02 M

Digital Low Energy pressure measuring cell

Applications

- Module for the production of pressure transmitters, level probes, data loggers, digital manometers, valve blocks and pumps
- Battery-powered low-energy applications, e.g. handheld or wireless devices

Brief description

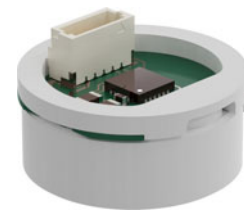
The digital pressure measuring cell is used to measure the pressure of liquid and gaseous media. In contrast to conventional pressure measuring cells, it is an active component that supplies a factory temperature-compensated and calibrated digital output signal (I²C). The ceramic thick film sensor with integrated signal processing is hermetically encapsulated and provides stable and precise linearity and accuracy values even under adverse conditions.

The digital pressure measuring cells use standard measuring ranges for relative pressure measurements. In addition, individual adjustments of the measuring range can be taken into consideration.

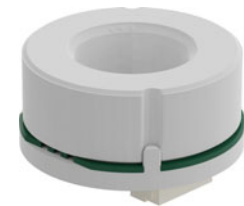
The compact design type of the digital pressure measuring cell and the low current consumption open up applications as a module of a pressure transmitter, a level probe or the direct integration into customer applications such as handheld devices or battery operated devices of any kind. For electric connection to downstream electronic components, versions with JST connector or edge connector are possible.

The pressure measuring cell can be accessed using an I²C interface and setup program. The setup program visualizes the actual process values. In addition, various configurations and offset correction can also be carried out.

A digital signature can be read out, enabling unambiguous traceability.



Type 405106
(rear view)



Type 405106
(front view)



Customer benefits

- Suitable for battery operation
- Factory calibrated and temperature compensated
- Simple zero point correction possible by using the setup program (e.g. after installation)
- Pressure and temperature values as a digital signal
- Direct mounting on circuit board possible (without additional connector)
- Traceability of the sensor with a clear digital signature

Special features

- Measuring ranges from 1,6 bar (232 psi) up to 60 bar (870 psi)
- Operating temperature depending on the electrical connection from -40 to +120 °C
- High signal resolution with up to 16 Bit
- Low current consumption (operating mode < 1 mA, sleep mode < 50 nA)
- Low input voltage of 1.68 to 3.6 V
- Fast wake-up time < 1 ms
- Digital output signal (I²C)

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Technical data

Input

Measuring range and accuracy

Pressure

The reference conditions according to DIN EN 61298-1 apply. Observe the calibration position ⇒ "Mechanical features", Page 3.

Measuring range	Linearity ^a	Accuracy at 20 °C ^c	0 to 85 °C ^d	-20 to +100 °C ^d	Long-term stability	Overload capacity ^b	Burst pressure
	% MSP ^e	% MSP		% MSP	% MSP per year	bar	bar
0 to 1,6 bar relative pressure	< 0.2	< 0.4	< 0.5	< 1	< 0.2	6	12
0 to 2,5 bar relative pressure						6	12
0 to 4 bar relative pressure						12	25
-1 to +1 bar relative pressure						6	10
-1 to +3 bar relative pressure						12	25
-1 to +6 bar relative pressure						24	36
-1 to +10 bar relative pressure						40	60
-1 to +16 bar relative pressure						50	75
-1 to +25 bar relative pressure						100	150
-1 to +40 bar relative pressure						120	200
-1 to +60 bar relative pressure							

^a According to limit point setting.

^b All pressure measuring cells are vacuum proof.

^c Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value, and measuring range end value.

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value, and measuring range end value, thermal effect on measuring range start and measuring span.

^e MSP = measuring span

Temperature

The integrated temperature sensor maps the internal temperature of the pressure measuring cell and provides indications of the medium temperature.

Measuring range	-20 to +80° C
Accuracy	±2 K

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Interface

Communication details ⇒ [JUMO CEROS Series 02 - Interface Description](#).

Digital output 523	I ² C, DC 3.3 V
Transmission type	Serial transmission (master-slave communication)
Standard address	0x2C in 7-bit addressing, 0x58 including R / W bit
I ² C signal level	
Low level input for SCL and SCD	< 25 % V _{DD}
High level input for SCL and SCD	> 75 % V _{DD}
Pull-up resistor	R _{Pull-up} 1 to 10 kΩ
Signal resolution	up to 16 bit
I ² C clock frequency	max. 3.4 MHz
Operational readiness time	< 2.5 ms
Conversion time ^a	< 3 ms
Response time t _{0,9} ^b	3 up to max. 6 ms

^a Time from signal acquisition via signal processing to signal output.

^b Time required for the output signal to reach 90% of an instantaneous full scale pressure change.

Electrical data

Voltage supply	DC 1,68 to 3,6 V
Current consumption	
Operating mode	< 1 mA
Sleep mode	< 50 nA

Mechanical features

Reference conditions	DIN 16086, DIN EN 60770
Measuring principle	Ceramic thick film (relative pressure sensor)
Admissible load changes	> 10 million
Mounting position	Any
Calibration position	Measuring cell vertically upright, membrane downwards

Materials

Components in contact with the medium ^a	
Sensor	Ceramic Al ₂ O ₃ 96 % (C795)
Process connection	AISI 304 (1.4301)
O-ring	FPM

^a Observe the resistance of the components in contact with the medium.

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Environmental influences

Admissible operating temperature ^a	
Electrical connection	
39 JST connector	-25 to +85 °C
42 Edge Connector	-40 to +120 °C
Admissible humidity	
Storage	<90 % relative humidity, without condensate formation
Electromagnetic compatibility (EMC) of the integrated ICs:	
EMC protection ^b	According to ESD human body model (MIL883, method 3015.7)
GND, U _B	≥ 4 kV
Vibration resistance	DIN EN 60068-2-6, DIN EN 60068-2-27
Vibration resistance	20 g for 5 to 2000 Hz
Shock resistance	75 g for 11 ms, 100 g for 1 ms
Insulation voltage	DC 700 V
Insulation resistance	> 50 MΩ at DC 500 V

^a Medium temperature, ambient temperature, storage temperature.

^b Further measures must be taken in a terminal device in order to fulfil application-specific EMC requirements.

Placing onto market

The component not meet the requirements of "equipment with safety function" according to Pressure Equipment Directive 2014/68/EU.

The pressure measuring cell is a component and not an end device and is therefore not subject to application-specific EMC requirements.

Placing the resulting end product onto the market in the European Economic Area (EEA) means that testing according to with standards mentioned, a declaration of conformity, and affixing CE marking can be carried out independently.

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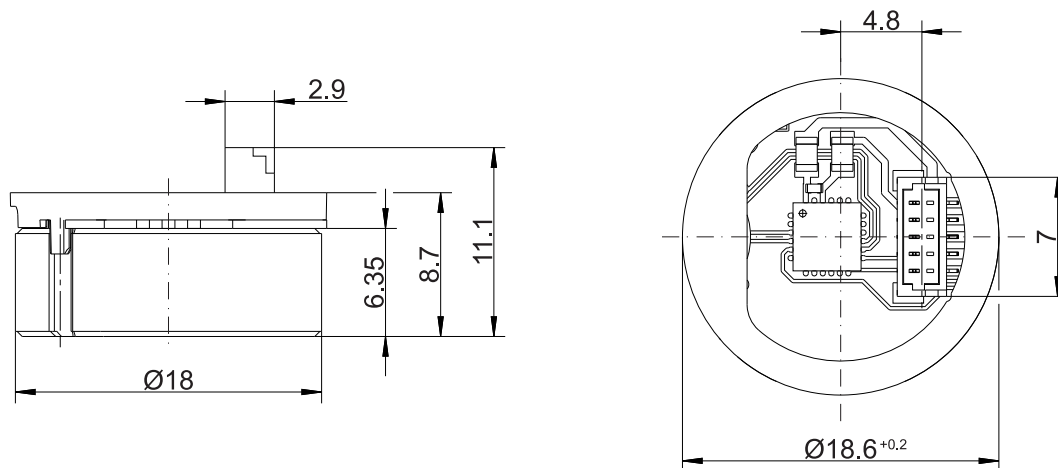
Dimensions

General tolerances for linear and angular dimensions without individual tolerance indications according to DIN ISO 2768-m.

Pressure measuring cell

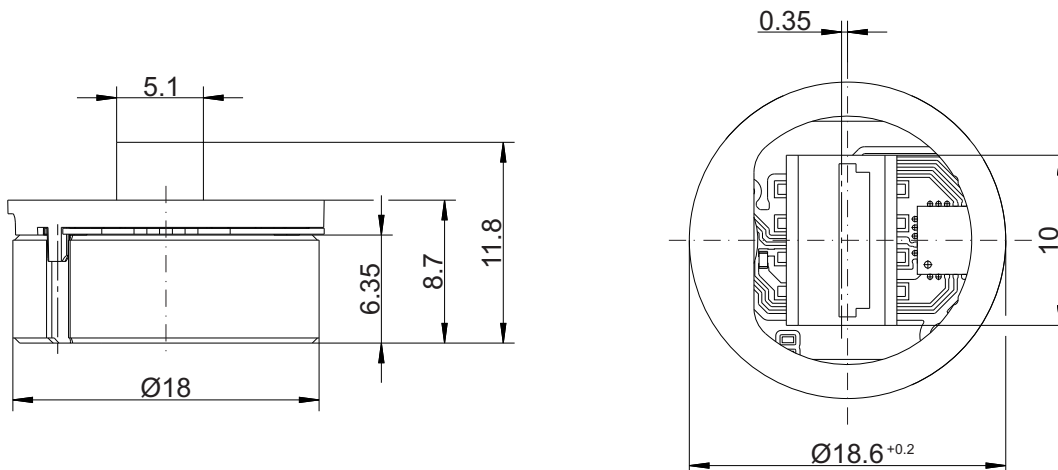
231, 39

Sensor element Ceramic with JST connector (Type BM05B-SRSS-TB)



231, 42

Sensor element Ceramic with Edge Connector



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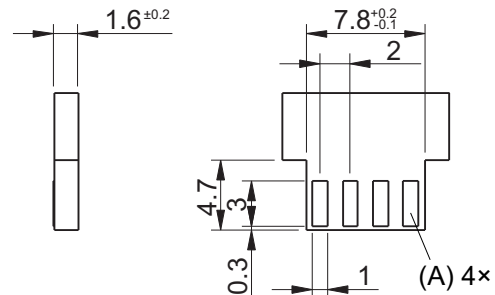
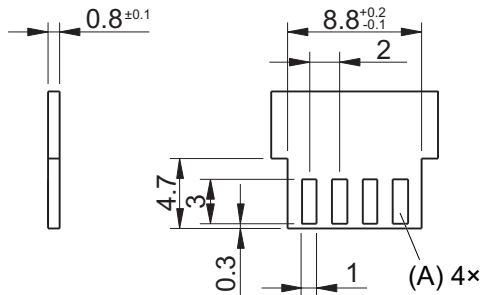
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Plug-in PCB for Edge Connector

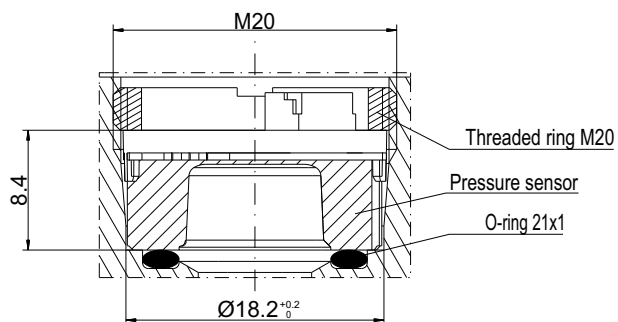
Layout (recommended)



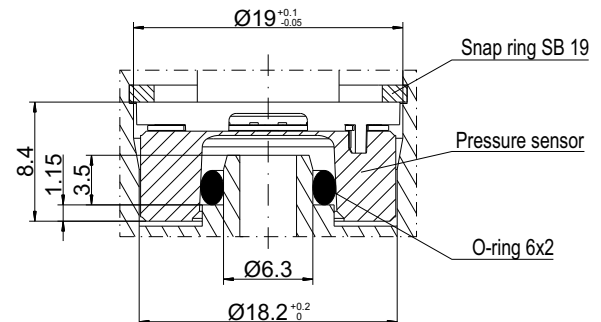
(A) Contact surface: Galvanic Nickel-Gold (recommended)

Installation examples

with threaded ring



with snap ring



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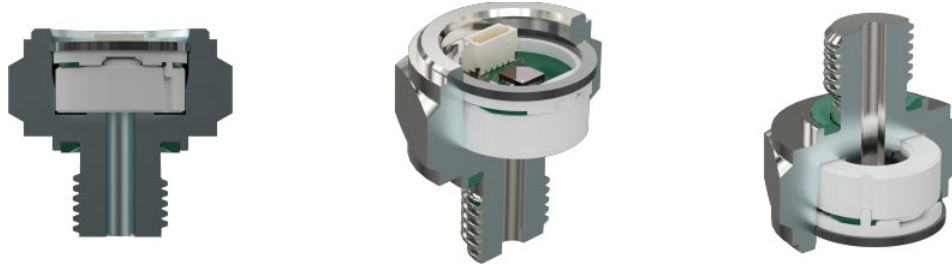
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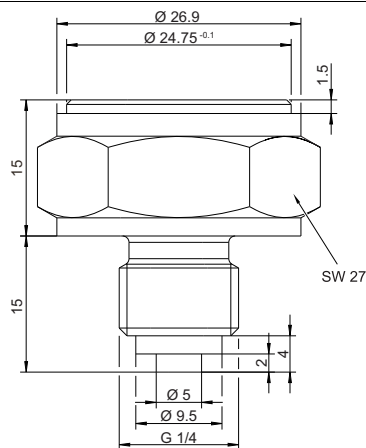
Process connections

521 – Section views (examples)



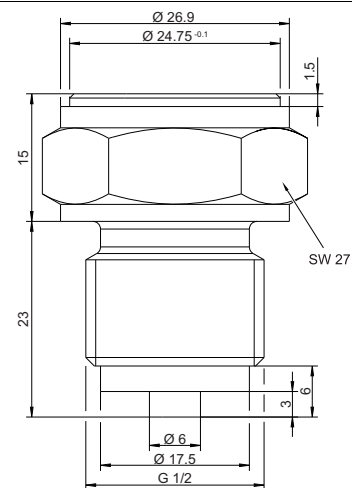
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G 1/4 DIN EN 837



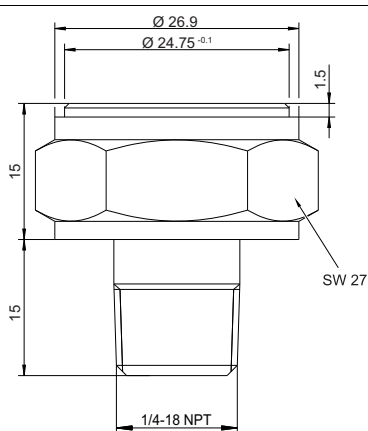
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G 1/2 DIN EN 837



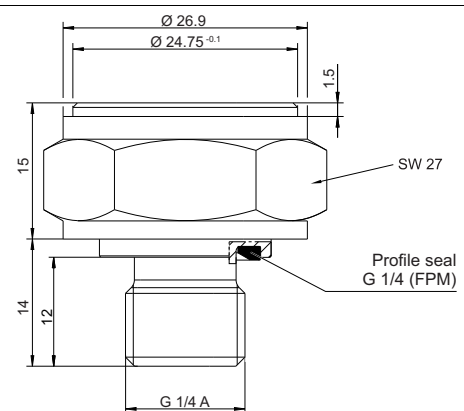
511

1/4-18 NPT DIN EN 837



521

G 1/4 DIN 3852-11



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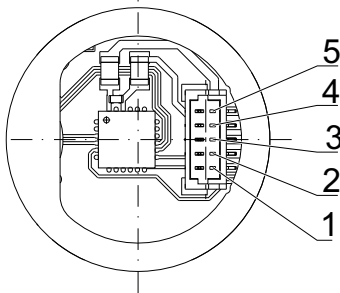
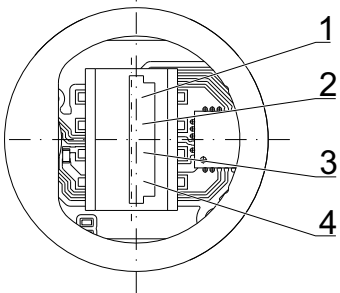
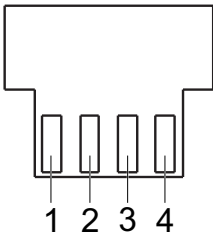
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Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Electrical connection	39	42	
	JST connector (type BM05B SRSS-TB)	Edge Connector	Plug-in PCB for Edge Connector
			
EOC	5	-	-
GND	4	4	4
U _B	3	3	3
SCL	2	2	2
SDA	1	1	1

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Order details

(1) Basic type	
405106	JUMO CEROS C02 M – digital pressure measuring cell
(2) Basic type extension	
000	None
(3) Input	
455	0 to 1,6 bar relative pressure
456	0 to 2,5 bar relative pressure
457	0 bis 4 bar relative pressure
449	-1 to +1 bar relative pressure
481	-1 to +3 bar relative pressure
545	-1 to +6 bar relative pressure
472	-1 to +10 bar relative pressure
434	-1 to +16 bar relative pressure
514	-1 to +25 bar relative pressure
546	-1 to +40 bar relative pressure
547	-1 to +60 bar relative pressure
(4) Measuring cell	
231	Sensor element Ceramic
232	Sensor element Ceramic with process connection and FPM seal
(5) Process connection	
000	No process connection
502	G 1/4 according to DIN EN 837
504	G 1/2 according to DIN EN 837
511	1/4-18 NPT according to DIN EN 837
521	G 1/4 DIN 3852-11
(6) Output	
523	I ² C, 3.3 V supply
(7) Electrical connection	
39	JST connector
42	Edge Connector
(8) Extra codes	
983	Test report

Order code (1) (2) (3) (4) (5) (6) (7) (8)
 / - - - - - / , ...^a
 Order example 405106 / 000 - 472 - 231 - 000 - 523 - 42 / 983

^a List extra codes in sequence and separate using commas.

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Accessories

Designation	Part no.
Setup JUMO CEROS Series 02 (PC setup software)	00759752
PC-Interface with Converter USB/I ² C 3,3 V JST (for connection to JST version)	00772261

Further information and downloads



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MID flow transmitter

Brief description

The flow rate transmitter has a magnetically inductive sensor (MID).

Standardized fittings ensure easy installation of the transmitter into tubes ranging from DN15 to DN400 (see Data Sheet 406090).

The transmitter can be used in liquids with a conductivity of 20 $\mu\text{S}/\text{cm}$ or greater.

Flow speeds from 0.2 to 10 m/s can be measured.

The transmitter provides an output signal of 4 to 20 mA.

The measurement is also represented as a frequency pulse signal of 0 to 240 Hz.

Simple control tasks can be implemented with the installed relay.



Type 406010/ ...

Example of mounting



Flow transmitter



Fitting
See Data Sheet 406090

Key features

- Stainless steel design.
- Simple mounting.
- For pressures up to PN16 and temperatures up to 150°C.

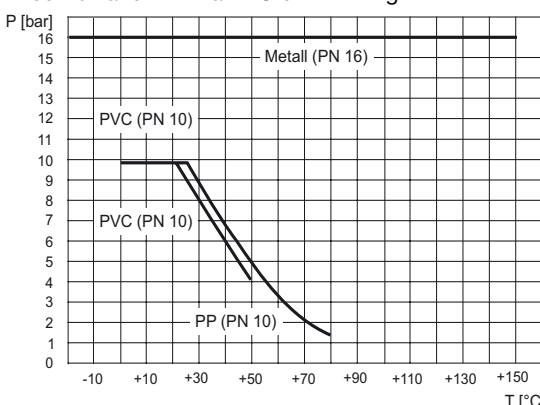
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Technical data

Operating conditions	
Measurement medium	Water or other conductive liquids Minimum conductivity: 20 µS/cm
Medium temperature	In combination with a PVC fitting: 0 to +50°C In combination with a PE fitting: 0 to +70°C In combination with a PP fitting: 0 to +80°C In combination with a stainless steel fitting: -15 to +150°C
Ambient temperature	-10 to +60°C operating temperature -20 to +60°C storage temperature
Tube diameter	For diameters DN15 to DN 400. Only in combination with fittings as per Data Sheet 406090.
System pressure	In combination with a PVC or PE fitting: 
Minimum inlet and outlet distances	See illustrations on page 5/5
Relative humidity	< 80%, non-condensing
Enclosure protection	IP65
EMC	EN 50081-1, EN 61000-6-2
Safety	EN 61010-1
Vibration	EN 60068-2-6
Impact	EN 60068-2-27
Measuring range	
Flow speed	0.2 to 10 m/s
Accuracy (With a flow speed of from 1 to 10 m/s and a medium temperature in the range from -15 to 70°C)	With standard K factor: ≤ ± 4% of measured value after teach-in: ≤ ± 2% of measured value
Linearity	≤ ± 1% of measured value + 0.1% of measurement range end
Repeatability	≤ ± 0.25% of measured value
Materials	
Housing, cover, nut	PPA
Screws, seal, cable gland	Sensor: stainless steel, EPDM, PA
Parts in contact with medium	Sensor: stainless steel 1.4404/316L, FKM, PEEK Fitting: see data sheet 406090

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




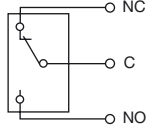
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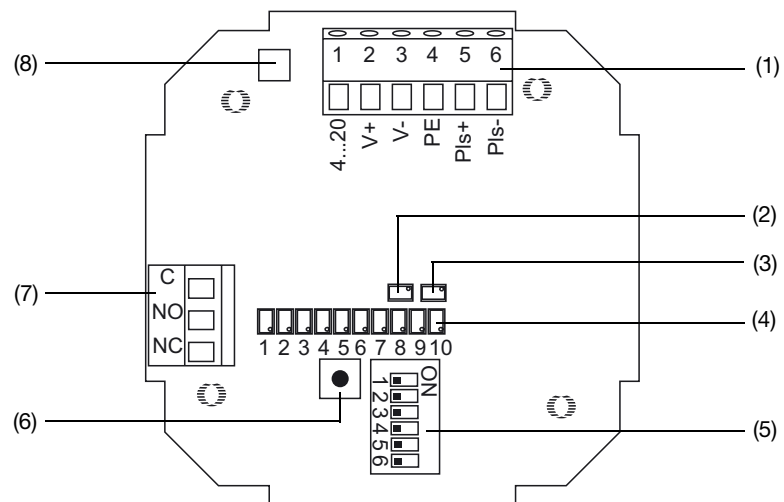
Electrical data	
Power supply voltage	DC 18 to 36 V, reverse polarity protected
Power consumption	≤ 220 mA
Output	Current: 4 to 20 mA, three wires Loop resistance: max. 1100 Ω at 36 V DC or max. 330 Ω at 18 V DC Frequency pulse: 0 to 240 Hz clock ratio: 50%, ≤ 100 mA, protected against short circuit and reverse polarity Relay: 3 A, 250 VAC, changeover contact Alarm: when exceeding scale value: 22 mA or 256 Hz Device error: 22 mA or 0 Hz
Cable gland	M20 x 1.5
Series terminals	for lines with cross-section up to 0.75 mm ²

Electrical connection

Connection	Terminal assignment
Supply voltage DC 11.5 to 36 V	 2 L+ 3 L-
Output 4 to 20 mA, three wires	 1 L+ max. 1100 Ω at 36 V DC 3 L- max. 330 Ω at 18 V DC
Output Frequency pulse	 5 Pls+ 6 Pls-
Equipotential bonding PE	4 
Screen	4 
Relay	

Terminal assignment

- (1) Connection terminals
- (2) Green display
- (3) Red display
- (4) Bar graph
- (5) DIP switch for configuration
- (6) Button
- (7) Relay connection
- (8) Switch: Sink / source



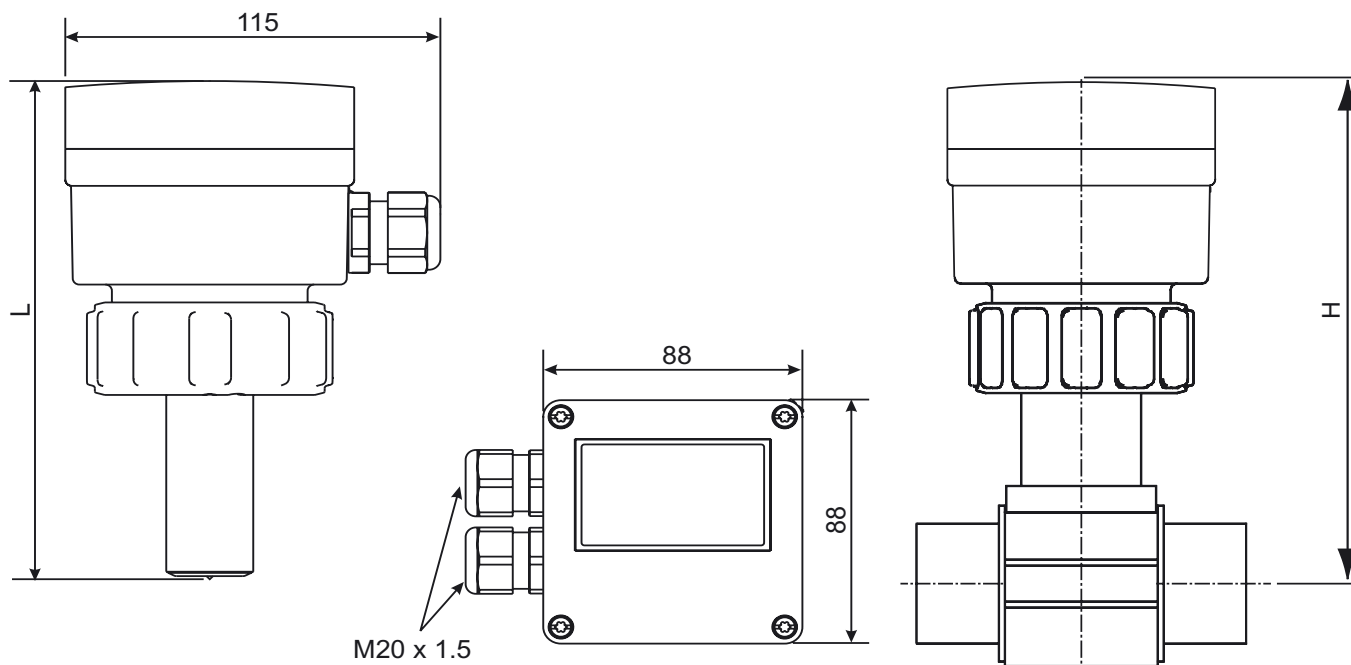
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Dimensions



Tube diameter DN	L	H Built into T fitting	Tube diameter DN	L	H Built into welded adapter
15	162	168	65	199	187
20		166	80		193
25		166	100		200
32		169	125		235
40		173	150		242
50		179	200		263
			250		281
			300		293
			350		306
			400		321

Note: suitable fittings can be found in Data Sheet 406090.

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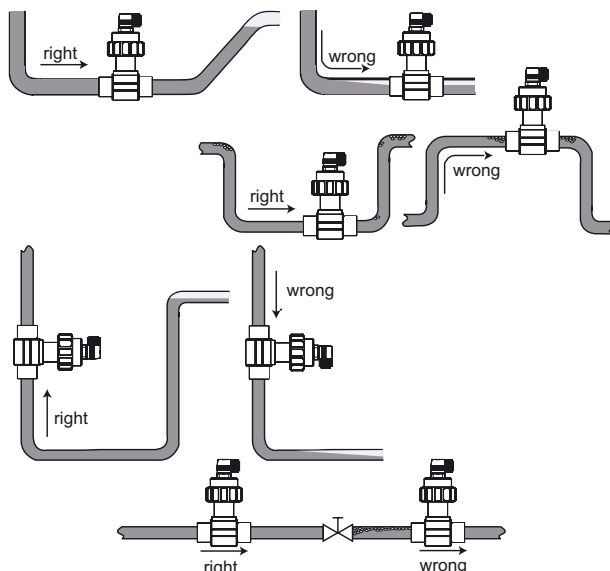
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Mounting

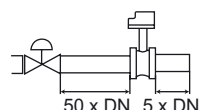
Installation

To ensure accurate flow measurements, the flow transmitter of type 406010 must be installed in vertical or horizontal tubing.

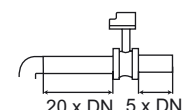


Minimum inlet and outlet distances

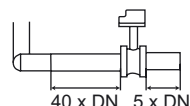
To eliminate turbulence in the tubing, the minimum inlet and outlet distances must be observed. To ensure greater accuracy, the length of these zones for eliminating turbulence can be increased. For additional information see EN ISO 5167-1. The direction of flow is from left to right. DN = Nominal tube width.



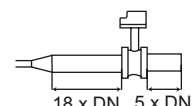
Control valve



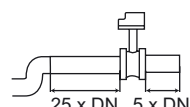
1 x 90° elbow or T piece



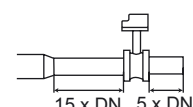
2 x 90° elbow
Three-dimensional



Extension



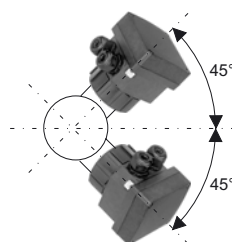
2 x 90° elbow



Reduction

Note: 45° angle installation position

We recommend installing the flow rate transmitter at an angle of 45° to the central axis of the tube! This will largely prevent accumulation from forming on the electrodes and measurement errors due to air bubbles.



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Mounting recommendation

Fittings for flow rate sensors - see Data Sheet 406090

PVC and stainless steel T fitting 	Nominal flow rate width DN15 to DN50	Sensor version (basic type extension) Short sensor
PE welded adapter 	Nominal flow rate width DN65 to DN100 DN125 to DN400	Sensor version (basic type extension) Short sensor Long sensor
Stainless steel welded adapter with radius 	Nominal flow rate width DN50 to DN200 DN250 to DN350	Sensor version (basic type extension) Short sensor Long sensor
PP connecting clamps 	Nominal flow rate width DN50 to DN200	Sensor version (basic type extension) Long sensor

Information for ordering: MID flow transmitter

- (1) **Basic type**
 406010 MID flow transmitter
- (2) **Basic type extension**
 001 Short sensor¹
 002 Long sensor¹
- (3) **Output**
 406 4 to 20 mA, three wires
- (4) **Electrical connection**
 82 Cable gland
- (5) **Extra codes**
 000 None

Order code	(1)	(2)	(3)	(4)	(5)
Sample order	406010	/ 001	- 406	- 82	/ 000

¹ See "Mounting recommendation" table above.



JUMO flowTRANS MAG I02

Electromagnetic flowmeter with display

Applications

- Industrial wastewater treatment and recovery
- Irrigation
- Drinking water
- Monitoring cleaning cycles in the foodstuff industry

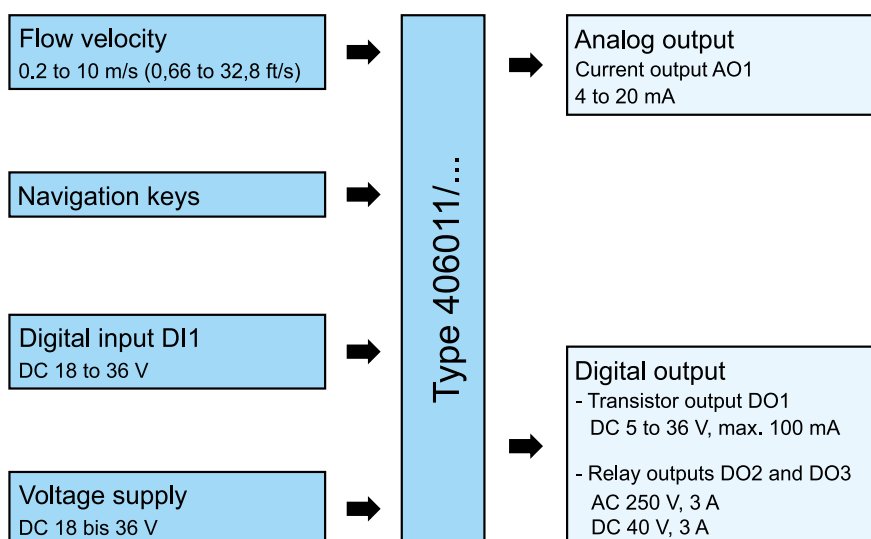
Brief description

The flowmeter is based on the magnetic-inductive measurement method. Standardized fittings (⇒ see data sheet 406090) enable easy installation of the flow meter in pipes of DN 15 to DN 400. Application areas are neutral, contaminated, or aggressive liquids with a minimum conductivity of 20 µS/cm. Flow velocities of 0.2 to 10 m/s can be measured here which generate an output signal of 4 to 20 mA and a pulse signal of 0 to 250 Hz. Two relay outputs and a digital input expand the functionality of the device. The flow rate is measured by two independent counters.



Type 406011/...

Block diagram



Special features

- Sensor without moving parts
- Display of the flow rate and volume
- Simulation of all output signals
- CIP capability
- FDA compliant materials

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Technical data

Measuring range and accuracy

Flow velocity	0.2 to 10 m/s (0,66 to 32,8 ft/s)
Measuring deviation with standard K-factor after Teach-In	$\leq \pm 3.5\%$ of the measured value ^a $\leq \pm 0.5\%$ of measured value ^a
Linearity	$\leq \pm 0.5\%$ of measuring range limit value ^b
Repeatability	$\leq \pm 0.25\%$ of measured value ^a

^a under reference conditions, i. e. measurement medium = water, ambient and water temperature = 20 °C, observing the necessary inlet and outlet sections and associated fitting (406090)

^b 10 m/s (32,8 ft/s)

Measurement media

Medium type	Neutral, contaminated, and aggressive liquids
Minimum conductivity of the medium	20 µS/cm
Viscosity	< 1000 mPas
Medium temperature ^a in conjunction with fitting made of PVC PE PP Stainless steel	0 to 50 °C (32 to 122 °F) 0 to 70 °C (32 to 158 °F) 0 to 80 °C (32 to 176 °F) -15 to +110 °C (5 to 230 °F)
Medium pressure ^a in conjunction with fitting made of PVC PE PP Stainless steel	PN 10 (145 psi) PN 10 (145 psi) PN 10 (145 psi) PN 16 (232 psi)

^a ⇒ see also "pressure temperature diagram", page 4

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Electrical data

Voltage supply	DC 18 to 36 V, filtered and regulated
Tolerance of the applied voltage	±0,5 %
Current consumption	Max. 300 mA at DC 18 V

Digital input DI1

Switching voltage	DC 18 to 36 V
Safety	Protected against polarity reversal and voltage peaks, galvanically isolated
Input impedance	15 kΩ
Minimum pulse length	200 ms
Switching thresholds	PLC level: logical „0“ < 7 V, logical „1“ > 10 V

Analog output AO1

Type	Current output
Signal range	4 to 20 mA, sink or source (depending on the connection), 22 mA for reporting faults
Load resistance	
at DC 18 V	450 Ω
at DC 24 V	700 Ω
at DC 30 V	1000 Ω
at DC 36 V	1300 Ω

Digital output DO1

Type	Transistor output (open-collector output), NPN/PNP (depending on connection)
Function (adjustable)	Pulse output (default setting), hysteresis/window mode, reverse flow direction message, generate a warning message
Pulse frequency	0 to 250 Hz
Switching voltage	DC 5 to 36 V
Switching current	Max. 100 mA
Duty cycle at f > 2 Hz	0,5
Minimum pulse length at f < 2 Hz	250 ms
Safety	Protected against excess voltage, polarity reversal, and short circuiting, galvanically isolated

Digital outputs DO2 and DO3

Type	Relay output
Function (adjustable)	Hysteresis (default setting), hysteresis/window mode, reverse flow direction message, generate a warning message
Switching output	N/O contact
Switching capacity	3 A at AC 250 V resistive load, 3 A at DC 40 V resistive load
Operating life	100000 cycles
Galvanic isolation	Mixed switching of mains voltage AC 230 V and SELV or PELV voltage is not admissible due to the basic insulation between the relays!

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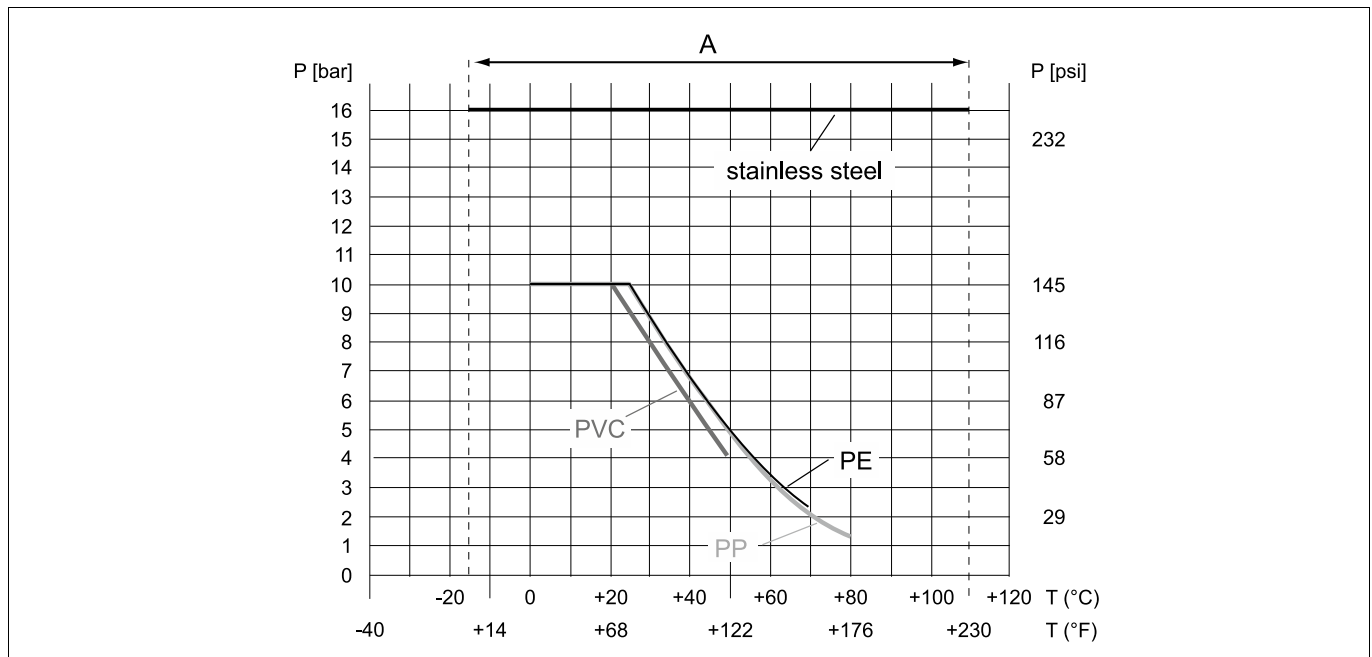
Mechanical features

Materials

Housing/seal	PPA, black/NBR
Union nut	PPA
Safety cap/seal	PSU/silicone
Front film	Polyester
M20 × 1.5 cable fittings/ seal	PA/neoprene
Screws	Stainless steel
Components in contact with the medium sensor	Stainless steel 316 L (1.4404), FKM, or EPDM, PEEK
Fitting	⇒ See data sheet 406090

Pressure temperature diagram

Relationship between the medium pressure and temperature for a device with a stainless steel sensor and a 406090 fitting made from stainless steel, PVC, PP, or PE:



Environmental influences

Wire diameter	DN 15 to DN 400 (1/2 to 16")
Fitting	Type 406090
Inlet and outlet sections	⇒ see "Inlet and outlet sections", page 8
Operating temperature range	-10 to +60 °C (14 to 140 °F)
Storage temperature range	-20 to +60 °C (-4 to +140 °F)
Relative humidity	< 85 %, non-condensing Height above sea level: max. 2000 m (6562 ft)
Protection type according to EN 60529	IP65, With connected device, screwed cable glands and screwed flap cover
EMC	EN 61000-6-3, EN 61000-6-2
Safety	EN 61010-1

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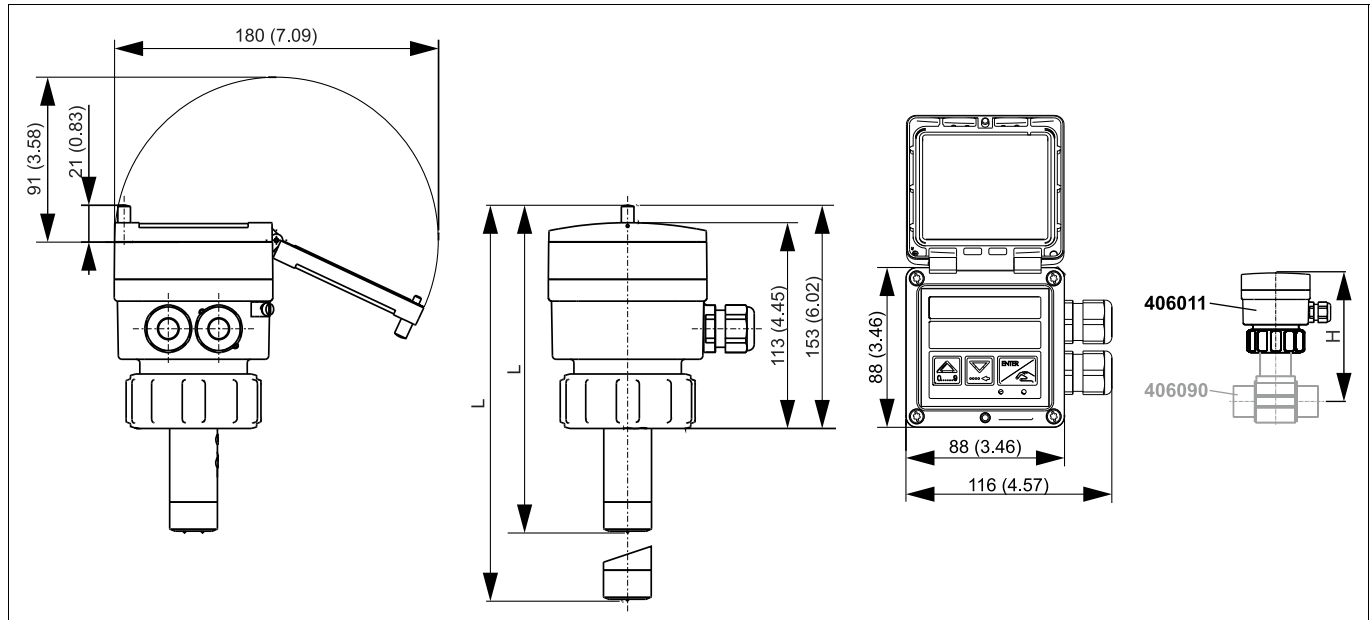
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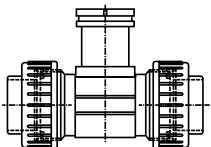
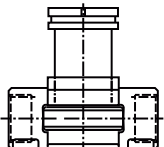
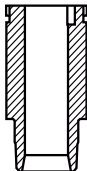
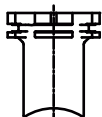
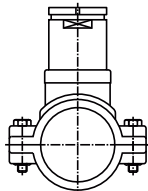
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Dimensions

Dimensions in mm (inch)



	installed in										
	T-fitting PVC		T-fitting stainless steel		Welded socket PE		Welded socket stainless steel		Connection clamp PP		
											
DN	L	H	L	H	L	H	L	H	L	H	
15 (1/2)	181 (7,13)	187 (7,36)	181 (7,13)	187 (7,36)							
20 (3/4)		185 (7,28)		185 (7,28)							
25 (1)											
32 (1 1/4)		188 (7,40)		188 (7,40)							
40 (1 1/2)		192 (7,56)		192 (7,56)							
50 (2)		198 (7,80)		198 (7,80)							
65 (2 1/2)					181 (7,13)	206 (8.11)	181 (7,13)	193 (7.60)	218 (8.58)	223 (8.78)	
80 (3)								199 (7.83)		222 (8.74)	
100 (4)								204 (8.03)		226 (8.90)	
110 (4 1/4)								214 (8.43)		231 (9.09)	
125 (5)					218 (8.58)	254 (10.00)	181 (7,13)	225 (8.86)		227 (8.94)	
150 (6)								261 (10.28)		236 (9.29)	234 (9.21)
180 (7)											244 (9.61)
200 (8)											268 (10.55)
250 (10)					218 (8.58)	282 (11.10)	181 (7,13)	257 (10.12)		280 (11.02)	
300 (12)								300 (11.81)		218 (8.58)	317 (12.48)
350 (14)								312 (12.28)			336 (13.22)
400 (16)								325 (12.8)			348 (13.70)
								340 (13.39)			

Suitable fittings ⇒ see data sheet 406090



Connection diagram



NOTE!

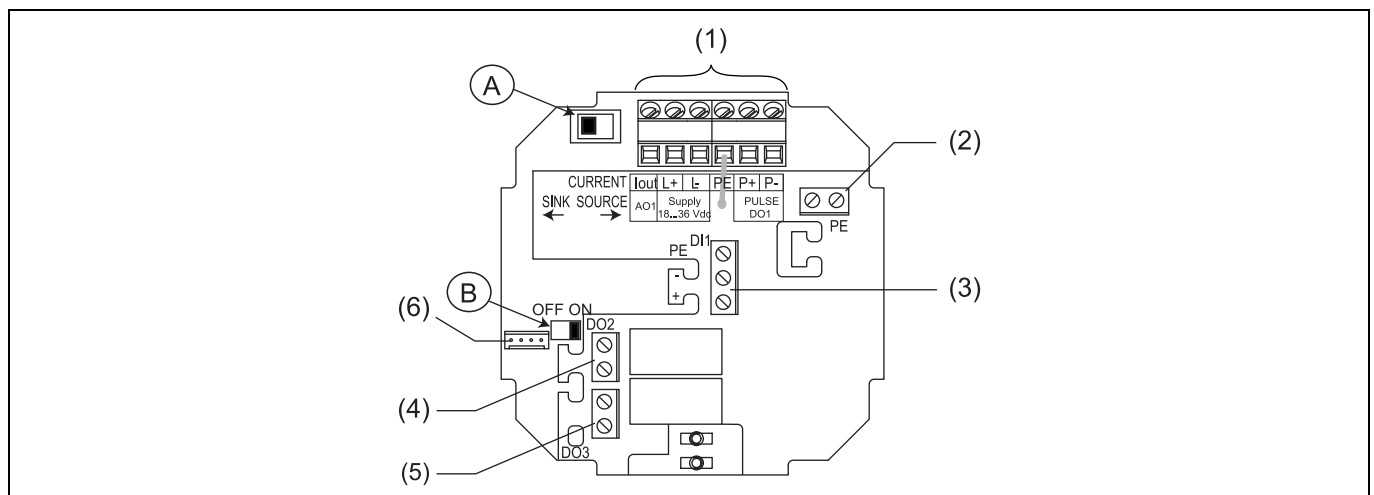
The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.



HINWEIS!

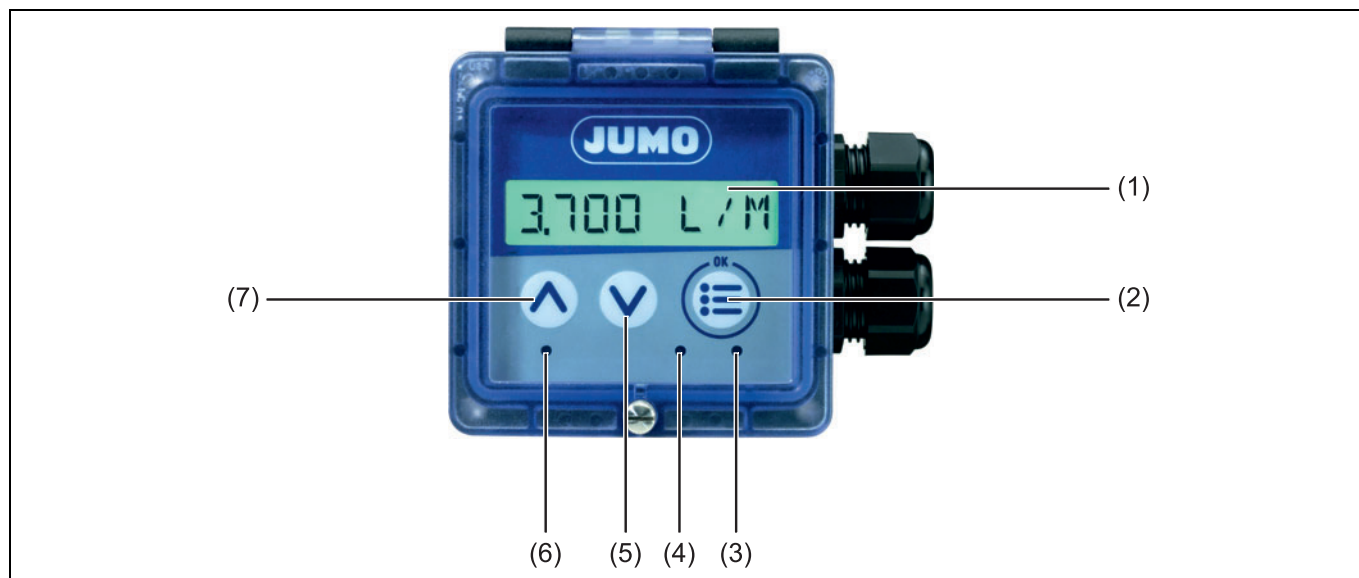
Galvanic isolation of relay outputs DO2 and DO3

Mixed switching of mains voltage AC 230 V and SELV or PELV voltage is not admissible due to the basic insulation between the relays!



- | | | | |
|-----|----------------|-------|--|
| (1) | Terminal strip | I out | Current output AO1 (4 to 20 mA) |
| | | L+ | V+ (positive power supply) |
| | | L- | 0 V (ground for the power supply) |
| | | PE | Functional ground |
| | | P+ | Positive transistor output DO1 |
| | | P- | Negative transistor output DO1 |
| (2) | Terminal strip | PE | Shielding on the supply cable and output cables of AO1 and DO1 |
| (3) | Terminal strip | PE | Functional ground for the cable for the digital input DI1 |
| | | - | Negative signal for the digital input DI1 |
| | | + | Positive signal for the digital input DI1 |
| (4) | Terminal strip | | Connection for the relay output DO2 |
| (5) | Terminal strip | | Connection for the relay output DO3 |
| (6) | Terminal strip | | 4-pin ribbon cable for connecting the sensor |
| (A) | Switch | | Sink / Source selection switch |
| (B) | Switch | | Selection switch for locking or unlocking the CONFIRM key |

Display, navigation keys and status LEDs



- (1) Digital indicator with eight digits (four numerical, four alphanumeric)
- (2) CONFIRM key: to select the displayed function, confirm settings
- (3) Status LED for the relay DO3 (LED on = contact closed)
- (4) Status LED for the relay DO2 (LED on = contact closed)
- (5) To read messages, to scroll down through the functions, to select the digit on the left
- (6) Device status LED ⇒ see table below
- (7) To scroll up through the functions, to increase the selected digit

Device status LED	Device status
Green	The device is working properly.
Orange	A warning message has been generated.
Red	An error message has been generated and the current output AO1 emits 22 mA.
Flashing, regardless of the color	<ul style="list-style-type: none"> The digital input DI1 is active The checking function for proper output response is active Calibration of the zero flow rate is active The daily counter is held at zero

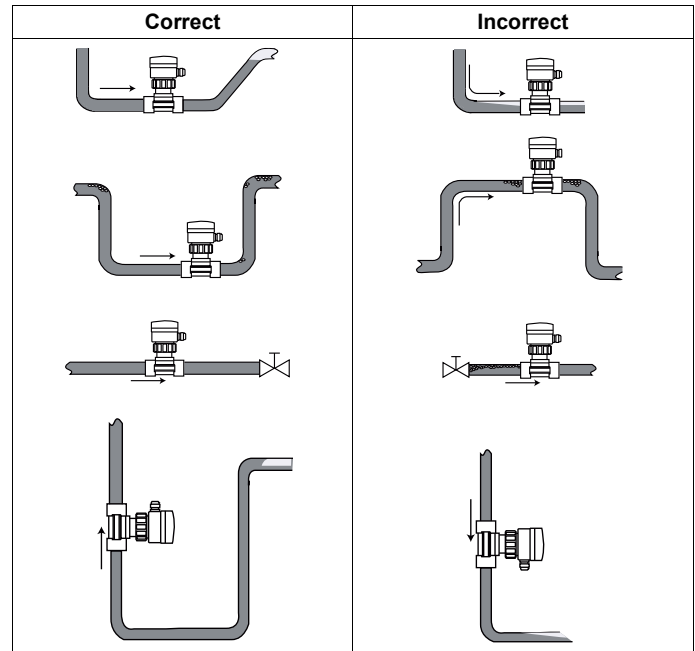
Mounting

Installation

The device can be installed in either a horizontal or vertical pipeline.

Make sure that:

- The section of pipe around the sensor is always filled.
- The direction of flow (arrow) points upwards when installing vertically.
- The formation of bubbles is avoided in the pipeline containing the device.
- The device is always installed upstream from discharge points for liquids with increased conductivity (e.g.: acids, bases, salt solutions).



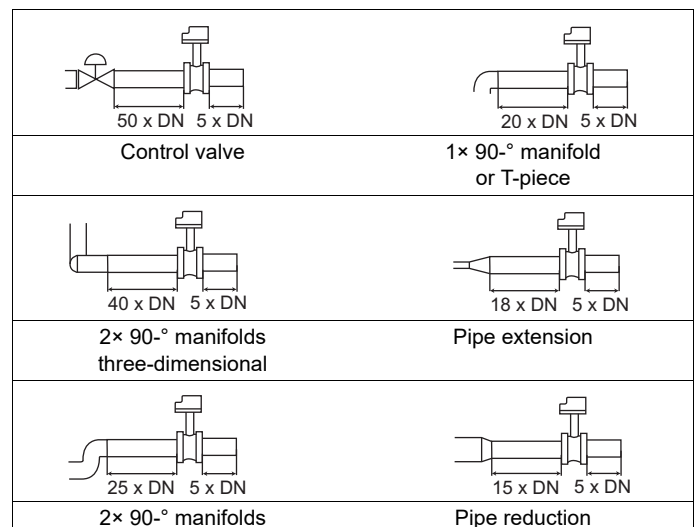
Inlet and outlet sections

To calm the flow in the pipeline, the specified inlet and outlet sections are required at the very least.

For increased accuracy, you can make these sections of contact longer.

Direction of flow: from left to right.

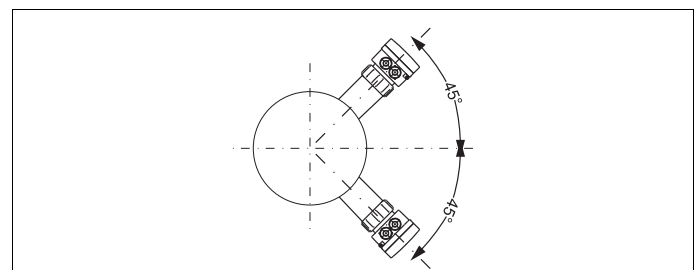
DN = Nominal pipe width



45° angle installation position

We recommend installing the flow rate transmitter at a 45° to the pipe's central horizontal axis.

This helps to avoid the majority of deposits on the measuring electrodes and measuring errors caused by air bubbles.



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Installation recommendation

Fittings for flow sensors ⇒ see data sheet 406090.

PVC and stainless steel T-fitting

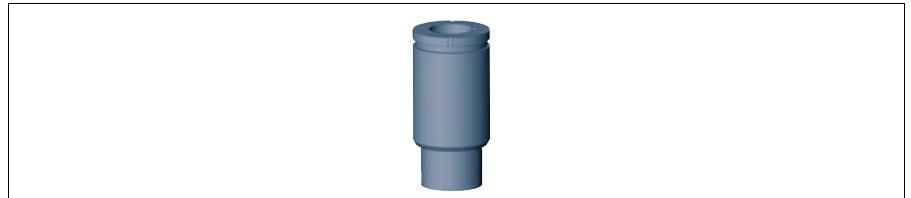
DN 15 to DN 50, short sensor



PE welded socket

DN 65 to DN 100, short sensor

DN 125 to DN 400, long sensor



Stainless steel welded socket with radius

DN 50 to DN 200, short sensor

DN 250 to DN 350, long sensor



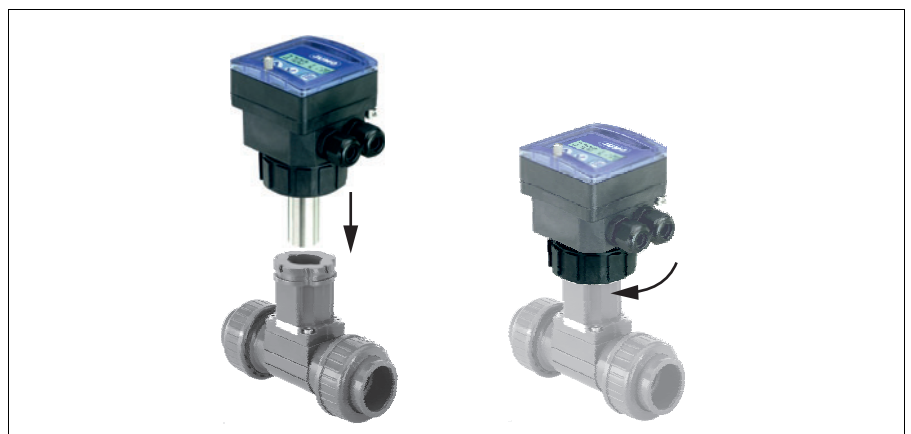
PP connection clamps

DN 50 to DN 200, long sensor



Mounting example

Flow transmitter with fitting



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Order details

(1) Basic type	
406011	JUMO flowTRANS MAG I02 with display
(2) Sensor version	
001	Short sensor (depending on the selected fitting)
002	Long sensor (depending on the selected fitting)
(3) Sensor material	
20	Stainless steel 1.4404/316 L
(4) Measuring electrode material	
01	Stainless steel 1.4404/316 L
(5) Output	
480	4 to 20 mA, three wire, open collector, 2× relays
(6) Electrical connection	
82	Cable fitting
(7) Voltage supply	
5	DC 18 to 36 V

Order code (1) (2) (3) (4) (5) (6) (7)
 Order example 406011 / X - 20 - 01 - 480 - 82 - 5

Spare parts and accessories

Designation	Part no.
PC lid, with flap, window, screws and adhesive film	693539
PPA lid, with flap, window, screws and adhesive film	693548
Set with 2 cable fittings M20 × 1.5 2 flat seals made from CR for cable fittings or screw plugs 2 screw plugs M20 × 1.5 2 multiway seals 2 × 6 mm	693568
Set with 2 reductions M20 × 1.5/NPT 1/2" (with mounted seal) 2 flat seals made from CR for screw plugs 2 screw plugs M20 × 1.5	693590
Set with 1 plug for cable fitting M20 × 1.5 1 multiway seal 2 × 6 mm, for cable fitting 1 green seal made from FKM 1 installation instruction	693607
Set with 1 green seal made from FKM 1 black seal made from EPDM	693610
Set with 1 plug for cable fitting M20 × 1.5 1 multiway seal 2 × 6 mm, for cable fitting	693612
Circlip	693620
PC union nut for PC housing	693625
PPA union nut for PPA housing	693627

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JUMO flowTRANS MAG S01

Electromagnetic flowmeter

for industrial applications

Brief description

The electromagnetic flowmeter JUMO flowTRANS MAG S01 was developed for industrial applications in areas such as the chemical, energy, water and wastewater, oil and gas, paper and pulp, metal, and mechanical engineering industries.

It is particularly flexible and available with a large variety of nominal widths, measuring tube linings, materials, and process connections.

The efficient and reliable transmitter stands out due to the many application possibilities, a high measuring accuracy, and simple startup.

The JUMO flowTRANS MAG S01 provides users with an inexpensive flowmeter that is tailored precisely to your requirements, has a short delivery time, and includes simple and easily understandable documentation.

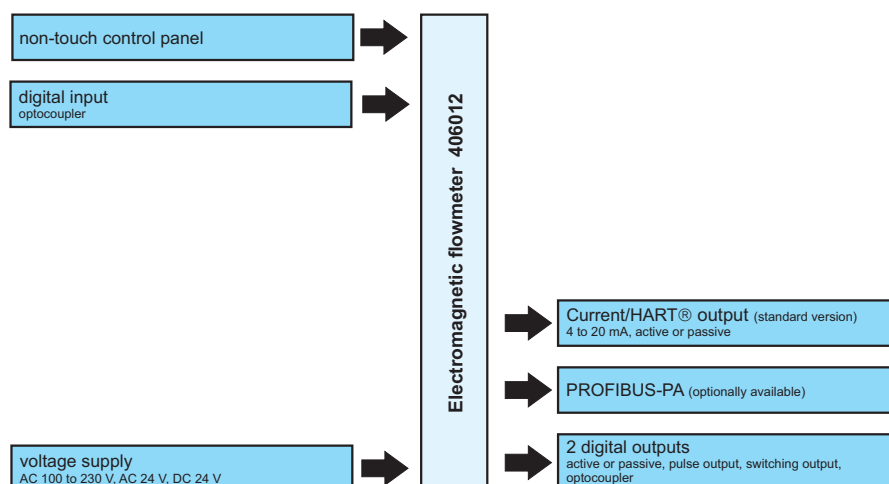


compact design



remote mount design

Block diagram



Special features

- High degree of accuracy
- Extremely simple operation
- State-of-the-art diagnosis for empty pipe detection
- Simpler and quicker fault rectification thanks to diagnosis-based help texts
- Digital communication via HART protocol (standard) or PROFIBUS-PA (option)
- Nominal pressure: PN 10, 16, 40, CL150, CL300
- Process connection: flange according to DIN/EN, ASME
- Lining: hard rubber, PTFE
- Medium temperature: up to 130 °C (266 °F)

Approvals/approval marks (see "Technical data")



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Description

General information

The JUMO flowTRANS MAG S01 was developed with particular consideration for the growing requirements that are placed on modern flowmeters. The modular device concept offers flexibility, cost-effective operation, and excellent reliability with a long operating life and minimal maintenance costs.

Diagnostics functions

State-of-the-art diagnostics functions such as "empty pipe detection" and "sensor measurement" monitor the functional capability of the device and the process.

The limit values for the diagnosis parameters can be adjusted on-site. If these limit values are exceeded, an alarm is issued.

The diagnosis data can be extracted via a state-of-the-art Device Type Manager (DTM) for further analysis. Critical states can therefore be detected at an early stage and countermeasures can be taken.

This enables higher productivity and avoids down times.

Status messages are classified in accordance with the NAMUR requirements.

In the event of a fault, a diagnosis-based help text is displayed which makes it significantly easier and quicker to rectify the fault. This provides maximum process reliability.

Sensor

Self-cleaning, double-sealing polished measuring electrodes increase the reliability and measurement performance of the device.

The high excitation frequency of the sensor means that the JUMO flowTRANS MAG S01 has a fast response time as a flow metering system. State-of-the-art filter methods that separate the measurement signal from the interference signal enable precise measurement with outstanding accuracy even under difficult conditions (max. measurement deviation 0.2 % of the measured value).

Startup

The latest memory technology in the sensor eliminates the need to check the assignment of the sensor and transmitter. The transmitter detects the sensor automatically using the built-in "SensorMemory". Once the voltage supply is switched on, the transmitter carries out self-configuration. The sensor data and the measuring-point specific parameters are loaded automatically. Potential errors are thus eliminated and startup is quick and reliable.

Operation

The parameters pre-set in the plant are changed via the user-friendly display and non-contact operating buttons – quickly and easily without the need to open the housing. The easy setup function also guides inexperienced users smoothly through the configuration, step by step.

The softkey functionality makes it as easy to use as a modern cell phone. During configuration, the admissible setting range of the relevant parameter is shown on the display and inadmissible entries are rejected.

Transmitter

The back-lit display can be turned without additional tools. The contrast is adjustable and the display is fully configurable. The size of the characters, the number of lines, and the resolution of the display (decimal points) are variable. In multiplex mode, several display appearances can be flexibly preconfigured and called up in succession.

The intelligent module design of the transmitter slot enables simple dismantling without unscrewing cables or removing connectors.

Whether it is for counting pulses (active or passive), 20 mA (active or passive), status output (active or passive) – the universal transmitter always offers the right signal. The HART protocol is standard here.

Alternatively to the HART® protocol, the transmitter can be equipped with PROFIBUS-PA as an option.

Conformities

The JUMO flowTRANS MAG S01 complies with the device standard for the process industry. It meets the various NAMUR requirements. In addition, the flowmeter is a universal device in terms of the Pressure Equipment Directive. In accordance with the NAMUR requirement, the evaluation is performed according to Category III for pipelines. This means that the JUMO flowTRANS MAG S01 can be used universally. Costs are reduced and reliability is improved.

Function overview

The following table provides an overview of the most important functions.

Measuring accuracy
0.4 % (optional 0.2 %) of the measured value
Additional software functions
Measuring units, editable counters
Graphic display
Line recorder function
Fieldbus
PROFIBUS-PA (optional)

Device version

The JUMO flowTRANS MAG S01 is available in a compact and remote mount design type.

Compact: sensor and transmitter form one mechanical unit.

Remote mount: sensor and transmitter are placed in separate housings.

The housings are available as single-compartment or dual-compartment housings, depending on the requirements concerning the Ex-protection type.

Overview of available versions:

	JUMO flowTRANS MAG S01	
	Compact	Remote mount
Standard		
No Ex-protection	Single-compartment housing	Single-compartment housing
Ex-protection		
Zone 2, 21, 22	Single-compartment housing	Single-compartment housing
Ex-protection		
Zone 1, 21, 22	Dual-compartment housing	Dual-compartment housing

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Technical data

Design

JUMO flowTRANS MAG S01 – compact design

406012/1-0 (without Ex-protection)	406012/1-1 (Ex-protection zone 2)	406012/1-1 (Ex-protection zone 1)
Transmitter: single-compartment housing sensor: Steel housing Aluminum housing 	Transmitter: single-compartment housing sensor: Aluminum housing 	Transmitter: dual-compartment housing sensor: Aluminum housing 
	ATEX/IECEX Gas zone 2 Dust zone 21, 22	ATEX/IECEX Gas zone 1 Dust zone 21, 22



IMPORTANT (NOTE)!

The scope of delivery for the compact design type includes the sensor and transmitter as one mechanical unit (model 406012/1-0 or 406012/1-1).

If only the sensor model 406012/2-0 or 406012/2-1 is needed, the order code "Remote mount design (sensor) ", page 51 should be used to generate the correct order details.

If only the transmitter model 406018/2-0 or 406018/2-1 is needed, the order code "Remote mount design (transmitter) ", page 54 should be used to generate the correct order details.

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Model number	406012/1-0, 406012/1-1
Measured value deviation	Standard: 0.4 % of the measured value Option: 0.2 % of the measured value
Nominal width range	DN 10 to 300 (3/8 to 12") - Aluminium housing DN 25 to 300 (1 to 12") - Steel housing
Process connection	Flange according to DIN 2501/EN 1092-1, ASME B16.5
Nominal pressure	PN 10, PN 16, PN 40, ASME CL150, ASME CL300
Lining	Hard rubber: DN 15 to 300 (1/2 to 12") - Aluminium housing Hard rubber: DN 40 to 300 (1 1/2 to 12") - Steel housing PTFE: DN 10 to 300 (3/8 to 12") - Aluminium housing PTFE: DN 25 to 300 (1 to 12") - Steel housing
Conductivity	> 5 µS/cm, (20 µS/cm for demineralized water)
Electrodes	Stainless steel, Hastelloy C, platinum-iridium, tantalum, titanium
Process connection material	Steel, stainless steel
Protection type	IP65, IP67 (NEMA 4X)
Medium temperature	Hard rubber: -15 to +90 °C (-5 to +194 °F) PTFE: -25 to +130 °C (-13 to +266 °F)
Approvals	
Electromagnetic compatibility	2004/108/EC – EMC (until April 19, 2016) 2014/30/EU – EMC (as of April 20, 2016)
Ex-protection	94/9/EC – ATEX (until April 19, 2016) 2014/34/EU – ATEX (as of April 20, 2016) IECEx
Pressure equipment - Conformity assessment acc. to Category III, Fluid group 1	97/23/EC (until July 18, 2016 - Mod. B+D) 2014/68/EU (as of June 1, 2015 - Art. 13) 2014/68/EU (as of July 19, 2016 - Mod. B+D)
Transmitter	
Voltage supply	AC 100 to 230 V (-15/+10 %), AC 24 V (-30/+10 %), DC 24 V (-30/+30 %)
Current output	4 to 20 mA active or passive
Pulse output	Active or passive can be set using software on-site
Switching output	Optocoupler, programmable function
Switching input	Optocoupler, programmable function
Display	Graphical display, adjustable
Housing	Compact design, available as single-compartment or dual-compartment housing, depending on the requirements concerning the Ex-protection
Communication	HART protocol (standard), PROFIBUS-PA (option)
Electrical safety	According to DIN EN 61010-1
Electromagnetic compatibility	According to DIN EN 61326-1, DIN EN 61326-2-3




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JUMO flowTRANS MAG S01 – remote mount design

406012/2-0 (without Ex-protection)	406012/2-1 (Ex-protection zone 2)	406012/1-1 (Ex-protection zone 1)
Sensor: Steel housing Aluminum housing 	Sensor: Aluminum housing 	Sensor: Aluminum housing 
	ATEX/IECEX Gas zone 2 Dust zone 21, 22	ATEX/IECEX Gas zone 1 Dust zone 21, 22

406018/2-0 (without Ex-protection)	406018/2-1 (Ex-protection zone 2)	406018/1-1 (Ex-protection zone 1)
Transmitter: single-compartment housing 	Transmitter: single-compartment housing 	Transmitter: dual-compartment housing 
	ATEX/IECEX Gas zone 2 Dust zone 21, 22	ATEX/IECEX Gas zone 1 Dust zone 21, 22



IMPORTANT (NOTE)!

The scope of delivery for the remote mount design type includes the sensor (model 406012/2-0 or 406012/2-1) and the corresponding transmitter (model 406018/2-0 or 406018/2-1) in separate housings.

If only the sensor model 406012/2-0 or 406012/2-1 is needed, the order code "Remote mount design (sensor) ", page 51 should be used to generate the correct order details.

If only the transmitter model 406018/2-0 or 406018/2-1 is needed, the order code "Remote mount design (transmitter) ", page 54 should be used to generate the correct order details.

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Sensor	406012/2-0, 406012/2-1
Measured value deviation	Standard: 0.4 % of the measured value Option: 0.2 % of the measured value
Nominal width range	DN 10 to 300 (3/8 to 12") - Aluminium housing DN 25 to 300 (1 to 12") - Steel housing
Process connection	Flange according to DIN 2501/EN 1092-1, ASME B16.5
Nominal pressure	PN 10, PN 16, PN 40, ASME CL150, ASME CL300
Lining	Hard rubber: DN 15 to 300 (1/2 to 12") - Aluminium housing Hard rubber: DN 40 to 300 (1 1/2 to 12") - Steel housing PTFE: DN 10 to 300 (3/8 to 12") - Aluminium housing PTFE: DN 25 to 300 (1 to 12") - Steel housing
Conductivity	> 5 µS/cm, (20 µS/cm for demineralized water)
Electrodes	Stainless steel, Hastelloy C, platinum-iridium, tantalum, titanium
Process connection material	Steel, stainless steel
Protection type	IP65, IP67 (NEMA 4X), IP68
Medium temperature	Hard rubber: -15 to +90 °C (-5 to +194 °F) PTFE: -25 to +130 °C (-13 to +266 °F)
Approvals	
Electromagnetic compatibility	2004/108/EC – EMC (until April 19, 2016) 2014/30/EU – EMC (as of April 20, 2016)
Ex-approvals	94/9/EC – ATEX (until April 19, 2016) 2014/34/EU – ATEX (as of April 20, 2016) IECEX
Pressure equipment (PED) – Conformity assessment acc. to Category III, Fluid group 1	97/23/EC (until July 18, 2016 - Mod. B+D) 2014/68/EU (as of June 1, 2015 - Art. 13) 2014/68/EU (as of July 19, 2016 - Mod. B+D)
Transmitter	406018/2-0, 406018/2-1
Voltage supply	AC 100 to 230 V (-15/+10 %), AC 24 V (-30/+10 %), DC 24 V (-30/+30 %)
Current output	4 to 20 mA active or passive
Pulse output	Active or passive can be set using software on-site
Switching output	Optocoupler, programmable function
Switching input	Optocoupler, programmable function
Display	Graphical display, adjustable
Housing	Remote mount design, available as single-compartment or dual-compartment housing, depending on the requirements concerning the Ex-protection
Protection type	IP65, IP67 (NEMA 4X)
Communication	HART protocol (standard), PROFIBUS-PA (option)
Electrical safety	According to DIN EN 61010-1
Electromagnetic compatibility	According to DIN EN 61326-1, DIN EN 61326-2-3

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General information

Reference conditions according to EN 29104

Medium temperature	20 °C (68 °F) ±2 K
Ambient temperature	20 °C (68 °F) ±2 K
Voltage supply	Nominal voltage according to the nameplate $U_n \pm 1 \%$, frequency $f \pm 1 \%$
Installation conditions	Upstream > 10 × DN pipe section Downstream > 5 × DN pipe section
Warm-up phase	30 min

Maximum measurement deviation

Pulse output	
Standard calibration:	±0.4 % of measured value, ±0.02 % Q_{\max} DN (DN10 to 300)
Optional calibration:	±0.2 % of measured value, ±0.02 % Q_{\max} DN (DN10 to 300)
Q_{\max} DN ⇒ See table "Nominal width and measuring range", page 8	
<p>Y Accuracy ± of measured value in [%] X Flow velocity v in [m/s], Q/Q_{\max}DN [%]</p>	
Analog output effect	Same as pulse output plus ±0.1 % of measured value + 0.01 mA

Repeatability, response time

Repeatability	≤ 0.11 % of the measured value $t_{\text{meas}} = 100 \text{ s}$ $v = 0.5 \text{ to } 10 \text{ m/s}$
Response time Current output with an attenuation of 0.02 seconds	For a step function 0 to 99 % 5 $t \geq 200 \text{ ms}$ at 25 Hz excitation frequency 5 $t \geq 400 \text{ ms}$ at 12.5 Hz excitation frequency 5 $t \geq 500 \text{ ms}$ at 6.25 Hz excitation frequency

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Nominal width and measuring range

The measuring range end value can be configured between $0.02 \times Q_{\max} \text{DN}$ and $2 \times Q_{\max} \text{DN}$.

Nominal width		Minimum measuring range end value	$Q_{\max} \text{DN}$	Maximum measuring range end value
DN	Inch "	$0.02 \times Q_{\max} \text{DN}$ ($\approx 0.2 \text{ m/s}$)	0 to $\approx 10 \text{ m/s}$	$2 \times Q_{\max} \text{DN}$ ($\approx 20 \text{ m/s}$)
10	3/8	0.9 l/min (0.24 US gal/min)	45 l/min (11.9 US gal/min)	90 l/min (23.78 US gal/min)
15	1/2	2 l/min (0.53 US gal/min)	100 l/min (26.4 US gal/min)	200 l/min (52.8 US gal/min)
20	3/4	3 l/min (0.79 US gal/min)	150 l/min (39.6 US gal/min)	300 l/min (79.3 US gal/min)
25	1	4 l/min (1.06 US gal/min)	200 l/min (52.8 US gal/min)	400 l/min (106 US gal/min)
32	1 1/4	8 l/min (2.11 US gal/min)	400 l/min (106 US gal/min)	800 l/min (211 US gal/min)
40	1 1/2	12 l/min (3.17 US gal/min)	600 l/min (159 US gal/min)	1200 l/min (317 US gal/min)
50	2	1.2 m ³ /h (5.28 US gal/min)	60 m ³ /h (264 US gal/min)	120 m ³ /h (528 US gal/min)
65	2 1/2	2.4 m ³ /h (10.57 US gal/min)	120 m ³ /h (528 US gal/min)	240 m ³ /h (1057 US gal/min)
80	3	3.6 m ³ /h (15.9 US gal/min)	180 m ³ /h (793 US gal/min)	360 m ³ /h (1585 US gal/min)
100	4	4.8 m ³ /h (21.1 US gal/min)	240 m ³ /h (1057 US gal/min)	480 m ³ /h (2113 US gal/min)
125	5	8.4 m ³ /h (37 US gal/min)	420 m ³ /h (1849 US gal/min)	840 m ³ /h (3698 US gal/min)
150	6	12 m ³ /h (52.8 US gal/min)	600 m ³ /h (2642 US gal/min)	1200 m ³ /h (5283 US gal/min)
200	8	21.6 m ³ /h (95.1 US gal/min)	1080 m ³ /h (4755 US gal/min)	2160 m ³ /h (9510 US gal/min)
250	10	36 m ³ /h (159 US gal/min)	1800 m ³ /h (7925 US gal/min)	3600 m ³ /h (15850 US gal/min)
300	12	48 m ³ /h (211 US gal/min)	2400 m ³ /h (10567 US gal/min)	4800 m ³ /h (21134 US gal/min)

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Sensor

Temperatures

The temperature range of the device depends on various factors. These factors include the medium temperature, the ambient temperature, the operating pressure, the lining material, and the approvals for the Ex-protection.

Storage temperature

-40 to +70 °C (-40 to +158 °F)

Minimum admissible pressure depending on the medium temperature

Sensor housing made of aluminum (shell housing)

Lining	Nominal width	P _{operating abs}	at T _{operating} ^a
Hard rubber	DN 15 to 300 (1/2 to 12")	0 mbar	< 90 °C (194 °F)
PTFE	DN 10 to 300 (3/8 to 12")	270 mbar	< 20 °C (68 °F)
		400 mbar	< 100 °C (212 °F)
		500 mbar	< 130 °C (266 °F)

^a Higher temperatures are admissible for CIP/SIP cleaning for a limited time (see table "Maximum admissible cleaning temperature ", page 9).

Sensor housing made of steel

Lining	Nominal width	P _{operating abs}	at T _{operating} ^a
Hard rubber	DN 40 to 300 (1 1/2 to 12")	600 mbar	< 80 °C (176 °F)
PTFE	DN 25 to 300 (1 to 12")	270 mbar	< 20 °C (68 °F)
		400 mbar	< 100 °C (212 °F)
		500 mbar	< 130 °C (266 °F)

^a Higher temperatures are admissible for CIP/SIP cleaning for a limited time (see table "Maximum admissible cleaning temperature ", page 9).

Maximum admissible cleaning temperature

CIP cleaning	Lining Sensor	T _{max}	T _{max} minutes	T _{Amb}
Steam cleaning	PTFE	150 °C (302 °F)	60	25 °C (77 °F)
Liquids	PTFE	140 °C (284 °F)	60	25 °C (77 °F)

If the ambient temperature is > 25 °C, the difference must be subtracted from the max. cleaning temperature. T_{max} - Δ °C.

(Δ °C = T_{Amb} - 25 °C)

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Maximum ambient temperature depending on the medium temperature



IMPORTANT (NOTE)!

If the device is used in potentially explosive areas, the additional "Temperature data for operation in zone 1 ", page 38 and "Temperature data for operation in zone 2 ", page 44 must be taken into account.

Compact design					
Lining	Flange material	Ambient temperature		Medium temperature	
		Minimum	Maximum	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	90 °C (194 °F)
Hard rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	90 °C (194 °F)
PTFE	Steel	-10 °C (14 °F)	60 °C (140 °F) 45 °C (113 °F)	-10 °C (14 °F)	90 °C (194 °F) 130 °C (266 °F)
PTFE	Stainless steel	-20 °C (-4 °F)	60 °C (140 °F) 45 °C (113 °F)	-25 °C (-13 °F)	90 °C (194 °F) 130 °C (266 °F)

Remote mount design					
Lining	Nominal width	Ambient temperature		Medium temperature	
		Minimum	Maximum	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	90 °C (194 °F)
Hard rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	90 °C (194 °F)
PTFE	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-25 °C (-13 °F)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)

Protection type according to EN 60529

Compact design (internal transmitter)	IP65, IP67 (NEMA X4)
Remote mount design (external transmitter)	IP65, IP67 (NEMA X4), IP68

Pipeline vibration according to EN 60068-2-6

Valid for:

Compact design (With aluminum transmitter housing)	In the range 10 to 58 Hz max. 0.15 mm (0.006") amplitude
	In the range 58 to 150 Hz max. 2 g acceleration
Remote mount design (Sensor)	In the range 10 to 58 Hz max. 0.15 mm (0.006") amplitude
	In the range 58 to 150 Hz max. 2 g acceleration

Insertion length

The flanged devices comply with the insertion lengths specified according to VDI/VDE 2641, ISO 13359 or according to DVGW (work sheet W420, design WP, ISO 4064 short).

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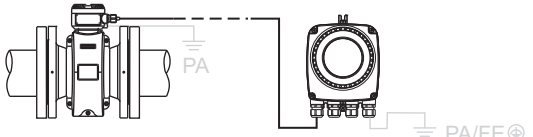
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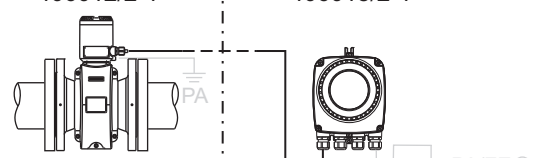
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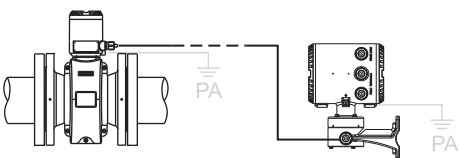


Signal cable length and preamplifier

For devices in the remote mount design, the electrical connection between the transmitter and sensor is made via a signal cable.

Transmitter housing design	Single-compartment housing	Ex-zone 2 or outside of Ex-area	
Maximum signal cable length^a		406012/2-0 406012/2-1	406018/2-0 406018/2-1
Without preamplifier	50 m (164 ft)		
With preamplifier	200 m (656 ft)		
Scope of delivery^b	5 m (16.4 ft) included		
Signal cable, part no.	00648906		

Transmitter housing design	Single-compartment housing	Ex-zone 1	Ex-zone 2 or outside of Ex-area
Maximum signal cable length^a		406012/2-1	406018/2-1
Without preamplifier	50 m (164 ft)		
With preamplifier	-		
Scope of delivery^b	5 m (16.4 ft) included		
Signal cable, part no.	00648906		

Transmitter housing design	Dual-compartment housing	Ex-zone 1	
Maximum signal cable length^a		406012/2-1	406018/2-1
Without preamplifier	10 m (164 ft)		
With preamplifier	-		
Scope of delivery^b	10 m (32.8 ft) permanently installed		
Signal cable, part no.	00648907		

^a At a minimum conductivity for the measurement medium of $\geq 5 \mu\text{S/cm}$

^b Other available signal cable lengths \Rightarrow see "Available signal cable lengths", page 56

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Materials – sensor housing made of aluminum (shell housing)



Housing parts	Standard	Option
Housing Nominal width: DN 10 to 300 (3/8 to 12")	Dual-shell housing for aluminum casting, painted, paint coat, $\geq 80 \mu\text{m}$ thick, RAL 5013 (cobalt blue)	-
Terminal box	Aluminum alloy, painted, $\geq 80 \mu\text{m}$ thick, RAL 5013 (cobalt blue)	-
Measuring pipe	Stainless steel ^a	-
Cable fitting^b	Polyamide	-

Parts not in contact with the medium	Standard	Option
Process connection Nominal width: DN 10 to 15 (3/8 to 1/2") Nominal width: DN 20 to 300 (3/4 to 12")	Stainless steel ^c Steel, galvanized ^d	- Stainless steel ^b

Parts in contact with the medium	Standard	Option
Lining	PTFE, hard rubber	-
Measuring and grounding electrode for: Hard rubber PTFE	CrNi steel 1.4571 (AISI 316 Ti) CrNi steel 1.4571 (AISI 316 Ti), Hastelloy C-4 (2.4610), titanium, tantalum, platinum-iridium	Hastelloy C-4 (2.4610), titanium, tantalum, platinum-iridium -

^a 1.4301, 1.4307, 1.4404, 1.4435, 1.4541, 1.4571
 ASTM materials:
 Grade TP304, TP304 L, TP316 L, TP321, TP316 Ti, TP317 L, 0Cr18Ni9, 00Cr18Ni10, 0Cr17Ni14Mo2, 0Cr27Ni12Mo3, 0Cr18Ni10Ti

^b Cable fitting with M20 \times 1.5 or NPT thread.

^c 1.4301 (AISI 304), 1.4307, 1.4404 (AISI 316 L), 1.4435 (AISI 316 L), 1.4541 (AISI 321), 1.4571 (AISI 316 Ti), ASTM A182 F304, ASTM A182 F304 L, ASTM A182 F316 L, ASTM A182 F321, ASTM A182 F316 Ti, ASTM A182 F316, 0Cr18Ni9, 0Cr18Ni10, 0Cr17Ni13Mo2, 0Cr27Ni12-Mo3, 1Cr18Ni9Ti, 0Cr18Ni12Mo2Ti

^d 1.0038, 1.0460, 1.0570, 1.0432, ASTM A105, Q255A, 20#, 16Mn

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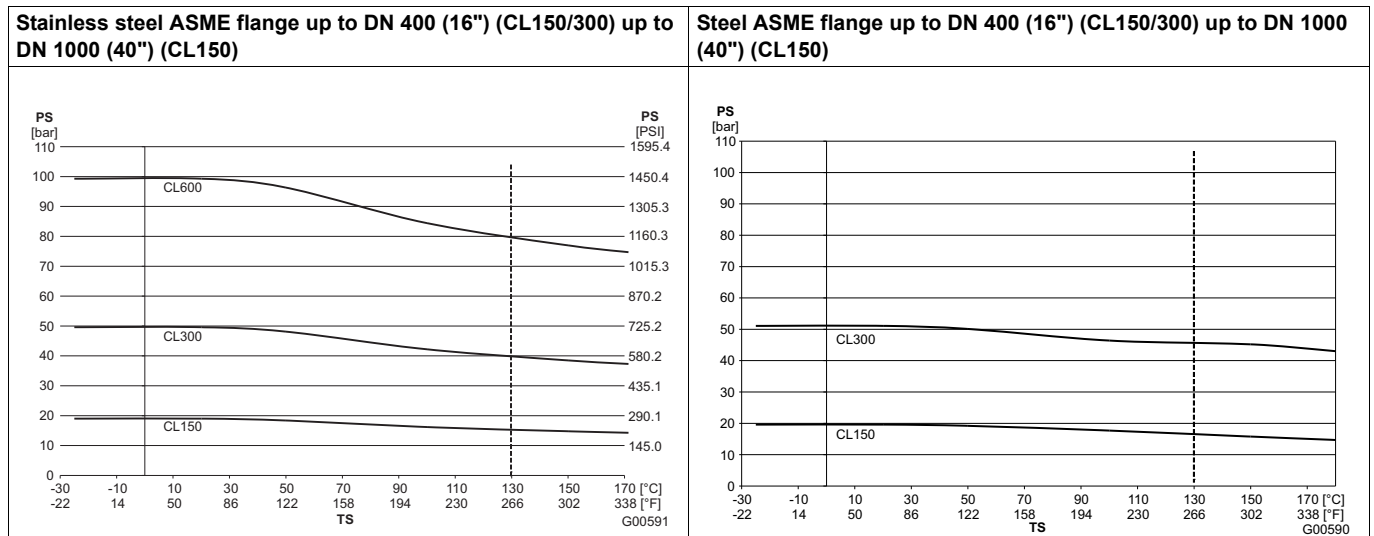
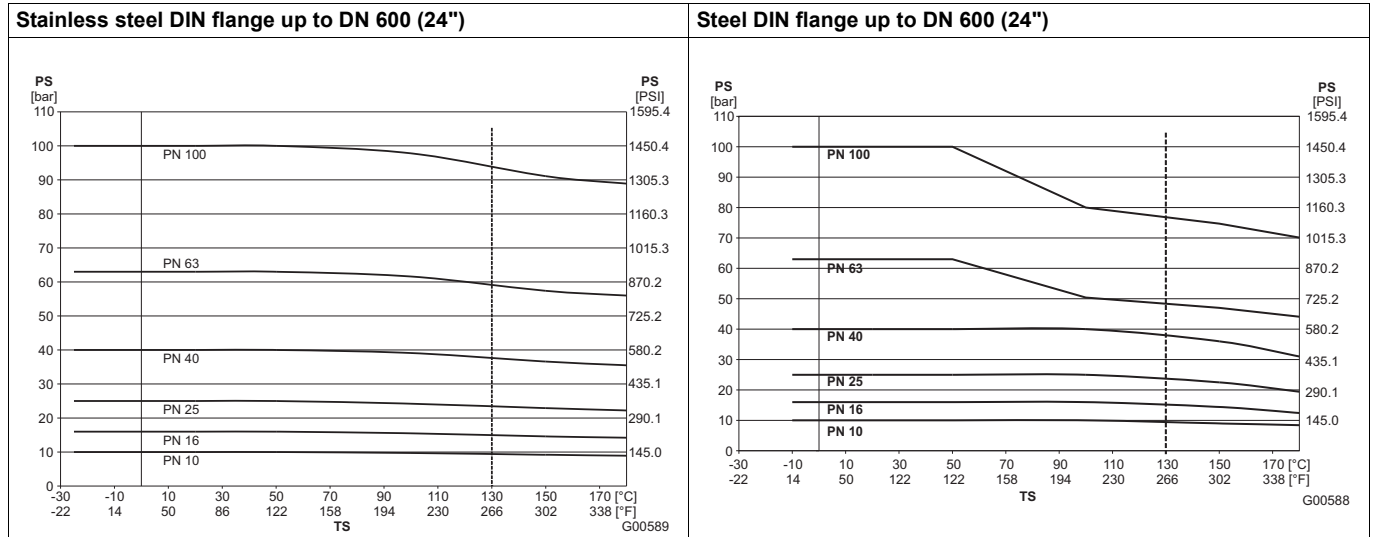
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Material load – sensor housing made of aluminum (shell housing)

Limits for the admissible fluid temperature (TS) and admissible pressure (PS) are determined by the used liner and flange materials of the device (see device nameplate).



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Materials – sensor housing made of steel

		
Housing parts	Standard	Option
Housing + measuring pipe^a Nominal width: DN 25 to 300 (1 to 12")	Steel, painted, paint coat, $\geq 80 \mu\text{m}$ thick, RAL 5013 (cobalt blue)	-
Terminal box	Aluminum alloy, painted, $\geq 80 \mu\text{m}$ thick, RAL 5013 (cobalt blue)	-
Cable fitting^b	Polyamide	-
Parts not in contact with the medium	Standard	Option
Process connection Nominal width: DN 25 to 300 (1 to 12")	Steel, painted ^c	-
Parts in contact with the medium	Standard	Option
Lining	PTFE, hard rubber	-
Measuring and grounding electrode for: Hard rubber - starting with a nominal width of: DN 40 (1 1/2") PTFE	CrNi steel 1.4571 (AISI 316 Ti) CrNi steel 1.4571 (AISI 316 Ti), Hastelloy C-4 (2.4610), titanium, tantalum, platinum-iridium	Hastelloy C-4 (2.4610), titanium, tantalum, platinum-iridium -

^a The measuring pipe is made of the following materials:

1.4301, 1.4307, 1.4404, 1.4435, 1.4541, 1.4571

ASTM materials:

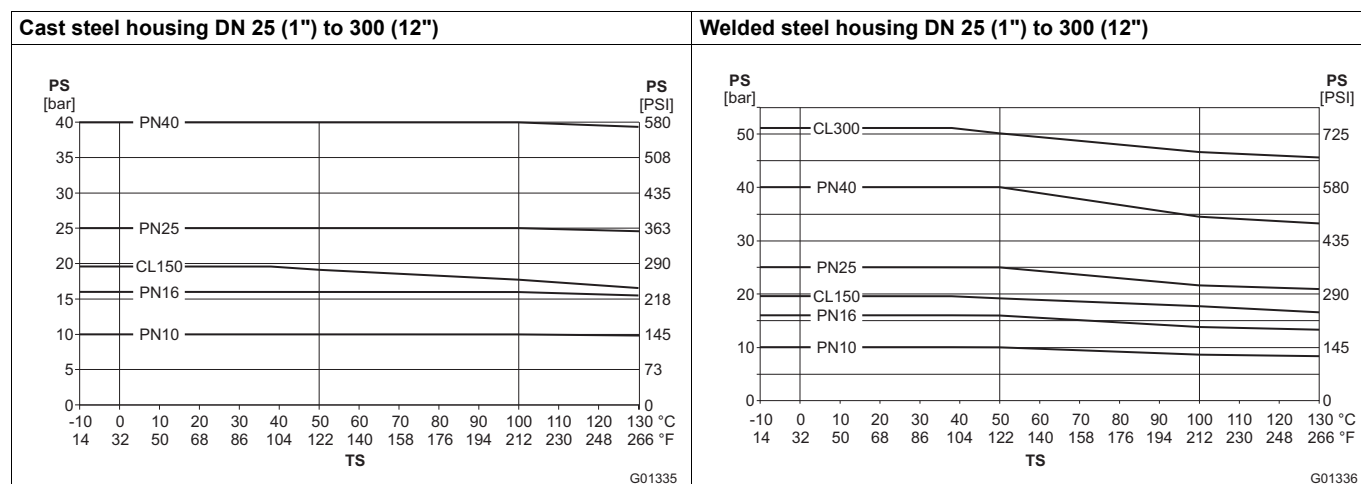
Grade TP304, TP304 L, TP316 L, TP321, TP316 Ti, TP317 L, 0Cr18Ni9, 00Cr18Ni10, 0Cr17Ni14Mo2, 0Cr27Ni12Mo3, 0Cr18Ni10Ti

^b Cable fitting with M20 × 1.5 or NPT thread.

^c 1.0038, 1.0460, 1.0570, 1.0432, ASTM A105, Q255A, 20#, 16Mn

Material load – sensor housing (steel)

Limits for the admissible fluid temperature (TS) and admissible pressure (PS) are determined by the used liner and flange materials of the device (see device nameplate).



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Transmitter

Electrical properties

Voltage supply	AC 100 to 230 V (-15 %/+10 %) AC 24 V (-30 %/+10 %) DC 24 V (-30 %/+30 %), harmonics < 5 %
Supply frequency	47 to 64 Hz
Excitation frequency	6.25 Hz, 7.5 Hz, 12.5 Hz, 15 Hz, 25 Hz, 30 Hz (50/60 Hz voltage supply)
Power consumption	Sensor including transmitter AC S ≤ 20 VA (switch-on current 8.8 A at AC 230 V) DC P ≤ 12 W (switch-on current 5.6 A)
Electrical connection	Screw terminals (maximum 2.5 mm ² – AWG 14)

Galvanic isolation

Current output, digital output (DO1 and DO2), and digital input are galvanically isolated from the sensor input circuit and each other. The same applies for the signal outputs of the versions with PROFIBUS-PA.

Empty pipe detection

Requirements for the function:

- Conductivity of the medium to be measured of ≥ 20 µS/cm
- Signal cable length of ≤ 50 m (164 ft)
- Sensor without preamplifier
- Nominal width DN ≥ DN 10

Mechanical features

Compact design	
Housing	Aluminum casting, painted
Paint	Paint coat ≥ 80 µm thick, RAL 5013 (cobalt blue)
Cable fitting	Polyamide
Remote mount design	
Housing	Aluminum casting, painted
Paint	Paint coat ≥ 80 µm thick, middle section RAL 5013 (cobalt blue) Front lid/rear lid RAL 5013 (cobalt blue)
Cable fitting	Polyamide
Weight	4.5 kg (9.92 lb)

Temperatures

Storage temperature	-40 to +70 °C (-40 to +158 °F)
Ambient temperature	-20 to +60 °C (-4 to +140 °F)

Protection type

Transmitter housing	IP65, IP67 (NEMA 4X)
---------------------	----------------------

Vibration according to EN 60068-2

Valid for:

Remote mount design (Transmitter)	In the range 10 to 58 Hz max. 0.15 mm (0.006") amplitude ^a In the range 58 to 150 Hz max. 2 g acceleration ^a
--------------------------------------	---

^a = Peak load



Mounting

Grounding

The grounding of the sensor is important both for safety reasons and for the electromagnetic flowmeter to function properly. The grounding screws of the sensor should be connected to protection conductor potential. For measurement reasons, this should be identical to the medium potential as far as possible.

For plastic lines or pipelines with insulating lining, the grounding is via a grounding plate or grounding electrode. If the pipe section is not free from external interference voltages, it is recommended that one grounding plate is fitted in front of the sensor and one is fitted behind the sensor.

Grounding plates are available upon request ⇒ see "Grounding plates", page 57.

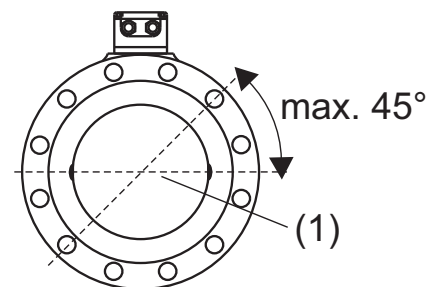
Installation

General information

- The measuring pipe must always be full.
- The flow direction must match the identification marking ⇒ see "Flow direction", page 17.
- The maximum torque for all flange screws must be observed. These must be selected according to factors including temperature, pressure, screw and seal material, and the relevant regulations in each case.
- Install the devices without any mechanical tension (torsion, bending).
- Fit flange devices with plane-parallel counterflanges only using the appropriate seals.
- Use a flange seal made from a material that is compatible with the medium and the medium temperature.
- Seals may not extend into the flow area, since any turbulence affects the device accuracy.
- The pipeline must not exert any inadmissible forces or torque on the device.
- Only remove the sealing plugs in the cable fittings when installing the electrical cables.
- Install remote mount transmitters at a location that is largely free of vibration.
- Do not expose the transmitter to direct sunlight; provide sun protection if necessary.

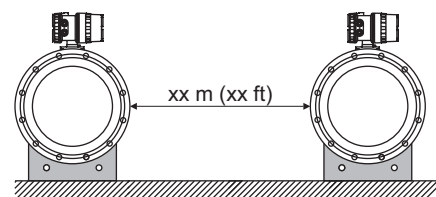
Electrode axis

- Electrode axis (1) horizontal if possible or rotated max. 45°.



Minimum clearance

- Maintain a minimum clearance of 0.7 m (2.3 ft) between the devices to prevent any mutually interference.



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Inlet section, outlet section

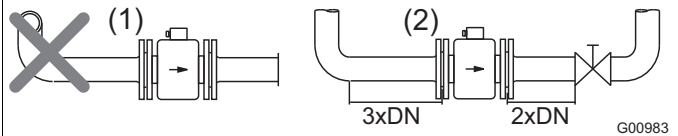
The measuring principle is independent of the flow profile as long as turbulence does not extend into the measurement zone, e.g. downstream from double elbows (1), in case of tangential inflow or where gate valves are partially open upstream of the sensor.

In these cases, measures must be taken to normalize the flow profile.

- Do not install fittings, elbows or valves, etc. directly upstream of the sensor (1).
- Flaps must be installed so that the flap blade does not extend into the sensor.
- Valves or other shut-off devices should be mounted in the outlet section (2).

Experience has shown that a straight inlet section of $3 \times \text{DN}$ and a straight outlet section of $2 \times \text{DN}$ is sufficient in most cases (DN = nominal width of the transmitter – see the adjacent figure).

For test stands, the reference conditions of $10 \times \text{DN}$ for the straight inlet and $5 \times \text{DN}$ for the straight outlet must be provided according to EN 29104/ISO 9104.



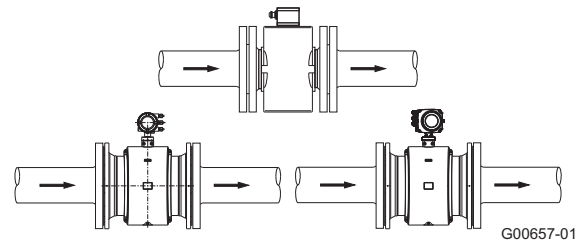
Flow direction

The device records the flow in both directions.

Default setting: forward flow direction

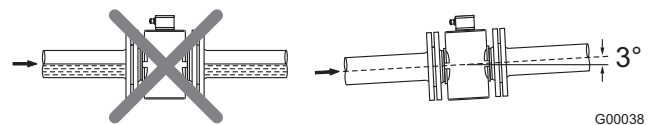
Identification marking:

- Arrow direction on the device
- Alignment of the sensor housing during initial startup (default setting) as displayed in the adjacent figures



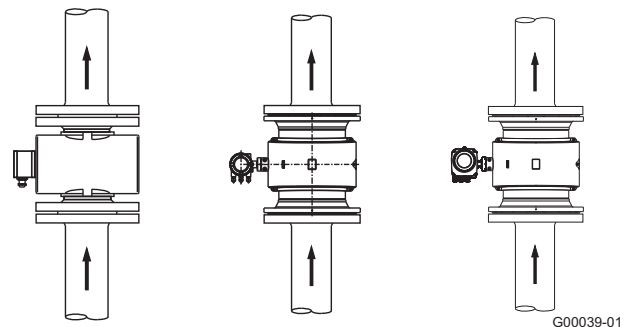
Horizontal flow direction

- Measuring pipe must always be full.
- Ensure the line is slightly inclined for degassing.



Vertical flow direction

- Vertical installation for measuring abrasive substances, the preferred flow direction is from bottom to top.



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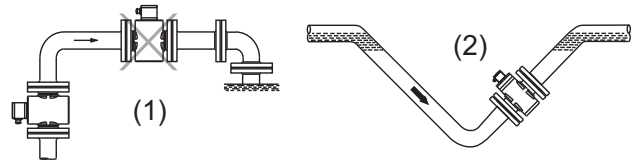
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Free inlet, free outlet

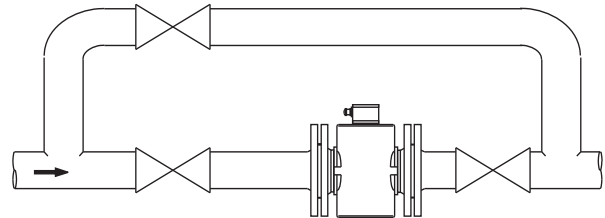
- For a free outlet, do not install the measuring device at the highest point or in the draining side of the pipeline, as the measuring pipe runs empty or air bubbles can form (1).
- For free inlets or outlets, provide a culvert (downward routing of the pipe) so that the pipeline is always full (2).



G00040

Heavily contaminated measurement media

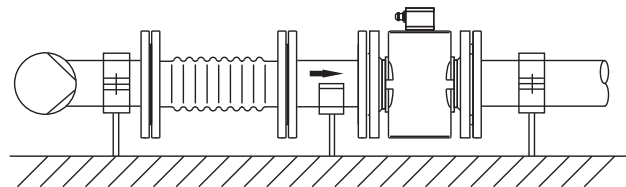
- We recommend a bypass connection, according to the figure, for heavily contaminated media so that the system can continue operating without any interruptions during mechanical cleaning.



G00042

Installation near pumps

- We recommend using mechanical vibration compensators for sensors that are installed near pumps or other equipment generating vibrations.



G00561

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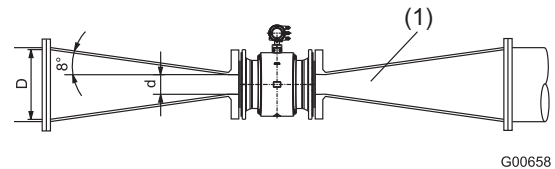
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Installation in pipelines with larger nominal widths

Determine the resulting pressure loss when using reducers (1):

1. Determine the diameter ratio d/D
2. Refer to the flow nomograph for the flow velocity (adjacent figure).
3. Read the pressure loss on the Y-axis in the flow nomogram.



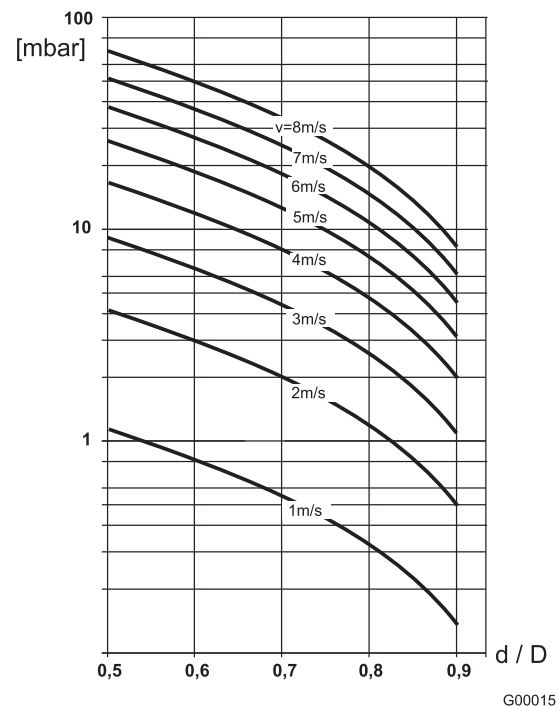
(1) Flange transition piece

(d) Inner diameter of the flowmeter

(D) Inner diameter of the pipeline

Nomograph for pressure loss calculations

For flange transition piece with $\alpha/2 = 8^\circ$



(V) Flow velocity [m/s]

(Δp) Pressure loss [mbar]

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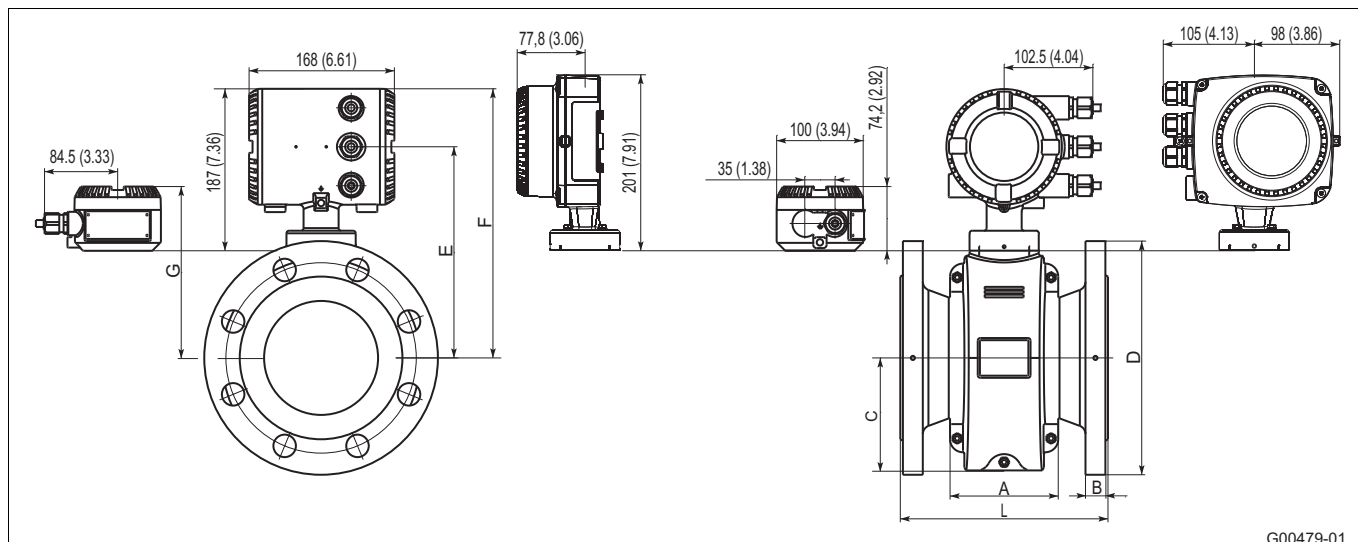
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Dimensions

Dimensions for flange DN 10 to 125 (3/8 to 5")

Sensor housing made of aluminum (shell housing)



G00479-01

Dimensions^a in mm (inch)

DN	Process connection ^b	D	L ^c	F ^d	C	E ^d	G ^d	A	B
10 (3/8) ^e	EN 1092-1 PN 10 to 40	90 (3,54)	200 (7,87)	255 (10,04)	82 (3,23)	188 (7,40)	143 (5,63)	113 (4,45)	19 (0,75)
	ASME B 16.5 CL150	89 (3,50)							14,2 (0,56)
	ASME B 16.5 CL300	96 (3,78)							17,3 (0,68)
15 (1/2)	EN 1092-1 PN 10 to 40	95 (3,74)	200 (7,87)	255 (10,04)	82 (3,23)	188 (7,40)	143 (5,63)	113 (4,45)	19 (0,75)
	ASME B 16.5 CL150	89 (3,50)							14,2 (0,56)
	ASME B 16.5 CL300	96 (3,78)							17,3 (0,68)
20 (3/4)	EN 1092-1 PN 10 to 40	105 (4,13)	200 (7,87)	255 (10,04)	82 (3,23)	188 (7,40)	143 (5,63)	113 (4,45)	21 (0,83)
	ASME B 16.5 CL150	98 (3,86)							15,7 (0,62)
	ASME B 16.5 CL300	118 (4,65)							18,7 (0,74)
25 (1)	EN 1092-1 PN 10 to 40	115 (4,53)	200 (7,87)	255 (10,04)	82 (3,23)	188 (7,40)	143 (5,63)	113 (4,45)	21 (0,83)
	ASME B 16.5 CL150	108 (4,25)							17,2 (0,68)
	ASME B 16.5 CL300	124 (4,88)							20,5 (0,81)
32 (1 1/4)	EN 1092-1 PN 10 to 40	140 (5,51)	200 (7,87)	262 (10,31)	92 (3,62)	195 (7,68)	150 (5,91)	113 (4,45)	21 (0,83)
	ASME B 16.5 CL150	118 (4,65)							18,7 (0,74)
	ASME B 16.5 CL300	134 (5,28)							22,1 (0,87)
40 (1 1/2)	EN 1092-1 PN 10 to 40	150 (5,91)	200 (7,87)	262 (10,31)	92 (3,62)	195 (7,68)	150 (5,91)	113 (4,45)	21 (0,83)
	ASME B 16.5 CL150	127 (5,00)							20,5 (0,81)
	ASME B 16.5 CL300	156 (6,14)							23,6 (0,93)

^a For DN 65, PN 16 acc. to EN 1092-1 please order PN 40.

^b Other pressure levels upon request.

^c Tolerance L: +0/-3 mm (+0/-0,118")

^d The dimensions change as in the following table according to the device version:

^e Connecting flange: 1/2".

Device version	Dimension E, F in mm (Zoll)	Dimension G in mm (Zoll)
Without Ex-protection	0	0
Ex-protection zone 2	0	0
Ex-protection zone 1	+74 (+2,91)	+47 (+1,85)

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Dimensions ^a in mm (Zoll)									
DN	Process connection ^b	D	L ^c	F ^d	C	E ^d	G ^d	A	B
50 (2)	EN 1092-1 PN 10 to 40	165 (6,50)	200 (7,87)	268 (10,55)	97 (3,82)	201 (7,91)	156 (6,14)	115 (4,53)	23 (0,91)
	ASME B 16.5 CL150	153 (6,02)							22,1 (0,87)
	ASME B 16.5 CL300	165 (6,50)							25,4 (1,00)
65 (2 1/2)	EN 1092-1 PN 16	185 (7,28)	200 (7,87)	279 (10,98)	108 (4,25)	212 (8,35)	156 (6,57)	104 (4,09)	22 (0,87)
	EN 1092-1 PN 40	185 (7,28)							26 (1,02)
	ASME B 16.5 CL150	178 (7,01)							25,4 (1,00)
	ASME B 16.5 CL300	191 (7,52)							28,4 (1,12)
80 (3)	EN 1092-1 PN 10 to 40	200 (7,87)	200 (7,87)	279 (10,98)	108 (4,25)	212 (8,35)	167 (6,57)	104 (4,09)	28 (1,10)
	ASME B 16.5 CL150	191 (7,52)							26,9 (1,06)
	ASME B 16.5 CL300	210 (8,27)							31,4 (1,24)
100 (4)	EN 1092-1 PN 10 to 16	220 (8,66)	250 (9,84)	301 (11,85)	122 (4,80)	234 (9,21)	189 (7,44)	125 (4,92)	24 (0,94)
	EN 1092-1 PN 25 to 40	235 (9,25)							28 (1,10)
	ASME B 16.5 CL150	229 (9,02)							27,4 (1,08)
	ASME B 16.5 CL300	254 (10,00)							35,8 (1,41)
125 (5)	EN 1092-1 PN 10 to 16	250 (9,84)	250 (9,84)	311 (12,24)	130 (5,12)	244 (9,61)	199 (7,83)	125 (4,92)	25 (0,98)
	EN 1092-1 PN 25 to 40	270 (10,63)							29 (1,14)
	ASME B 16.5 CL150	254 (10,00)							27,9 (1,09)
	ASME B 16.5 CL300	280 (11,02)							39,1 (1,54)

^a For DN 65, PN 16 acc. to EN 1092-1 please order PN 40.

^b Other pressure levels upon request.

^c Tolerance L: +0/-3 mm (+0/-0,118")

^d The dimensions change as in the following table according to the device version:

Device version	Dimension E, F in mm (Zoll)	Dimension G in mm (Zoll)
Without Ex-protection	0	0
Ex-protection zone 2	0	0
Ex-protection zone 1	+74 (+2,91)	+47 (+1,85)

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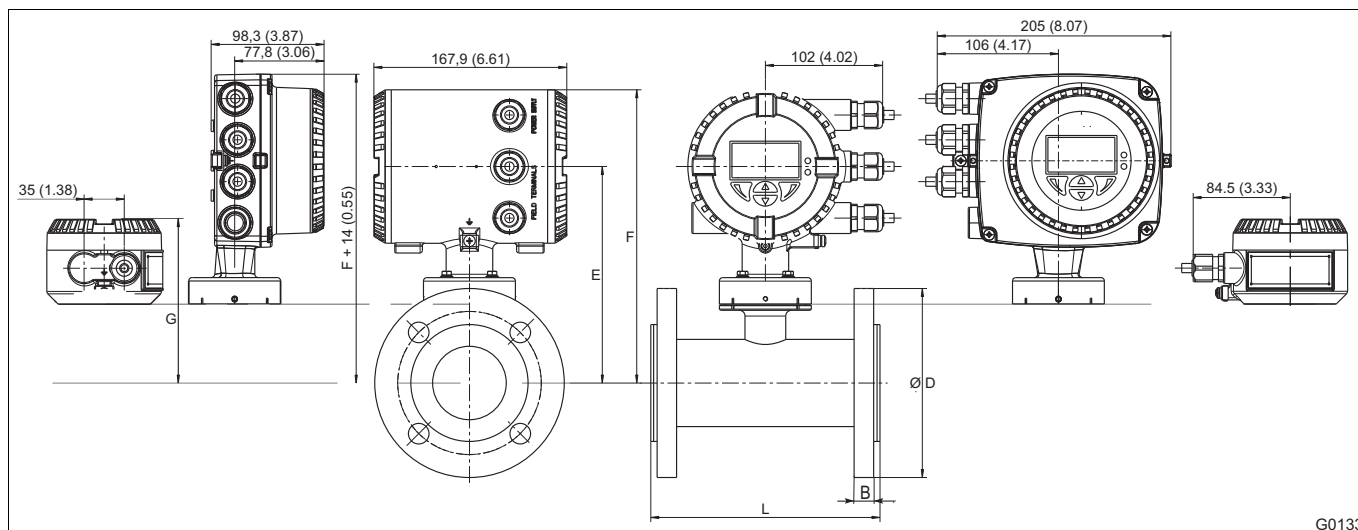
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Dimensions for flange DN 25 to 300 (1 to 12")

Sensor housing made of steel



G0133

Dimensions in mm (inch)							
DN	Process connection ^a	D	L ^b	F ^c	E ^d	G ^d	B
25 (1)	EN 1092-1 PN 10 to 40	115 (4,53)	200 (7,84)	244 (9,61)	177 (6,97)	131 (5,16)	23 (0,91)
	ASME B 16.5 CL150	115 (4,53)					23 (0,91)
	ASME B 16.5 CL300	124 (4,88)					20 (0,79)
32 (1 1/4)	EN 1092-1 PN 10 to 40	150 (5,91)	200 (7,84)	249 (9,80)	182 (7,17)	136 (5,35)	21 (0,83)
	ASME B 16.5 CL150	150 (5,91)					21 (0,83)
	ASME B 16.5 CL300	134 (5,28)					21 (0,83)
40 (1 1/2)	EN 1092-1 PN 10 to 40	150 (5,91)	200 (7,84)	254 (10,0)	187 (7,36)	141 (5,55)	21 (0,83)
	ASME B 16.5 CL150	150 (5,91)					21 (0,83)
	ASME B 16.5 CL300	156 (6,14)					23 (0,91)
50 (2)	EN 1092-1 PN 10 to 40	165 (6,50)	200 (7,84)	257 (10,12)	190 (7,48)	144 (5,67)	24 (0,94)
	ASME B 16.5 CL150	165 (6,50)					24 (0,94)
	ASME B 16.5 CL300	165 (6,50)					25 (0,98)
65 (2 1/2)	EN 1092-1 PN 10 to 40	185 (7,28)	200 (7,84)	271 (10,67)	204 (8,03)	158 (6,22)	28 (1,10)
	ASME B 16.5 CL150	185 (7,28)					28 (1,10)
	ASME B 16.5 CL300	191 (7,52)					28 (1,10)
80 (3)	EN 1092-1 PN 10 to 40	205 (8,07)	200 (7,84)	275 (10,83)	208 (8,19)	162 (6,38)	27 (1,06)
	ASME B 16.5 CL150	205 (8,07)					27 (1,06)
	ASME B 16.5 CL300	210 (8,27)					31 (1,22)
100 (4)	EN 1092-1 PN 10 to 40	235 (9,25)	250 (9,84)	306 (12,05)	239 (9,41)	193 (7,60)	27 (1,06)
	EN 1092-1 PN 25 to 40	235 (9,25)					29 (1,14)
	ASME B 16.5 CL150	235 (9,25)					27 (1,06)
	ASME B 16.5 CL300	254 (10,00)					35 (1,38)

^a Other pressure levels upon request.

^b Tolerance L: +0/-3 mm (+0/-0,118")

^c The dimensions change as in the following table according to the device version.

Device version	Dimension E, F in mm (inch)	Dimension G in mm (inch)
Without Ex-protection	0	0
Ex-protection zone 2	0	0
Ex-protection zone 1	+74 (+2.91)	+47 (+1.85)

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Dimensions in mm (inch)							
DN	Process connection ^a	D	L ^b	F ^c	E ^d	G ^d	B
125 (5)	PN 10 to 40	270 (10,63)	250 (9,84)	318 (12,52)	251 (9,88)	205 (8,07)	36 (1,42)
	PN 25 to 40	270 (10,63)					31 (1,22)
	CL150	270 (10,63)					36 (1,42)
	CL300	280 (11,02)					38 (1,50)
150 (6)	PN 10 to 40	300 (11,81)	300 (11,81)	339 (13,35)	272 (10,71)	226 (8,90)	29 (1,14)
	PN 25 to 40	300 (11,81)					33 (1,30)
	CL150	300 (11,81)					29 (1,14)
	CL300	381 (15,00)					40 (1,57)
200 (8)	PN 10 to 40	340 (13,39)	350 (13,78)	364 (14,33)	297 (11,69)	252 (9,92)	33 (1,30)
	PN 25 to 40	340 (13,39)					34 (1,34)
	CL150	343 (13,50)					34 (1,34)
	CL300	381 (15,00)					46 (1,81)
250 (10)	PN 10 to 16	395 (15,55)	450 (17,72)	390 (15,35)	323 (12,72)	278 (10,94)	35 (1,38)
	PN 25 to 40	395 (15,55)					35 (1,38)
	CL150	407 (16,02)					35 (1,38)
	CL300	445 (17,52)					51 (2,00)
300 (12)	PN 10 to 16	445 (17,52)	500 (19,68)	415 (16,34)	348 (13,68)	303 (11,93)	38 (1,50)
	PN 25 to 40	445 (17,52)					38 (1,50)
	CL150	483 (19,02)					38 (1,50)
	CL300	521 (20,51)					55 (2,17)

^a Other pressure levels upon request.

^b Tolerance L: DN 25 to 200 +0/-3 mm (+0/-0.118"), DN 250 to 300 +0/-5 mm (+0/-0.197")

^c The dimensions change as in the following table according to the device version.

Device version	Dimension E, F in mm (inch)	Dimension G in mm (inch)
Without Ex-protection	0	0
Ex-protection zone 2	0	0
Ex-protection zone 1	+74 (+2.91)	+47 (+1.85)

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Weight - Sensor housing

Dimensions in mm (inch)		Weight approx. kg (lb)			
DN	Process connection	Sensor housing made of aluminum (shell housing)		Sensor housing made of steel	
		Compact design	Remote mount design	Compact design	Remote mount design
10 (3/8)	EN 1092-1 PN 10 to 40	7 (15)	5 (11)	-	-
	ASME B 16.5 CL150				
	ASME B 16.5 CL300				
15 (1/2)	EN 1092-1 PN 10 to 40	7 (15)	5 (11)	-	-
	ASME B 16.5 CL150				
	ASME B 16.5 CL300				
20 (3/4)	EN 1092-1 PN 10 to 40	8 (18)	6 (13)	-	-
	ASME B 16.5 CL150				
	ASME B 16.5 CL300				
25 (1)	EN 1092-1 PN 10 to 40	9 (20)	7 (15)	9 (20)	7 (15)
	ASME B 16.5 CL150				
	ASME B 16.5 CL300				
32 (1 1/4)	EN 1092-1 PN 10 to 40	10 (22)	8 (18)	10 (22)	8 (18)
	ASME B 16.5 CL150				
	ASME B 16.5 CL300				
40 (1 1/2)	EN 1092-1 PN 10 to 40	11 (24)	9 (20)	11 (24)	9 (20)
	ASME B 16.5 CL150				
	ASME B 16.5 CL300				
50 (2)	EN 1092-1 PN 10 to 40	12 (26)	10 (22)	12 (26)	10 (22)
	ASME B 16.5 CL150				
	ASME B 16.5 CL300				
65 (2 1/2)	EN 1092-1 PN 16	15 (33)	13 (29)	15 (33)	13 (29)
	EN 1092-1 PN 40				
	EN 1092-1 PN 10 to 40	-	-		
	ASME B 16.5 CL150	13 (29)	11 (24)	13 (29)	11 (24)
	ASME B 16.5 CL300	15 (33)	13 (29)	15 (33)	13 (29)
80 (3)	EN 1092-1 PN 10 to 40	17 (38)	15 (33)	17 (38)	15 (33)
	ASME B 16.5 CL150				
	ASME B 16.5 CL300				
100 (4)	EN 1092-1 PN 10 to 16	19 (42)	17 (38)	19 (42)	17 (38)
	EN 1092-1 PN 25 to 40	23 (51)	21 (46)	23 (51)	21 (46)
	ASME B 16.5 CL150	21 (46)	19 (42)	21 (46)	19 (42)
	ASME B 16.5 CL300	30 (66)	28 (62)	30 (66)	28 (62)
125 (5)	EN 1092-1 PN 10 to 16	22 (49)	20 (44)	22 (49)	20 (44)
	EN 1092-1 PN 25 to 40	29 (64)	27 (60)	29 (64)	27 (60)
	ASME B 16.5 CL150	22 (49)	20 (44)	22 (49)	20 (44)
	ASME B 16.5 CL300	35 (77)	33 (73)	35 (77)	33 (73)
150 (6)	EN 1092-1 PN 10 to 16	33 (73)	31 (68)	33 (73)	31 (68)
	EN 1092-1 PN 25 to 40	39 (86)	37 (82)	39 (86)	37 (82)
	ASME B 16.5 CL150	33 (73)	31 (68)	33 (73)	31 (68)
	ASME B 16.5 CL300	47 (104)	45 (99)	47 (104)	45 (99)
200 (8)	EN 1092-1 PN 10 to 16	41 (90)	39 (86)	41 (90)	39 (86)
	EN 1092-1 PN 25 to 40	43 (95)	41 (90)	43 (95)	41 (90)
	ASME B 16.5 CL150	50 (110)	48 (106)	50 (110)	48 (106)
	ASME B 16.5 CL300	72 (158)	70 (154)	72 (158)	70 (154)

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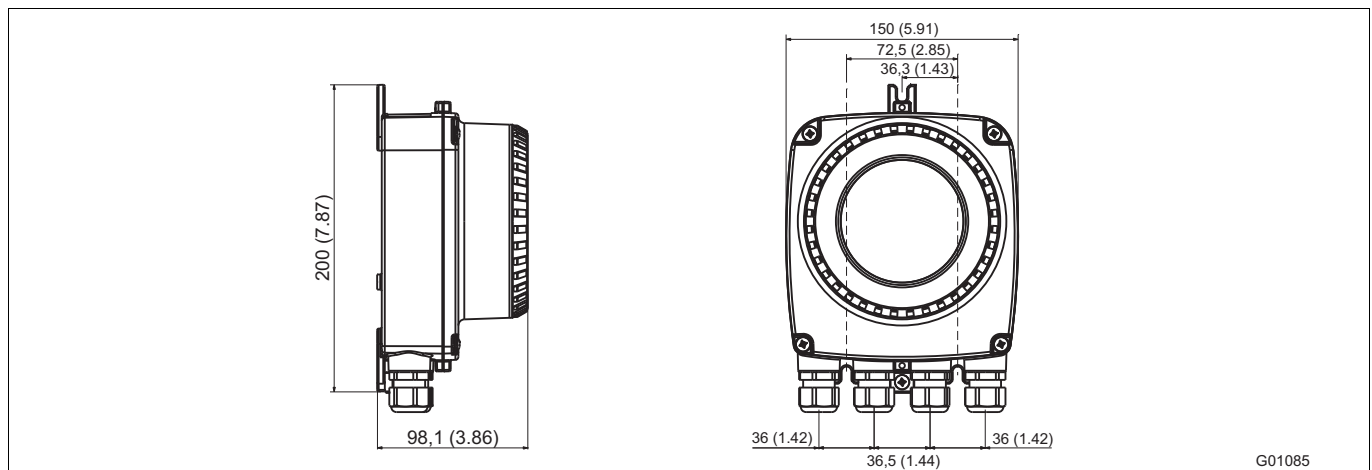
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Dimensions in mm (inch)		Weight approx. kg (lb)			
		Sensor housing made of aluminum (shell housing)		Sensor housing made of steel	
DN	Process connection	Compact design	Remote mount design	Compact design	Remote mount design
250 (10)	EN 1092-1 PN 10 to 16	61 (135)	59 (130)	61 (135)	59 (130)
	EN 1092-1 PN 25 to 40	65 (143)	63 (139)	65 (143)	63 (139)
	ASME B 16.5 CL150	70 (154)	68 (150)	70 (154)	68 (150)
	ASME B 16.5 CL300	105 (232)	103 (227)	105 (232)	103 (227)
300 (12)	EN 1092-1 PN 10 to 16	74 (163)	72 (159)	74 (163)	72 (159)
	EN 1092-1 PN 25 to 40	80 (176)	78 (172)	80 (176)	78 (172)
	ASME B 16.5 CL150	105 (232)	103 (227)	105 (232)	103 (227)
	ASME B 16.5 CL300	150 (331)	148 (326)	150 (331)	148 (326)

Dimensions of single-compartment housing transmitter model 406018/2-0 and 401618/2-1

For use in Ex-zone 2 and outside of the Ex-area

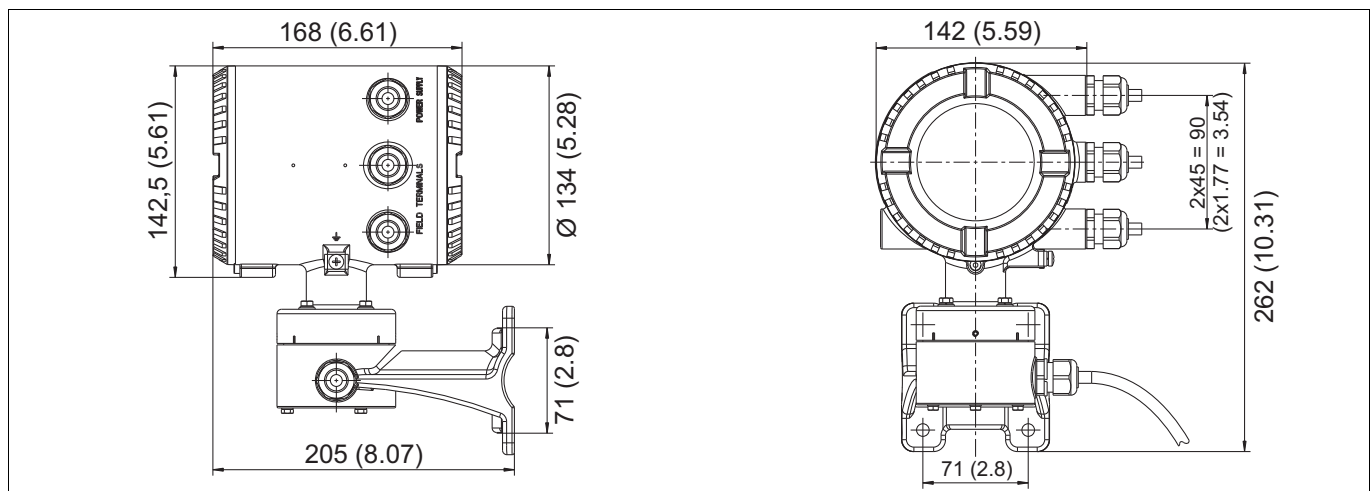


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Dimensions in mm (inch)

Dimensions of dual-compartment housing transmitter model 406018/2-1

For use in Ex-zone 1



Dimensions in mm (inch)

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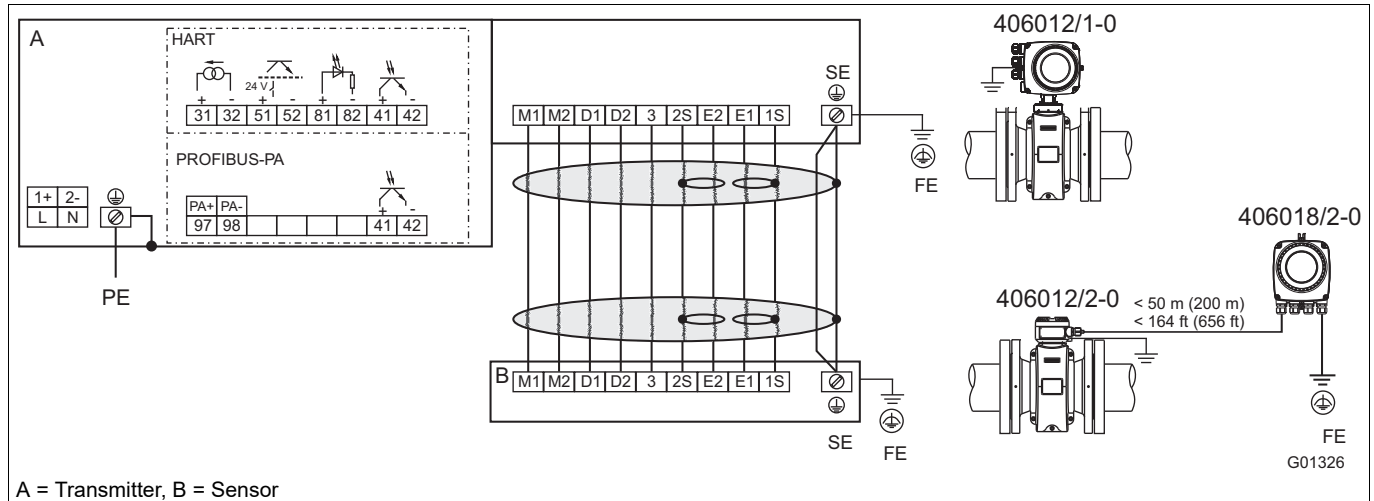
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Connection diagram

Electrical connection

Model 406012/1-0, 406012/2-0, and 406018/2-0 without explosion protection – HART protocol and PROFIBUS-PA



Voltage supply

Alternating voltage (AC)		Direct voltage (DC)	
Terminal	Function	Terminal	Function
L	Phase	1+	+
N	Neutral conductor	2-	-
PE	Protection conductor (PE)	PE	Protection conductor (PE)

Signal cable connection (for devices with remote mount design only)

Terminal	Function	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
SE	Shielding	-
E1	Signal line	Violet
1S	Shield of E1	-
E2	Signal line	Blue
2S	Shield of E2	-
3	Measurement potential	Green

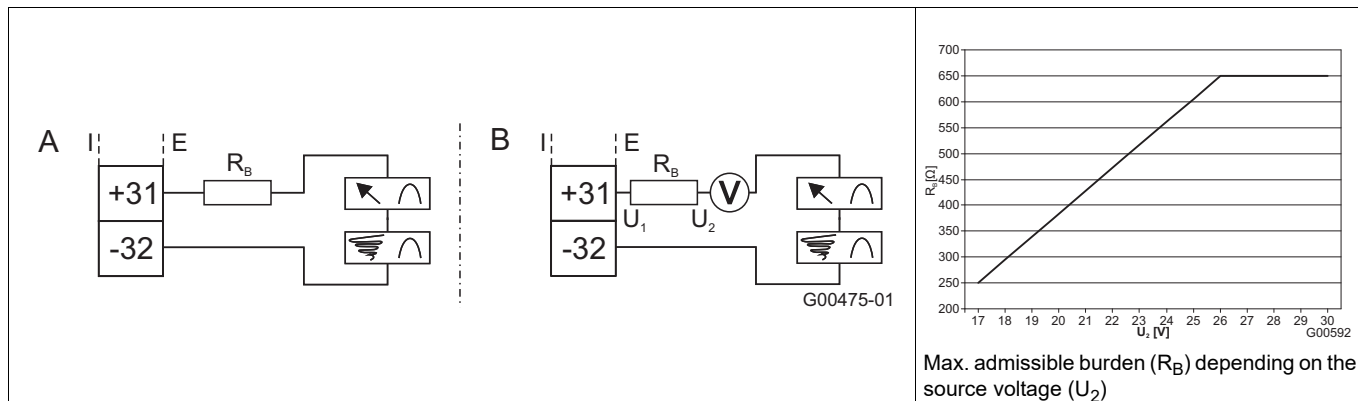
Input and output connection

Terminal	Function
31/32	Current/HART output - The current output is available in "active" or "passive" mode.
97/98	PROFIBUS-PA (PA+/PA-) - According to IEC 61158-2
51/52	Digital output DO1 active/passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Pulse output".
81/82	Digital input/contact input - Function can be configured using software on-site as "External output switch-off", "External totalizer reset", "External totalizer stop", or "Other".
41/42	Digital output DO2 passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Binary output", flow direction signaling.
FE	Functional ground



Electrical data

Current/HART output



The current/HART output is available in "active" or "passive" mode.

A = "Active" configuration 4 to 20 mA, HART protocol (standard), burden: $250 \Omega \leq R \leq 650 \Omega$

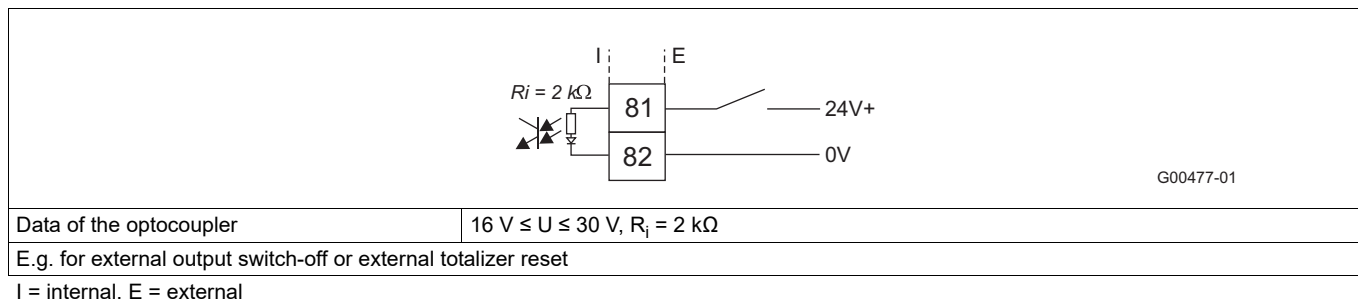
B = "Passive" configuration 4 to 20 mA, HART protocol (standard), burden: $250 \Omega \leq R \leq 650 \Omega$

Supply voltage for the current output Minimum 11 V, maximum 30 V

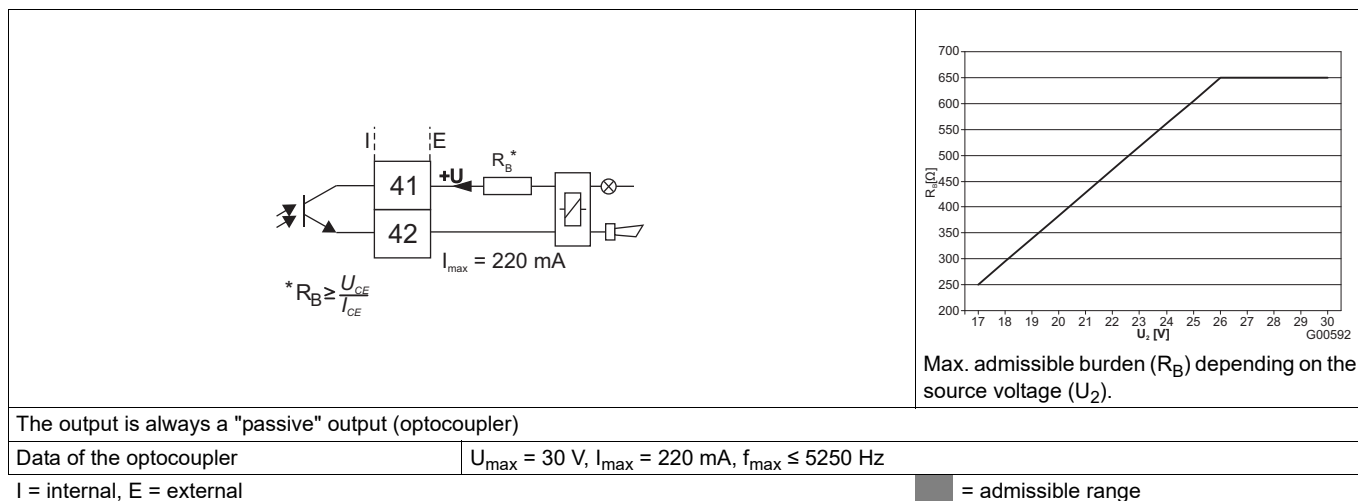
Operation in Ex-zone 1 **Maximum burden 300 Ω**

I = internal, E = external

Digital input DI1

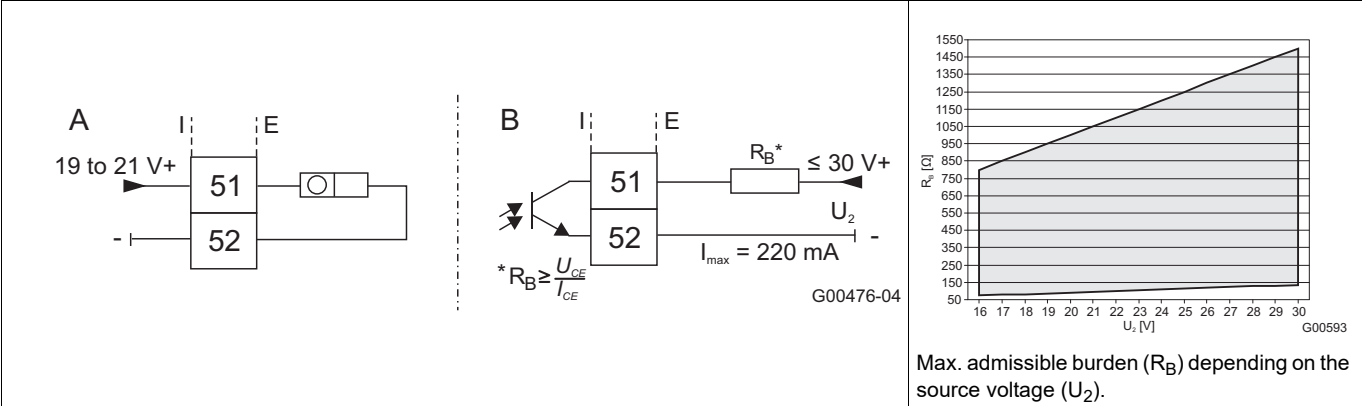


Digital output DO2





Digital output DO1



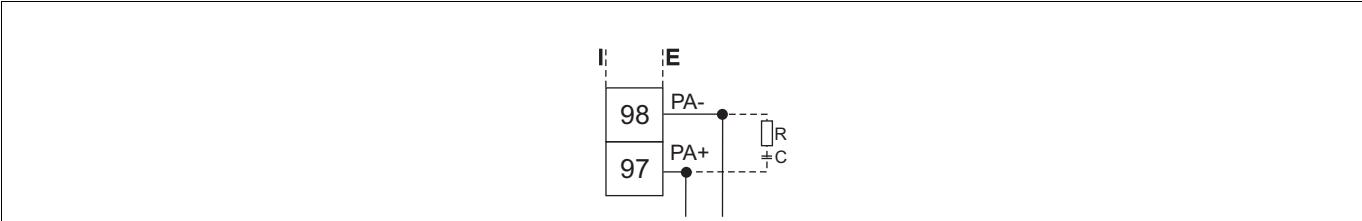
The output can be configured as an "active" or a "passive" output. For a transmitter with the dual-compartment housing, the configuration is performed using the software. For a transmitter with the single-compartment housing, the configuration is performed using jumpers on the transmitter backplane.

A = "Active" configuration	$U = 19 \text{ to } 21 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5250 \text{ Hz}$
B = "Passive" configuration	$U_{\text{max}} = 30 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5250 \text{ Hz}$
Configuration as pulse output	Maximum pulse frequency: 5250 Hz Pulse width: 0.1 to 2000 ms The pulse factor and pulse width are interdependent and are calculated dynamically.
Configuration as switching output	Function: system alarm, empty pipe alarm, max./min. alarm, flow direction signaling, other

I = internal, E = external

▨ = admissible range

PROFIBUS-PA (PA+/PA-) according to IEC 61158-2



Standard operation	$U = 9 \text{ to } 32 \text{ V}$, $I = 10 \text{ mA}$
In case of fault/FDE	$I = 13 \text{ mA}$

Bus connection with integrated reverse voltage protection

For the dual-compartment transmitter housing, the bus address can be set via the DIP switches in the device. For all other versions, it is set via the display of the transmitter or the fieldbus.

The resistor R and condenser C form the bus termination. They must be installed when the device is connected to the end of the entire bus cable.
 $R = 100 \Omega$, $C = 1 \mu\text{F}$

I = internal, E = external

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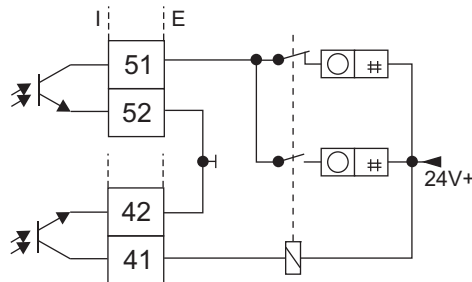
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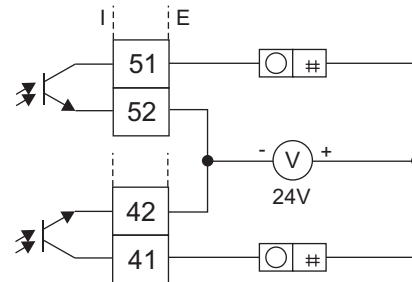
Connection examples

Digital output DO1 and DO2

Separate forward and reverse pulses



Separate forward and reverse pulses (connection type)

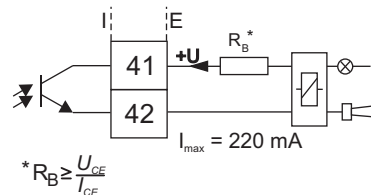


G00791

I = internal, E = external

Digital output DO2

E.g. for system monitoring, max./min. alarm, empty pipe alarm, forward/backward signal, or counting pulses (can be configured using software)

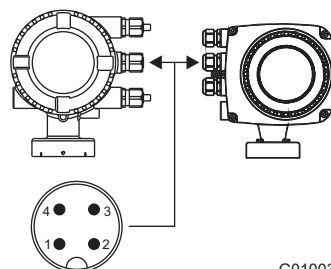


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I = internal, E = external

Digital communication – PROFIBUS-PA

Connection via M12 plug (only in non-potentially explosive areas!)



G01003-01

Pin assignment (view from front showing pin insert and pins):

- PIN 1 = PA+
- PIN 2 = nc
- PIN 3 = PA-
- PIN 4 = Shield

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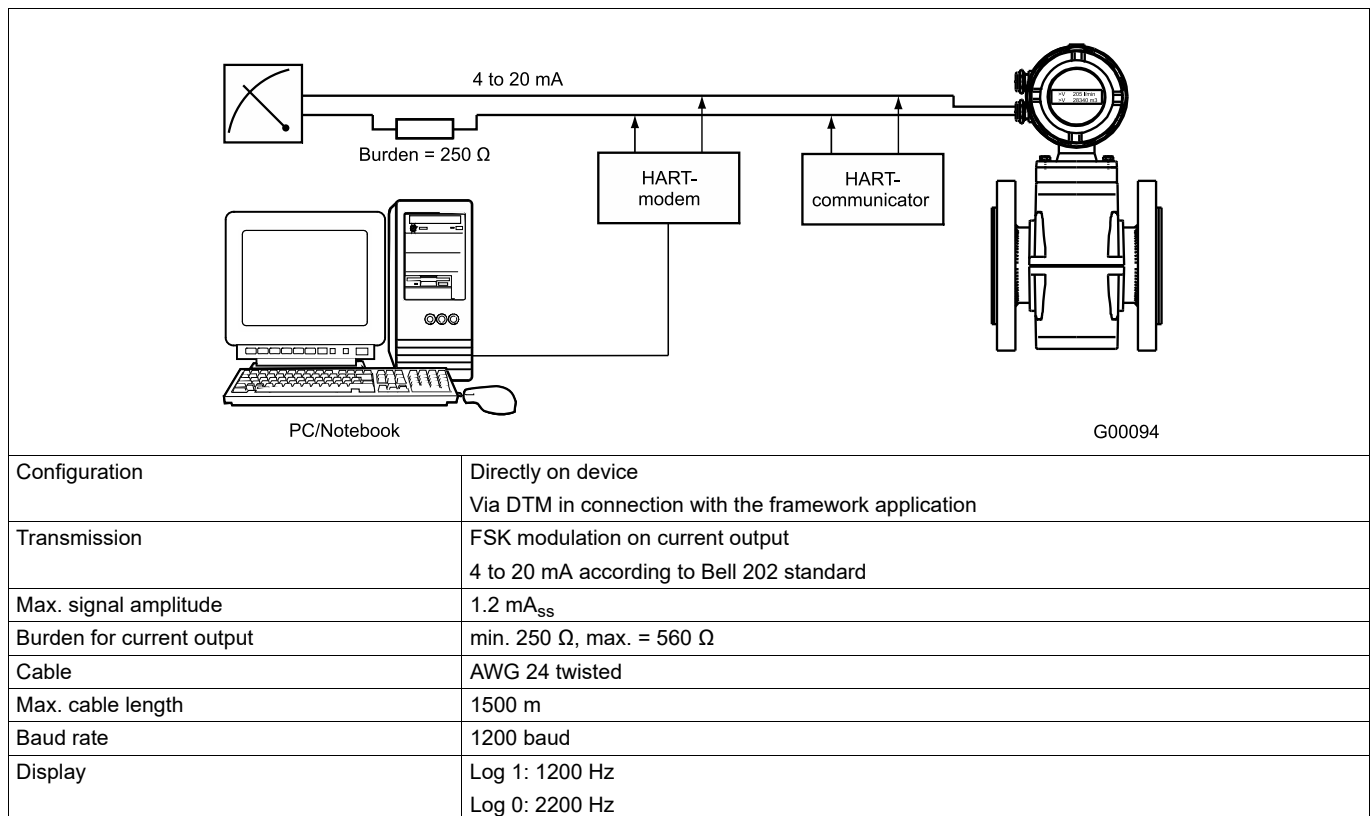
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Digital communication

HART protocol

The transmitter uses HART protocol (HART 5) for digital communication.



For further information ⇒ see the separate interface description.

System integration

The communication (configuration, parameterization) can be carried out in conjunction with the DTM (Device Type Manager) available for the device and the corresponding framework applications according to FDT 1.2.1.

The necessary device DTM is included on the CD and can be downloaded from www.jumo.de.

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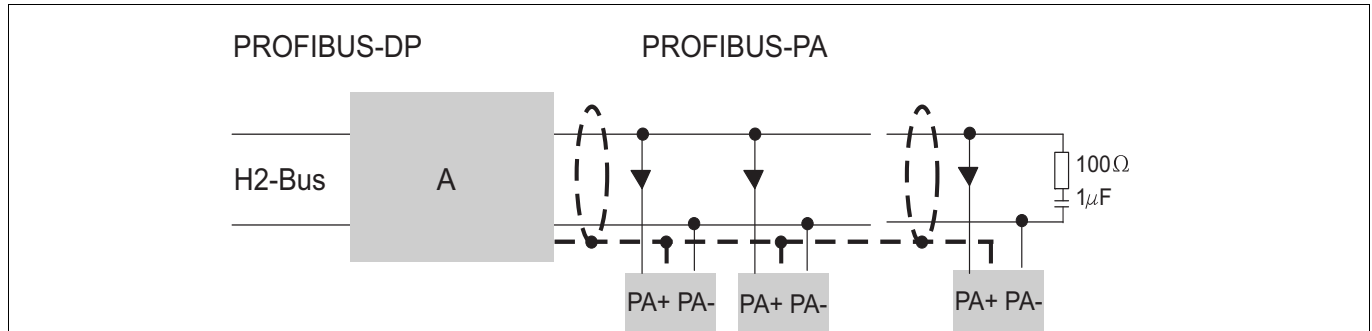
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PROFIBUS-PA protocol

The interface complies with profile 3.01 (standard PROFIBUS, EN 50170, DIN 19245 [PRO91]).



A = Segment coupler (including bus supply and termination)

PROFIBUS-PA ID no.:	0x3430
Alternative standard ID no.:	0x9700 or 0x9740
Configuration	Directly on device Via DTM in connection with the framework application
Transmission signal	According to IEC 61158-2
Cable	Shielded, twisted (Types A or B are preferred according to IEC 61158-2)
Bus topology	<ul style="list-style-type: none"> Tree and/or line structure Bus termination: passive on both ends of the main bus line (RC element $R = 100 \Omega$, $C = 1 \mu F$)
Voltage and current consumption	<ul style="list-style-type: none"> Average current consumption: 10 mA In case of a fault, the FDE (fault disconnection electronic) function integrated into the device ensures that the current consumption can rise to a maximum of 13 mA. The upper limit of the current is electronically limited. The voltage on the bus line must be in the range between DC 9 and 32 V.

For further information ⇒ see the separate interface description.

System integration

JUMO provides device GSD files for system integration.

The necessary device DTM is included on the CD and can be downloaded from www.jumo.de.

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Operation in potentially explosive areas zone 1, 21, 22

General information

The following models are approved for operation in potentially explosive areas according to ATEX/IECEx zone 1, 21, 22:

JUMO flowTRANS MAG S01 – compact design	JUMO flowTRANS MAG S01 – remote mount design	
406012/1-1	406012/2-1 – Sensor	406018/2-1 – Transmitter
Transmitter: dual-compartment housing Sensor: Aluminum housing 	Transmitter: - Sensor: Aluminum housing 	Transmitter: dual-compartment housing Sensor: - 
ATEX/IECEx Gas zone 1 Dust zone 21, 22	ATEX/IECEx Gas zone 1 Dust zone 21, 22	ATEX/IECEx Gas zone 1 Dust zone 21, 22



IMPORTANT (NOTE)!

For details about the ATEX/IECEx approvals ⇒ see chapter "Technical data", page 3



IMPORTANT (NOTE)!

The transmitter and sensor housing must be connected to the potential equalization PA before the protection conductor PE is connected. Before connecting the protection conductor PE, the operator must ensure that no potential differences can occur between the potential equalization PA and protection conductor PE.



IMPORTANT (NOTE)!

For the voltage supply, signal inputs, and signal outputs, only use cables with a specification of at least 70 °C (158 °F).

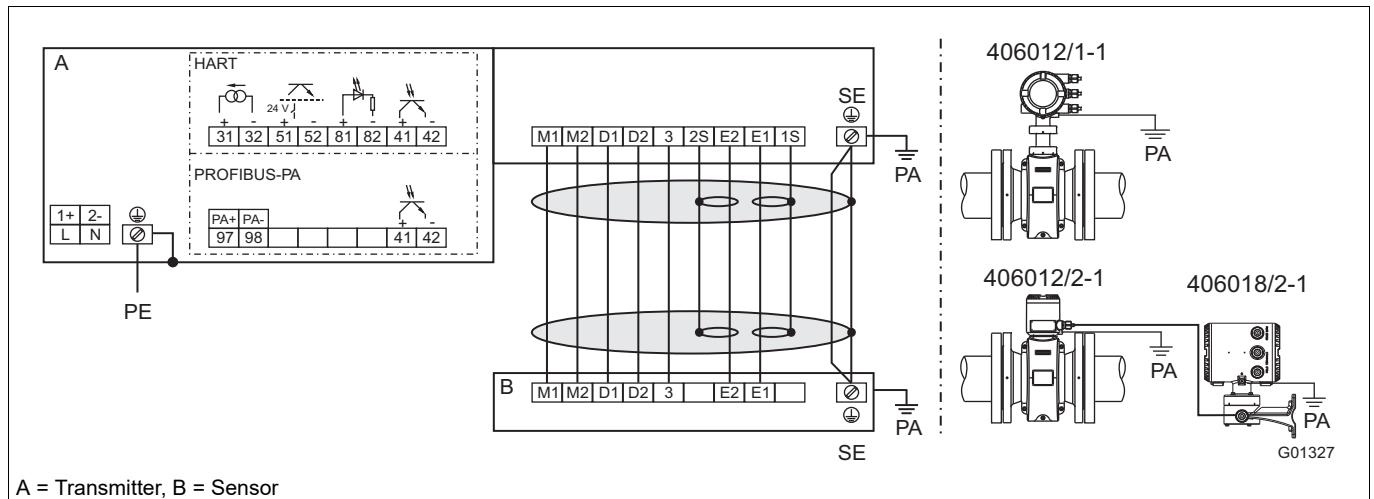
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Model 406012/1-1, 406012/2-1 with 406018/2-1 in zone 1 - HART protocol and PROFIBUS-PA



Voltage supply

Alternating voltage (AC)		Direct voltage (DC)	
Terminal	Function	Terminal	Function
L	Phase	1+	+
N	Neutral conductor	2-	-
PE	Protection conductor (PE)	PE	Protection conductor (PE)

Signal cable connection (for devices with remote mount design only)

Terminal	Function	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
SE	Shielding	-
E1	Signal line	Violet
1S	Shield of E1	-
E2	Signal line	Blue
2S	Shield of E2	-
3	Measurement potential	Green

Input and output connection

Terminal	Function
31/32	Current/HART output - The current output is available in "active" or "passive" mode. The configuration must be specified when ordering the unit, since the configuration cannot be changed on-site.
97/98	PROFIBUS-PA (PA+ PA-) - According to IEC 61158-2
51/52	Digital output DO1 active/passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Pulse output".
81/82	Digital input/contact input - Function can be configured using software on-site as "External output switch-off", "External totalizer reset", "External totalizer stop", or "Other". Only available in conjunction with "passive" current output.
41/42	Digital output DO2 passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Binary output", flow direction signaling.
PA	Potential equalization (PA)

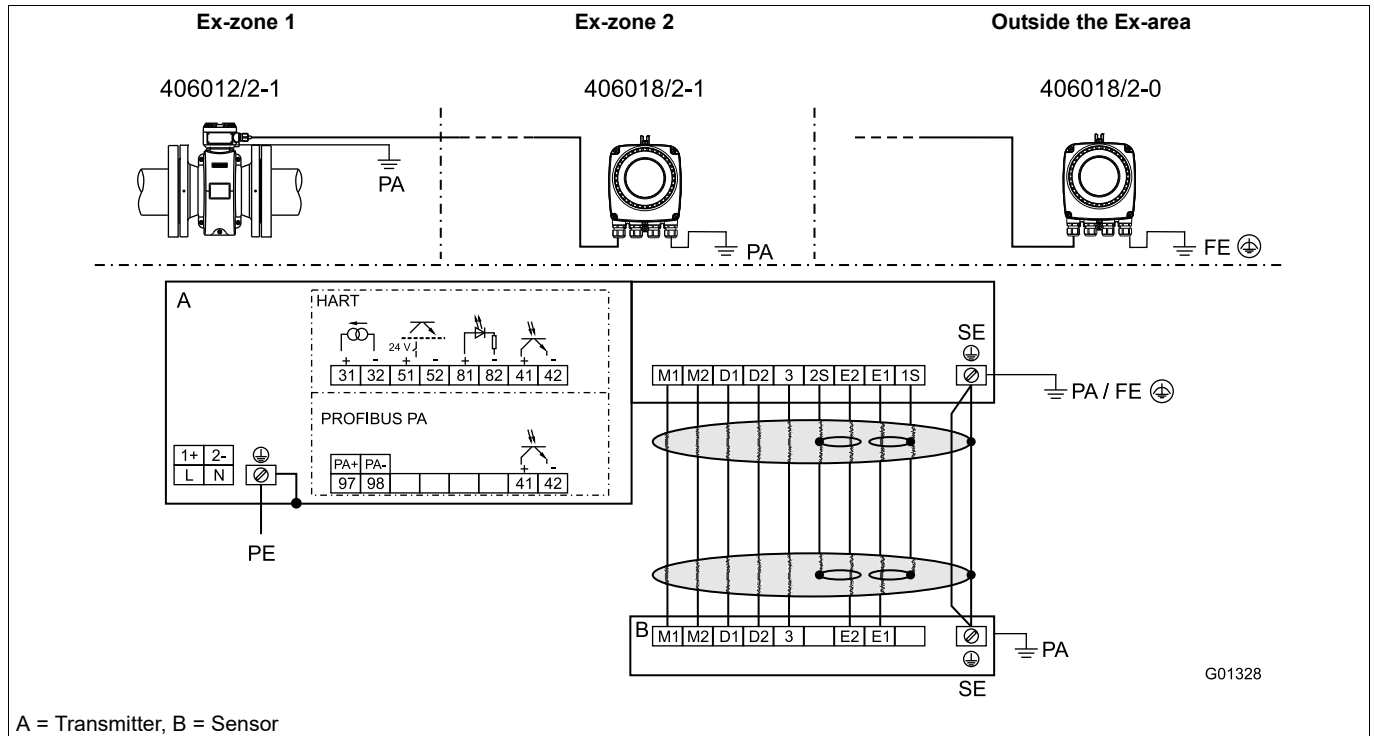
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Model 406012/2-1 in zone 1 with 406018/2-1 in zone 2 or with 406018/2-0 outside of the Ex-area – HART protocol and PROFIBUS-PA



Voltage supply

Alternating voltage (AC)		Direct voltage (DC)	
Terminal	Function	Terminal	Function
L	Phase	1+	+
N	Neutral conductor	2-	-
PE	Protection conductor (PE)	PE	Protection conductor (PE)

Signal cable connection

Terminal	Function	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
SE	Shielding	-
E1	Signal line	Violet
1S	Shield of E1	-
E2	Signal line	Blue
2S	Shield of E2	-
3	Measurement potential	Green



Input and output connection

Terminal	Function
31/32	Current/HART output - The current output is available in "active" or "passive" mode.
97/98	PROFIBUS-PA (PA+/PA-) - According to IEC 61158-2
51/52	Digital output DO1 active/passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Pulse output".
81/82	Digital input/contact input - Function can be configured using software on-site as "External output switch-off", "External totalizer reset", "External totalizer stop" or "Other".
41/42	Digital output DO2 passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Binary output", flow direction signaling.
PA	Potential equalization (PA)
FE	Functional ground (only for transmitters outside potentially explosive area)

Electrical data

Operation in zone 1 – devices with HART protocol

When operating in potentially explosive areas, observe the following electrical data for the transmitter signal inputs and outputs. For the current output version (active/passive), see the identification marking in the device's terminal box.



IMPORTANT (NOTE)!

Special connection conditions:

The output circuits are designed so that they can be connected to intrinsically safe and non-intrinsically safe electrical circuits. Intrinsically safe and non-intrinsically safe electrical circuits may not be combined. Potential equalization is required for intrinsically safe electrical circuits.

The rated voltage of the non-intrinsically safe electrical circuits is $U_M = 60 \text{ V}$.

If the rated voltage $U_M = 60 \text{ V}$ is not exceeded when non-intrinsically safe electrical circuits are connected, the intrinsic safety is maintained.

Model: 406012/1-1 or 406018/2-1 (dual-compartment housing)

Inputs and outputs	Operating data		Ex-data – ignition protection type Ex i, IS											
	U_N [V]	I_N [mA]	U_O [V]	U_I [V]	I_O [mA]	I_I [mA]	P_O [mW]	P_I [mW]	C_O [nF]	C_I [nF]	C_{OPA} [nF]	C_{IPA} [nF]	L_O [mH]	L_I [mH]
Current output active Terminal 31/32	30	30	20	60	100	425 ^a	500	2000 ^a	210	8.4	195	24	6	0.065
Current output passive Terminal 31/32	30	30		60		500 ^a		2000 ^a		8.4		24		170
Digital output DO2 passive Terminal 41/42	30	220		60		425 ^{ab} 500 ^{ac}		2000 ^a		3.6		3.6		170
Digital output DO1 passive Terminal 51/52	30	220		60		425 ^{ab} 500 ^{ac}		2000 ^a		3.6		3.6		170
Digital input DI^d passive Terminal 81/82	30	10		60		500 ^a		2000 ^a		3.6		3.6		170

^a Intrinsically safe single-channel or multichannel barriers (supply isolators) with resistance characteristic curve must be used.

^b For "active" current output.

^c For "passive" current output.

^d Only available in conjunction with passive current output.

All inputs and outputs are galvanically isolated from each other and from the voltage supply.



Operation in zone 1 – devices with PROFIBUS-PA

When operating in potentially explosive areas, observe the following electrical data for the transmitter signal inputs and outputs. For the (PROFI-BUS-PA) version, see the identification marking in the device's terminal box.



IMPORTANT (NOTE)!

For devices in zone 1, the bus termination must comply with the FISCO model (Fieldbus Intrinsically Safe COnccept) or the explosion protection regulations. For devices in zone 2, the bus termination must comply with the FNICO model (Fieldbus NonIncendive COnccept) or the explosion protection regulations.



IMPORTANT (NOTE)!

Special connection conditions:

The output circuits are designed so that they can be connected to intrinsically safe and non-intrinsically safe electrical circuits. Intrinsically safe and non-intrinsically safe electrical circuits may not be combined. Potential equalization is required for intrinsically safe electrical circuits.

The rated voltage of the non-intrinsically safe electrical circuits is $U_M = 60 \text{ V}$.

If the rated voltage $U_M = 60 \text{ V}$ is not exceeded when non-intrinsically safe electrical circuits are connected, the intrinsic safety is maintained.

Model: 406012/1-1, 406018/2-1 (dual-compartment housing)

The fieldbus and the digital output can be connected in zone 1 in three different variants.

Variante 1: Intrinsically safe fieldbus connection according to FISCO, intrinsically safe digital output connection

Signal inputs and outputs	Operating data		Ex-data – Ex i, IS, and FISCO					
	U_N [V]	I_N [mA]	U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Digital output DO2 passive Terminal 41/42	30	220	60	200 ^a	5000 ^a	3.6	3.6	0.17
Fieldbus Terminal 97/98	32	30	17	380	5320	1	1	5

^a Single-channel or multichannel barriers (supply isolators) with resistance characteristic curve must be used.

Variante 2: Intrinsically safe fieldbus connection (not according to FISCO!), intrinsically safe digital output connection

Signal inputs and outputs	Operating data		Ex-data – Ex i, IS, and FISCO					
	U_N [V]	I_N [mA]	U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Digital output DO2 passive Terminal 41/42	30	220	60	200 ^a	5000 ^a	3.6	3.6	0.17
Fieldbus Terminal 97/98	32	30	60	500	5000	1	1	5

^a Single-channel or multichannel barriers (supply isolators) with resistance characteristic curve must be used.

Variante 3: Fieldbus connection according to FNICO (zone 2), digital output connection (zone 2)

Signal inputs and outputs	Operating data		Ex-data – Ex n, NI, and FNICO					
	U_N [V]	I_N [mA]	U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Digital output DO2 passive Terminal 41/42	30	220	-	-	-	-	-	-
Fieldbus Terminal 97/98	32	30	60	500 ^a	5000 ^a	1	1	5

^a Single-channel or multichannel barriers (supply isolators) with resistance characteristic curve must be used.

All inputs and outputs are galvanically isolated from each other and from the voltage supply.



Temperature data for operation in zone 1

Temperature data for operation in zone 1

Model designation	Surface temperature
406012/1-1	70 °C (158 °F)
406012/2-1	85 °C (185 °F)
406018/2-1 (dual-compartment housing)	70 °C (158 °F)

The surface temperature depends on the medium temperature.

With an increasing medium temperature > 70 °C (158 °F) or > 85 °C (185 °F), the surface temperature also increases to the level of the medium temperature.



IMPORTANT (NOTE)!

The maximum admissible medium temperature depends on the lining and flange material and is limited by the operating data in table 1 and the explosion-relevant technical data in tables 2 and 3.

Table 1: Medium temperature depending on the lining and flange material

Model 406012/1-1 and 406012/2-1

Materials		Medium temperature (operating data)	
Lining	Flange	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	90 °C (194 °F)
Hard rubber	Stainless steel	-15 °C (5 °F)	90 °C (194 °F)
PTFE	Steel	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)

Table 2: Medium temperature (Ex-data) model 406012/1-1



IMPORTANT (NOTE)!

If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.

If the installation location for the device is only classified as a potentially explosive area for gases, the temperature data in the "Gas" column in the table must be taken into consideration.

Nominal width	Temperature class	Ambient temperature											
		-20 °C to +40 °C				-20 °C to +50 °C				-20 °C to +60 °C			
		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
		Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
DN 10 to DN 100	T1	130 °C								90 °C	30 °C	80 °C	40 °C
	T2	130 °C								90 °C	30 °C	80 °C	40 °C
	T3	130 °C								90 °C	30 °C	80 °C	40 °C
	T4	120 °C								90 °C	30 °C	80 °C	40 °C
	T5	85 °C								70 °C	30 °C	80 °C	40 °C
	T6	70 °C								70 °C	30 °C	80 °C	40 °C
DN 125 to DN 300	T1	130 °C								90 °C	30 °C	70 °C	40 °C
	T2	130 °C								90 °C	30 °C	80 °C	40 °C
	T3	130 °C								90 °C	30 °C	80 °C	40 °C
	T4	125 °C								90 °C	30 °C	80 °C	40 °C
	T5	90 °C								90 °C	30 °C	80 °C	40 °C
	T6	75 °C								75 °C	30 °C	75 °C	40 °C

Not thermally insulated: the sensor is not surrounded by pipe insulating material.

Thermally insulated: the sensor is surrounded by pipe insulating material.



Table 3: Medium temperature (Ex-data) model 406012/2-1



IMPORTANT (NOTE)!

The standard version includes Ex-protection for gases and dust.

If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.

If the installation location for the device is only classified as a potentially explosive area for gases, the temperature data in the "Gas" column in the table must be taken into consideration.

Nominal width	Temperature class	Ambient temperature											
		-20 °C to +40 °C				-20 °C to +50 °C				-20 °C to +60 °C			
		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
		Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
DN 10 to DN 100	T1	130 °C								110 °C	110 °C	110 °C	110 °C
	T2	130 °C								110 °C	110 °C	110 °C	110 °C
	T3	130 °C								110 °C	110 °C	110 °C	110 °C
	T4	120 °C								110 °C	110 °C	110 °C	110 °C
	T5	85 °C								85 °C	85 °C	85 °C	85 °C
	T6	70 °C								70 °C	70 °C	70 °C	70 °C
DN125 to DN300	T1	130 °C								110 °C	110 °C	110 °C	110 °C
	T2	130 °C								110 °C	110 °C	110 °C	110 °C
	T3	130 °C								110 °C	110 °C	110 °C	110 °C
	T4	125 °C								110 °C	110 °C	110 °C	110 °C
	T5	90 °C								90 °C	90 °C	90 °C	90 °C
	T6	75 °C								75 °C	75 °C	75 °C	75 °C

Not thermally insulated: the sensor is not surrounded by pipe insulating material.

Thermally insulated: the sensor is surrounded by pipe insulating material.

Special features of device version for operation in Ex-zone 1

Configuring the current output

For devices designed for use in Ex-zone 1, the current output configuration cannot be subsequently changed.

The desired configuration for the current output (active/passive) must be specified when the order is placed.

For the current output version (active/passive), see the identification marking in the device's terminal box.

Configuration of the digital outputs

For the device version for operation in Ex-zone 1, the digital outputs DO1 (51/52) and DO2 (41/42) can be configured for a connection to a NAMUR switching amplifier. In the default setting, the outputs are configured with the standard wiring (non-NAMUR).

Devices with PROFIBUS-PA only feature the digital output DO2 (41/42).



IMPORTANT (NOTE)!

This does not affect the output ignition protection type. The devices connected to these outputs must comply with the applicable regulations for explosion protection.

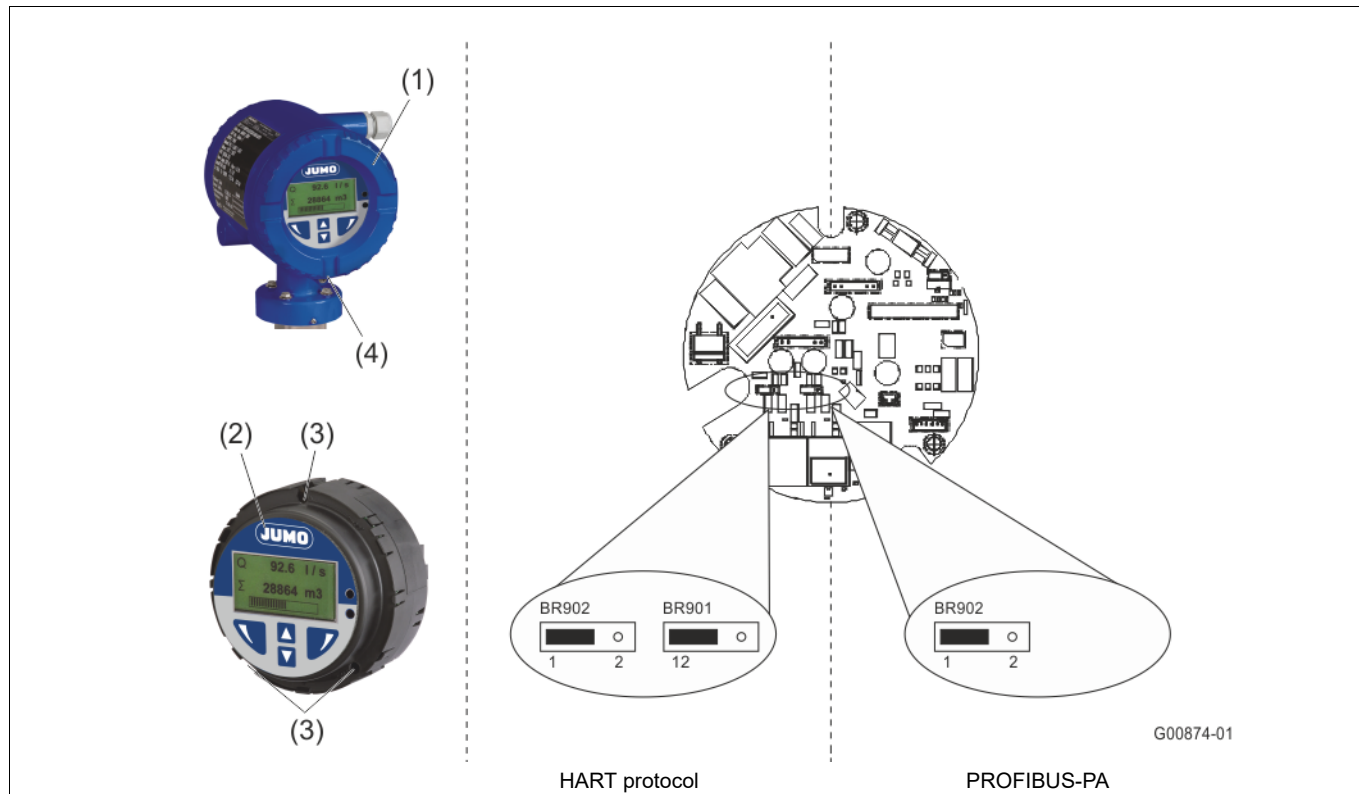
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The jumpers for configuration are located on the backplane in the transmitter housing.



BR902 for digital output DO1	BR901 for digital output DO2
BR902 in position 1: standard (non-NAMUR)	BR902 in position 1: standard (non-NAMUR)
BR902 in position 2: NAMUR	BR902 in position 2: NAMUR

Configure the digital outputs as described below:

1. Switch off the voltage supply and wait at least 20 minutes before performing the next step.
2. Screw in the lid lock (4) and open the housing lid (1).
3. Loosen the screws (3) and pull out the transmitter plug-in module (2).
4. Insert the jumpers at the required positions.
5. Re-insert the transmitter plug-in module (2) and retighten the screws (3).
6. Close the housing lid (1) and secure the lid by unscrewing the screw (4).

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Operation in potentially explosive areas zone 2, 21, 22

General information

The following models are approved for operation in potentially explosive areas according to ATEX/IECEEx zone 2, 21, 22:

JUMO flowTRANS MAG S01 – compact design	JUMO flowTRANS MAG S01 – remote mount design	
406012/1-1	406012/2-1 – Sensor	406018/2-1 – Transmitter
Transmitter: dual-compartment housing Sensor: Aluminum housing 	Transmitter: - Sensor: Aluminum housing 	Transmitter: dual-compartment housing Sensor: - 
ATEX/IECEEx Gas zone 2 Dust zone 21, 22	ATEX/IECEEx Gas zone 2 Dust zone 21, 22	ATEX/IECEEx Gas zone 2 Dust zone 21, 22



IMPORTANT (NOTE)!

For details about the ATEX/IECEEx approvals ⇒ see chapter "Technical data", page 3



IMPORTANT (NOTE)!

For the voltage supply, signal inputs, and signal outputs, only use cables with a specification of at least 70 °C (158 °F).

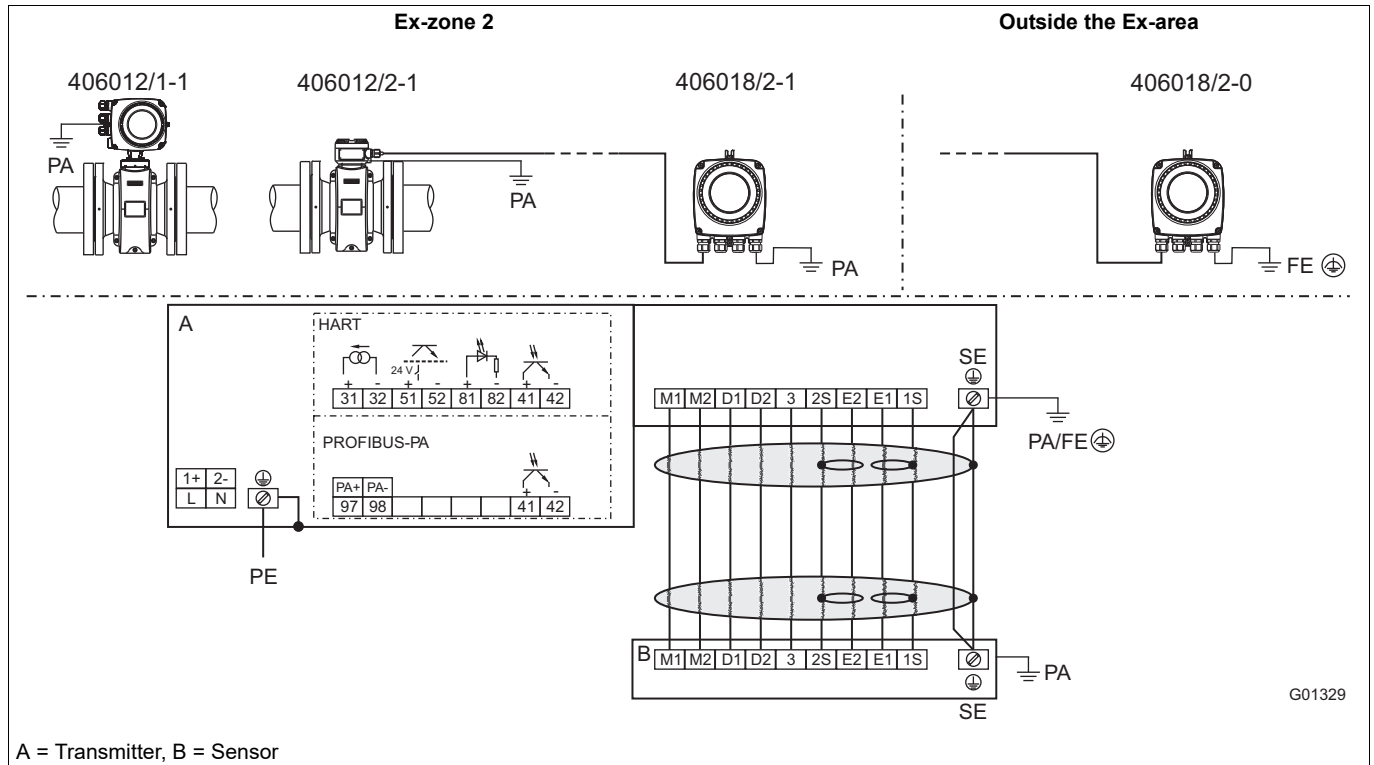
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Model 406012/1-1 and 406012/2-1 with 406018/2-1 in zone 2 and 406018/2-0 outside of the Ex-area – HART protocol and PROFIBUS-PA



Voltage supply

Alternating voltage (AC)		Direct voltage (DC)	
Terminal	Function	Terminal	Function
L	Phase	1+	+
N	Neutral conductor	2-	-
PE	Protection conductor (PE)	PE	Protection conductor (PE)

Signal cable connection (for devices with remote mount design only)

Terminal	Function	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
SE	Shielding	-
E1	Signal line	Violet
1S	Shield of E1	-
E2	Signal line	Blue
2S	Shield of E2	-
3	Measurement potential	Green

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Input and output connection

Terminal	Function
31/32	Current/HART output - The current output is available in "active" or "passive" mode.
97/98	PROFIBUS-PA (PA+/PA-) - According to IEC 61158-2
51/52	Digital output DO1 active/passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Pulse output".
81/82	Digital input/contact input - Function can be configured using software on-site as "External output switch-off", "External totalizer reset", "External totalizer stop", or "Other".
41/42	Digital output DO2 passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Binary output", flow direction signaling.
PA	Potential equalization (PA)
FE	Functional ground (only for transmitters outside potentially explosive area)

Electrical data

Operation in zone 2 – devices with HART protocol

When operating in potentially explosive areas, observe the following electrical data for the transmitter signal inputs and outputs. For the current output version (active/passive), see the identification marking in the device's terminal box.

Model: 406012/1-1 and 406018/2-1 (single-compartment housing)

	Operating data		Ex-data – Ex n/NI	
Signal inputs and outputs	U_i [V]	I_i [mA]	U_i [V]	I_i [mA]
Current output active/passive				
Terminal 31/32	30	30	30	30
Digital output DO1 active/passive				
Terminal 51/52	30	220	30	220
Digital output DO2 passive				
Terminal 41/42	30	220	30	220
Digital input DI				
Terminal 81/82	30	10	30	10

All inputs and outputs are galvanically isolated from each other and from the voltage supply.

Operation in zone 2 – devices with PROFIBUS-PA

When operating in potentially explosive areas, observe the following electrical data for the transmitter signal inputs and outputs. For the (PROFIBUS-PA) version, see the identification marking in the device's terminal box.



IMPORTANT (NOTE)!

For devices in zone 2, the bus termination must comply with the FNICO model (Fieldbus NonIncendive COnccept) or the explosion protection regulations.

Model: 406012/1-1 and 406018/2-1 (single-compartment housing)

	Operating data		Ex-data – Ex n, NI, and FNICO					
Signal inputs and outputs	U_N [V]	I_N [mA]	U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Digital output DO2 passive								
Terminal 41/42	30	220	-		-	-	-	-
Fieldbus								
Terminal 97/98	32	30	32	500 ^a	7000 ^a	1	1	5

^a Single-channel or multichannel barriers (supply isolators) with resistance characteristic curve must be used.



Temperature data for operation in zone 2

Temperature data for operation in zone 2

Model designation	Surface temperature
406012/1-1	70 °C (158 °F)
406012/2-1	85 °C (185 °F)
406018/2-1 (single-compartment housing)	70 °C (158 °F)

The surface temperature depends on the medium temperature.

With an increasing medium temperature > 70 °C (158 °F) or > 85 °C (185 °F), the surface temperature also increases to the level of the medium temperature.

Table 1: Medium temperature depending on the lining and flange material

Model 406012/1-1, 406012/2-1

Materials		Medium temperature (operating data)	
Lining	Flange	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	90 °C (194 °F)
Hard rubber	Stainless steel	-15 °C (5 °F)	90 °C (194 °F)
PTFE	Steel	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)

Table 2: Medium temperature (Ex-data) model 406012/1-1



IMPORTANT (NOTE)!

If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.

If the installation location for the device is only classified as a potentially explosive area for gases, the temperature data in the "Gas" column in the table must be taken into consideration.

Nominal width	Temperature class	Ambient temperature											
		-20 °C to +40 °C				-20 °C to +50 °C				-20 °C to +60 °C			
		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
		Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
DN 10 to DN 300	T1	130 °C	130 °C	-	-	130 °C	100 °C	-	-	80 °C	40 °C	-	-
	T2	130 °C	130 °C	-	-	130 °C	100 °C	-	-	80 °C	40 °C	-	-
	T3	130 °C	130 °C	-	-	130 °C	100 °C	-	-	80 °C	40 °C	-	-
	T4	130 °C	130 °C	-	-	130 °C	100 °C	-	-	80 °C	40 °C	-	-

Not thermally insulated: the sensor is not surrounded by pipe insulating material.

Thermally insulated: the sensor is surrounded by pipe insulating material.

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Table 3: Medium temperature (Ex-data) model 406012/2-1



IMPORTANT (NOTE)!

If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.

If the installation location for the device is only classified as a potentially explosive area for gases, the temperature data in the "Gas" column in the table must be taken into consideration.

Nominal width	Temperature class	Ambient temperature											
		-20 °C to +40 °C				-20 °C to +50 °C				-20 °C to +60 °C			
		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
		Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
DN 10 to DN 300	T1	130 °C	130 °C	-	-	130 °C	100 °C	-	-	110 °C	110 °C	-	-
	T2	130 °C	130 °C	-	-	130 °C	100 °C	-	-	110 °C	110 °C	-	-
	T3	130 °C	130 °C	-	-	130 °C	100 °C	-	-	110 °C	110 °C	-	-
	T4	130 °C	130 °C	-	-	130 °C	100 °C	-	-	110 °C	110 °C	-	-
	T5	95 °C	95 °C	-	-	95 °C	95 °C	-	-	95 °C	95 °C	-	-
	T6	80 °C	80 °C	-	-	80 °C	80 °C	-	-	80 °C	80 °C	-	-

Not thermally insulated: the sensor is not surrounded by pipe insulating material.

Thermally insulated: the sensor is surrounded by pipe insulating material.

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Ex-relevant technical data for operation in areas with combustible dust



IMPORTANT (NOTE)!

The dust explosion protection is guaranteed in part by the housing. The housing may not be modified in any way (e.g. by removing or omitting parts).

Notes on using the device in areas with combustible dust

The device with the transmitter in a single-compartment housing is approved for use in potentially explosive areas (gas and dust).

The Ex identification marking is provided on the nameplate.

Maximum admissible surface temperature



IMPORTANT (NOTE)!

The maximum surface temperature is applicable to dust layers of up to 5 mm (0.20 inches) in thickness. This is to be used to determine the minimum admissible ignition and glow temperature for the dust atmosphere according to IEC 61241ff.

The maximum admissible surface temperature must be reduced for thicker dust layers. The dust may be electrically conductive or non-conductive. IEC 61241ff. must be observed.

Model designation	Surface temperature
406012/1-1	70 °C (158 °F) to T_{Medium}
406012/2-1	85 °C (185 °F) to T_{Medium}
406018/2-1 (single-compartment/dual-compartment housing)	70 °C (158 °F)

Minimum signal cable length



IMPORTANT (NOTE)!

The signal cable in potentially explosive areas may not be shorter than 5 m (16.40 ft).

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Order details

Compact or remote mount design (sensor with transmitter)

				(1)	Type
406012					JUMO flowTRANS MAG S01
				(2)	Design
				1	Compact
				2	Remote mount ^{a, b}
				(3)	Explosion protection
				0	Without Ex-protection
				1	With Ex-protection
				(4)	Nominal width
X	X	X	X	0010	DN 10
X	X	X	X	0015	DN 15
X	X	X	X	0020	DN 20
X	X	X	X	0025	DN 25
X	X	X	X	0032	DN 32
X	X	X	X	0040	DN 40
X	X	X	X	0050	DN 50
X	X	X	X	0065	DN 65
X	X	X	X	0080	DN 80
X	X	X	X	0100	DN 100
X	X	X	X	0125	DN 125
X	X	X	X	0150	DN 150
X	X	X	X	0200	DN 200
X	X	X	X	0250	DN 250
X	X	X	X	0300	DN 300
				(5)	Lining material
X	X	X	X	01	PTFE
X	X	X	X	06	Hard rubber
				(6)	Electrode version
X	X	X	X	1	Standard
X	X	X	X	5	Bullet-nose
X	X	X	X	9	Others upon request
				(7)	Measuring electrode material
X	X	X	X	02	NiMo C-4 (2.4610) – Hastelloy
X	X	X	X	03	Titanium
X	X	X	X	04	Tantalum
X	X	X	X	06	Platinum-iridium
X	X	X	X	07	Stainless steel 1.4571 (316 Ti)
X	X	X	X	10	Others upon request
				(8)	Grounding accessories
X	X	X	X	1	Standard
X	X	X	X	2	Grounding electrodes ⇨ see (7) measuring electrode material

^a If only the sensor model 406012/2-0 or 406012/2-1 is needed, the order code "Remote mount design (sensor) ", page 51 should be used to generate the correct order details.

^b If only the transmitter model 406018/2-0 or 406018/2-1 is needed, the order code "Remote mount design (transmitter) ", page 54 should be used to generate the correct order details.

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Compact or remote mount design (sensor with transmitter) – continued

					(9)	Process connection
X	X	X	X	11		Flange DIN PN 10
X	X	X	X	12		Flange DIN PN 16
X	X	X	X	14		Flange DIN PN 40
X	X	X	X	20		Flange ASME CL150
X	X	X	X	21		Flange ASME CL300
					(10)	Process connection material
X	X	X	X	01		Steel
X	X	X	X	02		Stainless steel ^a
					(11)	Certificates
X	X	X	X	1		Measuring pipe with PED approval
X	X	X	X	3		Inspection certificate 3.1 according to EN 10204
X	X	X	X	4		Pressure test according to AD2000
X	X	X	X	5		Material certification 3.1 according to EN 10204 and pressure test according to AD2000
					(12)	Calibration
X	X	X	X	1		Standard accuracy ^b
X	X	X	X	2		Enhanced accuracy ^c
					(13)	Ambient temperature for sensor
X	X	X	X	1		Standard transducer design/-20 to +60 °C (-4 to +140 °F) ^d
					(14)	Nameplate
X	X	X	X	1		Adhesive label
X	X	X	X	2		Stainless steel
X	X	X	X	9		Others upon request
					(15)	Signal cable length^e
X	X	X	X	0		None
	X	X	X	1		5 m standard cable
	X	X	X	2		10 m standard cable
	X	X	X	3		20 m standard cable
	X	X	X	4		30 m standard cable
	X	X	X	5		50 m standard cable
	X	X	X	6		80 m standard cable
	X	X	X	7		100 m standard cable
	X	X	X	8		150 m standard cable
	X	X	X	9		Others upon request
					(16)	Ex-zone
X	X	X		0		None
X	X		X	1		ATEX/IECEx zone 1 ^f
X	X		X	2		ATEX/IECEx zone 2/21

^a ⇒ See "Materials – sensor housing made of aluminum (shell housing) ", page 12

^b Standard accuracy (0.4 % of the measured value) includes 2 calibration points. If more than 2 calibration points are required, specify 3 or 5 points under "Number of test points".

^c Enhanced accuracy (0.2 % of the measured value) includes 3 calibration points. If more than 3 calibration points are required, specify 5 points under "Number of test points". Available for DN10 (3/8") to 300 (12").

^d Maximum measurement medium temperature for sensor in standard design:
 130 °C with PTFE, 90 °C with hard rubber

^e For the model 406018/2-1 in the version for Ex-zone 1, 10 m (32.81 ft) cables are permanently connected to the transmitter. For maximum signal cable lengths ⇒ see "Signal cable length and preamplifier ", page 11.

^f Only in conjunction with dual-compartment housing.

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Compact or remote mount design (sensor with transmitter) – continued

					(17)	Protection type for transmitter/sensor
X	X	X	X	1		IP67 (NEMA 4X) ^a /IP67 (NEMA 4X)
	X	X	X	2		IP67 (NEMA 4X) ^a /IP68 ^b
					(18)	Cable fitting
X	X	X	X	1		M20 × 1.5
X	X	X	X	2		1/2" NPT
					(19)	Voltage supply
X	X	X	X	1		AC 100 to 230 V, 50 Hz
X	X	X	X	2		AC/DC 24 V, 50 Hz
					(20)	Signal inputs and outputs
X	X	X		0		None
X	X	X	X	1		HART and 20 mA passive and pulse and contact input/output ^c
X	X	X	X	2		HART and 20 mA active and pulse and contact input/output ^d
X	X		X	3		HART and 20 mA active and pulse and contact output ^e
X	X	X	X	4		PROFIBUS-PA and contact output
					(21)	Default settings/diagnosis
X	X	X	X	1		Parameters: default settings; standard diagnosis activated
					(22)	Accessories
X	X	X	X	000		None
	X	X	X	001		With preamplifier, installed in sensor housing ^f
					(23)	Plug connector
X		X		002		Fieldbus M12 × 1 ^g
					(24)	Transmitter housing version
X	X	X	X	003		Single-compartment housing ^h
X	X		X	004		Dual-compartment housing ⁱ
					(25)	Supply frequency
X	X	X	X	012		50 Hz
					(26)	Further options
X		X	X	014		With Gore-Tex membrane ^j
					(27)	Number of test points
X	X	X	X	025		3 points
X	X	X	X	026		5 points
					(28)	Language of documentation
X	X	X	X	029		German
X	X	X	X	030		English
X	X	X	X	036		French
X	X	X	X	037		Spanish

^a Protection type for transmitter = IP67 (NEMA 4X) for single and dual-compartment housing.

^b Only in conjunction with external transmitter.

^c Available for version Ex-zone 2 or Ex-zone 1.

^d Available for version Ex-zone 2.

^e Available for version Ex-zone 1.

^f Preamplifier required for signal cable lengths > 50 m (160 ft). Preamplifier is not available for zone 1.

^g Only available for PROFIBUS-PA.

^h Not available for version Ex-zone 1.

ⁱ Only available for version Ex-zone 1.

^j Not available for version Ex-zone 1.

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Order code	406012	/		-		-		-	
Order example	406012	/	X	-	X	-	XXXX	-	XX
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
					1				
	XX	-	XX	-	X	-	X	-	X
	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
	X	-	X	-	X	-	X	-	X
	(28)								
	X	-	X	-	X	-	X	-	X

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Remote mount design (sensor)

		(1)	Type
		406012	JUMO flowTRANS MAG S01 – sensor
		(2)	Design
		2	Remote mount ^{a, b}
		(3)	Explosion protection
		0	Without Ex-protection
		1	With Ex-protection
		(4)	Nominal width
X	X	0010	DN 10
X	X	0015	DN 15
X	X	0020	DN 20
X	X	0025	DN 25
X	X	0032	DN 32
X	X	0040	DN 40
X	X	0050	DN 50
X	X	0065	DN 65
X	X	0080	DN 80
X	X	0100	DN 100
X	X	0125	DN 125
X	X	0150	DN 150
X	X	0200	DN 200
X	X	0250	DN 250
X	X	0300	DN 300
		(5)	Lining material
X	X	01	PTFE
X	X	06	Hard rubber
		(6)	Electrode version
X	X	1	Standard
X	X	5	Bullet-nose
X	X	9	Others upon request
		(7)	Measuring electrode material
X	X	02	NiMo C-4 (2.4610) – Hastelloy
X	X	03	Titanium
X	X	04	Tantalum
X	X	06	Platinum-iridium
X	X	07	Stainless steel 1.4571 (316 Ti)
X	X	10	Others upon request
		(8)	Grounding accessories
X	X	1	Standard
X	X	2	Grounding electrodes ⇨ see (7) measuring electrode material

^a If the transmitter model 406018/2-0 or 406018/2-1 is also required for the sensor model 406012/2-0 or 406012/2-1, the order code "Compact or remote mount design (sensor with transmitter)", page 47 should be used to generate the correct order details.

^b If only the transmitter model 406018/2-0 or 406018/2-1 is needed, the order code "Remote mount design (transmitter)", page 54 should be used to generate the correct order details.

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Remote mount design (sensor) – continued

			(9)	Process connection
X	X	11		Flange DIN PN 10
X	X	12		Flange DIN PN 16
X	X	14		Flange DIN PN 40
X	X	20		Flange ASME CL150
X	X	21		Flange ASME CL300
			(10)	Process connection material
X	X	01		Steel
X	X	02		Stainless steel ^a
			(11)	Certificates
X	X	1		Measuring pipe with PED approval
X	X	3		Inspection certificate 3.1 according to EN 10204
X	X	4		Pressure test according to AD2000
X	X	5		Material certification 3.1 according to EN 10204 and pressure test according to AD2000
			(12)	Calibration
X	X	1		Standard accuracy ^b
X	X	2		Enhanced accuracy ^c
			(13)	Ambient temperature for sensor
X	X	1		Standard transducer design/-20 to +60 °C (-4 to +140 °F) ^d
			(14)	Nameplate
X	X	1		Adhesive label
X	X	2		Stainless steel
X	X	9		Others upon request
			(15)	Signal cable length^e
X	X	0		None
X	X	1		5 m standard cable
X	X	2		10 m standard cable
X	X	3		20 m standard cable
X	X	4		30 m standard cable
X	X	5		50 m standard cable
X	X	6		80 m standard cable
X	X	7		100 m standard cable
X	X	8		150 m standard cable
X	X	9		Others upon request
			(16)	Ex-zone
X		0		None
	X	1		ATEX/IECEx zone 1 ^f
	X	2		ATEX/IECEx zone 2/21
			(17)	Protection type for sensor
X	X	1		IP67 (NEMA 4X)
X	X	2		IP68 ^g

^a ⇒ See "Materials – sensor housing made of aluminum (shell housing) ", page 12

^b Standard accuracy (0.4 % of the measured value) includes 2 calibration points. If more than 2 calibration points are required, specify 3 or 5 points under "Number of test points".

^c Enhanced accuracy (0.2 % of the measured value) includes 3 calibration points. If more than 3 calibration points are required, specify 5 points under "Number of test points". Available for DN10 (3/8") to 300 (12").

^d Maximum measurement medium temperature for sensor in standard design:
 130 °C with PTFE, 90 °C with hard rubber.

^e For the model 406018/2-1 in the version for Ex-zone 1, 10 m (32.81 ft) cables are permanently connected to the transmitter. For maximum signal cable lengths ⇒ see "Signal cable length and preamplifier ", page 11.

^f Only in conjunction with dual-compartment housing.

^g Only in conjunction with external transmitter.

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Remote mount design (sensor) – continued

			(18)	Cable fitting
X	X	1		M20 × 1.5
X	X	2		1/2" NPT
			(19)	Voltage supply
X	X	0		None
			(20)	Signal inputs and outputs
X	X	0		None
			(21)	Default settings/diagnosis
X	X	0		None
X	X	1		Parameters: default settings; standard diagnosis activated
			(22)	Accessories
X	X	000		None
X	X	001		With preamplifier, installed in sensor housing ^a
			(23)	Supply frequency
X	X	012		50 Hz
			(24)	Number of test points
X	X	025		3 points
X	X	026		5 points
			(25)	Language of documentation
X	X	029		German
X	X	030		English
X	X	036		French
X	X	037		Spanish

^a Preamplifier required for signal cable lengths > 50 m (160 ft). Preamplifier is not available for zone 1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Order code	406012	/		-		-		-	
Order example	406012	/	X	-	X	-	XXXX	-	XX
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
					1				
	XX	-	XX	-	X	-	X	-	X
	(19)	(20)	(21)	(22)	(23)	(24)	(25)		
	0	-	0	-	X	/	XXX	-	XXX

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Remote mount design (transmitter)

		(1)	Type
		406018	JUMO flowTRANS MAG 01 – transmitter
		(2)	Design
		2	Remote mount ^{a, b}
		(3)	Explosion protection
		0	Without Ex-protection
		1	With Ex-protection
		(4)	Ambient temperature for sensor
X	X	1	Standard transducer design/-20 to +60 °C (-4 to +140 °F)
		(5)	Nameplate
X	X	1	Adhesive label
X	X	2	Stainless steel
X	X	9	Others upon request
		(6)	Signal cable length^c
X	X	0	None
		(7)	Ex-zone
X		0	None
	X	1	ATEX/IECEEx zone 1 ^d
	X	2	ATEX/IECEEx zone 2/21
		(8)	Protection type for transmitter
X	X	1	IP67 (NEMA 4X) ^e
		(9)	Cable fitting
X	X	1	M20 × 1.5
X	X	2	1/2" NPT
		(10)	Voltage supply
X	X	1	AC 100 to 230 V, 50 Hz
X	X	2	AC/DC 24 V, 50 Hz
		(11)	Signal inputs and outputs
X	X	1	HART and 20 mA passive and pulse and contact input/output ^f
X	X	2	HART and 20 mA active and pulse and contact input/output ^g
	X	3	HART and 20 mA active and pulse and contact output ^h
X	X	4	PROFIBUS-PA and contact output
		(12)	Default settings/diagnosisⁱ
X	X	0	None/standard diagnostics functions
X	X	1	Parameters: default settings; standard diagnosis activated

^a If the sensor model 406012/2-0 or 406012/2-1 is also required for the transmitter model 406018/2-0 or 406018/2-1, the order code "Compact or remote mount design (sensor with transmitter)", page 47 should be used to generate the correct order details.

^b If only the sensor model 406012/2-0 or 406012/2-1 is needed, the order code "Remote mount design (sensor)", page 51 should be used to generate the correct order details.

^c For the model 406018/2-1 in the version for Ex-zone 1, 10 m (32.81 ft) cables are permanently connected to the transmitter. For maximum signal cable lengths ⇒ see "Signal cable length and preamplifier", page 11

^d Only in conjunction with dual-compartment housing.

^e Protection type for transmitter = IP67 (NEMA 4X) for single and dual-compartment housing.

^f Available for version Ex-zone 2 or Ex-zone 1 or without Ex-protection.

^g Available for version Ex-zone 2 or without Ex-protection.

^h Available for version Ex-zone 1.

ⁱ If the transmitter (model 406018/2-0, 406018/2-1) is ordered as a spare part or without sensor, "None/standard diagnostics functions" should be selected.

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Remote mount design (transmitter) – continued

			(13)	Plug connector
X		002		Fieldbus M12 × 1 ^a
			(14)	Transmitter housing versions
X	X	000		none
X	X	003		Single-compartment housing
	X	004		Dual-compartment housing ^b
			(15)	Further options
X	X	014		With Gore-Tex membrane ^c
			(16)	Language of documentation
X	X	029		German
X	X	030		English
X	X	036		French
X	X	037		Spanish

^a Only available for PROFIBUS-PA.

^b Only available for version Ex-zone 1.

^c Not available for version Ex-zone 1.

Order code	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	406018	2		1		0		1	-
Order example	406018	2	X	1	X	0	X	1	-
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
	X	X	X	X	XXX	XXX	XXX	XXX	

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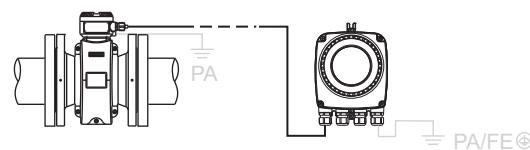
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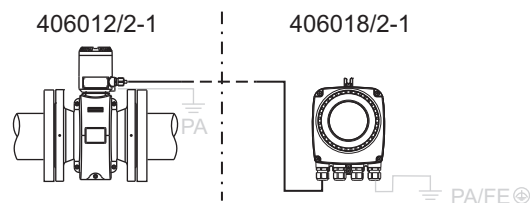
Accessories

Available signal cable lengths

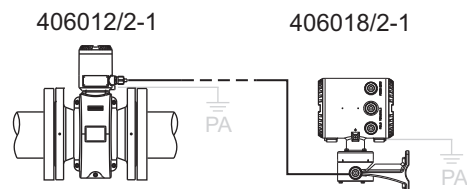
Signal cable length ^a	Part no.	Ex-zone 2 or outside of Ex-area	
5 m (16.4 ft)	00648906 (scope of delivery)	406012/2-0	406018/2-0
10 m (32.8 ft)	00648907	406012/2-1	406018/2-1
20 m (65.6 ft)	00648909		
30 m (98.4 ft)	00648910		
50 m (164.0 ft)	00648912		
80 m (262.5 ft)	00648913		
100 m (328 ft)	Upon request		
150 m (492 ft)	Upon request		



Signal cable length	Part no.	Ex-zone 1	Ex-zone 2 or outside of Ex-area
5 m (16.4 ft)	00648906 (scope of delivery)		
10 m (32.8 ft)	00648907		
20 m (65.6 ft)	00648909		
30 m (98.4 ft)	00648910		
50 m (164.0 ft)	00648912		



Signal cable length	Part no.	Ex-zone 1
5 m (16.4 ft)	00648906	
10 m (164 ft)	00648907 (permanently installed)	



^a At a minimum conductivity for the measurement medium of $\geq 5 \mu\text{S/cm}$, a preamplifier is required for cable lengths $> 50 \text{ m}$ (164 ft).



IMPORTANT (NOTE)!

Minimum signal cable length:

In potentially explosive areas with combustible dust, the signal cable must not be shorter than 5 m (16.40 ft).

Cable conduit sealing

Designation	Part no.	
Mounting set for sealing the cable conduit	00649012	



G01312

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Grounding plates

Installation in plastic lines or pipelines with insulated lining requires additional grounding via grounding plates (1). In this case it is recommended that one grounding plate is fitted in front of the device and one is fitted behind.

Designation	Part no.	
Grounding plate ^a (1)	-	

^a Available upon request for all available process connections in different materials.

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JUMO flowTRANS MAG H01

Electromagnetic flowmeter

for hygienic applications

Brief description

The electromagnetic flowmeter JUMO flowTRANS MAG H01 was specially developed for hygienic applications in the food and pharmaceutical industry and is available in numerous nominal widths.

The design which consists completely of stainless steel makes cleaning easier, is suitable for hygienic applications and is FDA-compliant.

The variable connection concept with standardized sensor provides flexibility and makes mounting easier.

The JUMO flowTRANS MAG H01 provides users with a versatile, inexpensive flowmeter that is synchronized precisely to your requirements, has a short delivery time, and includes a simple and easily understandable documentation.

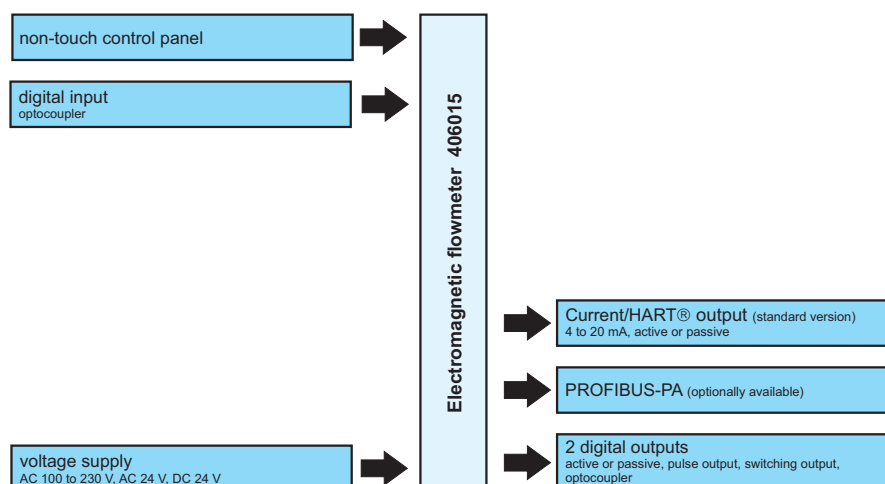


compact design



remote mount design

Block diagram



Special features

- High degree of accuracy
- Extremely simple operation
- State-of-the-art diagnosis for empty pipe detection
- Simpler and quicker fault rectification thanks to diagnosis-based help texts
- Digital communication via HART protocol (standard) or PROFIBUS-PA (option)
- Nominal pressure: PN 10, 16, 40, CL150, CL300
- Process connection: welded socket, compression fitting, Tri-Clamp, connection flange
- Lining: PFA
- Medium temperature: up to 130 °C (266 °F)

Approvals/approval marks (see "Technical data")



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Description

General information

The JUMO flowTRANS MAG H01 was developed with particular consideration for the requirements of the food and pharmaceutical industry. The modular device concept offers flexibility, cost-effective operation, and excellent reliability with a long operating life and minimal maintenance costs.

Diagnostics functions

State-of-the-art diagnostics functions such as "empty pipe detection" and "sensor measurement" monitor the functional capability of the device and the process.

The limit values for the diagnosis parameters can be adjusted on-site. If these limit values are exceeded, an alarm is issued.

The diagnosis data can be extracted via a state-of-the-art Device Type Manager (DTM) for further analysis. Critical states can therefore be detected at an early stage and countermeasures can be taken.

This enables higher productivity and avoids down times.

Status messages are classified in accordance with the NAMUR requirements.

In the event of a fault, a diagnosis-based help text is displayed which makes it significantly easier and quicker to rectify the fault. This provides maximum process reliability.

Sensor

The variable connection concept with standardized sensor provides flexibility and makes mounting easier. Spare parts stock and consequently storage costs can be reduced. The vacuum-proof, dimensionally stable PFA lining meets the highest standards. The sensor is suitable for CIP/SIP cleaning up to 150 °C (302 °F). State-of-the-art filter methods that separate the measurement signal from the interference signal enable precise measurement with outstanding accuracy (max. measurement deviation: 0.2 % of the measured value).

Startup

The latest memory technology in the sensor eliminates the need to check the assignment of the sensor and transmitter. The transmitter

detects the sensor automatically using the built-in "SensorMemory". Once the voltage supply is switched on, the transmitter carries out self-configuration. The sensor data and the measuring-point specific parameters are loaded automatically. Potential errors are thus eliminated and startup is quick and reliable.

Operation

The parameters pre-set in the plant are changed via the user-friendly display and non-contact operating buttons – quickly and easily without the need to open the housing. The easy setup function also guides inexperienced users smoothly through the configuration, step by step.

The softkey functionality makes it as easy to use as a modern cell phone. During configuration, the admissible setting range of the relevant parameter is shown on the display and inadmissible entries are rejected.

Transmitter

The back-lit display can be turned without additional tools. The contrast is adjustable and the display is fully configurable. The size of the characters, the number of lines, and the resolution of the display (decimal points) are variable. In multiplex mode, several display appearances can be flexibly preconfigured and called up in succession.

The intelligent module design of the transmitter slot enables simple dismantling without unscrewing cables or removing connectors.

Whether it is for counting pulses (active or passive), 20 mA (active or passive), status output (active or passive) – the universal transmitter always offers the right signal. The HART protocol is standard here.

Alternatively to the HART® protocol, the transmitter can be equipped with PROFIBUS-PA as an option.

Conformities

The JUMO flowTRANS MAG H01 complies with the device standard for the food and pharmaceutical industry. It meets the various NAMUR requirements.

Function overview

The following table provides an overview of the most important functions.

Measuring accuracy
0.4 % (optional 0.2 %) of the measured value
Additional software functions
Measuring units, editable counters
Graphic display
Line recorder function
Fieldbus
PROFIBUS-PA (optional)

Device version

The JUMO flowTRANS MAG H01 is available in a compact and remote mount design type.

Compact: Sensor and transmitter form one mechanical unit.

Remote mount: Sensor and transmitter are placed in separate housings.

The housings are available as single-compartment or dual-compartment housings, depending on the requirements concerning the Ex-protection type.

Overview of available versions:

	JUMO flowTRANS MAG H01	
	Compact	Remote mount
Standard	Single-compartment housing	Single-compartment housing
No Ex-protection		
Ex-protection	Single-compartment housing	Single-compartment housing
Zone 2, 21, 22		
Ex-protection	Dual-compartment housing	-
Zone 1, 21, 22		

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Technical data

Design

JUMO flowTRANS MAG H01 – compact design

406015/1-0 (without Ex-protection)	406015/1-1 (Ex-protection zone 2)	406015/1-1 (Ex-protection zone 1)
Transmitter: single-compartment housing 	Transmitter: single-compartment housing 	Transmitter: dual-compartment housing 
	ATEX/IECEX Gas zone 2 Dust zone 21, 22	ATEX/IECEX Gas zone 1 Dust zone 21, 22



IMPORTANT (NOTE)!

The scope of delivery for the compact design type includes the sensor and transmitter as one mechanical unit (model 406015/1-0 or 406015/1-1).

If only the sensor model 406015/2-0 or 406015/2-1 is needed, the order code "Remote mount design (sensor) ", page 45 should be used to generate the correct order details.

If only the transmitter model 406018/2-0 or 406018/2-1 is needed, the order code "Remote mount design (transmitter) ", page 48 should be used to generate the correct order details.

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Model number	406015/1-0, 406015/1-1	
Measured value deviation	Standard: 0.4 % of the measured value	
	Option: 0.2 % of the measured value	
Nominal width range	DN 3 to 100 (1/10" to 4")	
Process connection	Wafer design	
	Compression fitting according to DIN 11851	PN 10 to PN 40
	Welded socket according to DIN 11850	PN 10 to PN 40
	Tri-Clamp according to DIN 32676	PN 10 to PN 40
	Tri-Clamp according to ASME BPE	PN 10 to PN 40
Lining	PFA (vacuum proof)	
Conductivity	> 5 µS/cm, (20 µS/cm for demineralized water)	
Electrodes	1.4539 [904L], Hastelloy C, tantalum	
Process connection material	Variable process connections: 1.4404	
Protection type	IP65, IP67 (NEMA 4X)	
Temperature of medium	Flange: -25 to +180 °C (-13 to +356 °F)	
	Variable process connections: -25 to +130 °C (-13 to 266 °F)	
Approvals		
Electromagnetic compatibility	2014/30/EU – EMC	
Ex-protection	2014/34/EU – ATEX IECEx	
Pressure equipment directive (PED)		
Conformity assessment according to Category III, Fluid group 1	2014/68/EU (Article 13) 2014/68/EU (Mod. B+D)	
Transmitter		
Voltage supply	AC 100 to 230 V (-15/+10 %), AC 24 V (-30/+10 %), DC 24 V (-30/+30 %)	
Current output	4 to 20 mA active or passive	
Pulse output	Active or passive can be set using software on-site	
Switching output	Optocoupler, programmable function	
Switching input	Optocoupler, programmable function	
Display	Graphical display, adjustable	
Housing	Compact design, available as either single-compartment or dual-compartment housing, depending on the requirements concerning the Ex-protection	
Communication	HART protocol (standard), PROFIBUS-PA (option)	
Electrical safety	According to DIN EN 61010-1	
Electromagnetic compatibility	According to DIN EN 61326-1, DIN EN 61326-2-3	


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JUMO flowTRANS MAG H01 – remote mount design

406015/2-0 (without Ex-protection) Sensor 	406015/2-1 (Ex-protection zone 2) Sensor  ATEX/IECEX Gas zone 2 Dust zone 21, 22
406018/2-0 (without Ex-protection) Transmitter: single-compartment housing 	406018/2-1 (Ex-protection zone 2) Transmitter: single-compartment housing  ATEX/IECEX Gas zone 2 Dust zone 21, 22



IMPORTANT (NOTE)!

The scope of delivery for the remote mount design type includes the sensor (model 406015/2-0 or 406015/2-1) and the corresponding transmitter (model 406018/2-0 or 406018/2-1) in separate housings.

If only the sensor model 406015/2-0 or 406015/2-1 is needed, the order code "Remote mount design (sensor) ", page 45 should be used to generate the correct order details.

If only the transmitter model 406018/2-0 or 406018/2-1 is needed, the order code "Remote mount design (transmitter) ", page 48 should be used to generate the correct order details

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Sensor	406015/2-0, 406015/2-1
Measured value deviation	Standard: 0.4 % of the measured value Option: 0.2 % of the measured value
Nominal width range	DN 3 to 100 (1/10" to 4")
Process connection	Wafer design Compression fitting according to DIN 11851 PN 10 to PN 40 Welded socket according to DIN 11850 PN 10 to PN 40 Tri-Clamp according to DIN 32676 PN 10 to PN 40 Tri-Clamp according to ASME BPE PN 10 to PN 40
Lining	PFA (vacuum proof)
Conductivity	> 5 µS/cm, (20 µS/cm for demineralized water)
Electrodes	1.4539 [904L], Hastelloy C, tantalum
Process connection material	Variable process connections: 1.4404
Protection type	IP65, IP67 (NEMA 4X), IP68
Temperature of medium	Flange: -25 to +180 °C (-13 to +356 °F) Variable process connections: -25 to +130 °C (-13 to +266 °F)
Approvals	
Electromagnetic compatibility	2014/30/EU – EMC
Ex-approvals	2014/34/EU – ATEX IECEX
Pressure equipment directive (PED) Conformity assessment according to Category III, Fluid group 1	2014/68/EU (Article 13) 2014/68/EU (Mod. B+D)
Transmitter	406018/2-0, 406018/2-1
Voltage supply	AC 100 to 230 V (-15/+10 %), AC 24 V (-30/+10 %), DC 24 V (-30/+30 %)
Current output	4 to 20 mA active or passive
Pulse output	Active or passive can be set using software on-site
Switching output	Optocoupler, programmable function
Switching input	Optocoupler, programmable function
Display	Graphical display, adjustable
Housing	Remote mount design, available as single-compartment or dual-compartment housing, depending on the requirements concerning the Ex-protection
Protection type	IP65, IP67 (NEMA 4X)
Communication	HART protocol (standard), PROFIBUS-PA (option)
Electrical safety	According to DIN EN 61010-1
Electromagnetic compatibility	According to DIN EN 61326-1, DIN EN 61326-2-3

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General information

Reference conditions according to EN 29104

Medium temperature	20 °C (68 °F) ±2 K
Ambient temperature	20 °C (68 °F) ±2 K
Voltage supply	Nominal voltage according to the nameplate $U_n \pm 1 \%$, frequency $f \pm 1 \%$
Installation conditions	Upstream > 10 × DN pipe section Downstream > 5 × DN pipe section
Warm-up phase	30 min

Maximum measurement deviation

Pulse output	
Standard calibration:	±0.4 % of measured value, ±0.02 % Q_{\max} DN (DN3 to 100)
Optional calibration:	±0.2 % of measured value, ±0.02 % Q_{\max} DN (DN10 to 100)
Q_{\max} DN ⇒ See table "Nominal width and measuring range", page 8	
<p>Y Accuracy ± of measured value in [%] X Flow velocity v in [m/s], Q/Q_{\max}DN [%]</p>	
Analog output effect	Same as pulse output plus ±0.1 % of measured value + 0.01 mA

Repeatability, response time

Repeatability	≤ 0.11 % of the measured value $t_{\text{meas}} = 100 \text{ s}$ $v = 0.5 \text{ to } 10 \text{ m/s}$
Response time Current output with an attenuation of 0.02 seconds	For a step function 0 to 99 % 5 $t \geq 200 \text{ ms}$ at 25 Hz excitation frequency 5 $t \geq 400 \text{ ms}$ at 12.5 Hz excitation frequency 5 $t \geq 500 \text{ ms}$ at 6.25 Hz excitation frequency

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Nominal width and measuring range

The measuring range end value can be configured between $0.02 \times Q_{\max \text{ DN}}$ and $2 \times Q_{\max \text{ DN}}$.

Nominal width		Minimum measuring range end value	$Q_{\max \text{ DN}}$	Maximum measuring range end value
DN	Inch "	$0.02 \times Q_{\max \text{ DN}} (\approx 0.2 \text{ m/s})$	0 to $\approx 10 \text{ m/s}$	$2 \times Q_{\max \text{ DN}} (\approx 20 \text{ m/s})$
3	1/10	0.08 l/min (0.02 US gal/min)	4 l/min (1.06 US gal/min)	8 l/min (2.11 US gal/min)
4	5/32	0.16 l/min (0.04 US gal/min)	8 l/min (2.11 US gal/min)	16 l/min (4.23 US gal/min)
6	1/4	0.4 l/min (0.11 US gal/min)	20 l/min (5.28 US gal/min)	40 l/min (10.57 US gal/min)
8	5/16	0.6 l/min (0.16 US gal/min)	30 l/min (7.93 US gal/min)	60 l/min (15.85 US gal/min)
10	3/8	0.9 l/min (0.24 US gal/min)	45 l/min (11.9 US gal/min)	90 l/min (23.78 US gal/min)
15	1/2	2 l/min (0.53 US gal/min)	100 l/min (26.4 US gal/min)	200 l/min (52.8 US gal/min)
20	3/4	3 l/min (0.79 US gal/min)	150 l/min (39.6 US gal/min)	300 l/min (79.3 US gal/min)
25	1	4 l/min (1.06 US gal/min)	200 l/min (52.8 US gal/min)	400 l/min (106 US gal/min)
32	1 1/4	8 l/min (2.11 US gal/min)	400 l/min (106 US gal/min)	800 l/min (211 US gal/min)
40	1 1/2	12 l/min (3.17 US gal/min)	600 l/min (159 US gal/min)	1200 l/min (317 US gal/min)
50	2	1.2 m ³ /h (5.28 US gal/min)	60 m ³ /h (264 US gal/min)	120 m ³ /h (528 US gal/min)
65	2 1/2	2.4 m ³ /h (10.57 US gal/min)	120 m ³ /h (528 US gal/min)	240 m ³ /h (1057 US gal/min)
80	3	3.6 m ³ /h (15.9 US gal/min)	180 m ³ /h (793 US gal/min)	360 m ³ /h (1585 US gal/min)
100	4	4.8 m ³ /h (21.1 US gal/min)	240 m ³ /h (1057 US gal/min)	480 m ³ /h (2113 US gal/min)

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Sensor

Temperatures

The temperature range of the device depends on various factors. These factors include the medium temperature, the ambient temperature, the operating pressure, the lining material, and the approvals for the Ex-protection.

Storage temperature

-40 to +70 °C (-40 to +158 °F)

Minimum admissible pressure depending on the medium temperature

Lining	Nominal width	p _{Operation} abs	bei T _{Operation} ^a
PFA	DN 3 to 100 (1/10 to 4")	0 mbar	< 180 °C (356 °F)

^a Higher temperatures are admissible for CIP/SIP cleaning for a limited time (see table "Maximum admissible cleaning temperature", page 9).

Maximum admissible cleaning temperature

CIP cleaning	Lining Sensor	T _{max}	T _{max} minutes	T _{Amb}
Steam cleaning	PFA	150 °C (302 °F)	60	25 °C (77 °F)
Liquids	PFA	140 °C (284 °F)	60	25 °C (77 °F)

If the ambient temperature is > 25 °C, the difference must be subtracted from the max. cleaning temperature. $T_{max} - \Delta$ °C.

(Δ °C = $T_{Amb} - 25$ °C)

Maximum admissible temperature shock

Lining	Temp. shock max. temp. diff °C	Temp. gradient °C/min
PFA	Any	Any

Maximum ambient temperature depending on the medium temperature



IMPORTANT (NOTE)!

If the device is used in potentially explosive areas, the additional "Temperature data for operation in zone 1", page 34 and "Temperature data for operation in zone 2", page 38 must be taken into account!

Compact design				
Process connection	Ambient temperature		Medium temperature	
	Minimum	Maximum	Minimum	Maximum ^a
Variable process connections	-20 °C (-4 °F)	60 °C (140 °F)	-25 °C (-13 °F)	100 °C (212 °F)
		40 °C (104 °F)		130 °C (266 °F)

^a Higher temperatures are allowed for CIP/SIP cleaning for a limited time. (See table "Maximum admissible cleaning temperature", page 9)

Remote mount design				
Process connection	Ambient temperature		Medium temperature	
	Minimum	Maximum	Minimum	Maximum ^a
Variable process connections	-20 °C (-4 °F)	60 °C (140 °F)	-25 °C (-13 °F)	100 °C (212 °F)
		40 °C (104 °F)		130 °C (266 °F)

^a Higher temperatures are allowed for CIP/SIP cleaning for a limited time. (See table "Maximum admissible cleaning temperature", page 9)

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Protection type according to EN 60529

Compact design (internal transmitter)	IP65, IP67 (NEMA X4)
Remote mount design (external transmitter)	IP65, IP67 (NEMA X4), IP68

Pipeline vibration according to EN 60068-2-6

Valid for:

Compact design (With aluminum transmitter housing)	In the range 10 to 58 Hz max. 0.15 mm (0.006") amplitude In the range 58 to 150 Hz max. 2 g acceleration
Remote mount design (Sensor)	In the range 10 to 58 Hz max. 0.15 mm (0.006") amplitude In the range 58 to 150 Hz max. 2 g acceleration

Insertion length

The flanged devices comply with the insertion lengths specified according to VDI/VDE 2641, ISO 13359 or according to DVGW (work sheet W420, design WP, ISO 4064 short).

Signal cable length and preamplifier

For devices in the remote mount design type, the electrical connection between the transmitter and sensor is made via a signal cable.

Transmitter housing design	Single-compartment housing	Ex-zone 2 or outside of Ex-area	
Maximum signal cable length ^a		406015/2-0 406015/2-1	406018/2-0 406018/2-1
Without preamplifier	50 m (164 ft)		
With preamplifier	200 m (656 ft)		
Scope of delivery ^b	5 m (16.4 ft) included		
Signal cable, part no.	00648906		

^a At a minimum conductivity for the measurement medium of $\geq 5 \mu\text{S/cm}$

^b Other available signal cable lengths \Rightarrow see "Available signal cable lengths", page 50

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Materials – sensor housing

		
Housing parts	Standard	Option
Housing Nominal width: DN 3 to 100 (1/10 to 4")	Deep drawn housing, CrNi steel 1.4308 (ASTM)	-
Terminal box	CrNi steel 1.4308 (ASTM)	-
Measuring pipe	Stainless steel ^a	-
Cable fitting^b	Polyamide	-

Parts in contact with the medium	Standard	Option
Process connection Welded socket, Tri-Clamp, etc.	CrNi steel 1.4404 (AISI 316 L)	-
Lining	PFA	-
Measuring and grounding electrode	CrNi steel 1.4539 (AISI 904 L)	Hastelloy C-4 (2.4610)
Seals For welded sockets, compression fittings, Tri-Clamp, external thread	EPDM ^c (ethylene-propylene) – CIP-resistant, no oil and grease	Silicon ^c – resistant to oil and grease

^a 1.4301, 1.4307, 1.4404, 1.4435, 1.4541, 1.4571

ASTM materials:

Grade TP304, TP304 L, TP316 L, TP321, TP316 Ti, TP317 L, 0Cr18Ni9, 00Cr18Ni10, 0Cr17Ni14Mo2, 0Cr27Ni12Mo3, 0Cr18Ni10Ti

^b Cable fitting with M20 × 1.5 or NPT thread.

^c In accordance with FDA 21 CFR 177.

Material load

Limits for the admissible fluid temperature (TS) and admissible pressure (PS) are determined by the used liner and flange materials of the device (see device nameplate).

Process connection	Nominal width	PS _{max} bar (PSI)	TS
Wafer	DN 3 to 50 (1/10" to 2") DN 65 to 100 (2 1/2" to 4")	40 (580) 16 (232)	-25 to +130 °C (-13 to +266 °F)
Welded socket According to DIN 11850	DN 3 to 40 (1/10" to 1 1/2") DN 50, DN 80 (2", 3") DN 65, DN 100 (2 1/2", 4")	40 (580) 16 (232) 10 (145)	-25 to +130 °C (-13 to +266 °F)
Compression fitting According to DIN 11851	DN 3 to 40 (1/10" to 1 1/2") DN 50, DN 80 (2", 3") DN 65, DN 100 (2 1/2", 4")	40 (580) 16 (232) 10 (145)	-25 to +130 °C (-13 to +266 °F)
Tri-Clamp DIN 32676	DN 3 to 50 (1/10" to 2") DN 65 to 100 (2 1/2" to 4")	16 (232) 10 (145)	-25 to +121 °C (-13 to +250 °F)
Tri-Clamp ASME BPE	DN 3 to 100 (1/10" to 4")	10 (145)	-25 to +130 °C (-13 to +266 °F)

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Transmitter

Electrical properties

Voltage supply	AC 100 to 230 V (-15 %/+10 %) AC 24 V (-30 %/+10 %) DC 24 V (-30 %/+30 %), harmonics < 5 %
Supply frequency	47 to 64 Hz
Excitation frequency	6.25 Hz, 7.5 Hz, 12.5 Hz, 15 Hz, 25 Hz, 30 Hz (50/60 Hz voltage supply)
Power consumption	Sensor including transmitter AC S ≤ 20 VA (switch-on current 8.8 A at AC 230 V) DC P ≤ 12 W (switch-on current 5.6 A)
Electrical connection	Screw terminals (maximum 2.5 mm ² – AWG 14)

Galvanic isolation

Current output, digital output (DO1 and DO2), and digital input are galvanically isolated from the sensor input circuit and each other. The same applies for the signal outputs of the versions with PROFIBUS-PA.

Empty pipe detection

Requirements for the function:

- Conductivity of the medium to be measured of ≥ 20 µS/cm
- Signal cable length of ≤ 50 m (164 ft)
- Sensor without preamplifier
- Nominal width DN ≥ DN 10

Mechanical features

Compact design	
Housing	Aluminum casting, painted
Paint	Paint coat ≥ 80 µm thick, RAL 5013 (cobalt blue)
Cable fitting	Polyamide
Remote mount design	
Housing	Aluminum casting, painted
Paint	Paint coat ≥ 80 µm thick, middle section RAL 5013 (cobalt blue) Front lid/rear lid RAL 5013 (cobalt blue)
Cable fitting	Polyamide
Weight	4.5 kg (9.92 lb)

Temperatures

Storage temperature	-40 to +70 °C (-40 to +158 °F)
Ambient temperature	-20 to +60 °C (-4 to +140 °F)

Protection type

Transmitter housing	IP65, IP67 (NEMA 4X)
---------------------	----------------------

Vibration according to EN 60068-2

Valid for:

Remote mount design (Transmitter)	In the range 10 to 58 Hz max. 0.15 mm (0.006") amplitude ^a In the range 58 to 150 Hz max. 2 g acceleration ^a
--------------------------------------	---

^a = Peak load

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Mounting

Grounding

The grounding of the sensor is important both for safety reasons and for the electromagnetic flowmeter to function properly. The grounding screws of the sensor should be connected to protection conductor potential. For measurement reasons, this should be identical to the medium potential as far as possible.

Grounding of the different process connections

Process connection	Grounding
Wafer	For plastic lines or pipelines with insulating lining: via grounding electrodes or grounding plates ^a
Welded socket according to DIN 11850	The measurement medium is grounded via the process connection adapter so that an additional ground is not required.
Compression fitting according to DIN 11851	
Tri-Clamp DIN 32676	
Tri-Clamp ASME BPE	

^a If the pipe section is not free from external interference voltages, it is recommended that one grounding plate is fitted in front of the sensor and one is fitted behind the sensor.

Grounding plates are available upon request ⇒ see "Grounding plates ", page 50.

Installation

General information

- The measuring pipe must always be full.
- The flow direction must match the identification marking ⇒ see "Flow direction ", page 14.
- The maximum torque for all flange screws must be observed. These must be selected according to factors including temperature, pressure, screw and seal material, and the relevant regulations in each case.
- Install the devices without any mechanical tension (torsion, bending).
- Fit flange devices with plane-parallel counterflanges only using the appropriate seals.
- Use a flange seal made from a material that is compatible with the medium and the medium temperature.
- Seals may not extend into the flow area, since any turbulence affects the device accuracy.
- The pipeline must not exert any inadmissible forces or torque on the device.
- Only remove the sealing plugs in the cable fittings when installing the electrical cables.
- Install remote mount transmitters at a location that is largely free of vibration.
- Do not expose the transmitter to direct sunlight; provide sun protection if necessary.

Electrode axis

<ul style="list-style-type: none"> • Electrode axis (1) horizontal if possible or rotated max. 45°. 	
--	--

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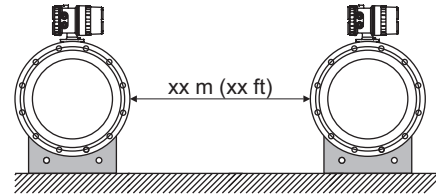
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Minimum clearance

- Maintain a minimum clearance of 0.7 m (2.3 ft) between the devices to prevent any mutually interference.



G01349

Inlet section, outlet section

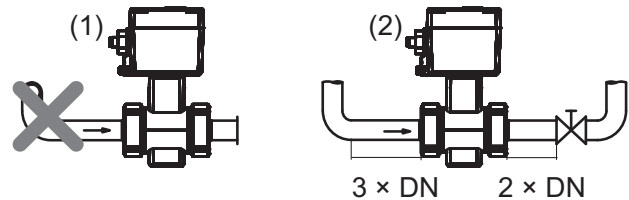
The measuring principle is independent of the flow profile as long as turbulence does not extend into the measurement zone, for example downstream from double elbows (1), in case of tangential inflow or where gate valves are partially open upstream of the sensor.

In these cases, measures must be taken to normalize the flow profile.

- Do not install fittings, elbows or valves, etc. directly upstream of the sensor (1).
- Flaps must be installed so that the flap blade does not extend into the sensor.
- Valves or other shut-off devices should be mounted in the outlet section (2).

Experience has shown that a straight inlet section of $3 \times DN$ and a straight outlet section of $2 \times DN$ is sufficient in most cases (DN = nominal width of the sensor – see the adjacent figure).

For test stands, the reference conditions of $10 \times DN$ for the straight inlet and $5 \times DN$ for the straight outlet must be provided according to EN 29104/ISO 9104.



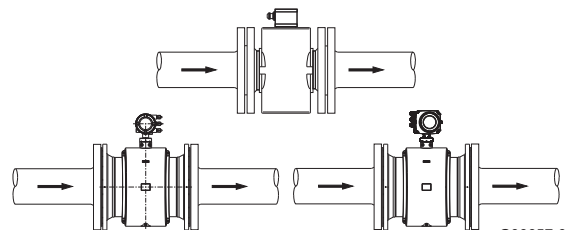
Flow direction

The device records the flow in both directions.

Default setting: forward flow direction

Identification marking:

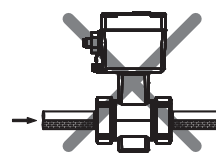
- Arrow direction on the device
- Alignment of the sensor housing during initial startup (default setting) as displayed in the adjacent figures



G00657-01

Horizontal flow direction

- Measuring pipe must always be full.
- Ensure the line is slightly inclined for degassing.



G00499

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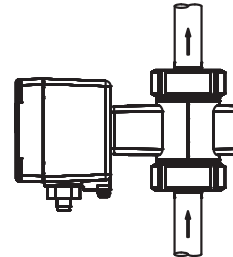
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Vertical flow direction

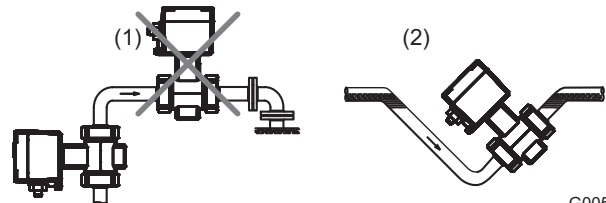
- Vertical installation for measuring abrasive substances, the preferred flow direction is from bottom to top.



G00498

Free inlet, free outlet

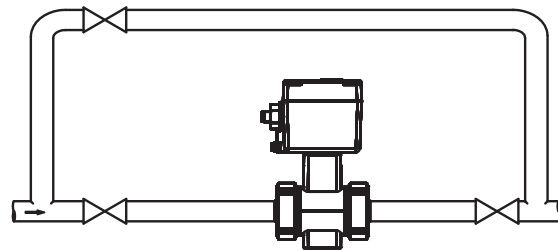
- For a free outlet, do not install the measuring device at the highest point or in the draining side of the pipeline, as the measuring pipe runs empty or air bubbles can form (1).
- For free inlets or outlets, provide a culvert (downward routing of the pipe) so that the pipeline is always full (2).



G00500

Heavily contaminated measurement media

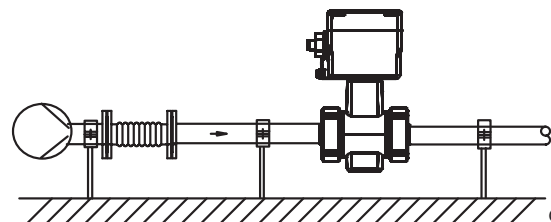
- We recommend a bypass connection, according to the figure, for heavily contaminated measuring media so that the system can continue operating without any interruptions during mechanical cleaning.



G00501

Installation near pumps

- We recommend using mechanical vibration compensators for sensors that are installed near pumps or other equipment generating vibrations.



G00511

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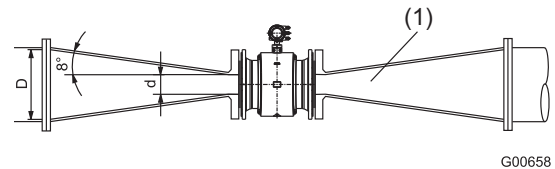
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Installation in pipelines with larger nominal widths

Determine the resulting pressure loss when using reducers (1):

1. Determine the diameter ratio d/D
2. Refer to the flow nomograph for the flow velocity (adjacent figure).
3. Read the pressure loss on the Y-axis in the flow nomogram.



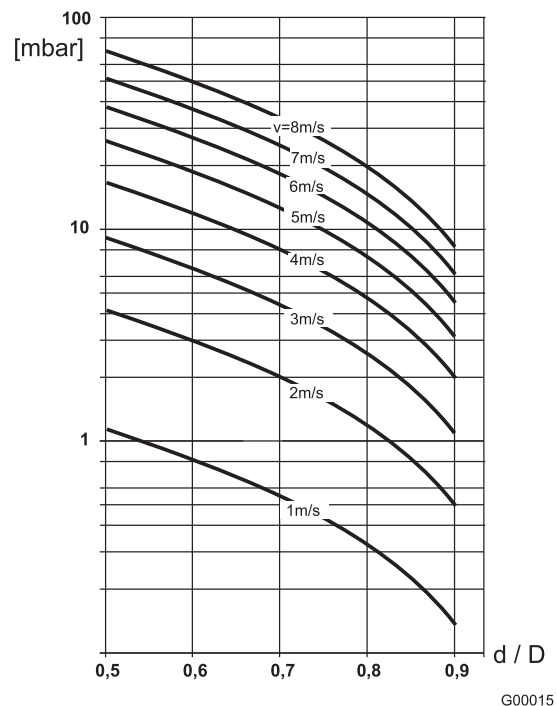
(1) Flange transition piece

(d) Inner diameter of the flowmeter

(D) Inner diameter of the pipeline

Nomograph for pressure loss calculations

For flange transition piece with $\alpha/2 = 8^\circ$



(V) Flow velocity [m/s]

(Δp) Pressure loss [mbar]

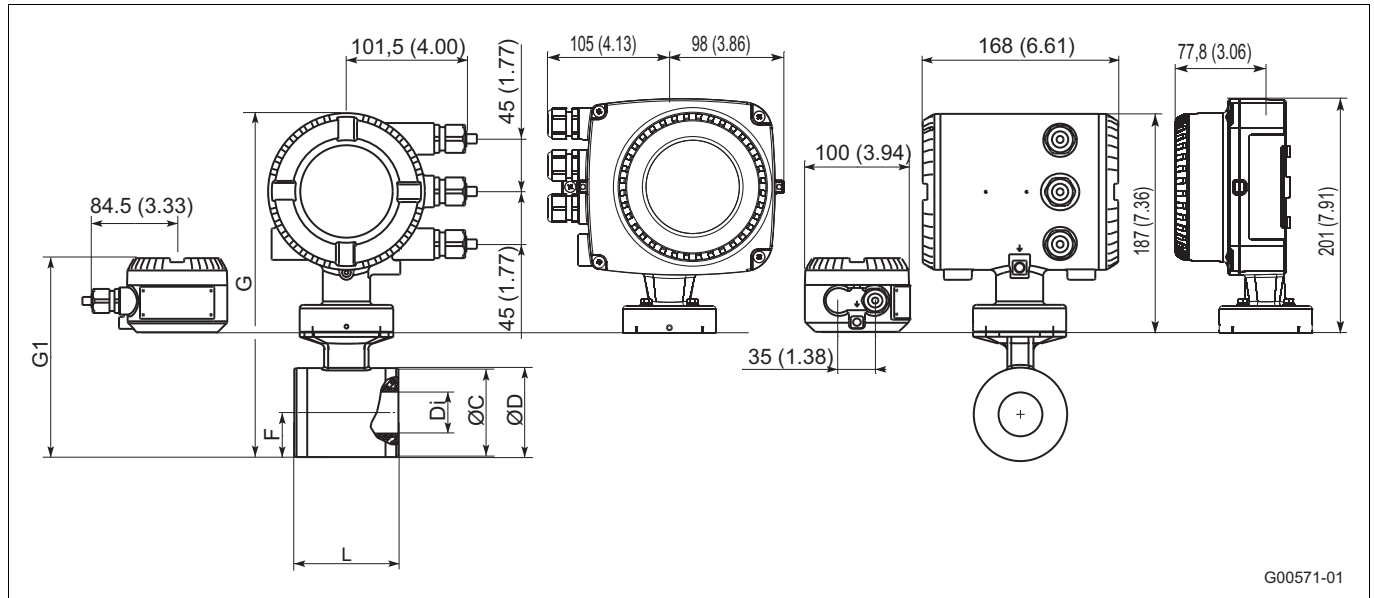
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Wafer DN 50 to 100 (2 to 4")



Dimensions in mm (inch)

Dimensions in mm (inch)									Weight approx. kg (lb)	
DN	Process connection	C	D	Di	F	G ^a	G1 ^a	L ^b	Compact design	Remote mount design
50 (2)	PN 10 to 40	95 (3.74)	100 (3.94)	47 (1.85)	50 (1.97)	332 (13.07)	213 (8.39)	117 (4.61)	6.5 (14.5)	4.5 (10)
	CL150/CL300									
65 (2 1/2)	PN 16	111 (4.37)	116 (4.57)	62 (2.44)	58 (2.28)	348 (13.70)	235 (9.25)	200 (7.87)	7 (15.5)	5 (11)
	CL150									
80 (3)	PN 16	128 (5.04)	133 (5.24)	74 (2.91)	66.5 (2.62)	365 (14.37)	252 (9.92)	200 (7.87)	8.5 (19)	6.5 (14.5)
	CL150									
100 (4)	PN 16	155 (6.10)	160 (6.30)	96 (3.78)	80.2 (3.16)	392 (15.43)	280 (11.02)	250 (9.84)	11 (24)	9 (20)
	CL150									

^a The dimensions for the device version with Ex-protection in zone 1 change according to the following table.

^b Tolerance L: +0/-3 mm (+0/-0.118 inches)

Device version	Dimension G in mm (inch)	Dimension G1 in mm (inch)
Ex-protection zone 1	+74 (+2.91)	unavailable

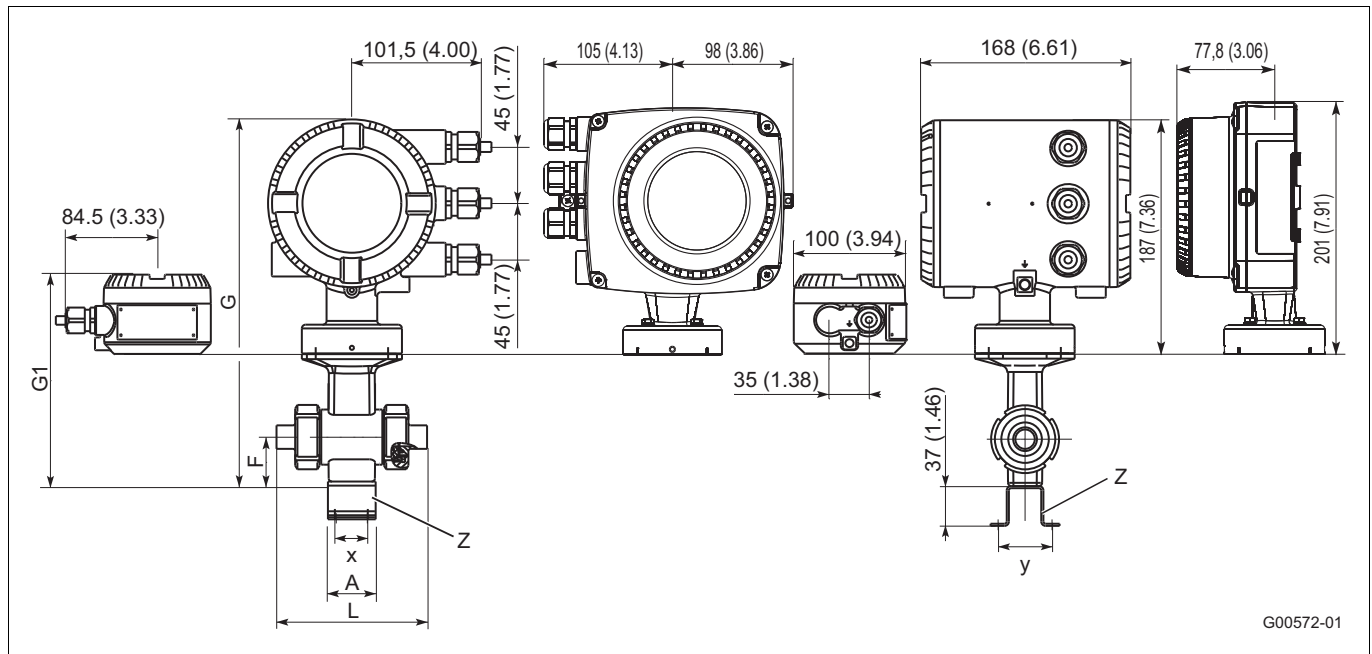
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Variable process connections DN 3 to 40 (1/10 to 1 1/2")



G00572-01

Dimensions in mm (inch)

Insertion length L including process connection ⇒ see chapter "Adapter for variable process connections DN 3 to 100 (1/10 to 4")", page 21.

Dimensions in mm (inch)						Weight ^a approx. kg (lb)	
DN	Process connection	A	F	G ^b	G1 ^a	Compact design	Remote mount design
3 to 8 (1/10 to 5/16)	PN 10 to 40	37 (1.65)	38.5 (1.5)	293 (11.5)	180 (7.1)	4 (8.8)	2 (4.4)
10 (3/8)	PN 10 to 40	37 (1.65)	38.5 (1.5)	293 (11.5)	180 (7.1)	4 (8.8)	2 (4.4)
15 (1/2)	PN 10 to 40	37 (1.65)	38.5 (1.5)	293 (11.5)	180 (7.1)	4 (8.8)	2 (4.4)
20 (3/4)	PN 10 to 40	42 (1.65)	43 (1.7)	302 (11.9)	190 (7.5)	4.5 (9.9)	2.5 (5.5)
25 (1)	PN 10 to 40	54 (2.13)	48 (1.9)	311 (12.2)	199 (7.8)	5 (11)	3 (6.6)
32 (1 1/4)	PN 10 to 40	62 (2.44)	53 (2.1)	321 (12.6)	208 (8.2)	5 (11)	3 (6.6)
40 (1 1/2)	PN 10 to 40	67 (2.64)	57 (2.2)	330 (13)	217 (8.5)	5.5 (12)	3.5 (7.7)

^a Plus weight of process connection ⇒ see chapter "Adapter for variable process connections DN 3 to 100 (1/10 to 4")", page 21.

^b The dimensions for the device version with Ex-protection in zone 1 change according to the following table.

Device version	Dimension G in mm (inch)	Dimension G1 in mm (inch)
Ex-protection zone 1	+74 (+2.91)	unavailable

Mounting bracket Z (optional extra) – unavailable for 3A approval

Nominal width	Mounting hole spacing x in mm (inch)	Mounting hole spacing y in mm (inch)
DN 3 to 20	28 (1.1)	50 (1.97)
DN 25 to 40	46 (1.81)	70 (2.76)

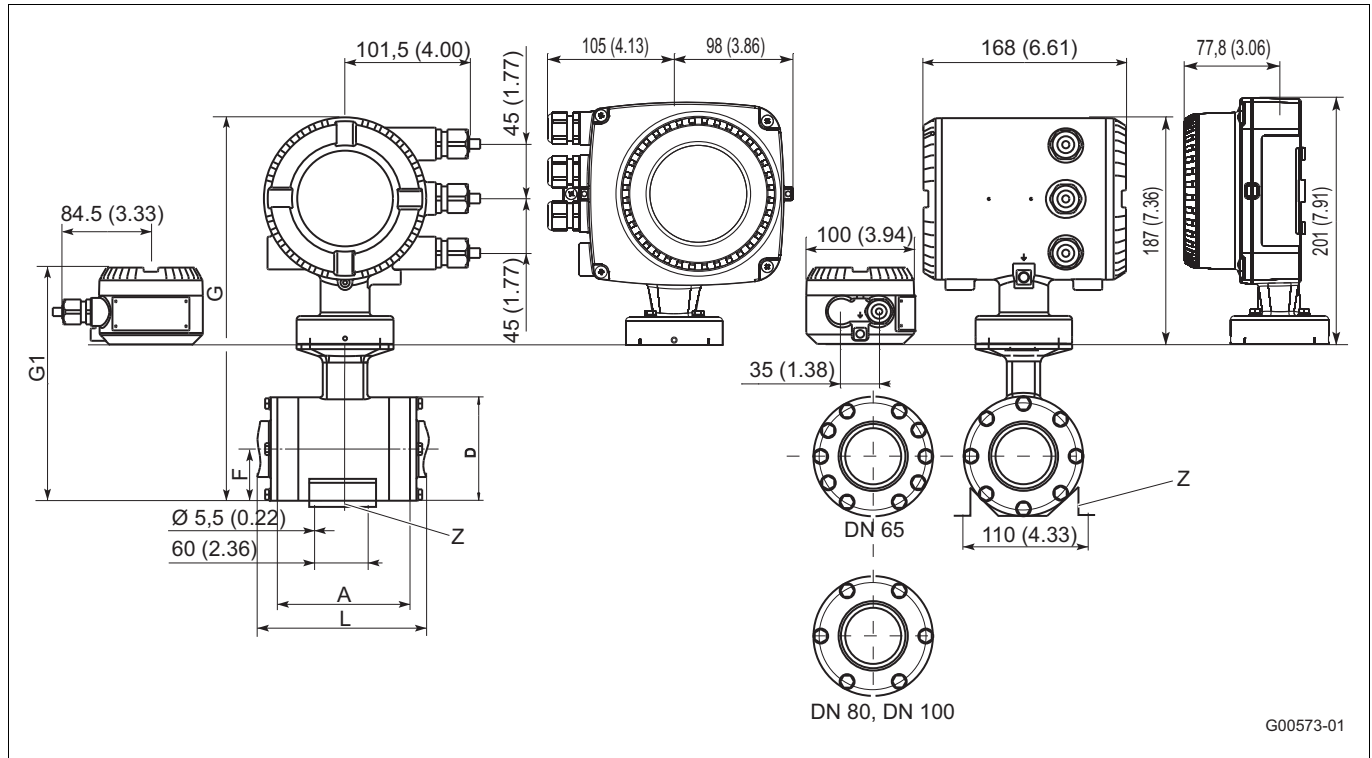
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Variable process connections DN 50 to 100 (2 to 4")



Dimensions in mm (inch)

Insertion length **L** including process connection ⇒ see chapter "Adapter for variable process connections DN 3 to 100 (1/10 to 4")", page 21.

Mounting bracket **Z** (optional extra) – unavailable for 3A approval

Dimensions in mm (inch)						Weight ^a approx. kg (lb)	
DN	Process connection	A	F	G ^b	G1 ^a	Compact design	Remote mount design
50 (2)	PN 10 to 40	128 (5.04)	50 (1.97)	332 (13.06)	213 (8.39)	4 (8.8)	2 (4.4)
65 (2 1/2)	PN 10 to 40	200 (7.87)	58 (2.28)	348 (13.70)	235 (9.26)	4 (8.8)	2 (4.4)
80 (3)	PN 10 to 40	200 (7.87)	67 (2.64)	365 (14.37)	252 (9.92)	4 (8.8)	2 (4.4)
100 (4)	PN 10 to 40	250 (9.84)	81 (3.19)	393 (15.45)	280 (11.01)	4.5 (9.9)	2.5 (5.5)

^a Plus weight of process connection ⇒ see chapter "Adapter for variable process connections DN 3 to 100 (1/10 to 4")", page 21.

^b The dimensions for the device version with Ex-protection in zone 1 change according to the following table.

Device version	Dimension G in mm (inch)	Dimension G1 in mm (inch)
Ex-protection zone 1	+74 (+2.91)	unavailable

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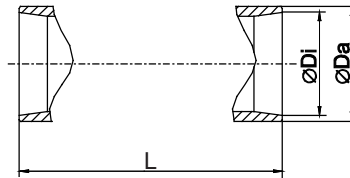
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Adapter for variable process connections DN 3 to 100 (1/10 to 4")

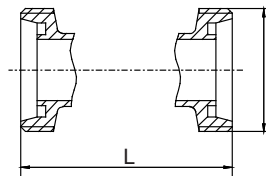
Welded socket DIN 11850



Dimensions in mm (inch)					Weight
DN	Ø DI	Ø Da	Row	L ^a	kg (lb)
3 to 10 (1/10 to 3/8)	10 (0.39)	13 (0.51)	2	127 (5)	0.4 (0.9)
15 (1/2)	16 (0.63)	19 (0.75)	2	127 (5)	0.4 (0.9)
20 (3/4)	20 (0.79)	23 (0.91)	2	132 (5.20)	0.7 (1.5)
25 (1)	26 (1.02)	29 (1.14)	2	149 (5.87)	0.7 (1.5)
32 (1 1/4)	32 (1.26)	34 (1.34)	1	166 (6.54)	1 (2.2)
40 (1 1/2)	38 (1.50)	41 (1.61)	2	171 (6.73)	1 (2.2)
50 (2)	50 (1.97)	53 (2.09)	3	173 (6.81)	1 (2.2)
65 (2 1/2)	66 (2.60)	70 (2.76)	2	251 (9.88)	1.4 (3.1)
80 (3)	81 (3.19)	85 (3.35)	2	255 (10.04)	2 (4.4)
100 (4)	100 (4)	104 (3.94)	2	305 (12.01)	3 (6.6)

^a Tolerance L: +0/-3 mm (+0/-0.118")

Compression fitting DIN 11851



Dimensions in mm (inch)			Weight
DN	Round thread	L ^a	kg (lb)
3 to 10 (1/10 to 3/8)	28 × 1/8" (1.10 × 1/8")	169 (6.65)	0.5 (1.1)
15 (1/2)	34 × 1/8" (1.34 × 1/8")	169 (6.65)	0.5 (1.1)
20 (3/4)	44 × 1/6" (1.73 × 1/6")	180 (7.09)	0.9 (2)
25 (1)	52 × 1/6" (2.05 × 1/6")	207 (8.15)	0.9 (2)
32 (1 1/4)	58 × 1/6" (2.28 × 1/6")	230 (9.06)	1.4 (3.1)
40 (1 1/2)	65 × 1/6" (2.56 × 1/6")	237 (9.33)	1.4 (3.1)
50 (2)	78 × 1/6" (3.07 × 1/6")	243 (9.57)	1.4 (3.1)
65 (2 1/2)	96 × 1/6" (3.78 × 1/6")	331 (13.03)	2.2 (3.1)
80 (3)	110 × 1/4" (4.33 × 1/4")	345 (13.58)	3.2 (4.4)
100 (4)	130 × 1/4" (5.12 × 1/4")	413 (16.26)	4.4 (6.6)

^a Tolerance L: +0/-3 mm (+0/-0.118")

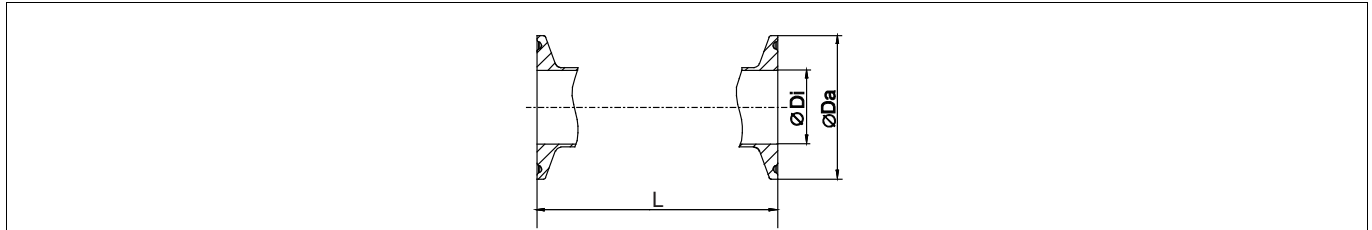
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Tri-Clamp DIN 32676 and ASME BPE



Tri-Clamp according to DIN 32676

Dimensions in mm (inch)					Weight
DN	Ø DI	Ø Da	Row	L ^a	kg (lb)
3 to 10 (1/10 to 3/8)	10 (0.39)	34 (1.34)	3	163 (6.42)	0.5 (1.1)
15 (1/2)	16 (0.63)	34 (1.34)	3	163 (6.42)	0.5 (1.1)
20 (3/4)	20 (0.79)	34 (1.34)	3	168 (6.61)	0.7 (1.5)
25 (1)	26 (1.02)	50 (1.99)	3	192 (7.56)	0.8 (1.8)
32 (1 1/4)	32 (1.26)	50 (1.99)	3	209 (8.23)	1.5 (3.3)
40 (1 1/2)	38 (1.50)	50 (1.99)	3	214 (8.43)	1.4 (2.7)
50 (2)	50 (1.97)	64 (2.52)	3	216 (8.50)	1.2 (2.2)
65 (2 1/2)	66 (2.60)	91 (3.58)	1	307 (12.09)	1.6 (3.5)
80 (3)	81 (3.19)	106 (4.17)	1	311 (12.24)	2.4 (5.3)
100 (4)	100 (4)	119 (4.69)	1	361 (14.21)	3.1 (6.8)

^a Tolerance L: +0/-3 mm (+0/-0.118")

Tri-Clamp according to ASME BPE

Dimensions in mm (inch)					Weight
DN	Tri-Clamp	Ø DI	Ø Da	L ^a	kg (lb)
3 to 10 (1/10 to 3/8)	1/2"	9.4 (0.37)	25 (0.98)	143 (5.63)	0.5 (1.1)
15 (1/2)	3/4"	15.7 (0.62)	25 (0.98)	143 (5.63)	0.5 (1.1)
20 (3/4)	1"	22.1 (0.87)	50.4 (1.98)	143 (5.63)	0.7 (1.5)
25 (1)	1"	22.1 (0.87)	50.4 (1.98)	143 (5.63)	1.2 (2.7)
32 (1 1/4)	-	-	-	-	-
40 (1 1/2)	1 1/2"	34.8 (1.37)	50.4 (1.98)	277 (10.91)	1.8 (4)
50 (2)	2"	47.5 (1.87)	63.9 (2.52)	277 (10.91)	1.8 (4)
65 (2 1/2)	2 1/2"	60.2 (2.37)	77.4 (3.05)	277 (10.91)	2.0 (4.5)
80 (3)	3"	72.9 (2.87)	90.9 (3.58)	337 (13.27)	3.6 (8)
100 (4)	4"	97.4 (3.83)	118.9 (4.68)	337 (13.27)	4.1 (8.8)

^a Tolerance L: +0/-3 mm (+0/-0.118")

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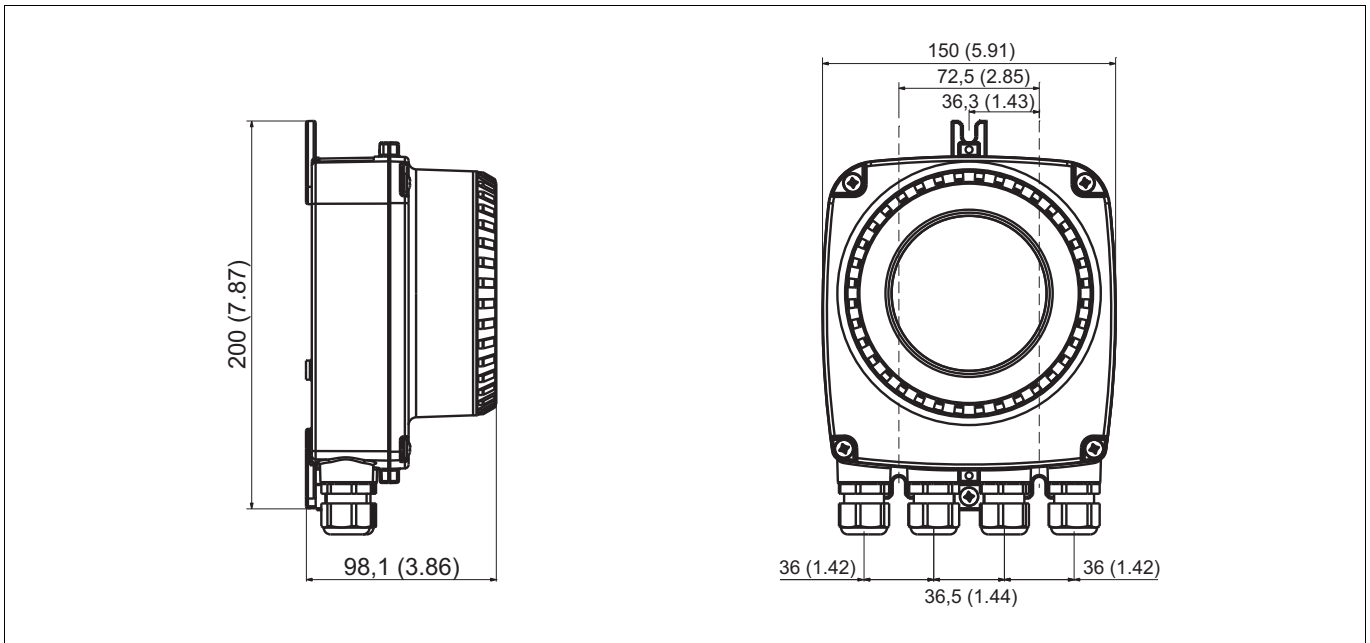
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**Dimensions of single-compartment housing transmitter model 406018/2-0 and 401618/2-1**

For use in Ex-zone 2 and outside of the Ex-area



Dimensions in mm (inch)

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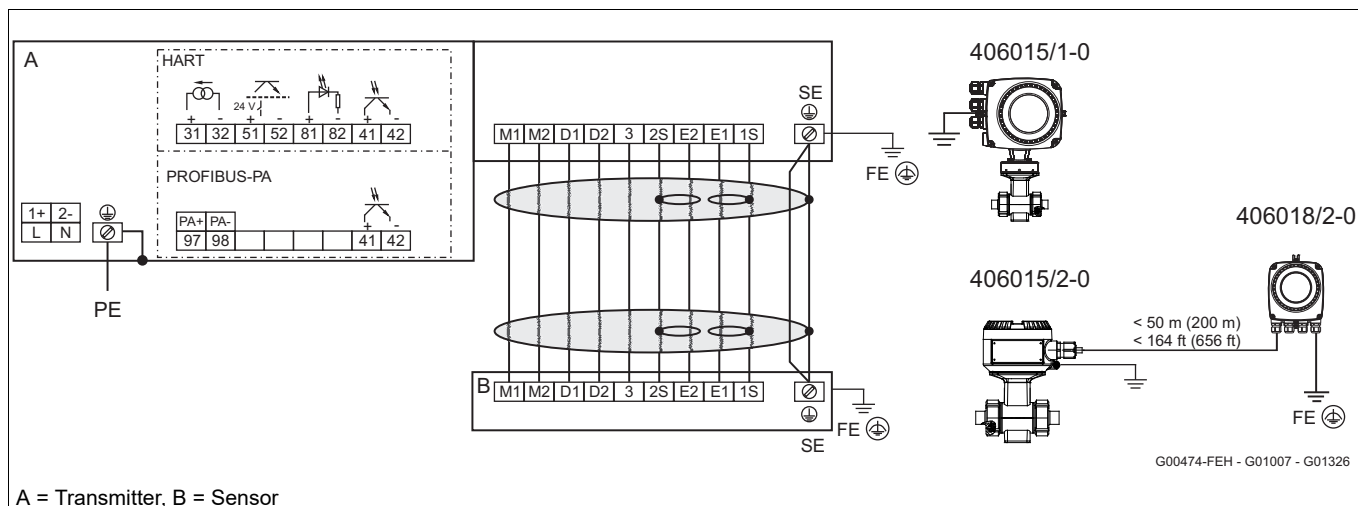
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Connection diagram

Electrical connection

Model 406015/1-0, 406015/2-0, with 406018/2-0 without explosion protection – HART protocol and PROFIBUS-PA



Voltage supply

Alternating voltage (AC)		Direct voltage (DC)	
Terminal	Function	Terminal	Function
L	Phase	1+	+
N	Neutral conductor	2-	-
PE	Protection conductor (PE)	PE	Protection conductor (PE)

Signal cable connection (for devices with remote mount design only)

Terminal	Function	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
SE	Shielding	-
E1	Signal line	Violet
1S	Shield of E1	-
E2	Signal line	Blue
2S	Shield of E2	-
3	Measurement potential	Green

Input and output connection

Terminal	Function
31/32	Current/HART output - The current output is available in "active" or "passive" mode.
97/98	PROFIBUS-PA (PA+/PA-) - According to IEC 61158-2
51/52	Digital output DO1 active/passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Pulse output".
81/82	Digital input/contact input - Function can be configured using software on-site as "External output switch-off", "External totalizer reset", "External totalizer stop", or "Other".
41/42	Digital output DO2 passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Binary output", flow direction signaling.
FE	Functional ground

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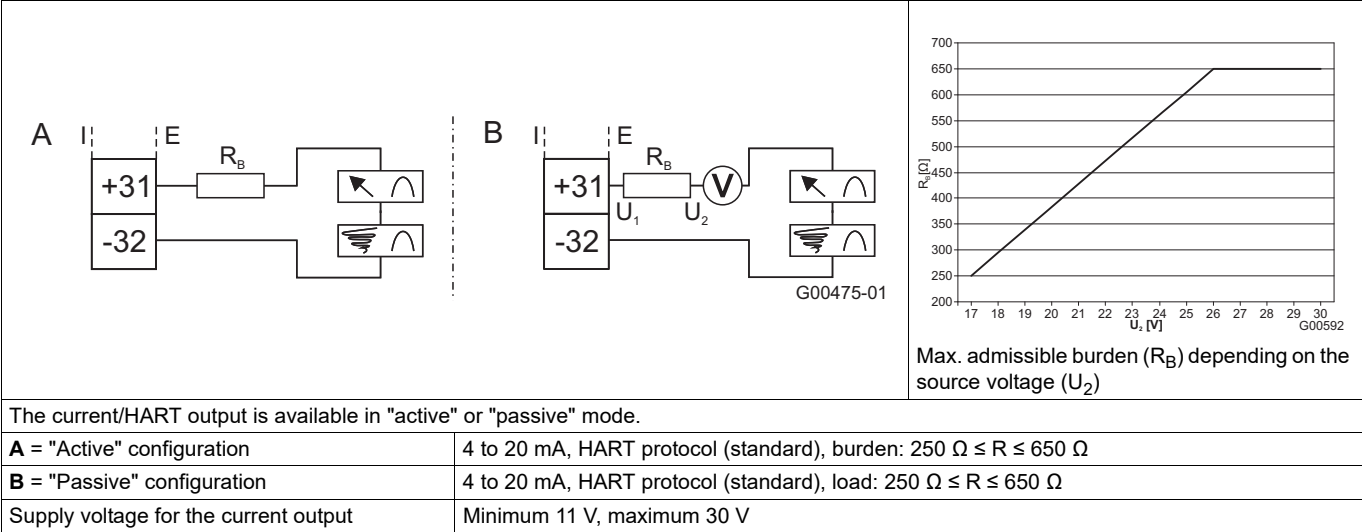
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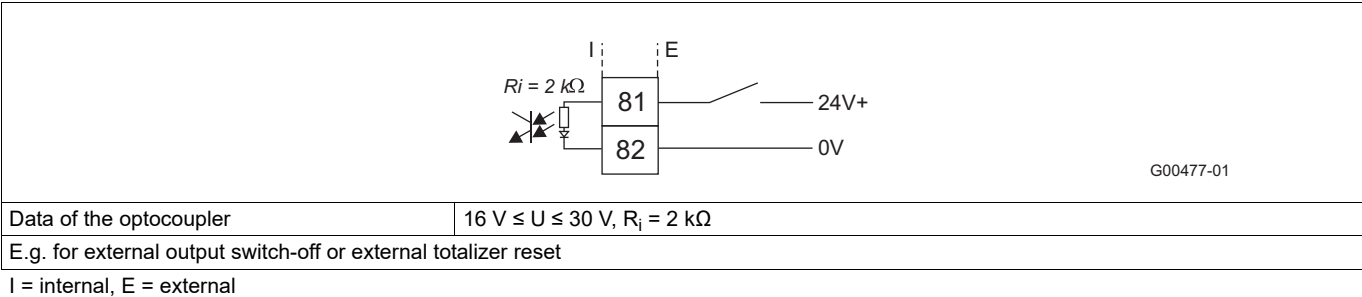


Electrical data

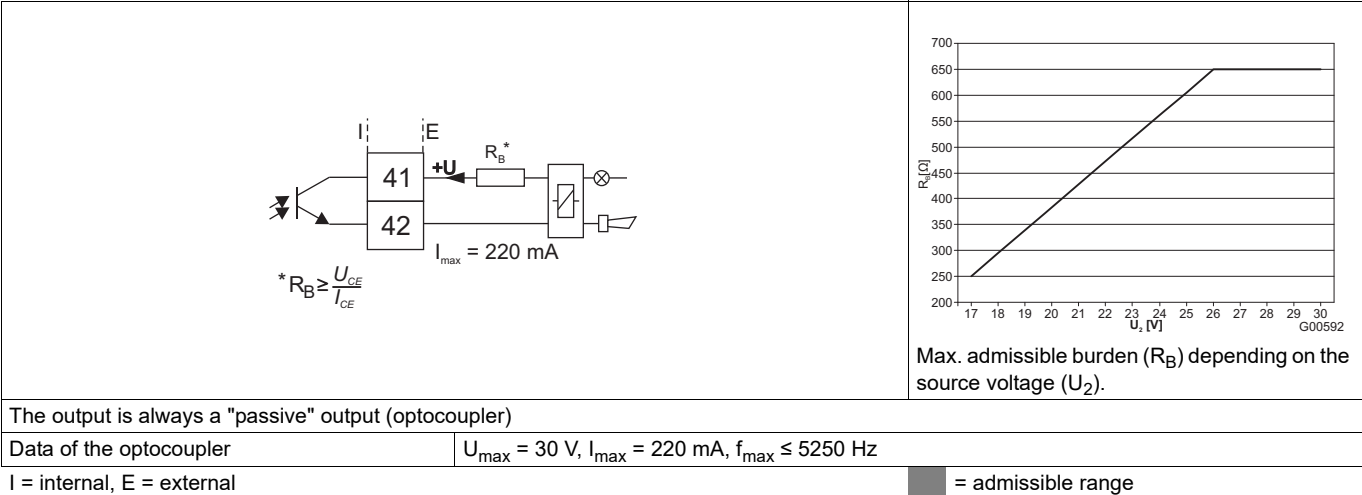
Current/HART output



Digital input DI1

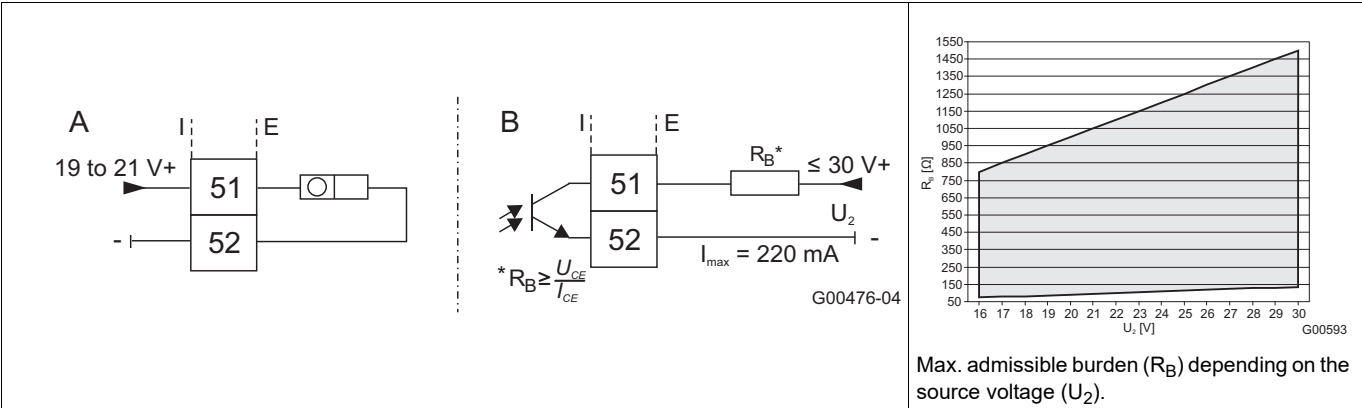


Digital output DO2





Digital output DO1



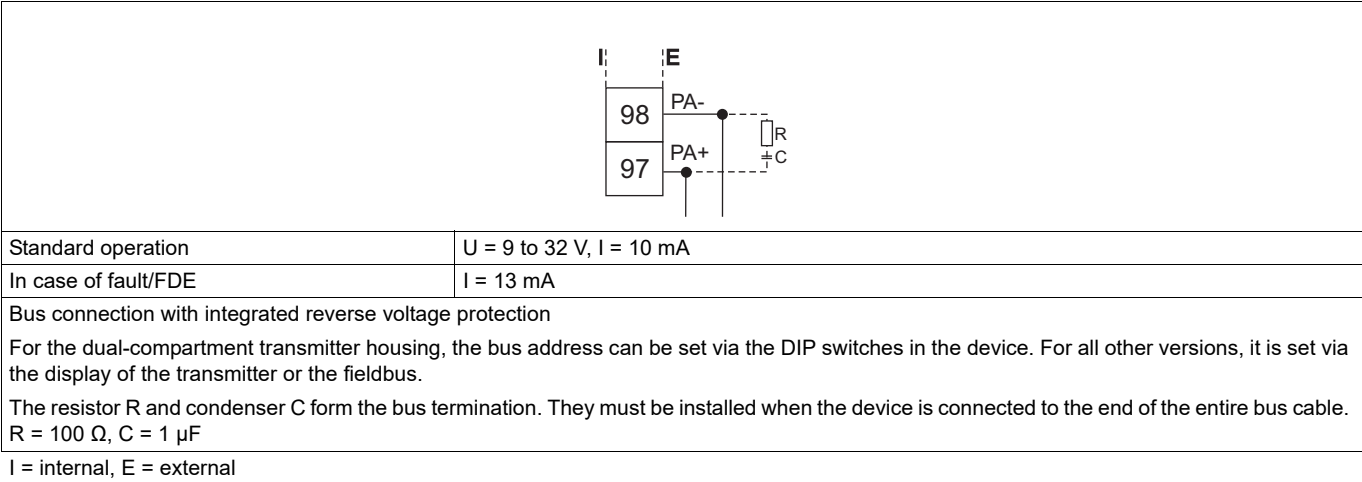
The output can be configured as an "active" or a "passive" output. For a transmitter with the dual-compartment housing, the configuration is performed using the software. For a transmitter with the single-compartment housing, the configuration is performed using jumpers on the transmitter backplane.

A = "Active" configuration	$U = 19 \text{ to } 21 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5250 \text{ Hz}$
B = "Passive" configuration	$U_{\text{max}} = 30 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5250 \text{ Hz}$
Configuration as pulse output	Maximum pulse frequency: 5250 Hz Pulse width: 0.1 to 2000 ms The pulse factor and pulse width are interdependent and are calculated dynamically.
Configuration as switching output	Function: system alarm, empty pipe alarm, max./min. alarm, flow direction signaling, other

I = internal, E = external

▨ = admissible range

PROFIBUS-PA (PA+/PA-) according to IEC 61158-2



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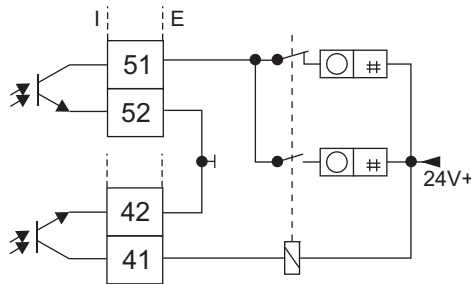
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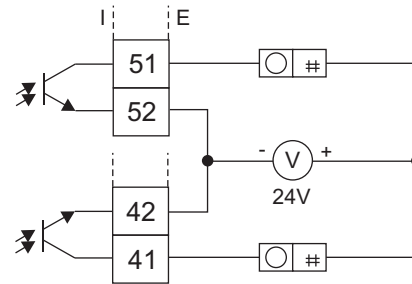
Connection examples

Digital output DO1 and DO2

Separate forward and reverse pulses



Separate forward and reverse pulses (connection type)

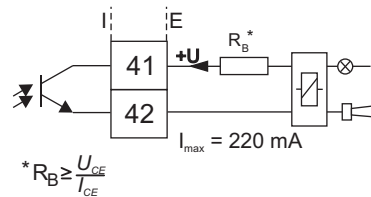


G00791

I = internal, E = external

Digital output DO2

E.g. for system monitoring, max./min. alarm, empty pipe alarm, forward/backward signal, or counting pulses (can be configured using software)

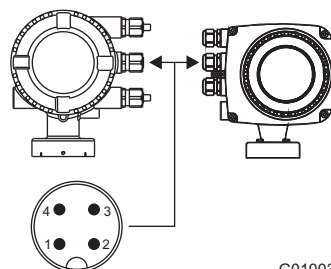


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I = internal, E = external

Digital communication – PROFIBUS-PA

Connection via M12 plug (only in non-potentially explosive areas!)



G01003-01

Pin assignment (view from front showing pin insert and pins):

- PIN 1 = PA+
- PIN 2 = nc
- PIN 3 = PA-
- PIN 4 = Shield

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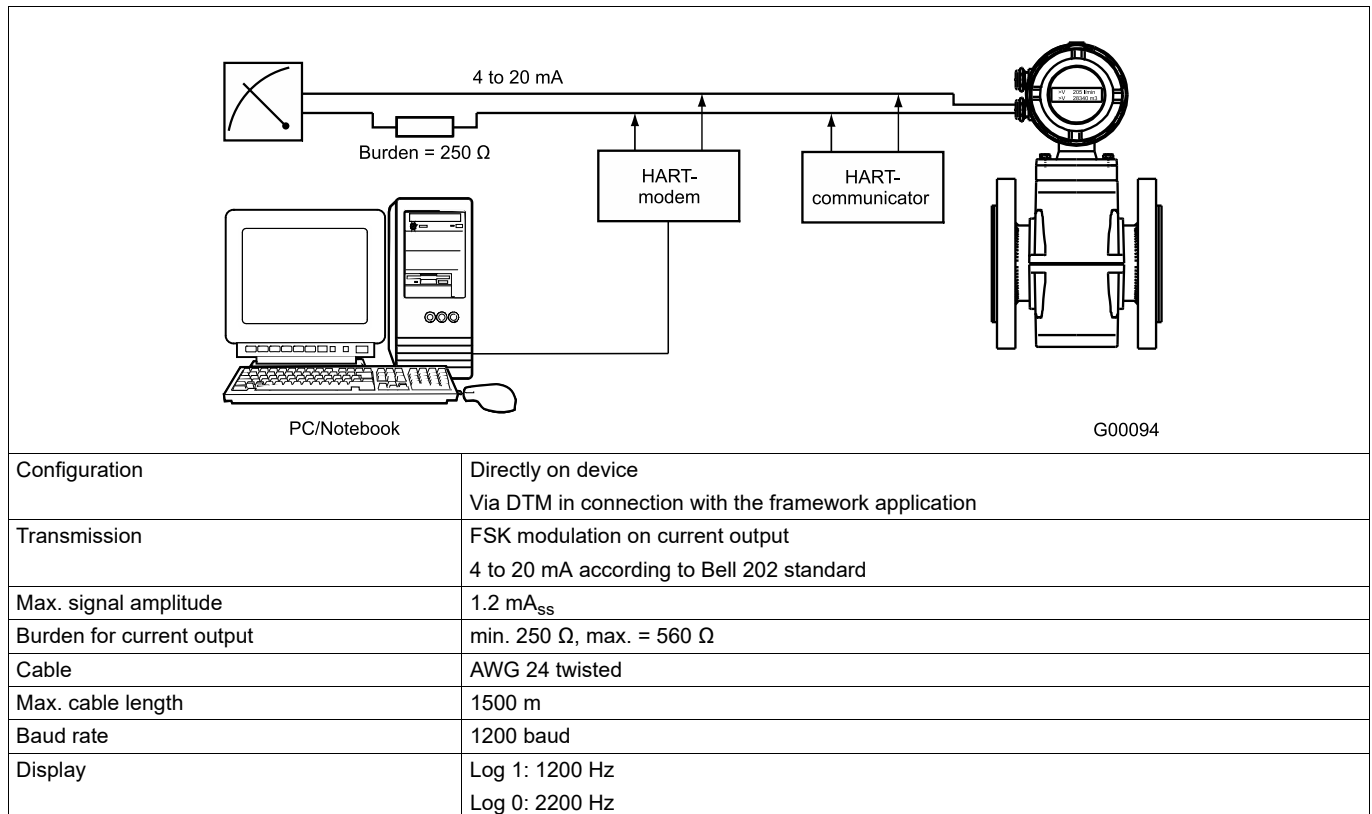
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Digital communication

HART protocol

The transmitter uses HART protocol (HART 5) for digital communication.



For further information ⇒ see the separate interface description.

System integration

The communication (configuration, parameterization) can be carried out in conjunction with the DTM (Device Type Manager) available for the device and the corresponding framework applications according to FDT 1.2.1.

The necessary device DTM is included on the CD and can be downloaded from www.jumo.de.

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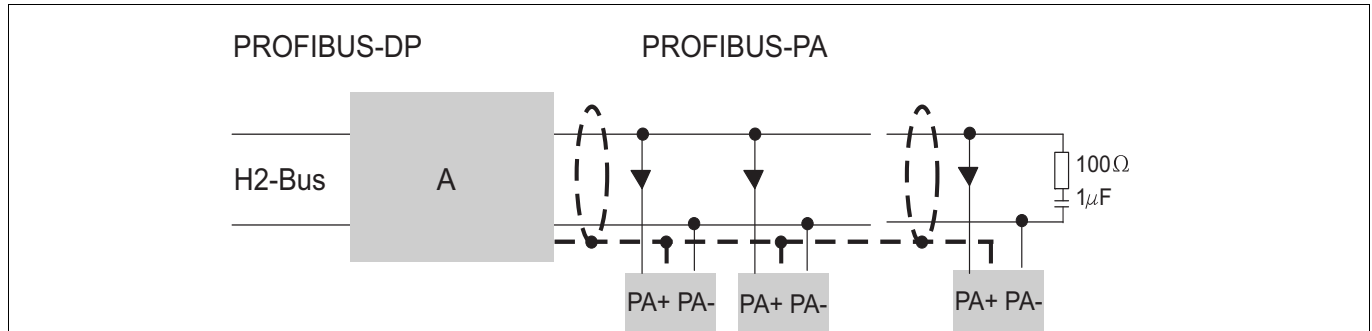
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PROFIBUS-PA protocol

The interface complies with profile 3.01 (standard PROFIBUS, EN 50170, DIN 19245 [PRO91]).



A = Segment coupler (including bus supply and termination)

PROFIBUS-PA ID no.:	0x3430
Alternative standard ID no.:	0x9700 or 0x9740
Configuration	Directly on device Via DTM in connection with the framework application
Transmission signal	According to IEC 61158-2
Cable	Shielded, twisted (Types A or B are preferred according to IEC 61158-2)
Bus topology	<ul style="list-style-type: none"> Tree and/or line structure Bus termination: passive on both ends of the main bus line (RC element R = 100 Ω, C = 1 μF)
Voltage and current consumption	<ul style="list-style-type: none"> Average current consumption: 10 mA In case of a fault, the FDE (fault disconnection electronic) function integrated into the device ensures that the current consumption can rise to a maximum of 13 mA. The upper limit of the current is electronically limited. The voltage on the bus line must be in the range between DC 9 and 32 V.

For further information ⇒ see the separate interface description.

System integration

JUMO provides device GSD files for system integration.

The necessary device DTM is included on the CD and can be downloaded from www.jumo.de.

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Operation in potentially explosive areas zone 1, 21, 22

General information

The following models are approved for operation in potentially explosive areas according to ATEX/IECEx zone 1, 21, 22:

JUMO flowTRANS MAG H01 – compact design

406015/1-1

Transmitter: dual-compartment housing



ATEX/IECEx

Gas zone 1

Dust zone 21, 22



IMPORTANT (NOTE)!

For details about the ATEX/IECEx approvals ⇨ see chapter "Technical data", page 3



IMPORTANT (NOTE)!

The transmitter and sensor housing must be connected to the potential equalization PA before the protection conductor PE is connected. Before connecting the protection conductor PE, the operator must ensure that no potential differences can occur between the potential equalization PA and protection conductor PE.



IMPORTANT (NOTE)!

For the voltage supply, signal inputs, and signal outputs, only use cables with a specification of at least 70 °C (158 °F).

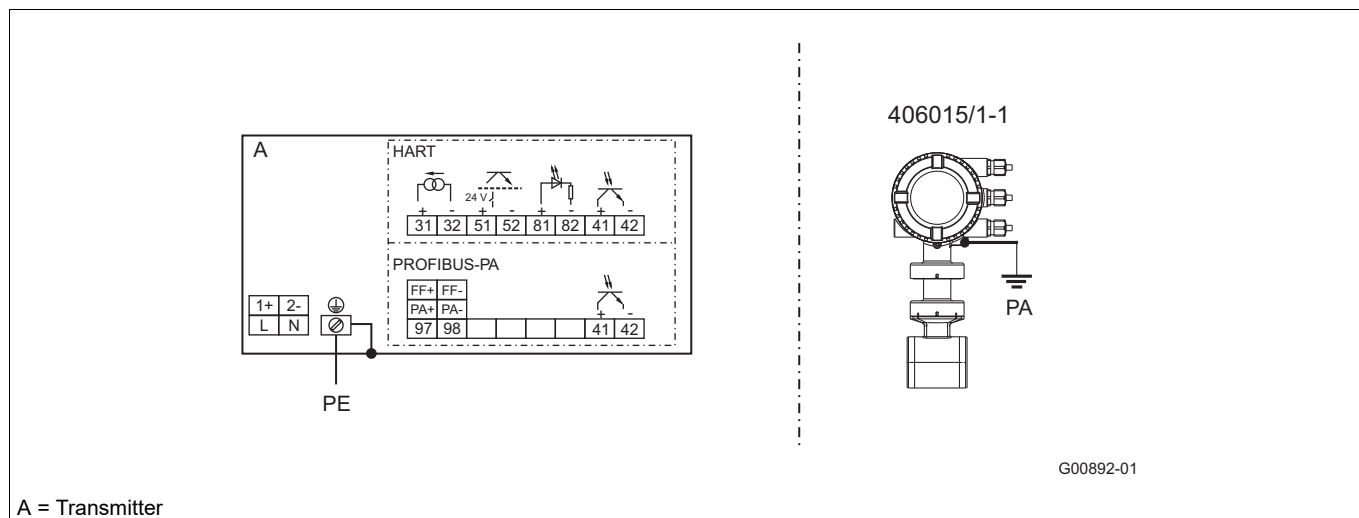
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Model 406015/1-1 in zone 1 – HART protocol and PROFIBUS-PA



Voltage supply

Alternating voltage (AC)		Direct voltage (DC)	
Terminal	Function	Terminal	Function
L	Phase	1+	+
N	Neutral conductor	2-	-
PE	Protection conductor (PE)	PE	Protection conductor (PE)

Input and output connection

Terminal	Function
31/32	Current/HART output - The current output is available in "active" or "passive" mode. The configuration must be specified when ordering the unit, since the configuration cannot be changed on-site.
97/98	PROFIBUS-PA (PA+/PA-) - According to IEC 61158-2
51/52	Digital output DO1 active/passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Pulse output".
81/82	Digital input/contact input - Function can be configured using software on-site as "External output switch-off", "External totalizer reset", "External totalizer stop", or "Other". Only available in conjunction with "passive" current output.
41/42	Digital output DO2 passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Binary output", flow direction signaling.
PA	Potential equalization (PA)

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Electrical data

Operation in zone 1 – devices with HART protocol

When operating in potentially explosive areas, observe the following electrical data for the transmitter signal inputs and outputs. For the current output version (active/passive), see the identification marking in the device's terminal box.



IMPORTANT (NOTE)!

Special connection conditions:

The output circuits are designed so that they can be connected to intrinsically safe and non-intrinsically safe electrical circuits. Intrinsically safe and non-intrinsically safe electrical circuits may not be combined. Potential equalization is required for intrinsically safe electrical circuits.

The rated voltage of the non-intrinsically safe electrical circuits is $U_M = 60 \text{ V}$.

If the rated voltage $U_M = 60 \text{ V}$ is not exceeded when non-intrinsically safe electrical circuits are connected, the intrinsic safety is maintained.

Model: 406015/1-1

Inputs and Outputs	Operating data		Ex-data – ignition protection type Ex i, IS											
	U_N [V]	I_N [mA]	U_O [V]	U_I [V]	I_O [mA]	I_I [mA]	P_O [mW]	P_I [mW]	C_O [nF]	C_I [nF]	C_{OPA} [nF]	C_{IPA} [nF]	L_O [mH]	L_I [mH]
Current output active Terminal 31/32	30	30	20	60	100	425 ^a	500	2000 ^a	210	8.4	195	24	6	0.065
Current output passive Terminal 31/32	30	30		60		500 ^a		2000 ^a		8.4		24		170
Digital output DO2 passive Terminal 41/42	30	220		60		425 ^{ab} 500 ^{ac}		2000 ^a		3.6		3.6		170
Digital output DO1 passive Terminal 51/52	30	220		60		425 ^{ab} 500 ^{ac}		2000 ^a		3.6		3.6		170
Digital input DI^d passive Terminal 81/82	30	10		60		500 ^a		2000 ^a		3.6		3.6		170

^a Intrinsically safe single-channel or multichannel barriers (supply isolators) with resistance characteristic curve must be used.

^b For "active" current output.

^c For "passive" current output.

^d Only available in conjunction with passive current output.

All inputs and outputs are galvanically isolated from each other and from the voltage supply.



Operation in zone 1 – devices with PROFIBUS-PA

When operating in potentially explosive areas, observe the following electrical data for the transmitter signal inputs and outputs. For the (PROFI-BUS-PA) version, see the identification marking in the device's terminal box.



IMPORTANT (NOTE)!

For devices in zone 1, the bus termination must comply with the FISCO model (Fieldbus Intrinsically Safe COnccept) or the explosion protection regulations! For devices in zone 2, the bus termination must comply with the FNICO model (Fieldbus NonIncendive COnccept) or the explosion protection regulations!



IMPORTANT (NOTE)!

Special connection conditions:

The output circuits are designed so that they can be connected to intrinsically safe and non-intrinsically safe electrical circuits. Intrinsically safe and non-intrinsically safe electrical circuits may not be combined. Potential equalization is required for intrinsically safe electrical circuits.

The rated voltage of the non-intrinsically safe electrical circuits is $U_M = 60 \text{ V}$.

If the rated voltage $U_M = 60 \text{ V}$ is not exceeded when non-intrinsically safe electrical circuits are connected, the intrinsic safety is maintained.

Model: 406015/1-1 (dual compartment housing)

The fieldbus and the digital output can be connected in zone 1 in three different variants.

Variant 1: Intrinsically safe fieldbus connection according to FISCO, intrinsically safe digital output connection

Signal inputs and outputs	Operating data		Ex-data – Ex i, IS, and FISCO					
	U_N [V]	I_N [mA]	U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Digital output DO2 passive Terminal 41/42	30	220	60	200 ^a	5000 ^a	3.6	3.6	0.17
Fieldbus Terminal 97/98	32	30	17	380	5320	1	1	5

^a Single-channel or multichannel barriers (supply isolators) with resistance characteristic curve must be used.

Variant 2: Intrinsically safe fieldbus connection (not according to FISCO!), intrinsically safe digital output connection

Signal inputs and outputs	Operating data		Ex-data – Ex i, IS, and FISCO					
	U_N [V]	I_N [mA]	U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Digital output DO2 passive Terminal 41/42	30	220	60	200 ^a	5000 ^a	3.6	3.6	0.17
Fieldbus Terminal 97/98	32	30	60	500	5000	1	1	5

^a Single-channel or multichannel barriers (supply isolators) with resistance characteristic curve must be used.

Variant 3: Fieldbus connection according to FNICO (zone 2), digital output connection (zone 2)

Signal inputs and outputs	Operating data		Ex-data – Ex n, NI, and FNICO					
	U_N [V]	I_N [mA]	U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Digital output DO2 passive Terminal 41/42	30	220	-	-	-	-	-	-
Fieldbus Terminal 97/98	32	30	60	500 ^a	5000 ^a	1	1	5

^a Single-channel or multichannel barriers (supply isolators) with resistance characteristic curve must be used.

All inputs and outputs are galvanically isolated from each other and from the voltage supply.

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Temperature data for operation in zone 1

Temperature data for operation in zone 1

Model designation	Surface temperature
406015/1-1	70 °C (158 °F)

The surface temperature depends on the medium temperature.

With an increasing medium temperature > 70 °C (158 °F) or > 85 °C (185 °F), the surface temperature also increases to the level of the medium temperature.



IMPORTANT (NOTE)!

The maximum admissible medium temperature depends on the lining and flange material and is limited by the operating data in table 1 and the explosion-relevant technical data in tables 2 and 3.

Table 1: Medium temperature depending on the lining and flange material

Model 406015/1-1

			Medium temperature (operating data)	
Lining	Process connection	Material	Minimum	Maximum
PFA	Wafer	-	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Variable process connection	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)

Table 2: Medium temperature (Ex-data) model 406015/1-1



IMPORTANT (NOTE)!

If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.

If the installation location for the device is only classified as a potentially explosive area for gases, the temperature data in the "Gas" column in the table must be taken into consideration.

Nominal width	Temperature class	Ambient temperature											
		-20 °C to +40 °C				-20 °C to +50 °C				-20 °C to +60 °C			
		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
		Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
DN3 to 100	T1	130 °C								110 °C	20 °C	80 °C	40 °C
	T2	130 °								110 °C	20 °C	80 °C	40 °C
	T3	130 °C								110 °C	20 °C	80 °C	40 °C
	T4	120 °C								110 °C	20 °C	80 °C	40 °C
	T5	85 °C								85 °C	20 °C	70 °C	40 °C
	T6	70 °C								70 °C	20 °C	70 °C	40 °C

Not thermally insulated: the sensor is not surrounded by pipe insulating material.

Thermally insulated: the sensor is surrounded by pipe insulating material.

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Operation in potentially explosive areas zone 2, 21, 22

General information

The following models are approved for operation in potentially explosive areas according to ATEX/IECEx zone 2, 21, 22:

JUMO flowTRANS MAG H01 – compact design		JUMO flowTRANS MAG H01 – remote mount design	
406015/1-1		406015/2-1 – sensor	406018/2-1 – transmitter
			
Single-compartment housing			Single-compartment housing
ATEX/IECEx Gas zone 2 Dust zone 21, 22		ATEX/IECEx Gas zone 2 Dust zone 21, 22	ATEX/IECEx Gas zone 2 Dust zone 21, 22



IMPORTANT (NOTE)!

For details about the ATEX/IECEx approvals ⇒ see chapter "Technical data", page 3



IMPORTANT (NOTE)!

For the voltage supply, signal inputs, and signal outputs, only use cables with a specification of at least 70 °C (158 °F).

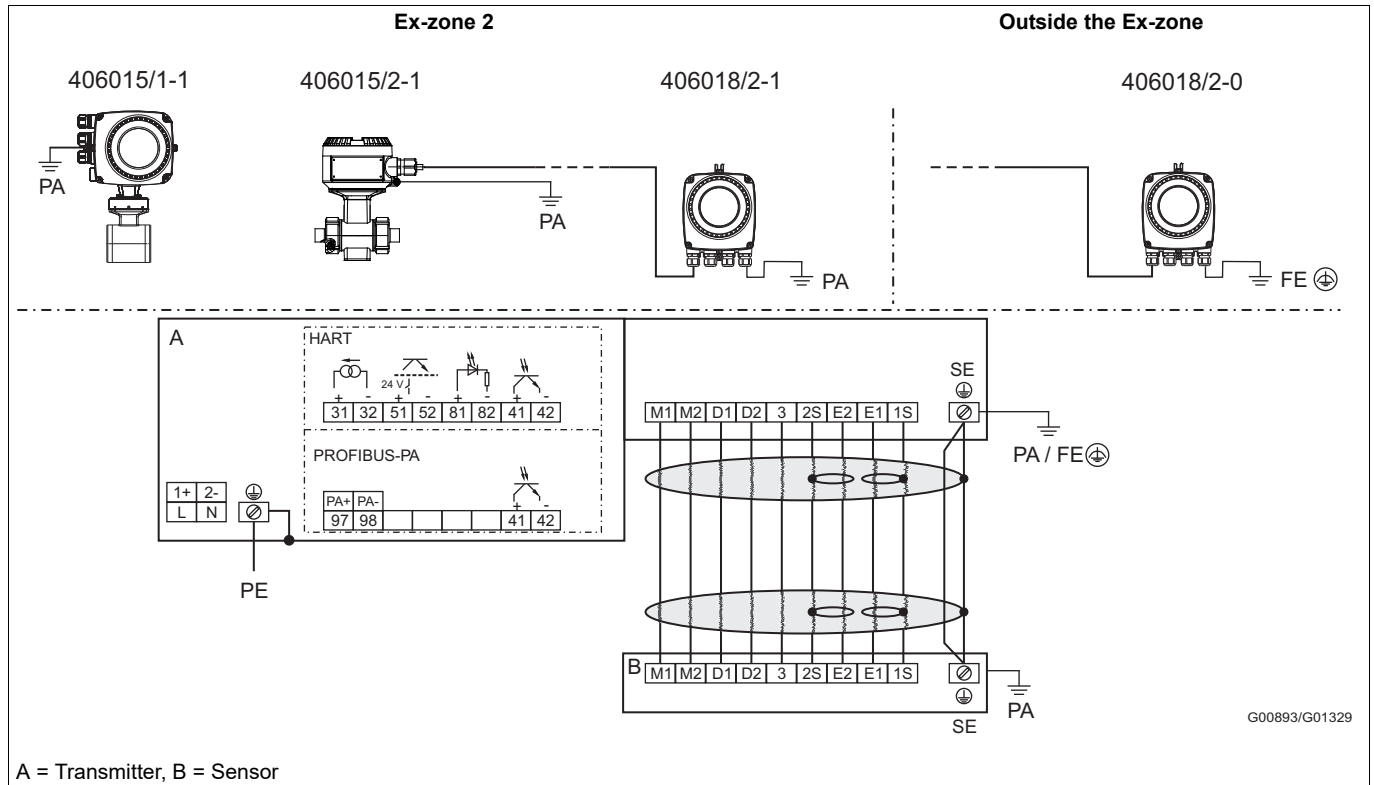
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Model 406015/1-1 and 406015/2-1 with 406018/2-1 in zone 2 and 406018/2-0 outside of the Ex-area – HART protocol and PROFIBUS-PA



G00893/G01329

A = Transmitter, B = Sensor

Voltage supply

Alternating voltage (AC)		Direct voltage (DC)	
Terminal	Function	Terminal	Function
L	Phase	1+	+
N	Neutral conductor	2-	-
PE	Protection conductor (PE)	PE	Protection conductor (PE)

Signal cable connection (for devices with remote mount design only)

Terminal	Function	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
SE	Shielding	-
E1	Signal line	Violet
1S	Shield of E1	-
E2	Signal line	Blue
2S	Shield of E2	-
3	Measurement potential	Green

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Input and output connection

Terminal	Function
31/32	Current/HART output - The current output is available in "active" or "passive" mode.
97/98	PROFIBUS-PA (PA+/PA-) - According to IEC 61158-2
51/52	Digital output DO1 active/passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Pulse output".
81/82	Digital input/contact input - Function can be configured using software on-site as "External output switch-off", "External totalizer reset", "External totalizer stop", or "Other".
41/42	Digital output DO2 passive - Function can be configured using software on-site as "Pulse output" or "Binary output". The default setting is "Binary output", flow direction signaling.
PA	Potential equalization (PA)
FE	Functional ground (only for transmitters outside potentially explosive area)

Electrical data

Electrical data for operation in zone 2 – devices with HART protocol

When operating in potentially explosive areas, observe the following electrical data for the transmitter signal inputs and outputs. For the current output version (active/passive), see the identification marking in the device's terminal compartment.

Model: 406015/1-1 and 406018/2-1 (single-compartment housing)

	Operating data		Ex-data – Ex n/NI	
Signal inputs and outputs	U_i [V]	I_i [mA]	U_i [V]	I_i [mA]
Current output active/passive				
Terminal 31/32	30	30	30	30
Digital output DO1 active/passive				
Terminal 51/52	30	220	30	220
Digital output DO2 passive				
Terminal 41/42	30	220	30	220
Digital input DI				
Terminal 81/82	30	10	30	10

All inputs and outputs are galvanically isolated from each other and from the voltage supply.

Electrical data for operation in zone 2 – devices with PROFIBUS-PA

When operating in potentially explosive areas, observe the following electrical data for the transmitter signal inputs and outputs. For the (PROFIBUS-PA) version, see the identification marking in the device's terminal box.



IMPORTANT (NOTE)!

For devices in zone 2, the bus termination must comply with the FNICO model (Fieldbus NonIncendive COnccept) or the explosion protection regulations.

Model: 406015/1-1 and 406018/2-1 (single-compartment housing)

	Operating data		Ex-data – Ex n/NI and FNICO					
Signal inputs and outputs	U_N [V]	I_N [mA]	U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Digital output DO2 passive								
Terminal 41/42	30	220	30	-	-	-	-	-
Fieldbus								
Terminal 97/98	32	30	32	500 ^a	7000 ^a	1	1	5

^a Single-channel or multichannel barriers (supply isolators) with resistance characteristic curve must be used.

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Temperature data for operation in zone 2

Temperature data for operation in zone 2

Model designation	Surface temperature
406015/1-1	70 °C (158 °F)
406015/2-1	85 °C (185 °F)
406018/2-1 (single-compartment housing)	70 °C (158 °F)

The surface temperature depends on the medium temperature.

With an increasing medium temperature > 70 °C (158 °F) or > 85 °C (185 °F), the surface temperature also increases to the level of the medium temperature.

Table 1: Medium temperature depending on the lining and flange material

Model 406015/1-1 and 406015/2-1

			Medium temperature (operating data)	
Lining	Process connection	Material	Minimum	Maximum
PFA	Wafer	-	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Variable process connection	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)

Table 2: Medium temperature (Ex-data) model 406015/1-1



IMPORTANT (NOTE)!

If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.

If the installation location for the device is only classified as a potentially explosive area for gases, the temperature data in the "Gas" column in the table must be taken into consideration.

Nominal width	Temperature class	Ambient temperature											
		-20 °C to +40 °C				-20 °C to +50 °C				-20 °C to +60 °C			
		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
		Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
DN3 to 100	T1	130 °C	130 °C	-	-	130 °C	110 °C	-	-	80 °C	40 °C	-	-
	T2	130 °C	130 °C	-	-	130 °C	110 °C	-	-	80 °C	40 °C	-	-
	T3	130 °C	130 °C	-	-	130 °C	110 °C	-	-	80 °C	40 °C	-	-
	T4	130 °C	130 °C	-	-	130 °C	110 °C	-	-	80 °C	40 °C	-	-

Not thermally insulated: the sensor is not surrounded by pipe insulating material.

Thermally insulated: the sensor is surrounded by pipe insulating material.

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Table 3: Medium temperature (Ex-data) model 406015/2-1



IMPORTANT (NOTE)!

The standard version includes Ex-protection for gases and dust.

If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.

If the installation location for the device is only classified as a potentially explosive area for gases, the temperature data in the "Gas" column in the table must be taken into consideration.

Nominal width	Temperature class	Ambient temperature											
		-20 °C to +40 °C				-20 °C to +50 °C				-20 °C to +60 °C			
		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
		Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
DN3 to 100	T1	130 °C	130 °C	-	-	130 °C	100 °C	-	-	120 °C	110 °C	-	-
	T2	130 °C	130 °C	-	-	130 °C	100 °C	-	-	120 °C	110 °C	-	-
	T3	130 °C	130 °C	-	-	130 °C	100 °C	-	-	120 °C	110 °C	-	-
	T4	130 °C	130 °C	-	-	130 °C	100 °C	-	-	120 °C	110 °C	-	-
	T5	95 °C	95 °C	-	-	95 °C	95 °C	-	-	95 °C	95 °C	-	-
	T6	80 °C	80 °C	-	-	80 °C	80 °C	-	-	80 °C	80 °C	-	-

Not thermally insulated: the sensor is not surrounded by pipe insulating material.

Thermally insulated: the sensor is surrounded by pipe insulating material.

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Ex-relevant technical data for operation in areas with combustible dust



IMPORTANT (NOTE)!

The dust explosion protection is guaranteed in part by the housing. The housing may not be modified in any way (e.g. by removing or omitting parts).

Notes on using the device in areas with combustible dust

The device with the transmitter in a single-compartment housing is approved for use in potentially explosive areas (gas and dust).

The Ex identification marking is provided on the nameplate.

Maximum admissible surface temperature



IMPORTANT (NOTE)!

The maximum surface temperature is applicable to dust layers of up to 5 mm (0.20 inches) in thickness. This is to be used to determine the minimum admissible ignition and glow temperature for the dust atmosphere according to IEC 61241ff.

The maximum admissible surface temperature must be reduced for thicker dust layers. The dust may be electrically conductive or non-conductive. IEC 61241ff. must be observed.

Model designation	Surface temperature
406015/1-1	70 °C (158 °F) to T _{Medium}
406015/2-1	85 °C (185 °F) to T _{Medium}
406018/2-1 (single-compartment housing)	70 °C (158 °F)

Minimum signal cable length



IMPORTANT (NOTE)!

The signal cable in potentially explosive areas may not be shorter than 5 m (16.40 ft).

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Order details

Compact or remote mount design (sensor with transmitter)

				(1)	Type
406015					JUMO flowTRANS MAG H01
				(2)	Design
1					Compact
2					Remote mount ^{a, b}
				(3)	Explosion protection
0					Without Ex-protection
1					With Ex-protection
				(4)	Nominal width
X	X	X	X	0003	DN 3
X	X	X	X	0004	DN 4
X	X	X	X	0006	DN 6
X	X	X	X	0008	DN 8
X	X	X	X	0010	DN 10
X	X	X	X	0015	DN 15
X	X	X	X	0020	DN 20
X	X	X	X	0025	DN 25
X	X	X	X	0032	DN 32
X	X	X	X	0040	DN 40
X	X	X	X	0050	DN 50
X	X	X	X	0065	DN 65
X	X	X	X	0080	DN 80
X	X	X	X	0100	DN 100
				(5)	Lining material
X	X	X	X	08	PFA
				(6)	Electrode version
X	X	X	X	1	Standard
X	X	X	X	5	Bullet-nose
X	X	X	X	9	Others upon request
				(7)	Measuring electrode material
X	X	X	X	01	Stainless steel 1.4539 (904)
X	X	X	X	02	NiMo C-4 (2.4610) – Hastelloy
X	X	X	X	04	Tantalum
X	X	X	X	10	Others upon request
				(8)	Grounding accessories
X	X	X	X	1	Standard
X	X	X	X	2	Grounding electrodes ⇨ see (7) measuring electrode material

^a If only the sensor model 406015/2-0 or 406015/2-1 is needed, the order code "Remote mount design (sensor)", page 45 should be used to generate the correct order details.

^b If only the transmitter model 406018/2-0 or 406018/2-1 is needed, the order code "Remote mount design (transmitter)", page 48 should be used to generate the correct order details.

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Compact or remote mount design (sensor with transmitter) – continued

					(9)	Process connection ^a
X	X	X	X	40		Screw connection according to DIN 11851
X	X	X	X	52		Welded socket according to DIN 11850
X	X	X	X	60		Tri-Clamp according to DIN 32676
X	X	X	X	61		Tri-Clamp according to ASME BPE
X	X	X	X	70		Wafer
X	X	X	X	80		Without adapter
					(10)	Process connection material
X	X	X	X	03		Stainless steel with EPDM seal
X	X	X	X	04		Stainless steel with EPDM seal and mounting ^b
X	X	X	X	09		Without process connection, without seal, with mounting ^b
X	X	X	X	10		Without process connection, without seal, without mounting ^c
					(11)	Certificates
X	X	X	X	1		Measuring pipe with PED approval
X	X	X	X	3		Inspection certificate 3.1 according to EN 10204
X	X	X	X	4		Pressure test according to AD2000
X	X	X	X	5		Material certification 3.1 according to EN 10204 and pressure test according to AD2000
					(12)	Calibration
X	X	X	X	1		Standard accuracy ^d
X	X	X	X	2		Enhanced accuracy ^e
					(13)	Ambient temperature sensor (10)
X	X	X	X	1		Standard sensor design/-20 to +60 °C (-4 to +140 °F) ^f
					(14)	Nameplate
X	X	X	X	1		Adhesive label
X	X	X	X	2		Stainless steel
X	X	X	X	9		Others upon request
					(15)	Signal cable length
X	X	X	X	0		None
	X	X	X	1		5 m standard cable
	X	X	X	2		10 m standard cable
	X	X	X	3		20 m standard cable
	X	X	X	4		30 m standard cable
	X	X	X	5		50 m standard cable
	X	X	X	6		80 m standard cable
	X	X	X	7		100 m standard cable
	X	X	X	8		150 m standard cable
	X	X	X	9		Others upon request
					(16)	Ex-zone
X	X	X		0		None
X			X	1		ATEX/IECEx zone 1 ^g
X	X		X	2		ATEX/IECEx zone 2/21

^a Available nominal widths of different process connections ⇒ see chapter "Dimensions", page 17.

^b 3A conformity not available.

^c 3A conformity not available. Specify with process connection "Wafer" or with process connection "without adapter".

^d Standard accuracy (0.4 % of the measured value) includes 2 calibration points. If more than 2 calibration points are required, specify 3 or 5 points under "Number of test points".

^e Enhanced accuracy (0.2 % of the measured value) includes 3 calibration points. If more than 3 calibration points are required, specify 5 points under "Number of test points". Available for DN10 (3/8") to 100 (4").

^f Standard sensor design maximum medium temperature: 130 °C (266 °F) with PFA.

^g Only in conjunction with dual-compartment housing.

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Compact or remote mount design (sensor with transmitter) – continued

					(17)	Protection type for transmitter/sensor
X	X	X	X	1		IP67 (NEMA 4X) ^a /IP67 (NEMA 4X)
	X	X	X	2		IP67 (NEMA 4X) ^a /IP68 ^b
					(18)	Cable fitting
X	X	X	X	1		M20 × 1.5
X	X	X	X	2		1/2" NPT
					(19)	Voltage supply
X	X	X	X	1		AC 100 to 230 V, 50 Hz
X	X	X	X	2		AC/DC 24 V, 50 Hz
					(20)	Signal inputs and outputs
X	X	X		0		None
X	X	X	X	1		HART and 20 mA passive and pulse and contact input/output ^c
X	X	X	X	2		HART and 20 mA active and pulse and contact input/output ^d
X			X	3		HART and 20 mA active and pulse and contact output ^e
X	X	X	X	4		PROFIBUS-PA and contact output
					(21)	Default settings/diagnosis
	X	X	X	0		None/standard diagnostics functions ^f
X	X	X	X	1		Parameters: default settings; standard diagnosis activated
					(22)	Accessories
X	X	X	X	000		None
	X	X	X	001		With preamplifier, installed in sensor housing
					(23)	Plug connector
X		X		002		Fieldbus M12 × 1 ^g
					(24)	Transmitter housing version
X	X	X	X	003		Single-compartment housing ^h
X			X	004		Dual-compartment housing ⁱ
					(25)	Supply frequency^j
X	X	X	X	012		50 Hz
					(26)	Further options
X	X	X		014		With Gore-Tex membrane
					(27)	Number of test points
X	X	X	X	025		3 points
X	X	X	X	026		5 points
					(28)	Language of documentation
X	X	X	X	029		German
X	X	X	X	030		English
X	X	X	X	036		French
X	X	X	X	037		Spanish

^a Protection type for transmitter = IP67 (NEMA 4X) for single and dual-compartment housing.

^b Only in conjunction with external transmitter

^c Available for version Ex-zone 2 or Ex-zone 1.

^d Available for version Ex-zone 2 or without Ex-protection (model 406018/2-1)

^e Available for version Ex-zone 1.

^f To be selected if the transmitter (model 406018/2-0, 406018/2-1) is ordered as a spare part or without sensor.

^g Only available for PROFIBUS-PA.

^h Not available for version Ex-zone 1.

ⁱ Only available for version Ex-zone 1.

^j If the transmitter is ordered without sensor, the supply frequency must be specified.

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Compact or remote mount design (sensor with transmitter) – continued

Order code	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	406015	/			08				
Order example	406015	/	X	X	XXXX	08	X	XX	X
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
					1				
	XX	XX	X	X	1	X	X	X	X
	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
	X	X	X	/	XXX	XXX	XXX	XXX	XXX
	(28)								

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Remote mount design (sensor)

		(1)	Type
		406015	JUMO flowTRANS MAG H01 – sensor
		(2)	Design
		2	Remote mount ^{a, b}
		(3)	Explosion protection
		0	Without Ex-protection
		1	With Ex-protection
		(4)	Nominal width (1)
X	X	0003	DN 3
X	X	0004	DN 4
X	X	0006	DN 6
X	X	0008	DN 8
X	X	0010	DN 10
X	X	0015	DN 15
X	X	0020	DN 20
X	X	0025	DN 25
X	X	0032	DN 32
X	X	0040	DN 40
X	X	0050	DN 50
X	X	0065	DN 65
X	X	0080	DN 80
X	X	0100	DN 100
		(5)	Lining material (2)
X	X	08	PFA
		(6)	Electrode version (3)
X	X	1	Standard
X	X	5	Bullet-nose
X	X	9	Others upon request
		(7)	Measuring electrode material (4)
X	X	01	Stainless steel 1.4539 (904)
X	X	02	NiMo C-4 (2.4610) – Hastelloy
X	X	04	Tantalum
X	X	10	Others upon request
		(8)	Grounding accessories (5)
X	X	1	Standard
X	X	2	Grounding electrodes ⇒ see (7) measuring electrode material
		(9)	Process connection ^c (6)
X	X	40	Screw connection according to DIN 11851
X	X	52	Welded socket according to DIN 11850
X	X	60	Tri-Clamp according to DIN 32676
X	X	61	Tri-Clamp according to ASME BPE
X	X	70	Wafer
X	X	80	Without adapter

^a If the transmitter model 406018/2-0 or 406018/2-1 is also required for the sensor model 406015/2-0 or 406015/2-1, the order code "Compact or remote mount design (sensor with transmitter)", page 41 should be used to generate the correct order details.

^b If only the transmitter model 406018/2-0 or 406018/2-1 is needed, the order code "Remote mount design (transmitter)", page 48 should be used to generate the correct order details.

^c Available nominal widths of different process connections ⇒ see chapter "Dimensions", page 17.

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Remote mount design (sensor) – continued

		(10)	Process connection material
X	X	03	Stainless steel with EPDM seal
X	X	04	Stainless steel with EPDM seal and mounting ^a
X	X	09	Without process connection, without seal, with mounting ^a
X	X	10	Without process connection, without seal, without mounting ^b
		(11)	Certificates
X	X	1	Measuring pipe with PED approval
X	X	3	Inspection certificate 3.1 according to EN 10204
X	X	4	Pressure test according to AD2000
X	X	5	Material certification 3.1 according to EN 10204 and pressure test according to AD2000
		(12)	Calibration
X	X	1	Standard accuracy ^c
X	X	2	Enhanced accuracy ^d
		(13)	Ambient temperature sensor (10)
X	X	1	Standard sensor design/-20 to +60 °C (-4 to +140 °F) ^e
		(14)	Nameplate
X	X	1	Adhesive label
X	X	2	Stainless steel
X	X	9	Others upon request
		(15)	Signal cable length
X	X	0	None
X	X	1	5 m standard cable
X	X	2	10 m standard cable
X	X	3	20 m standard cable
X	X	4	30 m standard cable
X	X	5	50 m standard cable
X	X	6	80 m standard cable
X	X	7	100 m standard cable
X	X	8	150 m standard cable
X	X	9	Others upon request
		(16)	Ex-zone
X		0	None
	X	2	ATEX/IECEx zone 2/21
		(17)	Protection type for sensor
X	X	1	IP67 (NEMA 4X)
X	X	2	IP68 ^f
		(18)	Cable fitting
X	X	1	M20 × 1.5
X	X	2	1/2" NPT

^a 3A conformity not available.

^b 3A conformity not available. Specify with process connection "Wafer" or with process connection "without adapter".

^c Standard accuracy (0.4 % of the measured value) includes 2 calibration points. If more than 2 calibration points are required, specify 3 or 5 points under "Number of test points".

^d Enhanced accuracy (0.2 % of the measured value) includes 3 calibration points. If more than 3 calibration points are required, specify 5 points under "Number of test points". Available for DN10 (3/8") to 100 (4").

^e Standard sensor design maximum medium temperature: 130 °C (266 °F) with PFA.

^f Only with external transmitter.

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Remote mount design (sensor) – continued

			(19)	Voltage supply
X	X	0		None
			(20)	Signal inputs and outputs
X	X	0		None
			(21)	Default settings/diagnosis
X	X	1		Parameters: default settings; standard diagnosis activated
			(22)	Accessories
X	X	000		None
X	X	001		With preamplifier, installed in sensor housing ^a
			(23)	Supply frequency^b
X	X	012		50 Hz
			(24)	Further options
X		014		With Gore-Tex membrane
			(25)	Number of test points
X	X	025		3 points
X	X	026		5 points
			(26)	Language of documentation
X	X	029		German
X	X	030		English
X	X	036		French
X	X	037		Spanish

^a Preamplifier required for signal cable lengths > 50 m (160 ft).

^b If the transmitter is ordered without sensor, the supply frequency must be specified.

Order code	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	406015	/		-		-	08	-	
Order example	406015	/	X	-	X	-	XXXX	-	08
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
	XX	-	XX	-	X	-	X	-	XX
	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	
	0	-	0	-	X	/	XXX	-	XXX

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Remote mount design (transmitter)

		(1)	Type
		406018	JUMO flowTRANS MAG 01 – transmitter
		(2)	Design
		2	Remote mount ^{a, b}
		(3)	Explosion protection
		0	Without Ex-protection
		1	With Ex-protection
		(4)	Ambient temperature sensor
X	X	1	Standard sensor design/-20 to +60 °C (-4 to +140 °F)
		(5)	Nameplate
X	X	1	Adhesive label
X	X	2	Stainless steel
X	X	9	Others upon request
		(6)	Signal cable length
X	X	0	None
		(7)	Ex-zone
X		0	None
	X	2	ATEX/IECEX zone 2/21
		(8)	Protection type for transmitter
X	X	1	IP67 (NEMA 4X)
		(9)	Cable fitting
X	X	1	M20 × 1.5
X	X	2	1/2" NPT
		(10)	Voltage supply
X	X	1	AC 100 to 230 V, 50 Hz
X	X	2	AC/DC 24 V, 50 Hz
		(11)	Signal inputs and outputs
X	X	1	HART and 20 mA passive and pulse and contact input/output ^c
X	X	2	HART and 20 mA active and pulse and contact input/output ^d
X	X	4	PROFIBUS-PA and contact output
		(12)	Default settings/diagnosis
X	X	0	None/standard diagnostics functions ^e
X	X	1	Parameters: default settings; standard diagnosis activated
		(13)	Plug connector
X		002	Fieldbus M12 × 1 ^f

^a If the sensor model 406015/2-0 or 406015/2-1 is also required for the transmitter model 406018/2-0 or 406018/2-1, the order code "Compact or remote mount design (sensor with transmitter)", page 41 should be used to generate the correct order details.

^b If only the sensor model 406015/2-0 or 406015/2-1 is needed, the order code "Remote mount design (sensor)", page 45 should be used to generate the correct order details.

^c Available for version Ex-zone 2 or without Ex-protection

^d Available for version Ex-zone 2 or without Ex-protection

^e To be selected if the transmitter (model 406018/2-0, 406018/2-1) is ordered as a spare part or without sensor.

^f Only available for PROFIBUS-PA.

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Remote mount design (transmitter) – continued

			(14)	Transmitter housing version
X	X	000		none
X	X	003		Single-compartment housing
			(15)	Further options
X	X	014		With Gore-Tex membrane
			(16)	Language of documentation
X	X	029		German
X	X	030		English
X	X	036		French
X	X	037		Spanish

Order code (1) (2) (3) (4) (5) (6) (7) (8)
 406018 / 2 - X - 1 - X - 0 - X - 1 -

Order example 406018 / 2 - X - 1 - X - 0 - X - 1 -

(9) (10) (11) (12) (13) (14) (15) (16)
 X - X - X - X / XXX - XXX - XXX - XXX

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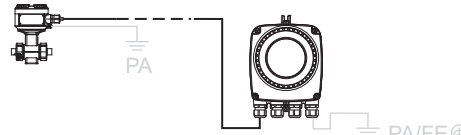
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Accessories

Available signal cable lengths

Signal cable length ^a	Part no.	Ex-zone 2 or outside of Ex-area	
5 m (16.4 ft)	00648906 (scope of delivery)	406015/2-0	406018/2-0
10 m (32.8 ft)	00648907	406015/2-1	406018/2-1
20 m (65.6 ft)	00648909		
30 m (98.4 ft)	00648910		
50 m (164.0 ft)	00648912		
80 m (262.5 ft)	00648913		
100 m (328 ft)	Upon request		
150 m (492 ft)	Upon request		

^a At a minimum conductivity for the measurement medium of $\geq 5 \mu\text{S/cm}$, a preamplifier is required for cable lengths $> 50 \text{ m}$ (164 ft).




IMPORTANT (NOTE)!

Minimum signal cable length:


In potentially explosive areas with combustible dust, the signal cable must not be shorter than 5 m (16.40 ft).

Cable conduit sealing

Designation	Part no.	
Mounting set for sealing the cable conduit	00649012	
		G01312

Grounding plates

For the process connection "Wafer" and with installation in plastic lines or pipelines with insulated lining, additional grounding via grounding plates is required (1). In this case it is recommended that one grounding plate is fitted in front of the device and one is fitted behind.

Designation	Part no.	
Grounding plate ^a (1)	-	

^a Available upon request for all available process connections in different materials.

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Paddlewheel flow sensor

Brief description

The paddlewheel rate sensor is designed for continuous measurement of the flow of neutral and weakly aggressive liquids containing low levels of solids.

Flow speeds of 0.3 to 10 m/s can be measured.

The sensor provides a frequency pulse signal proportional to the flow speed.

Standardized fittings ensure easy installation of the measuring transducer in tubes ranging from DN15 to DN400 (see Data Sheet 406090).

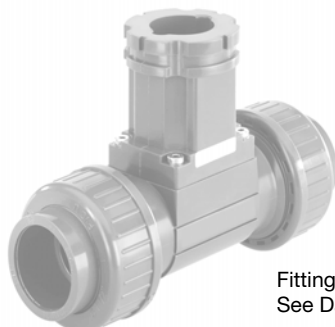


Type 406020/ ...

Example of mounting



Flow sensor



Fitting
See Data Sheet 406090

Key features

- Simple mounting.
- For pressures up to PN10 and temperatures up to +70°C.
- Three-wire frequency pulse signal is suitable for direct connection to PLC.

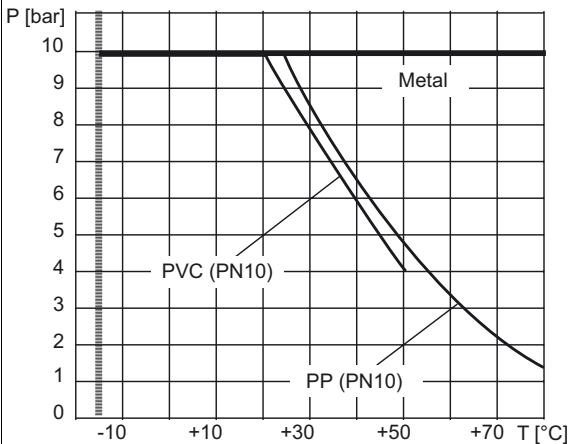
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Technical data

Operating conditions	
Measurement medium	Water or other neutral or weakly aggressive liquids
Viscosity of the measurement medium	≤ 300 cStokes
Medium temperature	In combination with PVC fitting: 0 to +50°C In combination with PP fitting: 0 to +80°C In combination with PE fitting: 0 to +70°C In combination with stainless steel fitting: -15 to +80°C
Ambient temperature	-10 to +60°C operating temperature -20 to +60°C storage temperature
Tube diameter	For diameters DN15 to DN 400. Only in combination with fittings as per Data Sheet 406090.
System pressure	In combination with a PVC or PE fitting: 
Minimum inlet and outlet distances	See illustrations on page 5/5
Relative humidity	≤ 80%, non-condensing
Enclosure protection	IP65 (with mating connector connected)
EMC	EN 61000-6-2, EN 61000-6-3
Vibration	EN 60068-2-6
Impact	EN 60068-2-27
Measuring range	
Flow speed	0.3 to 10 m/s
Accuracy	With standard K factor: ≤ ± 3% of measured value after teach-in: ≤ ± 0.5% of measured value
Linearity	≤ ± 0.5% of measurement range end (at 10 m/s)
Repeatability	≤ ± 0.4% of measured value
Materials	
Enclosure, union nut	PE, PC
Cable plug	PA
Parts in contact with medium	Sensor: PVDF, ceramic, FKM Fitting: see data sheet 406090

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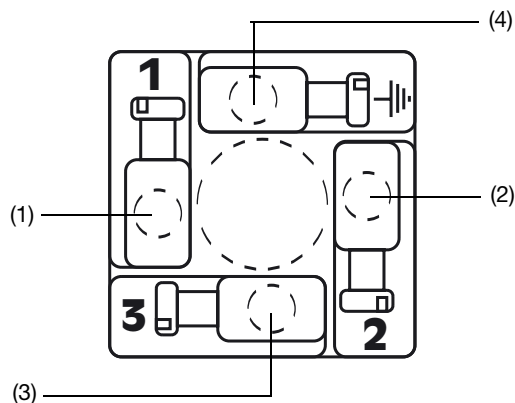
Electrical data	
Power supply voltage	DC 12 to 36 V
Power consumption	≤ 50 mA
Output	Pulse: 0 - 300 Hz, clock ratio: 50%, ≤ 100 mA, protected against reverse polarity
Connection	Device socket EN 175301-803
Recommended connecting cable	max. 1.5 mm ² , max. 50 m long, shielded

Electrical connection

Connection		Terminal assignment
Supply voltage DC 12 to 36 V		1 L+ 3 L-
Output pulse (PNP)		Pls+ 3 L-
Output pulse (NPN)		1 L+ 2 Pls-

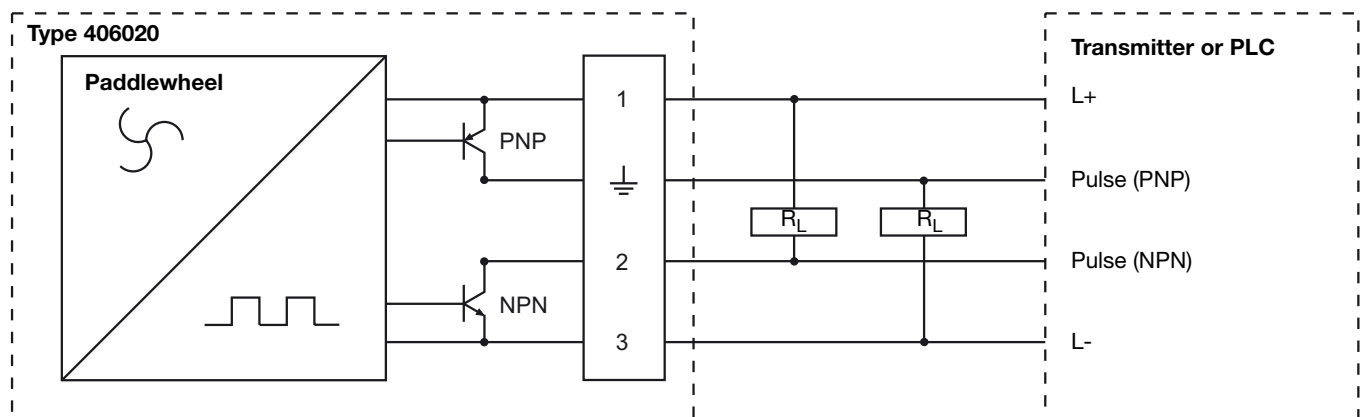
Terminal assignment

- (1) Supply voltage
- (2) Output pulse
NPN transistor
- (3) 0 V
- (4) Output pulse
PNP transistor

**Connection example**

L+ and L- must always be connected!

Pulse (PNP) or pulse (NPN) are optionally connected.



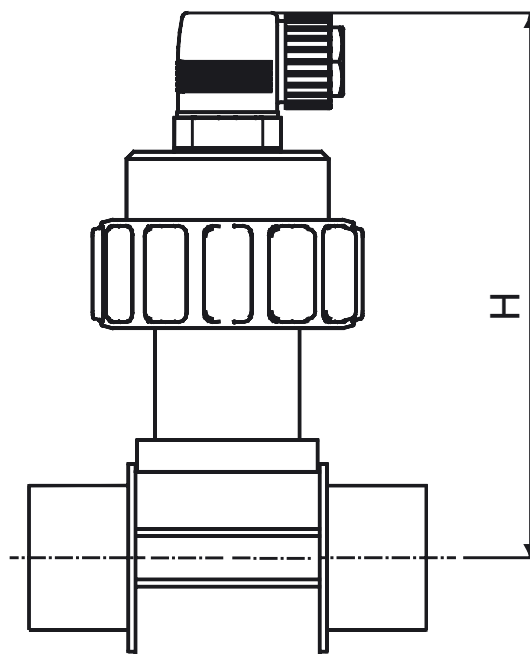
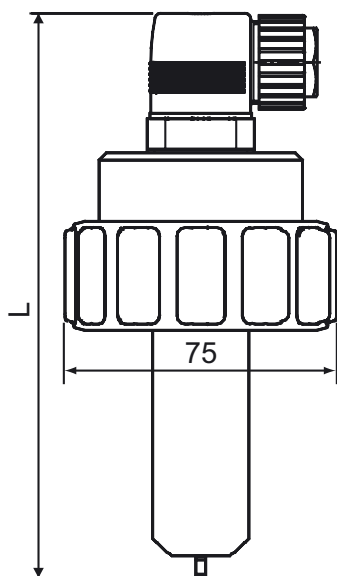
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Dimensions



Tube diameter DN	L	H Built into T fitting	Tube diameter DN	L	H Built into welded adapter
15	153	156	65	191	173
20		154	80		178
25		154	100		184
32		157	150		230
40		161	200		251
50		167	250		269
			300		281
			350		294
			400		309

Note: suitable fittings can be found in Data Sheet 406090.

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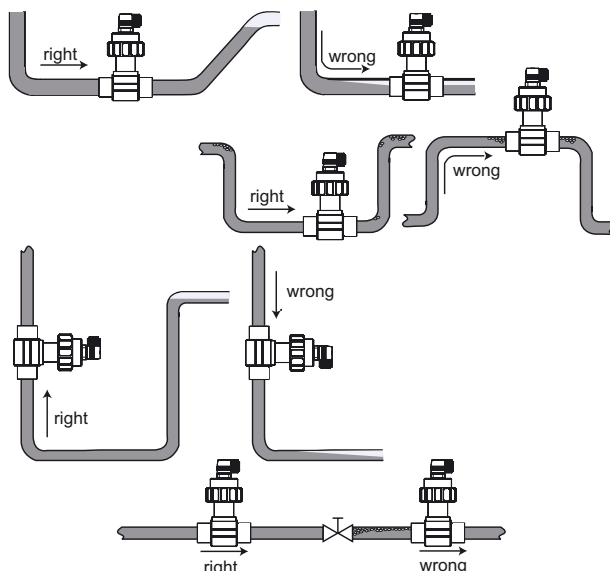
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Mounting

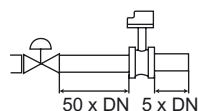
Installation

To ensure accurate flow measurements, the flow sensor of type 406020 must be installed in vertical or horizontal tubing.

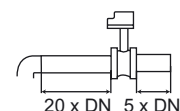


Minimum inlet and outlet distances

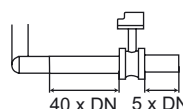
To eliminate turbulence in the tubing, the minimum inlet and outlet distances must be observed. To ensure greater accuracy, the length of these zones for eliminating turbulence can be increased. For additional information see EN ISO 5167-1. The direction of flow is from left to right. DN = Nominal tube width.



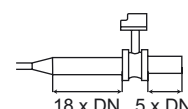
Control valve



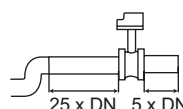
1 x 90° elbow
or T piece



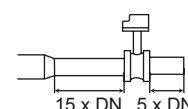
2 x 90° elbow
Three-dimensional



Extension



2 x 90° elbow



Reduction

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Mounting recommendation

Fittings for flow rate sensors - see Data Sheet 406090

PVC and stainless steel T fitting 	Nominal flow rate width DN15 to DN50	Sensor version (basic type extension) Short sensor
PE welded adapter 	Nominal flow rate width DN65 to DN100 DN125 to DN400	Sensor version (basic type extension) Short sensor Long sensor
Stainless steel welded adapter with radius 	Nominal flow rate width DN50 to DN200 DN250 to DN350	Sensor version (basic type extension) Short sensor Long sensor
PP connecting clamps 	Nominal flow rate width DN50 to DN200	Sensor version (basic type extension) Long sensor

Information for ordering: Paddlewheel flow sensor

- (1) **Basic type**
 406020 Paddlewheel flow sensor
- (2) **Basic type extension**
 001 Short sensor¹
 002 Long sensor¹
- (3) **Output**
 440 Frequency pulse
- (4) **Electrical connection**
 61 Cable socket
- (5) **Extra codes**
 000 None

Order code (1) (2) (3) (4) (5)
 Sample order 406020 / 001 - xxx - 61 / 000

¹ See "Mounting recommendation" table above.



JUMO PINOS L02

Calorimetric flow sensor

Brief description

The JUMO PINOS L02 flow sensor measures and monitors flow velocities of liquid media. The measurement method is based on the calorimetric measuring principle and does not include any moving parts which can influence the flow profile negatively. The measuring principle is based on the cooling of a heating element. Due to the flow behavior of the liquid, heat is taken from the temperature probe. The higher the flow velocity, the higher the heat emission of the heating element. The resulting measured value can be output via an analog output of 4 to 20 mA or open or close a switching output. A device version with analog and switching output is also available. Both output variants can be configured for the output of the flow velocity or the medium temperature. The status of the device is displayed using 3 LEDs.

The JUMO PINOS L02 can be used for a nominal pressure up to 75 bar and in an admissible flow range of 0 to 300 cm/s.

To allow for simple startup of the flow sensor, it is equipped with a micro USB interface while a setup program is also available as an accessory. A switching point can be set on-site using a push-button on the user interface. The push-button can also be used for flow calibration if the process requirements (for example, medium, flow velocity) do not correspond to the default settings. Due to its robust design with protection type IP65/67, the flow sensor can also be used in difficult environmental conditions.

The main areas of use are the monitoring of cooling water circuits, pumps, heat exchangers, lubrication circuits, leakage monitoring for process lines, and dry-run protection for pumps.



Type 406041

Customer benefits

- **Configuration interface**
Simple connection to the JUMO PC setup via the micro USB interface.
- **Flexibility**
By turning the sensor 360°, the measuring device can be installed in any installation position, regardless of the flow direction.
- **Process reliability**
Different fittings and versions ensure a simple and reliable connection.
- **Applications**
Can be used for different liquids in various nominal tube widths.

Special features

- Analog and/or switching output
- No moving parts
- Variable installation position of the sensor (can be rotated 360°)
- Switching point is adjustable on-site
- With temperature output

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Technical data

Output

Analog output – flow sensor		Default setting	Setting range
Output signal		Flow velocity	Flow velocity Medium temperature
Attenuation		0 s	0 to 99 s
Scale start		0 % ± 0 cm/s (water)	0 to 100 %
Scale end		100 % ± 150 cm/s (water)	0 to 100 %
Behavior on error		3.4 mA	0, 3.4, or 22 mA
Output signal		4 to 20 mA	0 to 20, 4 to 20, 20 to 0, 20 to 4 mA
Switching output – flow switch			
Output signal		Flow velocity	Flow velocity Medium temperature
Output behavior		N/O contact	N/O contact, N/C contact, window opening function, window closing function
Switching point (Sp)		50 % ± 75 cm/s (water)	0 to 100 %
Release point (Rsp)		40 % ± 60 cm/s (water)	0 to 100 %
Switch-on delay		0 s	0 to 99 s
Behavior on error		Switch off	Switch on, switch off
Analog and switching output			
Analog output		Medium temperature	Flow velocity Medium temperature
Switching output		Flow velocity	Flow velocity Medium temperature

Flow velocity	Measuring range 0 to 300 cm/s
Repeatability	±2 % from measuring range end value
Measuring accuracy	±8 % from measuring range end value (applies for reference conditions and default setting)
Temperature drift	±0.2 %/K from measuring range end value
Response time to flow change	4 to 10 s

Reference conditions	
Medium	Water
Flow velocity	≤ 150 cm/s
Medium temperature	20 °C ±5 °C
Ambient temperature	20 °C ±5 °C
Installation position	JUMO installation device Vertical riser pipe Rotation ±20 % away from preferred direction (Inlet and outlet section according to operating manual)

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Electrical data

Voltage supply Requirement	DC 24 V $\pm 10\%$, SELV The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".
Electromagnetic compatibility	Acc. to DIN EN 61326-1
Interference emission	Class A – only for industrial use
Interference immunity	Industrial requirement
Current consumption	Analog output - flow sensor: ≤ 200 mA Switching output - flow switch: ≤ 400 mA

Housing and environmental conditions

Housing	PA66-GF30
Parts in contact with the medium	Stainless steel 316L, 316Ti (1.4404, 1.4571), sealing material FPM Viton
Nominal pressure (input)	PN 75
Burst pressure (input)	200 bar
Weight	Approx. 100 g (depending on the probe length)
Ambient temperature range on the housing	-25 to +70 °C
Medium temperature range	-25 to +90 °C (liquids, no abrasive media)
Storage temperature range	-25 to +80 °C
Resistance to climatic conditions:	
Operation	100 % relative humidity including condensation of the housing
Storage	90 % relative humidity without condensation
Mounting position	Horizontal or vertical, housing can be rotated

Operation

On-site calibration	Analog and/or switching output: Push-button on the device for setting the switching point (only for version with switching output); calibration for low and high flow velocity.
Setup interface	Micro USB socket

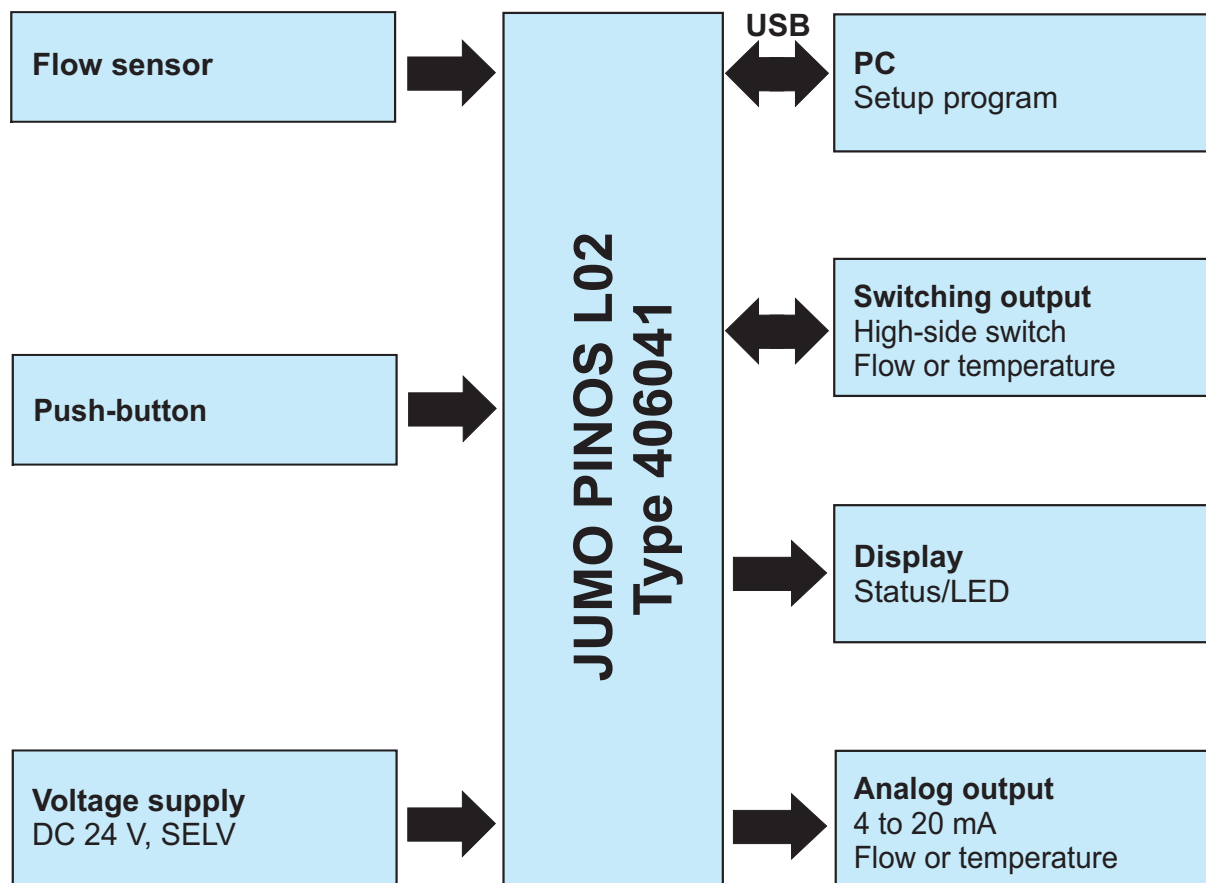
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Block diagram



Setup program

Function

The setup program serves the configuration of the flow sensor using a PC. The configuration data can be archived on data carriers and printed.

The setup program can be used to overwrite changed parameters with the default settings at any time. The connection between flow sensor and PC is established via a micro USB interface.

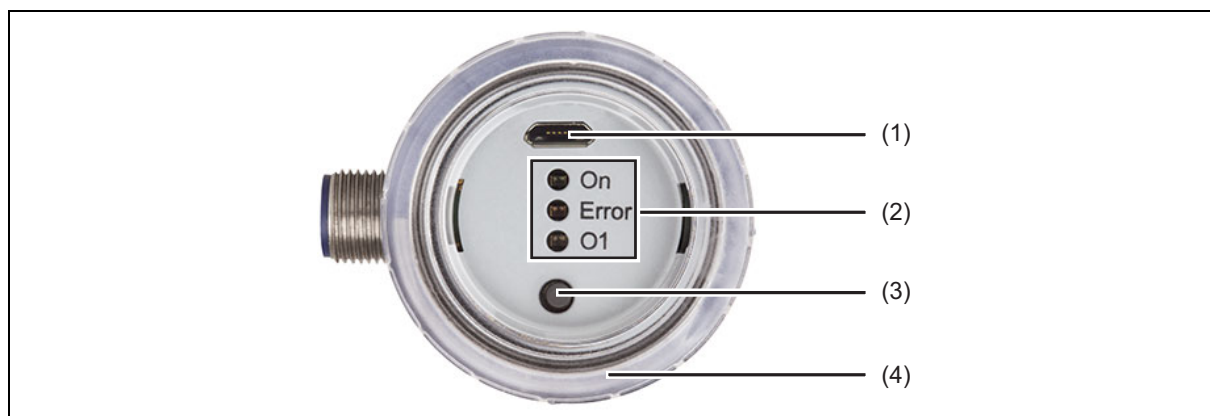
- Set the behavior of the outputs when the measuring range is exceeded
- Set the analog output function (optional)
- Set the switching output function (optional)

NOTE!

It is possible to configure the flow sensor **without** auxiliary energy using the micro USB interface.



Display and control elements



- | | |
|-------------------------|---|
| (1) Micro USB interface | (3) Button |
| (2) LEDs | (4) Protective lid with viewing window (IP67) |
| On: green LED | |
| Error: red LED | |
| O1: yellow LED | |

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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection for	Type	PIN	Description	Terminal assignment
Analog output		1	+24 V	
		2	Analog output	
		3	GND	
		4	Not used	
Switching output		1	+24 V	
		2	Not used	
		3	GND	
		4	Switching output	
Analog and switching output		1	+24 V	
		2	Analog output	
		3	GND	
		4	Switching output	
PC	Micro USB interface ^a (Type B)			

^a The micro USB interface is designed only for configuring the flow sensor. Continuous operation is not admissible.

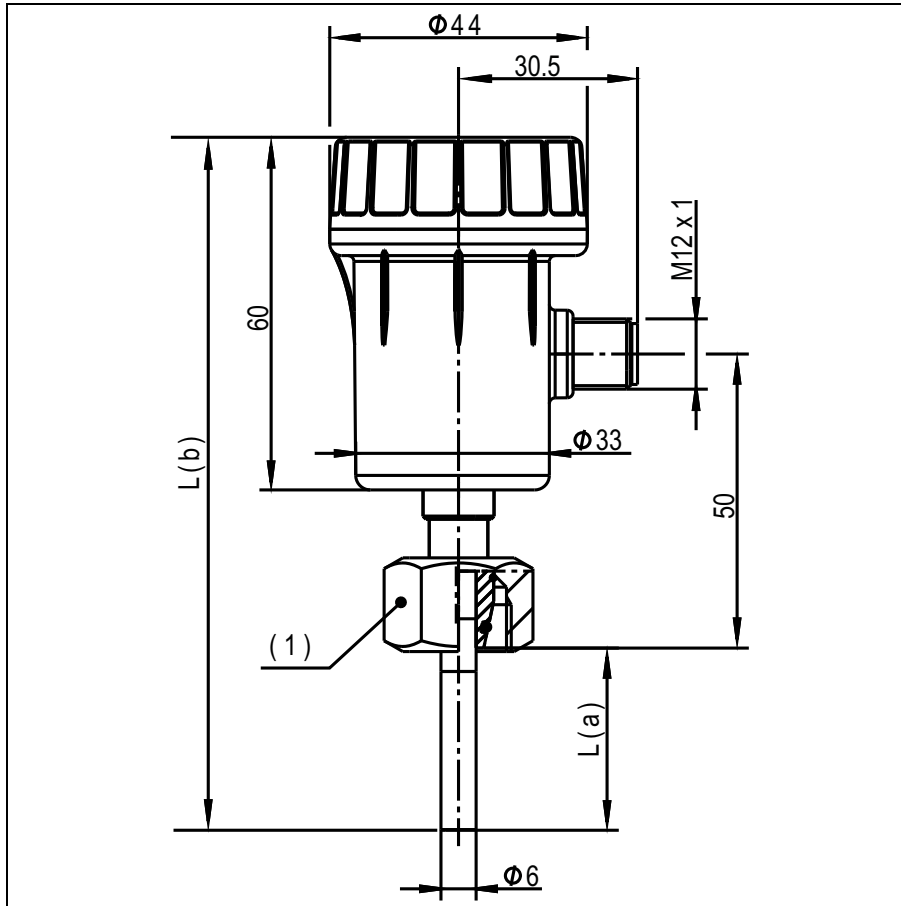
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Dimensions



(1) Union nut L12, M18 × 1.5; DIN EN ISO 8434-1, wrench size 22

	Nominal pipe width	Internal pipe diameter [mm]
NTS 0020	DN 20	20 to 23.7
NTS 0025	DN 25	26 to 29.7
NTS 0032	DN 32	32 to 38.4
NTS 0040	DN 40	38 to 44.3
NTS 0050	DN 50	50 to 56.3
NTS 6530	Additional nominal widths	

Sensor version	L(a) mm	L(b) mm
NTS 37	37	124
NTS 51	51	138
NTS 65	65	152

(NTS = numerical type code)

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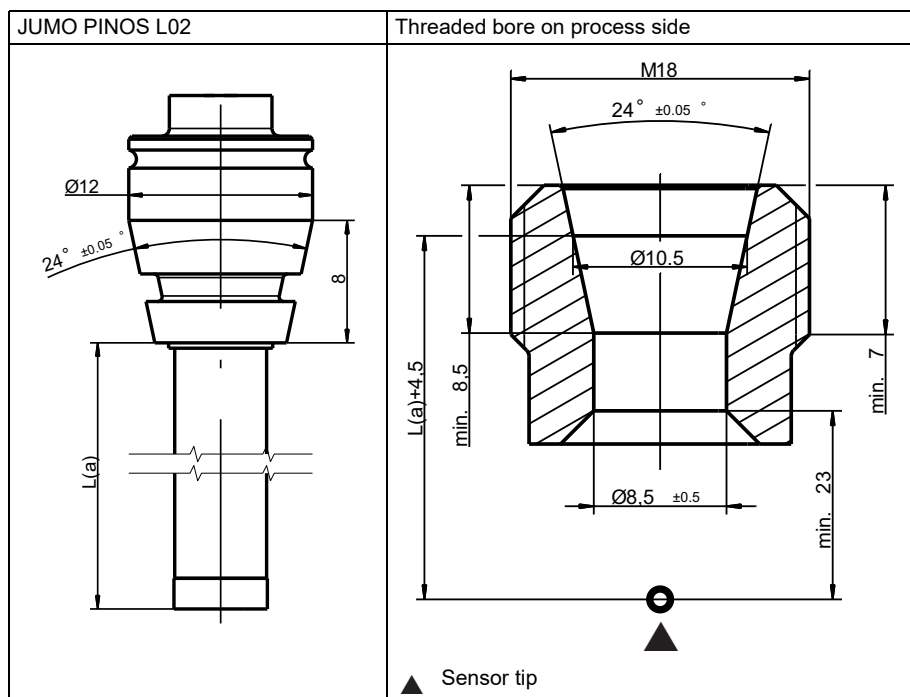
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**Conical plug**

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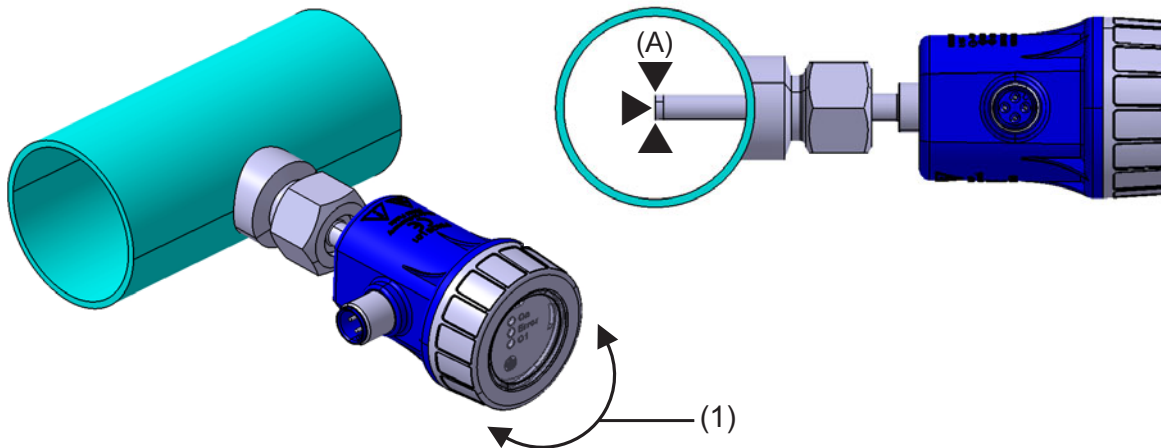
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Installation

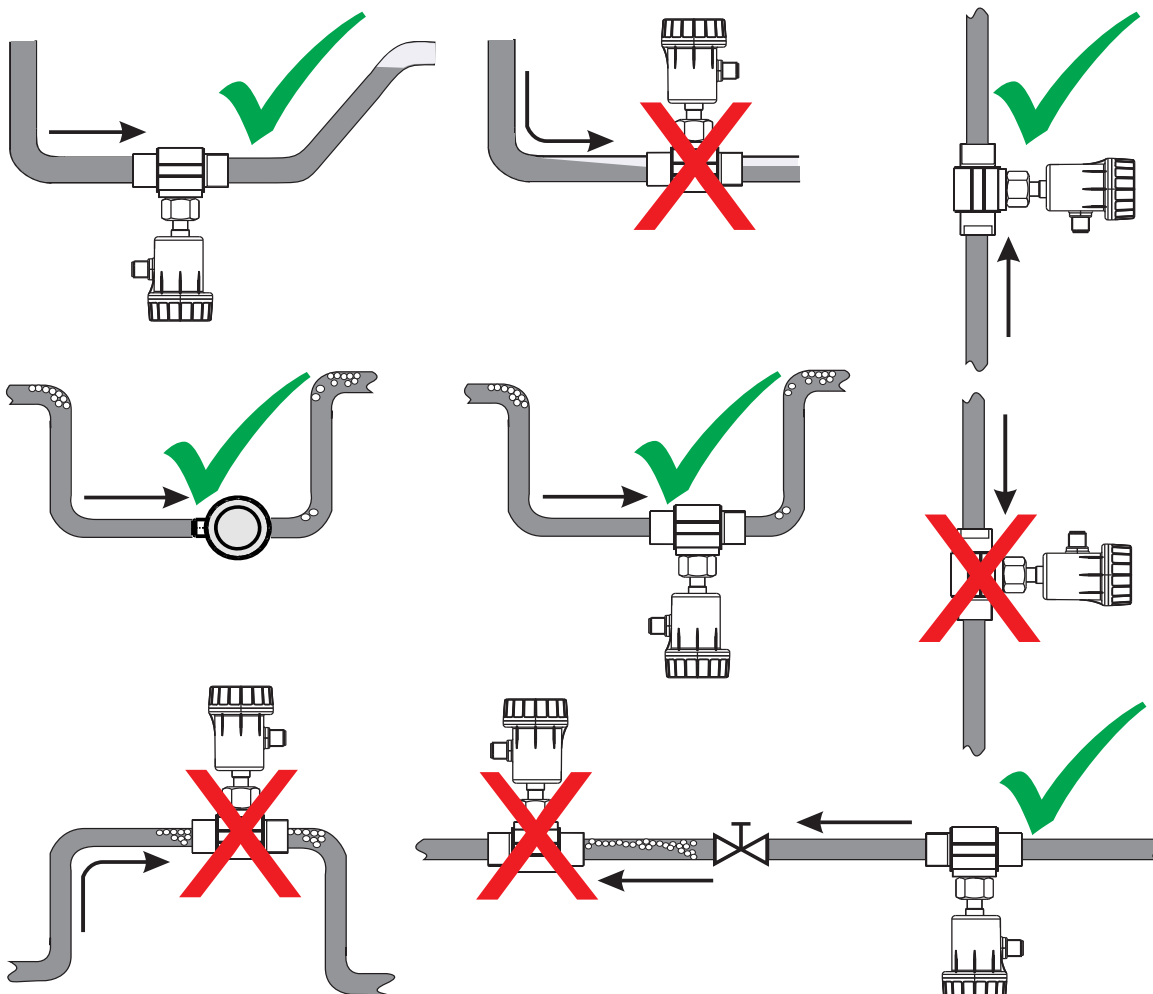
Mounting example



(1) Sensor alignment can be turned 360°.

Preferred direction:
 Flow is towards M12 connector

(A) Distance to sensor
 (dependent on pipe diameter)



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Order details

(1) Basic type	
406041	JUMO PINOS L02
(2) Basic type extension	
000	None
999	Special version
(3) Output	
406	4 to 20 mA, three-wire
470	1 x PNP switching output
475	1 x PNP switching output, and 1 x analog output, 4 to 20 mA, three-wire
(4) Nominal width	
0020	DN 20 (3/4 in.)
0025	DN 25 (1 in.)
0032	DN 32 (1-1/4 in.)
0040	DN 40 (1-1/2 in.)
0050	DN 50 (2 in.)
6530	Additional nominal widths*
* only available for sensor version 99 (on-site calibration)	
(5) Process connection	
182	Union nut M18 × 1.5
(6) Sensor length	
37	Sensor length L(a) 37 mm
51	Sensor length L(a) 51 mm
65	Sensor length L(a) 65 mm
(7) Sensor version	
88	Factory calibration
99	On-site calibration
(8) Extra code	
100	Customer-specific configuration (specifications in plain text)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)							
Order code	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>				
Order example	406041	/	000	-	406	-	0050	-	182	-	51	-	88	/	100

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Installation recommendation

	Installation situation			
Nominal width	Stainless steel/ welded socket	PVC glue fitting/ PVC T-piece	Screw-in adapter	Other
DN 20	L(a) = 37 (NTS 37)	L(a) = 37 (NTS 37)	L(a) = 51 (NTS 51) or L(a) = 65 (NTS 65)	Upon request
DN 25				
DN 32		L(a) = 51 (NTS 51)		
DN 40				
DN 50				
Additional nominal widths	L(a) = 51 (NTS 51)	- -		

(NTS = numerical type code)

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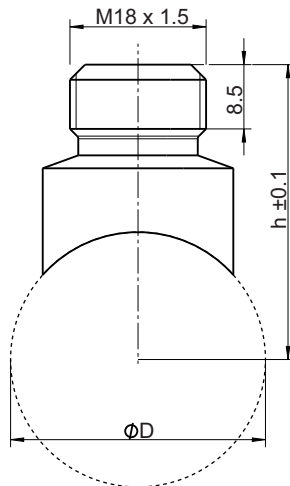
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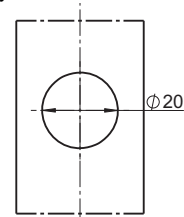
Accessories

Item	Part no.
Setup program on CD-ROM, multilingual	00694887
Micro USB cable, type A USB connector on Micro-B USB connector, length 3 m	00616250
4-pole cable box (straight) M12 × 1 with 2 m PVC cable	00404585
4-pole angled socket M12 x 1 with 2 m PVC cable	00409334

Welded socket



A hole with a diameter of 20 mm must be drilled at the installation location and the welded socket is welded onto this centrally.

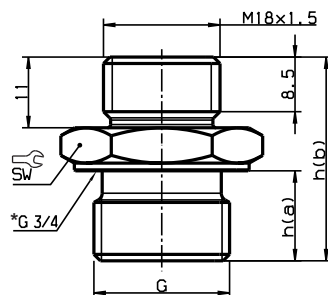


DN	Material	Nominal pressure	Temperature operating range	h	ØD	Part no.
20	Stainless steel 316L	PN 75	-25 to +90°C	45	26.9	00667698
25					33.7	00659696
32					42.4	00659697
40					48.3	00659699
50				50	60.3	00659700

- Other variants for alternative pipe diameters available upon request.

- Pressure Equipment Directive (2014/68/EU): Article 4, Paragraph 3 - "Sound engineering practice".

Screw-in adapter



* Profile sealing ring

Thread identifier	Material	Nominal pressure	Temperature operating range	Seal material	Wrench size	h(a)	h(b)	Part no.
G 1/2	Stainless steel 316L	PN 25	-25 to +90 °C	FPM	27	14	31.7	00669206
G 3/4					32	16	33.7	00669205
1/2 NPT	Stainless steel 316L	PN 25	-25 to +90 °C	--	27	*	*	00699496
3/4 NPT					32	*	*	00699495

- Other variants for alternative pipe diameters available upon request.

* upon request

- Pressure Equipment Directive (2014/68/EU): Article 4, Paragraph 3 - "Sound engineering practice".

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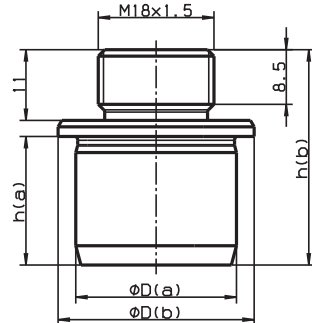
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PVC spigot



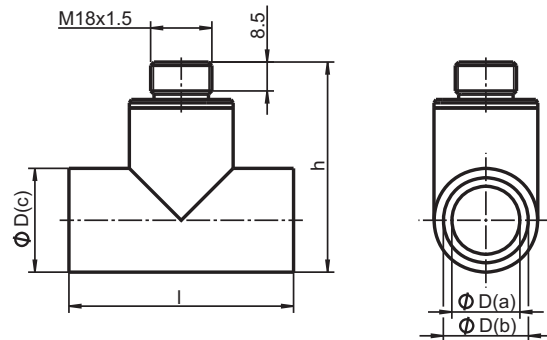
DN	Material	Nominal pressure	Temperature operating range	h(a)	h(b)	øD(a)	øD(b)	Part no.
20 to 50	PVC-U	PN 16	0 to +60°C	20	33.5	25	30.5	00671018

- For gluing in PVC T-pieces with (reduced) outflow of a diameter of 25 mm.

- Other variants for alternative pipe diameters available upon request.

- Pressure Equipment Directive (2014/68/EU): Article 4, Paragraph 3 - "Sound engineering practice".

PVC T-piece



DN	Material	Nominal pressure	Temperature operating range	øD(a)	øD(b)	øD(c)	h	l	Part no.
20	PVC-U	PN 16	0 to +60°C	20	25.2	30.5	62.5	66	00670832
25				31	32.2	41	70.5	78	00670845
32				39	40.2	50	81	98	00670850
40				49	50.2	62	92	108	00670862
50				62	63.2	77	105	145	00670866

- Other variants for alternative pipe diameters available upon request.

- Pressure Equipment Directive (2014/68/EU): Article 4, Paragraph 3 - "Sound engineering practice".



JUMO flowTRANS US W01

Ultrasonic flowmeter for liquids

Applications

- Reverse osmosis
- Desalination of seawater
- Wash water recovery
- Waste water (galvanic, surface treatment)
- Cooling towers

Brief description

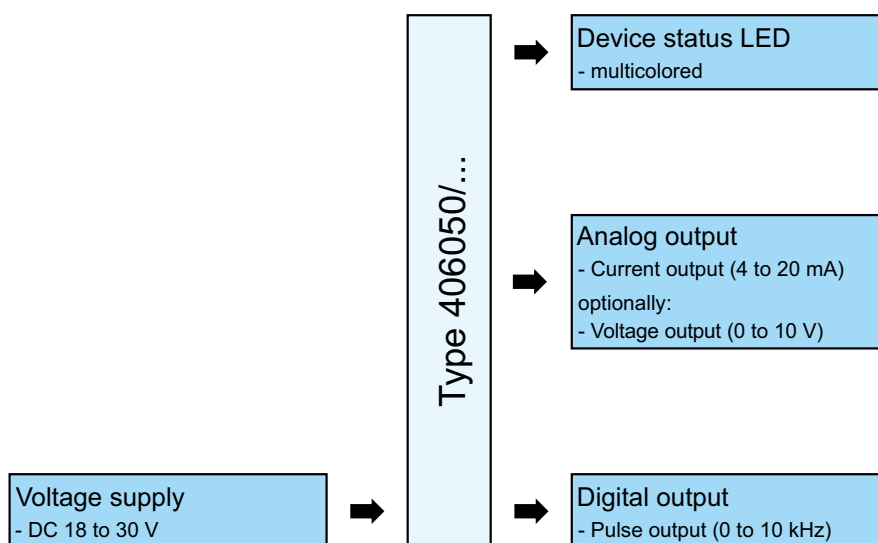
The ultrasonic flow meter measures the volume flow of conductive and non-conductive media. The volume flows can be output in analogue as a current signal (4 to 20 mA) and digitally as a pulse signal (0 to 10 kHz).

The inline device is available in nominal widths DN 15 to DN 32 and can be installed horizontally or vertically in existing plastic or metal pipes using installation accessories. Another mounting set enables the flow-optimized transition of the nominal width DN 15 to DN 10 (low-flow calibration).



Type 406050/...

Block diagram



Special features

- Easy installation
- Corrosion-resistant
- Low-wear
- Easy to clean

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Technical data

Input

Measuring range and accuracy

Nominal width	Default settings for analog output ^{a, b}	Flow _{max} ^a
DN 15 (Low-flow calibration)	0 to 30 l/min	60 l/min
DN 15	0 to 62.5 l/min	80 l/min
DN 20	0 to 105 l/min	210 l/min
DN 25	0 to 160 l/min	320 l/min
DN 32	0 to 260 l/min	520 l/min

^a Low flow cut off: 0.05 % of flow_{max}.

^b Optionally expandable up to flow_{max}.

<p>X = Flow_{max} (%)</p> <p>Y = Measuring deviation from the measured value ± (%)</p>	
Measuring deviation ^a	
Pulse output	≤ ±2.0 % of measured value ±0.1 % of flow _{max}
Current output	Like pulse output, additionally ≤ ±0.1 % of 20 mA
Voltage output	Like pulse output, additionally ≤ ±0.1 % of 10 V
Reproducibility	≤ ±0.5 % of measured value ^a ±0.03 % of flow _{max}
Temperature drift	≤ ±0.15% of measured value ^a per 10 K temperature change (at -20 to +80° C)
Response time t ₉₀	≤ 2 s

^a Under reference conditions.

Reference conditions

Measurement medium	Water
Medium temperature	23 °C (73 °F) ±5 K
Ambient temperature	23 °C (73 °F) ±5 K
Medium pressure	1 to 4 bar
Meter run	Horizontal installation, compliance with the required inlet and outlet sections

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Output

Analog output

Type	Current output
Function	Output of the current flow rate, output of a signal for error messages, display via device status LED
Signal range	4 to 20 mA
Signal limits	3.8 to 20.5 mA
Error message	3.4 or 22 mA (default settings: 3.4 mA)
Temperature influence	75 ppm/K
Burden	$\leq 500 \Omega$
Burden influence	$\leq \pm 0.02 \%$ per 100 Ω

Type	Voltage output (optionally)
Function	Output of the current flow rate, output of a signal for error messages, display via device status LED
Signal range	DC 0 to 10 V
Signal limits	DC 0 to 10.3 V
Error message	DC 0 or 11 V (default settings: 0 V)
Temperature influence	75 ppm/K
Burden	$\geq 700 \Omega$
Burden influence	$\leq \pm 0.02 \%$ per 100 Ω

Digital output

Type	Transistor output
Function	Pulse output
Switching output	Push-Pull, PNP/NPN (optionally)
Ampacity	$\leq 200 \text{ mA}$
Voltage drop	$\leq 2 \text{ V}$
Protection	Against polarity reversal, short circuiting and overload
Pulse frequency	0 to 10 kHz
Duty cycle	50 %
Output value at nominal width	Pulses per Liter (l)
DN 15 (Low-flow calibration)	10000
DN 15	4800
DN 20	2850
DN 25	1875
DN 32	1150

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Electrical data

Voltage supply	DC 18 to 30 V SELV, PELV, Class 2
Current consumption	50 mA, with digital output 300 mA
Power consumption	≤ 10 W
Protection rating	DIN EN 61140, Class III (protective low voltage)
Electrical safety	The device must be equipped with an electrical circuit that meets the requirements of DIN EN 61010-1 with regard to "Limited-energy circuits".

Mechanical features

Materials

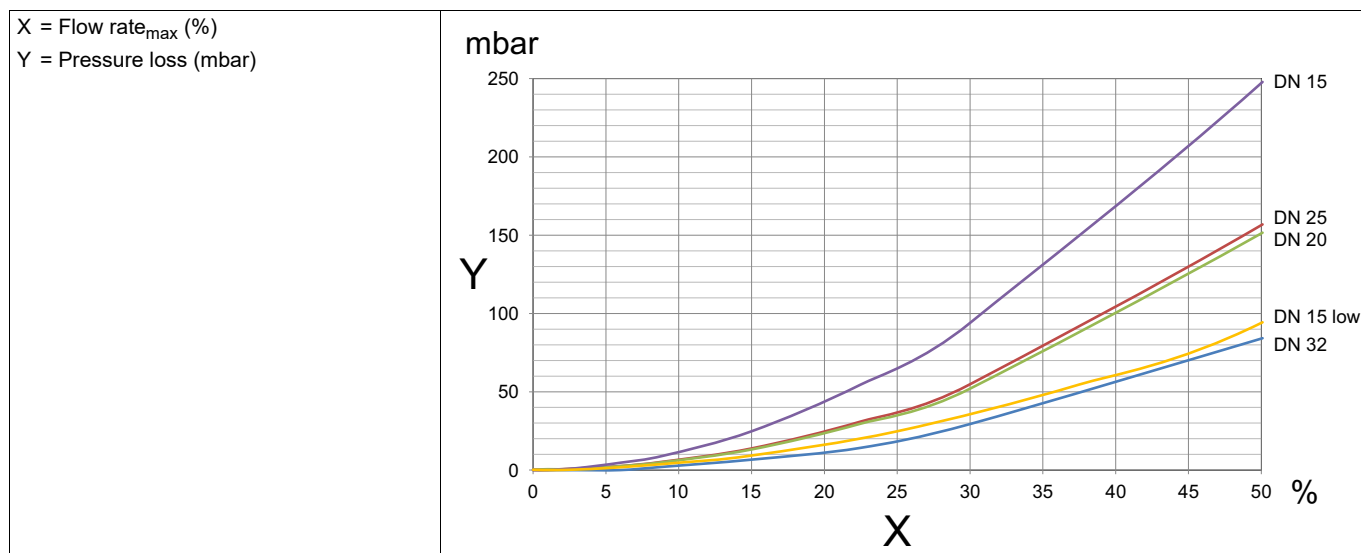
Housing	PA66-GF25
Components in contact with the medium	
Meter run	PPSU
Transducer	PEEK
Seals	
Process connection, transducer	EPDM or FKM (optionally)
Approvals	
Components in contact with the medium	Drinking water certified materials (when using EPDM seals)

Nominal pressure

Nominal pressure levels	PN 16
-------------------------	-------

Pressure loss diagram

Created under reference conditions ⇒ "Reference conditions", Page 2.



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Measurement media

Medium type	Conductive or non-conductive liquids
Viscosity	≤ 100 mPas
Foreign matter content	
Solids	≤ 5 % vol
Gases	≤ 1 % vol
Medium temperature	
Temperature range	-20 to +95 °C
within the accuracy specifications	-20 to +80 °C
outside of the accuracy specifications ^a	> 80 to 95 °C

^a Return to the accuracy specifications after cooling down.

Environmental influences

Admissible ambient temperature	DIN 60068-2-1, DIN 60068-2-2
at a medium temperature of ≤ 80 °C	-20 to +70 °C
at a medium temperature of > 80 °C	-20 to +45 °C
Climatic conditions	DIN EN 60721-3-1, DIN EN 60721-3-3, DIN EN 60068-2-78
Climate class	3K6
Temperature range	-20 to +55 °C
Relative humidity	≤ 100 % – Condensation on device outer shell
Protection type	DIN EN 60529, EN 50102
	IP65, IP67
Electromagnetic compatibility (EMC)	DIN EN 61326-1, DIN EN 61326-2-3
Interference emission	Class B ^a
Interference immunity	Industrial requirements
Vibration resistance	DIN EN 60068-2-6, DIN EN 60068-2-27
Vibration resistance	5 g at 10 to 2000 Hz
Shock resistance	20 g over 11 ms
Pressure Equipment Directive	2014/68/EU
Group 1 fluids - DN ≤ 25	Sound engineering practice acc. to Art. 4, para. 3 i. c. w. Art. 4 para. 1c.i
Group 2 fluids - DN ≤ 32	Sound engineering practice acc. to Art. 4, para. 3 i. c. w. Art. 4 para. 1c.i
Group 1 fluids	Sound engineering practice acc. to Art. 4, para. 3 i. c. w. Art. 4 para. 1c.ii

^a The product is suitable for industrial use as well as for households and small businesses.

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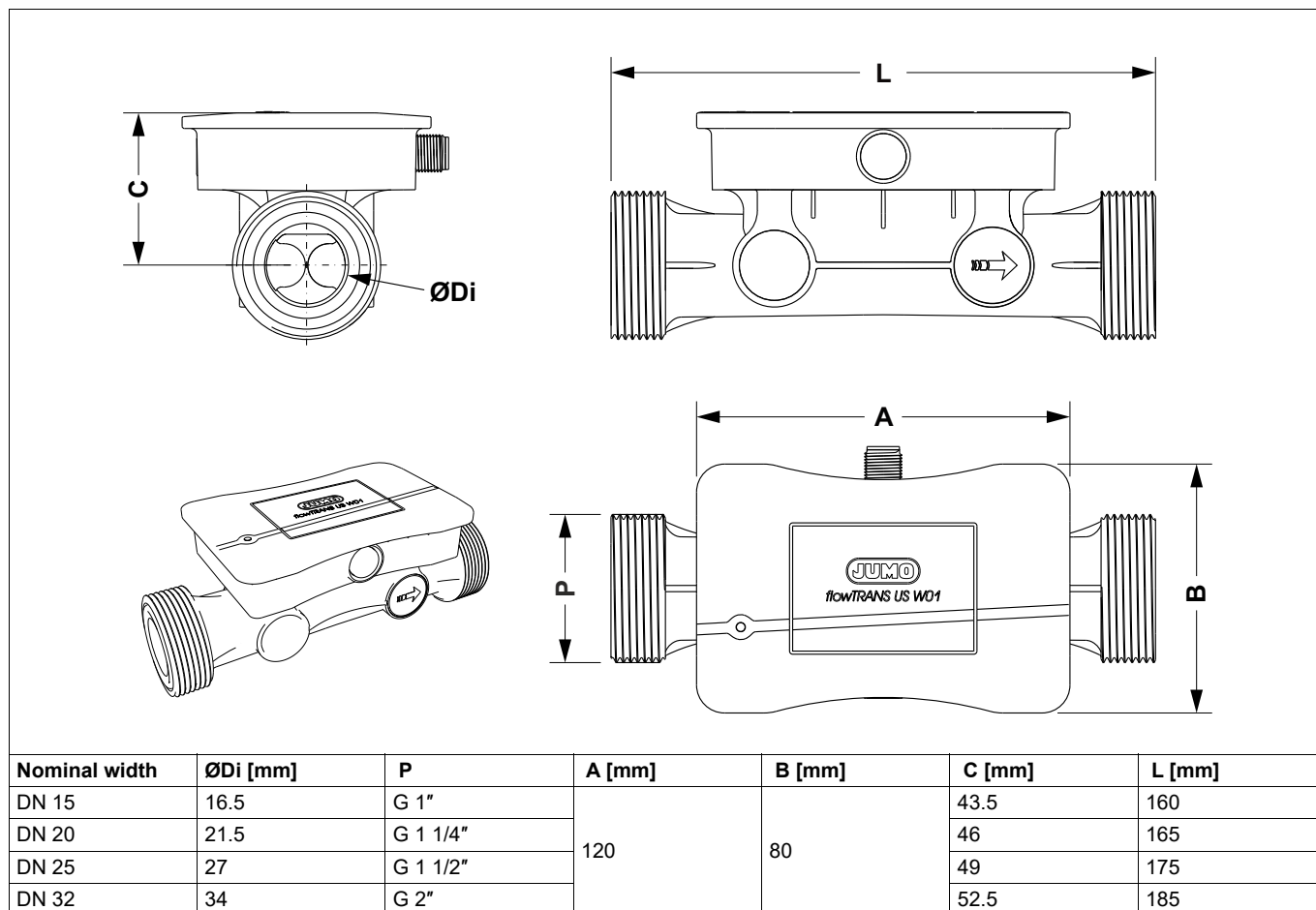
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Dimensions

Device



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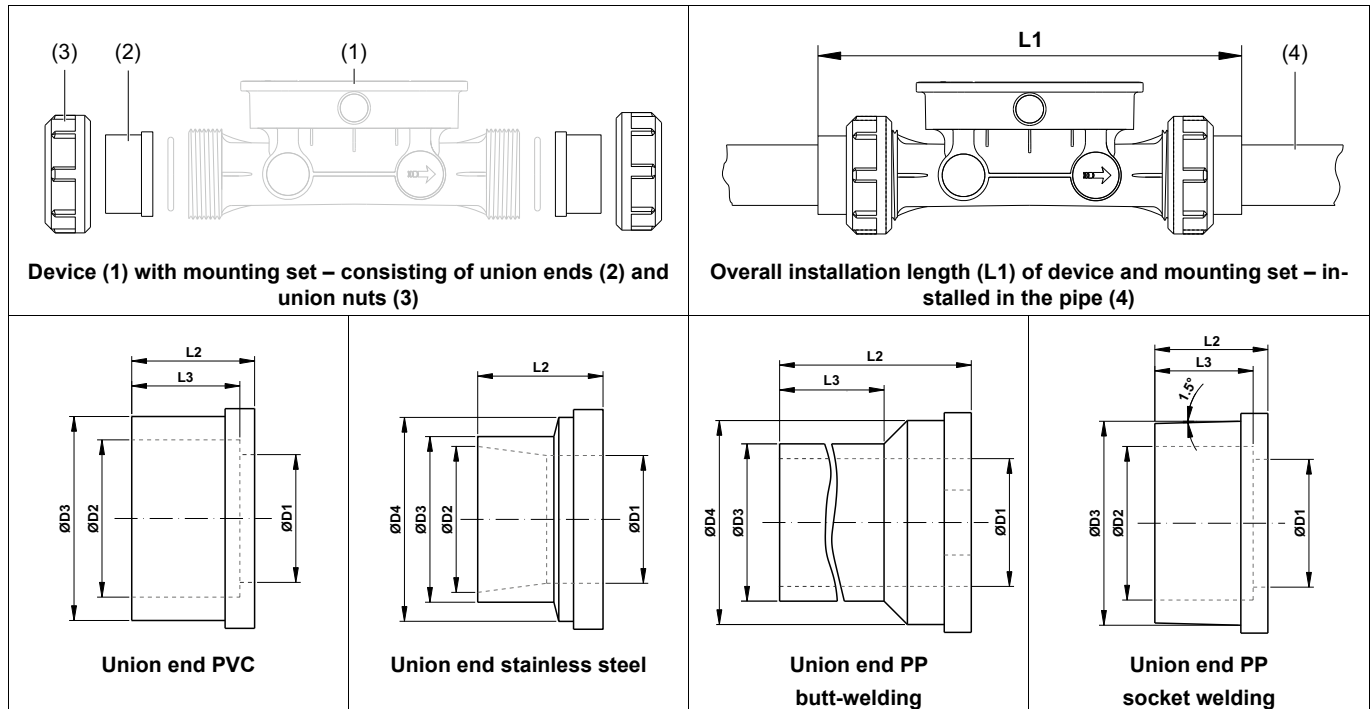
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Installation accessories

Mounting sets – DN 15 to DN 32



Nominal width	ØD1 [mm]	ØD2 [mm]	ØD3 [mm]	ØD4 [mm]	L1 [mm]	L2 [mm]	L3 [mm]
Union end PVC							
DN 15 to DN 10	10.5	16	23.5	27.5	203	24	16
DN 15	15	20	27.5	-	198	19	16
DN 20	22	25	36	-	209	22	19
DN 25	26	32	41.5	-	225	25	22
DN 32	33	40	53	-	243	29	26
Union end stainless steel							
DN 15 to DN 10	10.5	16	23.5	27.5	203	24	16
DN 15	15	17.3	21.3	27.5	203	21.5	-
DN 20	22	22.9	26.9	36	210	22.5	-
DN 25	26	29.7	33.7	41.5	226	25.5	-
DN 32	33	38.4	42.4	53	236	25.5	-
Union end PP butt-welding							
DN 15	15/16.2	-	20	27.5	266	53	37.75
DN 20	19.8	-	25	36	277.8	56.4	38.6
DN 25	26	-	32	41.5	293	59	41.25
DN 32	32.6	-	40	53	310.6	62.8	41.8
Union end PP socket-welding							
DN 15	17	19.35	27.5	-	198	19	16
DN 20	21	24.3	36	-	207	21	18
DN 25	26	31.25	41.5	-	221	23	20
DN 32	33	39.2	53	-	235	25	22

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Installation notes

The installation notes in the data sheet provide information on product selection.

For the mechanical connection, only use the installation instructions or the operating manual.

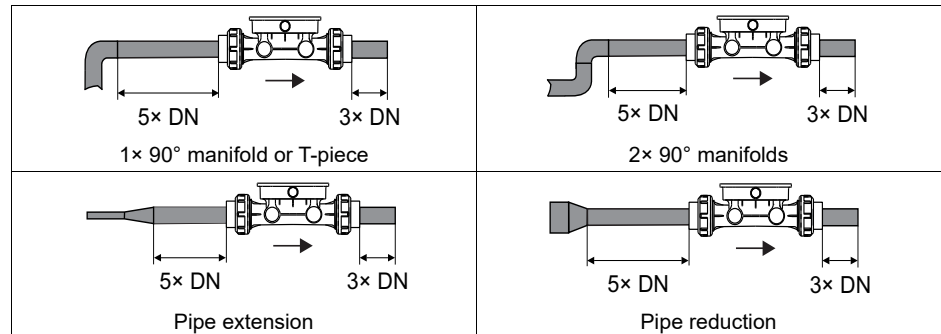
Inlet and outlet sections

To calm the flow in the pipeline, the specified inlet and outlet sections are required at the very least.

For increased accuracy, the inlet and outlet sections can be made longer.

DN = Nominal pipe width

→ = Flow direction

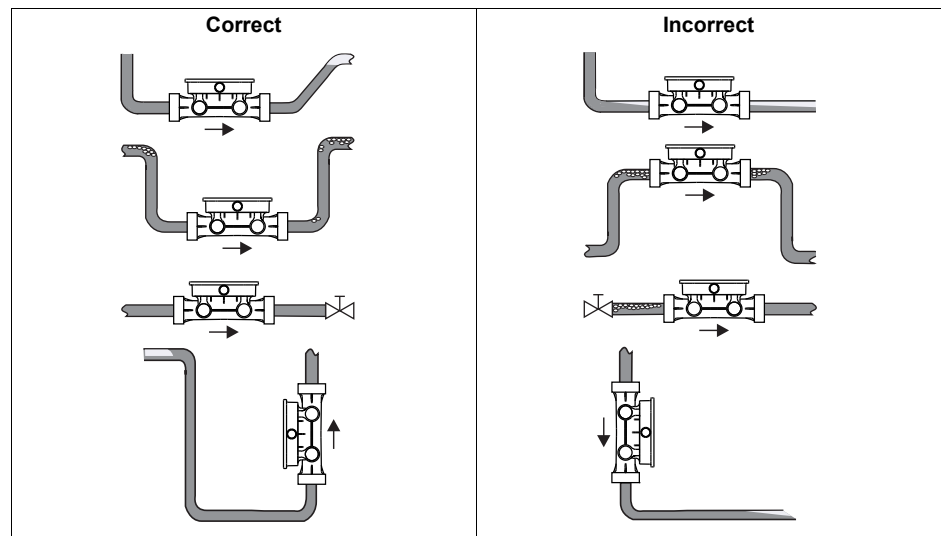


Installation position

Mount the device in either the horizontal or vertical pipe.

Requirements:

- The pipe around the transducers must be filled.
- The flow direction (→) must run upward when mounting vertically.
- Avoid the formation of air bubbles in the pipe and right at the device.



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Connection elements

The connection elements in the data sheet provide information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

Pin assignment of the M12 connector

Connection	Device	Connecting cable ^a
Pin assignment and color coding ^b Figure		
Voltage supply V+ (DC 24 V)	(1)	(1) – BN (brown)
Analog output	(2)	(2) – WH (white)
GND	(3)	(3) – BU (blue)
Digital output	(4)	(4) – BK (black)
Connection type	Plug connector M12	Plug connector M12 with screw locking

^a Connecting cable for plug connector M12 ⇨ "Spare parts and accessories", Page 11.

^b The color coding is only valid for A-coded standard cables!

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Order details

	(1) Basic type
406050	JUMO flowTRANS US W01
	(2) Basic type extension
000	None
	(3) Nominal width
0012	DN 15 (1/2") with Low-flow-calibration
0015	DN 15 (1/2")
0020	DN 20 (3/4")
0025	DN 25 (1")
0032	DN 32 (1 1/4")
	(4) Material sensor
121	PPSU
	(5) Process connection
32	External thread ISO 228
	(6) Mat. seals sensor
58	EPDM
	(7) Signal inputs and outputs
12	Pulse, 4 to 20 mA
	(8) Extra codes
000	None
100	Customer-specific configuration (specifications in plain text)

Order code (1) (2) (3) (4) (5) (6) (7) (8) ...^a
 Order example 406050 / 000 - 0015 - 121 - 32 - 58 - 12 / 000

^a List extra codes in sequence and separate using commas.

Scope of delivery

1× JUMO flowTRANS US W01 – Device in the ordered version, including test certificate
2× O-ring (seal for the process connection) in the ordered version
1× JUMO flowTRANS US W01 operating manual

Stock versions

Order code	Part no.
406050/000-0012-121-32-58-12/000	00749926
406050/000-0015-121-32-58-12/000	00744920
406050/000-0020-121-32-58-12/000	00744932
406050/000-0025-121-32-58-12/000	00744899
406050/000-0032-121-32-58-12/000	00744941

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Spare parts and accessories

Product name	Part no.
Installation accessories	
Mounting set PVC DN 15 with PP-Nut	00750871
Mounting set PVC DN 20 with PP-Nut	00750872
Mounting set PVC DN 25 with PP-Nut	00750874
Mounting set PVC DN 32 with PP-Nut	00750876
Mounting set PP socket-welding DN 15	00750888
Mounting set PP socket-welding DN 20	00750890
Mounting set PP socket-welding DN 25	00750927
Mounting set PP socket-welding DN 32	00750926
Mounting set PP butt-welding DN 15	00750878
Mounting set PP butt-welding DN 20	00750881
Mounting set PP butt-welding DN 25	00750884
Mounting set PP butt-welding DN 32	00750887
Mounting set stainless steel DN 15 with PP-Nut	00750923
Mounting set stainless steel DN 20 with PP-Nut	00750920
Mounting set stainless steel DN 25 with PP-Nut	00750919
Mounting set stainless steel DN 32 with PP-Nut	00750918
Mounting set PVC DN 10 with PP-Nut	00750869
Mounting set stainless steel DN 10 with PP-Nut	00750924
Connecting cable for plug connector M12	
Cable socket, straight, 4-pole, M12 × 1, 2m	00404585
Cable socket, angled, 4-pole, M12 × 1, 2m	00409334

Further information on this chapter:

Installation accessories	⇒ "Installation accessories", Page 7
Connecting cable for plug connector M12	⇒ "Pin assignment of the M12 connector", Page 9

Further information and downloads



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JUMO flowTRANS MAG S10

Electromagnetic flowmeter

Brief description

The electromagnetic JUMO flowTRANS MAG S10 flowmeter has been designed and developed for standard applications in the processing industry and mechanical engineering.

It features a high degree of flexibility and is available in a wide range of nominal diameters, lining materials and process connection.

The high-performance, reliable transmitter stands out because it can be used in various applications while offering a high level of measuring accuracy and ease of commissioning. Users are afforded a cost-effective and customized flowmeter with the JUMO flowTRANS MAG S10, complete with a clear and straightforward documentation.



Type 406060/1... Variant 2

Model variants

Integral mount design

The transmitter and the flow sensor form a mechanical unit in devices featuring a compact (integral mount) design.

Remote mount design

The transmitter and the flow sensor are mounted physically separated from one another in devices featuring a separate (remote mount) design.

The electrical connection between the transmitter and the sensor is provided by a signal cable. With a minimum conductivity of 20 µS/cm of the medium being measured, a maximum signal cable length of 50 m (164 ft) is possible.

JUMO flowTRANS MAG S10 flow sensors are available in two different versions, variant 1 and variant 2.

Refer to **Overview – models** on page 2.

Customer benefits

- Integral or remote mount design
- Uniform transmitter electronics for all versions
- Rotatable LCD display (optional) can be operated via capacitive control buttons
- Ongoing self-monitoring of sensor, transmitter and process
- Diagnostics-related help texts for the quick and target-oriented elimination of errors (e. g. empty pipe detection)

Features

- Ease of use
- Verification option based on fingerprint technology
- Display of service interval
- Nominal pressure ratings:
PN 10 to PN 40, ASME CL150/CL300, JIS 10K
- Various process connection and lining materials
- Temperature range of medium:
-25 to +130 °C (-13 to +266 °F)

Approvals/Certification marks



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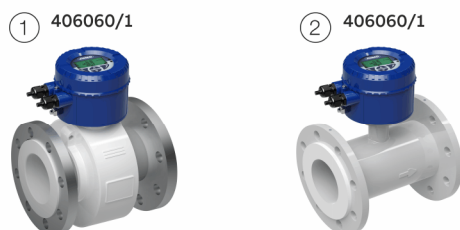
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Overview – models

Sensor

Integral mount design



Remote mount design



- ① Sensor housing for variant 1 (double shell housing) - DN 3 to 2000
 ② Sensor housing for variant 2 - DN 25 to 600

- ③ External transmitter

Figure 1: Designs

Sensor	
Model	JUMO flowTRANS MAG S10
Design	Integral mount design (406060/1), remote mount design (406060/2)
Measuring accuracy for liquids	0.5 % of rate
Permissible temperature of the medium being measured (Tmedium)	-25 to 130 °C (-13 to 266 °F)
Minimum conductivity	> 20 µS/cm
Nominal pressure rating	PN 10 to 40; ASME CL 150, 300; JIS 10K
Nominal diameter	DN 3 to 2000 (1/10 to 80 in.)
Process connection	Flange* acc. to DIN, ASME, JIS
Process connection material	Steel, cast steel, stainless steel
Lining material	Hard rubber (DN 15 to 2000), soft rubber (DN 50 to 2000), PTFE (DN 10 to 600), PFA (DN 3 to 200), ETFE (DN 25 to 600)
Electrode material	Stainless steel, Hastelloy B, Hastelloy C, platinum-iridium, tantalum, titanium
IP degree of protection	Integral mount design: IP 65 / IP 67 Remote mount design: IP 65 / IP 67 / IP 68 (only for sensors)

Approvals

Pressure Equipment Directive 2014/68/EU	Conformity assessment in accordance with category III, fluid group 1
Further approvals	Are available in the download section at www.jumo.de , or on request.

* For information regarding flange thicknesses, see **Dimensions** on page 16.

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Transmitter

Model	JUMO flowTRANS MAG 10
Design	Remote mount design (406067/2)
IP degree of protection	IP 65 / IP 67
Signal cable length	Maximum 50 m (164 ft), remote mount design only
Power supply	100 to 240 V AC (–15% / +10 %), 24 to 48 V DC (–10% / +10 %)
Outputs	Current output: 4 to 20 mA, active Digital output 1: Passive, can be configured as pulse, frequency or switching output Digital output 2: Passive, can be configured as pulse or switching output
Local display	Graphical display, can be configured (optional)

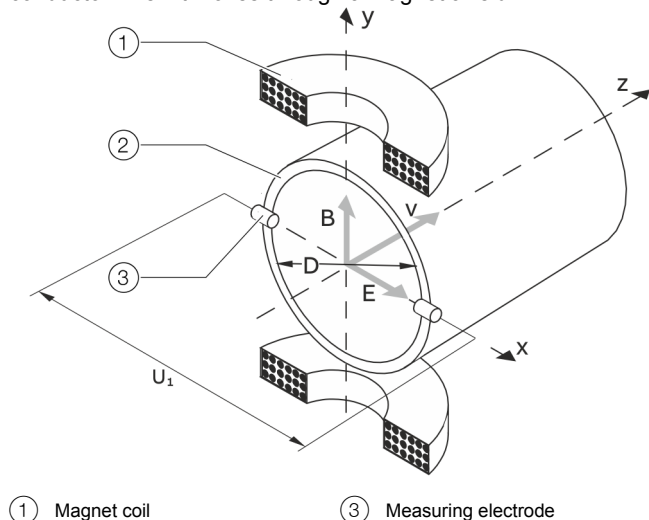
Approvals

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Measuring principle

Measurements performed by the electromagnetic flowmeter are based on Faraday's law of induction. A voltage is generated in a conductor when it moves through a magnetic field.



- ① Magnet coil
 ② Measuring tube in electrode plane
 ③ Measuring electrode

Figure 2: Electromagnetic flowmeter diagram

$U_1 \sim B \times D \times v$	$qv = \frac{D^2 \times \pi}{4} \times v$	$U_1 \sim qv$
U_1 Measuring span	v Average flow velocity	
B Magnetic induction	qv Volume flow rate	
D Electrode spacing		

With the device-relevant application of this measuring principle, a conductive measuring medium flows through a tube in which a magnetic field is generated perpendicular to the flow direction (see Figure 2).

The voltage induced in the measuring medium is tapped by two diametrically opposed electrodes. This measurement voltage is proportional to the magnetic induction, the electrode spacing and the average medium velocity.

Taking into account that the magnetic induction and the electrode spacing are constant values results in a proportion between the measurement voltage U_1 and the average medium velocity.

From the calculation of the volume flow rate follows that the measurement voltage is linear and proportional to the volume flow rate

The induced voltage is converted by the transmitter to standardized, analog and digital signals.

Flowmeter sensor

Measuring accuracy

Reference conditions

In accordance with EN 29104

Temperature of medium being measured	20 °C (68 °F) ±2 K
Ambient temperature	20 °C (68 °F) ±2 K
Power supply	Rated voltage as per rating plate $U = \pm 1\%$; frequency $f = \pm 1\%$
Installation conditions	<ul style="list-style-type: none"> Upstream: > 10 x DN straight section Downstream: > 5 x DN straight section
Warm-up phase	30 minutes

Measurement value deviation and reproducibility

Measuring accuracy

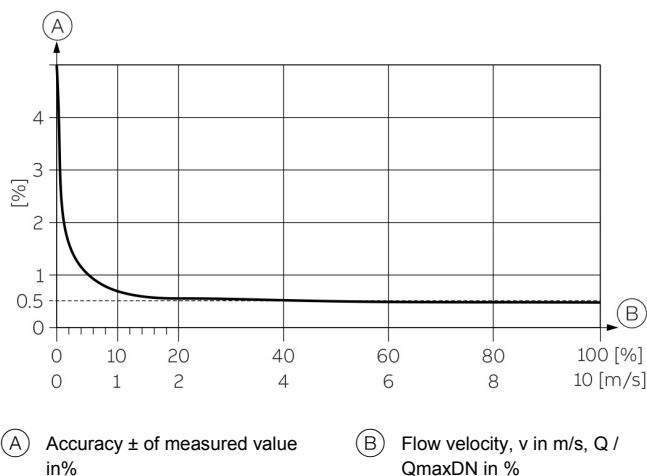


Figure 3: Measuring accuracy

Pulse output

±0.5 % of measured value, ±0.02 % Q_{maxDN} *

* Q_{maxDN} : Refer to **Measuring range table** on page 7.

Current output

Same as pulse output plus ± 0.1 % of measured value ± 0.01 mA.

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Reproducibility, response time

Reproducibility $\leq 0.11\%$ of measured value, $t_{\text{meas}} = 100\text{ s}$,
 $v = 0.5$ to 10 m/s

Response time* As step function, 0 to 99 %
 $5\tau \geq 200\text{ ms}$ at 25 Hz excitation frequency
 $5\tau \geq 400\text{ ms}$ at 12.5 Hz excitation frequency
 $5\tau \geq 500\text{ ms}$ at 6.25 Hz excitation frequency

* For current output with damping of 0.02 seconds.

Permitted pipe vibration

In accordance with EN 60068-2-6

Valid for sensors in remote mount and integral mount design.

- Maximum deflection: 0.15 mm (0.006 in) in the frequency range of 10 to 58 Hz
- Maximum acceleration: 2 g in the frequency range of 58 to 150 Hz

IP degree of protection

- IP 65 / IP 67 in accordance with EN 60529
- IP 68 in accordance with EN 60529 (for remote mount design only)
- NEMA 4X

Signal cables

Only for remote mount design.

The maximum signal cable length between the flow sensor and the transmitter is 50 m (164 ft).

A 5 m (16.4 ft) long signal cable is included in the standard scope of supply.

Should a signal cable longer than 5 m (16.4 ft) be required, this can be ordered separately (part number: 00645914).

Temperature data

Storage temperature range

-30 to 70 °C (-22 to 158 °F)

The temperature range offered by the device is dependent on a number of different factors.

These factors include the measuring medium temperature

T_{medium} , the ambient temperature T_{amb} , operating pressure

P_{medium} , liner material and the approval for explosion protection.

Maximum permissible cleaning temperature

CIP media	Liner	Cleaning temperature
Steam	PTFE, PFA	150 °C (302 °F)
Cleaning fluid	PTFE, PFA	140 °C (284 °F)

- The maximum cleaning temperature specified applies to a maximum ambient temperature of 25 °C (77 °F). If the ambient temperature up-scales > 25 °C (> 77 °F), then the temperature difference to the current temperature must be subtracted from the max. cleaning temperature.
- The specified cleaning temperature may have an effect for a maximum of 60 minutes.

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Maximum ambient temperature depending on measuring medium temperature

Integral mount design

Liner material	Flange material	Ambient temperature (T _{amb.})		Temperature of medium being measured (T _{medium})	
		Minimum	Maximum	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	85 °C (185 °F)*
Hard rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	85 °C (185 °F)*
Soft rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	60 °C (140 °F)
Soft rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	85 °C (185 °F)
		-10 °C (14 °F)	30 °C (86 °F)	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-20 °C (-4 °F)	60 °C (140 °F)	-25 °C (-13 °F)	85 °C (185 °F)
		-20 °C (-4 °F)	30 °C (86 °F)	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	85 °C (185 °F)
		-10 °C (14 °F)	30 °C (86 °F)	-10 °C (14 °F)	130 °C (266 °F)
PFA	Stainless steel	-20 °C (-4 °F)	60 °C (140 °F)	-25 °C (-13 °F)	85 °C (185 °F)
		-20 °C (-4 °F)	30 °C (86 °F)	-25 °C (-13 °F)	130 °C (266 °F)
ETFE	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	85 °C (185 °F)
		-10 °C (14 °F)	30 °C (86 °F)	-10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	-20 °C (-4 °F)	60 °C (140 °F)	-25 °C (-13 °F)	85 °C (185 °F)
		-20 °C (-4 °F)	30 °C (86 °F)	-25 °C (-13 °F)	130 °C (266 °F)

* For variant 2 sensors lined with hard rubber, a reduced maximum temperature of 80 °C (176 °F) applies to the medium being measured.

Remote mount design

Liner material	Flange material	Ambient temperature (T _{amb.})		Temperature of medium being measured (T _{medium})	
		Minimum	Maximum	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	90 °C (194 °F)*
Hard rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	90 °C (194 °F)*
Soft rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	60 °C (140 °F)
Soft rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-25 °C (-13 °F)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
PFA	Stainless steel	-25 °C (-13 °F)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
ETFE	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	-25 °C (-13 °F)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)

* For variant 2 sensors lined with hard rubber, a reduced maximum temperature of 80 °C (176 °F) applies to the medium being measured.

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Measuring range table

The full-scale value can be set between $0.02 \times Q_{\max} \text{ DN}$ and $2 \times Q_{\max} \text{ DN}$.

Nominal diameter		Lower range value	$Q_{\max} \text{ DN}$	Upper range value
DN	in.	$0.02 \times Q_{\max} \text{ DN} (\approx 0.2 \text{ m/s})$	0 to $\approx 10 \text{ m/s}$	$2 \times Q_{\max} \text{ DN} (\approx 20 \text{ m/s})$
3	$\frac{1}{10}$	0.08 l/min (0.02 US gal/min)	4 l/min (1.06 US gal/min)	8 l/min (2.11 US gal/min)
4	$\frac{5}{32}$	0.16 l/min (0.04 US gal/min)	8 l/min (2.11 US gal/min)	16 l/min (4.23 US gal/min)
6	$\frac{1}{4}$	0.4 l/min (0.11 US gal/min)	20 l/min (5.28 US gal/min)	40 l/min (10.57 US gal/min)
8	$\frac{5}{16}$	0.6 l/min (0.16 US gal/min)	30 l/min (7.93 US gal/min)	60 l/min (15.85 US gal/min)
10	$\frac{3}{8}$	0.9 l/min (0.24 US gal/min)	45 l/min (11.9 US gal/min)	90 l/min (23.78 US gal/min)
15	$\frac{1}{2}$	2 l/min (0.53 US gal/min)	100 l/min (26.4 US gal/min)	200 l/min (52.8 US gal/min)
20	$\frac{3}{4}$	3 l/min (0.79 US gal/min)	150 l/min (39.6 US gal/min)	300 l/min (79.3 US gal/min)
25	1	4 l/min (1.06 US gal/min)	200 l/min (52.8 US gal/min)	400 l/min (106 US gal/min)
32	1 $\frac{1}{4}$	8 l/min (2.11 US gal/min)	400 l/min (106 US gal/min)	800 l/min (211 US gal/min)
40	1 $\frac{1}{2}$	12 l/min (3.17 US gal/min)	600 l/min (159 US gal/min)	1200 l/min (317 US gal/min)
50	2	1.2 m ³ /h (5.28 US gal/min)	60 m ³ /h (264 US gal/min)	120 m ³ /h (528 US gal/min)
65	2 $\frac{1}{2}$	2.4 m ³ /h (10.57 US gal/min)	120 m ³ /h (528 US gal/min)	240 m ³ /h (1057 US gal/min)
80	3	3.6 m ³ /h (15.9 US gal/min)	180 m ³ /h (793 US gal/min)	360 m ³ /h (1585 US gal/min)
100	4	4.8 m ³ /h (21.1 US gal/min)	240 m ³ /h (1057 US gal/min)	480 m ³ /h (2113 US gal/min)
125	5	8.4 m ³ /h (37 US gal/min)	420 m ³ /h (1849 US gal/min)	840 m ³ /h (3698 US gal/min)
150	6	12 m ³ /h (52.8 US gal/min)	600 m ³ /h (2642 US gal/min)	1200 m ³ /h (5283 US gal/min)
200	8	21.6 m ³ /h (95.1 US gal/min)	1080 m ³ /h (4755 US gal/min)	2160 m ³ /h (9510 US gal/min)
250	10	36 m ³ /h (159 US gal/min)	1800 m ³ /h (7925 US gal/min)	3600 m ³ /h (15850 US gal/min)
300	12	48 m ³ /h (211 US gal/min)	2400 m ³ /h (10567 US gal/min)	4800 m ³ /h (21134 US gal/min)
350	14	66 m ³ /h (291 US gal/min)	3300 m ³ /h (14529 US gal/min)	6600 m ³ /h (29059 US gal/min)
400	16	90 m ³ /h (396 US gal/min)	4500 m ³ /h (19813 US gal/min)	9000 m ³ /h (39626 US gal/min)
450	18	120 m ³ /h (528 US gal/min)	6000 m ³ /h (26417 US gal/min)	12000 m ³ /h (52834 US gal/min)
500	20	132 m ³ /h (581 US gal/min)	6600 m ³ /h (29059 US gal/min)	13200 m ³ /h (58117 US gal/min)
600	24	192 m ³ /h (845 US gal/min)	9600 m ³ /h (42268 US gal/min)	19200 m ³ /h (84535 US gal/min)
700	28	264 m ³ /h (1162 US gal/min)	13200 m ³ /h (58118 US gal/min)	26400 m ³ /h (116236 US gal/min)
760	30	312 m ³ /h (1374 US gal/min)	15600 m ³ /h (68685 US gal/min)	31200 m ³ /h (137369 US gal/min)
800	32	360 m ³ /h (1585 US gal/min)	18000 m ³ /h (79252 US gal/min)	36000 m ³ /h (158503 US gal/min)
900	36	480 m ³ /h (2113 US gal/min)	24000 m ³ /h (105669 US gal/min)	48000 m ³ /h (211337 US gal/min)
1000	40	540 m ³ /h (2378 US gal/min)	27000 m ³ /h (118877 US gal/min)	54000 m ³ /h (237754 US gal/min)
1050	42	616 m ³ /h (2712 US gal/min)	30800 m ³ /h (135608 US gal/min)	61600 m ³ /h (271217 US gal/min)
1100	44	660 m ³ /h (3038 US gal/min)	33000 m ³ /h (151899 US gal/min)	66000 m ³ /h (290589 US gal/min)
1200	48	840 m ³ /h (3698 US gal/min)	42000 m ³ /h (184920 US gal/min)	84000 m ³ /h (369841 US gal/min)
1400	54	1080 m ³ /h (4755 US gal/min)	54000 m ³ /h (237755 US gal/min)	108000 m ³ /h (475510 US gal/min)
1500	60	1260 m ³ /h (5548 US gal/min)	63000 m ³ /h (277381 US gal/min)	126000 m ³ /h (554761 US gal/min)
1600	66	1440 m ³ /h (6340 US gal/min)	72000 m ³ /h (317006 US gal/min)	144000 m ³ /h (634013 US gal/min)
1800	72	1800 m ³ /h (7925 US gal/min)	90000 m ³ /h (396258 US gal/min)	180000 m ³ /h (792516 US gal/min)
2000	80	2280 m ³ /h (10039 US gal/min)	114000 m ³ /h (501927 US gal/min)	228000 m ³ /h (1003853 US gal/min)

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Process connections

For an overview of available process connection versions, see **Overview – models** on page 2.

Insertion length

The flange devices comply with the installation lengths specified in ISO 13359, or according to DVGW (process sheet W420, design WP, ISO 4064 short).

For further details, refer to chapter **Dimensions** on page 16.

Materials

Parts in contact with the medium

Part	Standard	Option
Liner material	PTFE, PFA, ETFE, hard rubber, soft rubber	–
Measurement and grounding electrode with liner material:		
• Hard rubber	CrNi steel 1.4571 (AISI 316Ti)	Hastelloy B-3 (2.4600), Hastelloy C-4 (2.4610), titanium, tantalum, platinum-iridium, CrNi steel 1.4539 (AISI 904L)
• PTFE, PFA, ETFE	CrNi steel 1.4539 (AISI 904L)	CrNi steel 1.4571 (AISI 316Ti), Hastelloy B-3 (2.4600), Hastelloy C-4 (2.4610), titanium, tantalum, platinum-iridium
Grounding plate	Stainless steel	On request
Protective pane	Stainless steel	On request

Parts that do not come into contact with medium (process connection)

DN	Standard	Option
Sensor, variant 1		
DN 3 to 15 ($\frac{1}{10}$ to $\frac{1}{2}$ in.)	Stainless steel*	–
DN 20 to 400 ($\frac{3}{4}$ to 16 in.)	Steel (galvanized)**	Stainless steel ¹
DN 450 to 2000 (18 to 80 in.)	Steel (painted)**	–
Sensor, variant 2		
DN 25 to 600 (1 to 24 in.)	Steel (painted)**	–
	Cast steel (painted)***	

The process connections are made of one of the materials listed below:

- * 1.4301 (AISI 304), 1.4307, 1.4404 (AISI 316L), 1.4435 (AISI 316L), 1.4541 (AISI 321), 1.4571 (AISI 316Ti)
- * 1.0038, 1.0460, 1.0570, 1.0432, ASTM A105, Q255A, 20#, 16Mn
- * EN-JS1025 (5.3103)

Sensor housing

Part / DN	Material
Sensor, variant 1	
Housing	
DN 3 to 400 ($\frac{1}{10}$ to 16 in.)	Cast aluminum (painted) Paint coat, $\geq 80 \mu\text{m}$ thick, RAL 9002
DN 450 to 2000 (18 to 80 in.)	Welded steel structure (painted) Paint coat, $\geq 80 \mu\text{m}$ thick, RAL 9002
Meter tube	Stainless steel*
Terminal box	Cast aluminum, Cobalt Blue, RAL 5013
Cable gland**	Polyamide

Sensor, variant 2

Housing / Meter tube	
DN 25 to 600 (1 to 24 in.)	Steel (painted), cast steel (painted)*** Paint coat, $\geq 80 \mu\text{m}$ thick, RAL 9002
Terminal box	Cast aluminum, Cobalt Blue, RAL 5013
Cable gland**	Polyamide

The meter tube is made of one of the materials listed below:

- * 1.4301, 1.4307, 1.4404, 1.4435, 1.4541, 1.4571

ASTM materials:

Grade TP304, TP304L, TP316L, TP321, TP316Ti, TP317L, 0Cr18Ni9, 00Cr18Ni10, 0Cr17Ni14Mo2, 0Cr27Ni12Mo3, 0Cr18Ni10Ti

- ** For a cable gland with M20 x 1.5 or NPT thread, select the appropriate part number.

- *** EN-JS1025 (5.3103)

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Material load for process connections

The limits of the permissible measuring medium temperature (T_{medium}) and permissible pressure (P_{medium}) are calculated on the basis of the liner and flange material used in the device (see device name plate).

Minimum permissible operating pressure

The minimum permissible operating pressure (P_{medium}) dependent on the temperature of the medium being measured (T_{medium}) and the liner material is indicated in the table below.

Sensor, variant 1

Liner material	Nominal diameter	P_{medium} [mbar abs]	T_{medium}^*
Hard rubber	DN 15 to 2000 (½ to 80 in.)	0	< 85 °C (185 °F)
Soft rubber	DN 50 to 2000 (2 to 80 in.)	0	< 60 °C (140 °F)
PTFE	DN 10 to 600 (⅜ to 24 in.)	270	< 20 °C (68 °F)
		400	< 100 °C (212 °F)
		500	< 130 °C (266 °F)
PFA	DN 3 to 200 (⅓ to 8 in.)	0	< 130 °C (266 °F)
ETFE	DN 25 to 600 (1 to 24 in.)	100	< 130 °C (266 °F)

Sensor, variant 2

Liner material	Nominal diameter	P_{medium} [mbar abs]	T_{medium}^*
Hard rubber	DN 40 to 600 (1 ½ to 24 in.)	600	< 80 °C (176 °F)
PTFE	DN 25 to 600 (1 to 24 in.)	270	< 20 °C (68 °F)
		400	< 100 °C (212 °F)
		500	< 130 °C (266 °F)

* For CIP/SIP cleaning, higher temperatures are permitted for limited periods; refer to table **Maximum permissible cleaning temperature** on page 5.

Approvals for liners available on request; please contact the manufacturer.

Material load

Sensor, variant 1

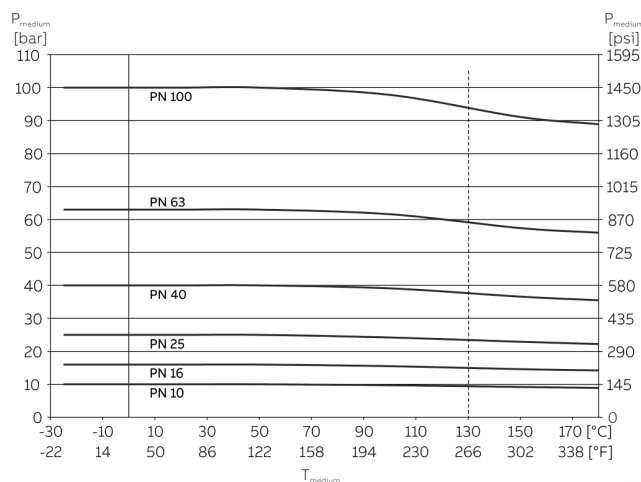


Figure 4: DIN flange, stainless steel up to DN 600 (24 in.)

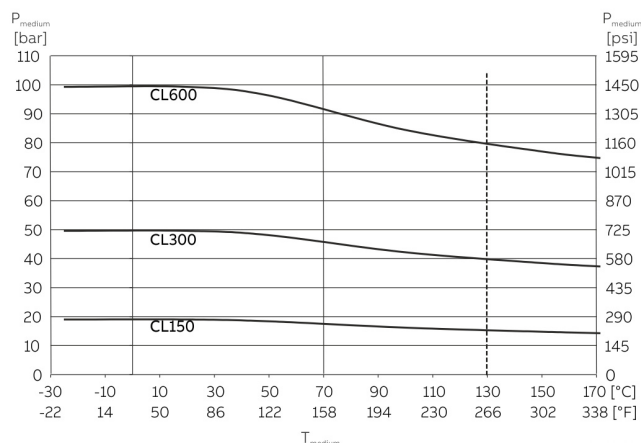


Figure 5: ASME flange, stainless steel up to DN 400 (16 in.) (CL150/300) and up to DN 1000 (40 in.) (CL150)

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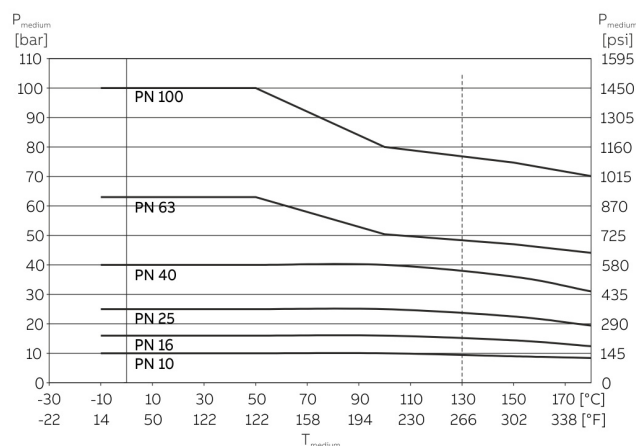


Figure 6: DIN flange, steel up to DN 600 (24 in.)

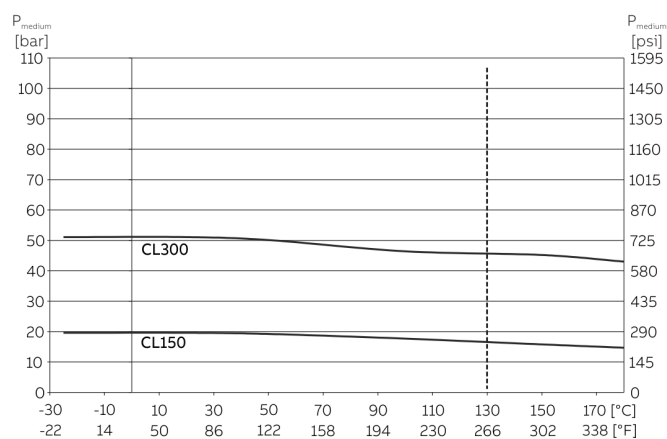
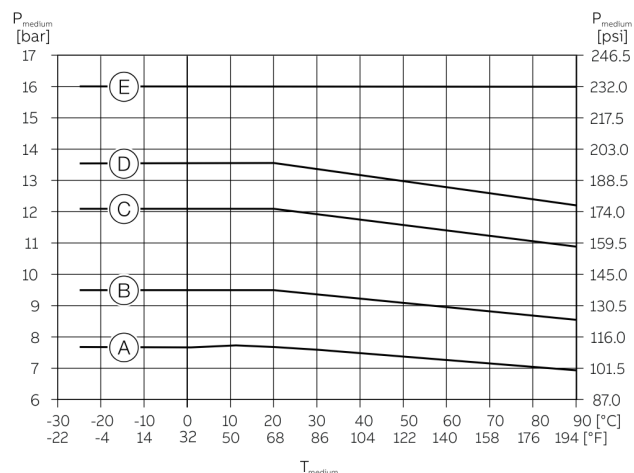


Figure 7: ASME flange, steel up to DN 400 (16 in.) (CL150/300); and up to DN 1000 (40 in.) (CL150)

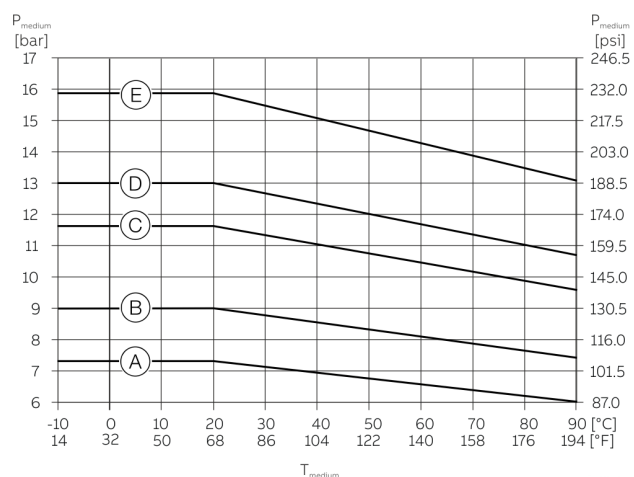
JIS 10K-B2210 flange

DN	Material	PN	T _{medium}	P _{medium}
DN 32 to 400 (1 ¼ to 16 in.)	Stainless steel	10	-25 to 180 °C (-13 to 356 °F)	10 bar (145 psi)
DN 32 to 400 (1 ¼ to 16 in.)	Steel	10	-10 to 180 °C (14 to 356 °F)	10 bar (145 psi)



- (A) DN 1000, PN 10
 (B) DN 700, DN800, DN900, PN 10
 (C) DN 1000, PN 16
 (D) DN 900, DN 800, PN 16
 (E) DN 700, PN 16

Figure 8: DIN flange, stainless steel, DN 700 to 1000 (28 to 40 in.)



- (A) DN 1000, PN 10
 (B) DN 700, DN800, DN900, PN 10
 (C) DN 1000, PN 16
 (D) DN 900, DN 800, PN 16
 (E) DN 700, PN 16

Figure 9: DIN flange, steel, DN 700 to 1000 (28 to 40 in.)

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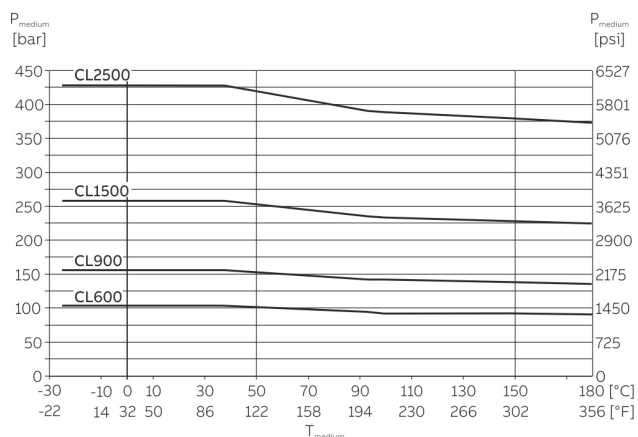


Figure 10: ASME flange, steel, DN 25 to 400 (1 to 24 in.)

Sensor, variant 2

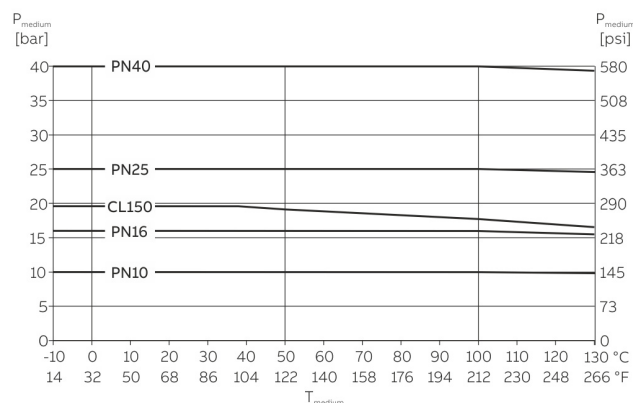


Figure 12: Cast steel housing, DN 25 to 600 (1 to 2 in.)

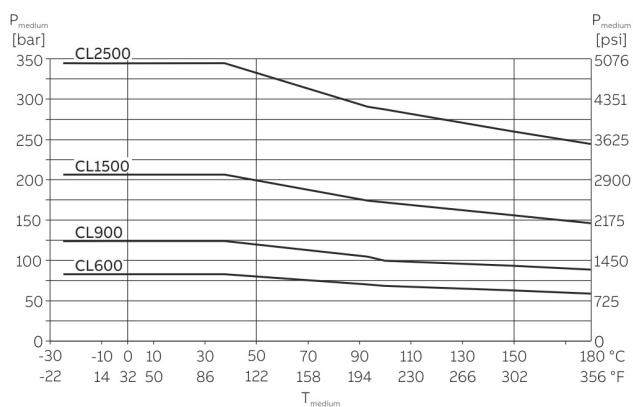


Figure 11: ASME flange, stainless steel, DN 25 to 400 (1 to 24 in.)

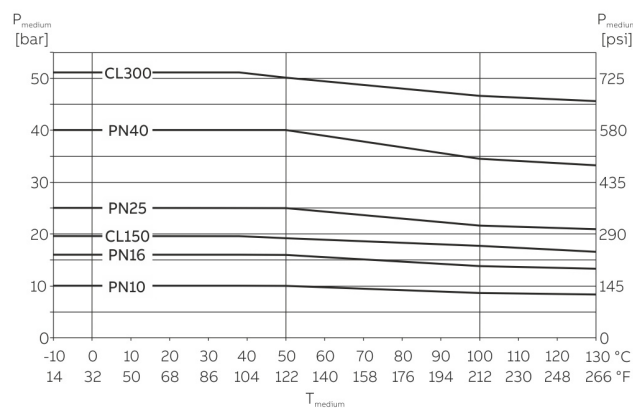


Figure 13: Welded steel housing, DN 25 to 600 (1 to 24 in.)



Installation conditions

General

Compliance with the following points is required for installation:

- Ensure that the flow direction corresponds to the marking, if there is one.
- Ensure that the maximum torque specification is maintained for all flange screws. See chapter **"Torque information" in the operating instruction..**
- Secure flange screws and nuts against pipe vibrations.
- Install devices without mechanical tension (torsion, bend).
- Install flange and wafer-type devices with coplanar counter flanges and use only appropriate gaskets.
- Use only gaskets made from a material that is compatible with the medium being measured and its temperature.
- Ensure that gaskets do not extend into the flow area since possible turbulence could influence the device accuracy.
- Ensure that no impermissible forces or moments act on the device owing to the piping.
- Ensure that the temperature limits for the device are being adhered to during operation.
- Avoid vacuum shocks in the piping. Vacuum shocks can destroy the liner and the device.
- Do not remove the plugs for the cable glands until you are ready to install the electrical cables.
- Make sure that the gaskets for the housing cover are seated properly. Carefully close the cover. Tighten the cover screws.
- Install the remote-mount transmitter at a location that is free of vibrations to a large extent.
- Do not expose the transmitter or the sensor to direct sunlight; provide protection from the sun as needed.
- Ensure that sufficient cooling is provided whenever installing the transmitter in a control cabinet.
- Ensure that the remote-mount transmitter and the associated sensor are correctly assigned (paired).
 Devices that form a pair have the same numeric suffix; e.g., the X001 sensor is paired with the Y001 transmitter or the X002 sensor is paired with the Y002 transmitter; this is indicated on the rating plate.

Brackets

NOTE

Potential damage to device!

Improperly placed support structures can result in a deformed housing and damage to the inner solenoids.

Place the support structures at the edge of the transmitter housing (see arrows in **Figure 14**).

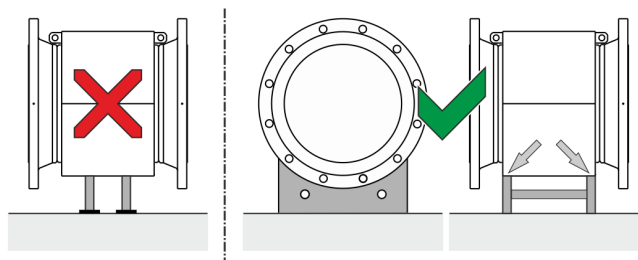


Figure 14: Support for nominal diameters larger than DN 400

Devices with nominal diameters larger than DN 400 must be mounted on a sufficiently strong foundation with support.

Gaskets

The following points must be observed when installing gaskets:

- To achieve the best results, make sure that the gaskets and meter tube fit concentrically.
- To make sure that the flow profile is not distorted, the gaskets may not intrude in the piping cross-section.
- The use of graphite with the flange or process connection gaskets is prohibited. This is because, in some instances, an electrically conductive coating may form on the inside of the meter tube.



Device with hard rubber or soft rubber lining

- Additional gaskets are always required for devices with lining made of hard rubber or soft rubber.
- The use of rubber gaskets or sealing materials that are similar to rubber is recommended by the manufacturer.
- When selecting the seals ensure that the torques detailed in "Torque information" in the operating instruction are not exceeded.

Devices with lining made of PTFE, PFA or ETFE

- No additional gaskets are required for devices with lining made of PTFE, PFA or ETFE.

Flow direction

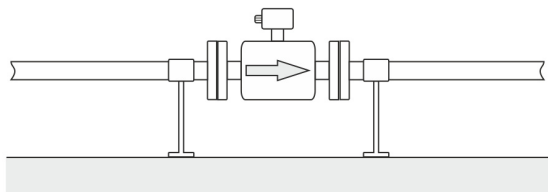
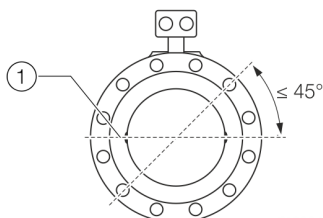


Figure 15: Flow direction

The device measures the flow rate in both flow directions. Forward flow is the factory setting, as shown in Figure 15.

Electrode axis



① Electrode axis

Figure 16: Orientation of the electrode axis

The flowmeter sensor should be mounted in the piping in such a manner that the electrode axis is oriented as horizontally as possible.

A maximum deviation of 45° from the horizontal position is permissible.

Mounting position

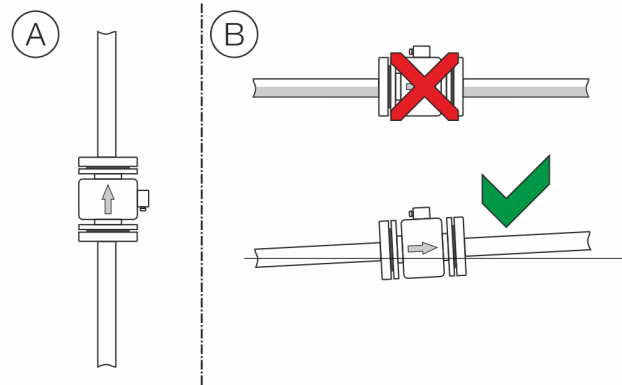


Figure 17: Mounting position

- Ⓐ Vertical installation for measuring abrasive materials, preferably with flow in upward direction.
- Ⓑ For a horizontal installation, the meter tube must always be completely filled with the measuring medium. Provide for a slight incline of the connection for degassing.

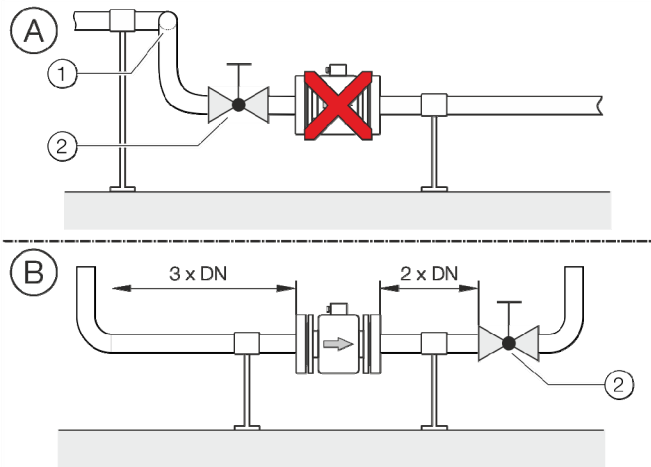
Minimum spacing of the devices

Figure 18: Distance (D): ≥ 1.0 m (3.3 ft) for variant 1; ≥ 0.7 m (2.3 ft) for variant 2

- To rule out that the devices interfere with one another, ensure that the minimum distance between the devices shown in Figure 18 is maintained.
- Do not operate the sensor in the vicinity of strong electromagnetic fields, e.g., motors, pumps, transformers, etc. Keep a minimum distance of approx. 1 m (3.28 ft).
- When installing on or at steel parts (e. g. steel joists) maintain a minimum distance of 100 mm (3.94 in.). (These values were determined based on IEC 801-2 and/or IEC TC77B).



Inlet and outlet sections



- ① 90° out-of-plane double bend ② Shut-off device

Figure 19: Upstream and downstream sections, shut-off devices

The metering principle is independent of the flow profile as long as stationary eddies do not extend into the metering section, such as may occur downstream of 90° out-of-plane double bends, in the event of tangential inflow, or where half-open gate valves are located upstream of the sensor. Such cases require measures to be put in place to normalize the flow profile.

- Ⓐ Do not install connections, elbows, valves, etc. directly upstream of the sensor.
 Ⓑ Upstream section / Downstream section: Length of the straight pipe at the inlet and the outlet of the sensor. Experience has shown that, in most installations, a straight upstream section length of three times the nominal diameter of the flow sensor and a straight downstream section length of two times the nominal diameter of the flow sensor are sufficient.

For test stands, the reference conditions of straight upstream section lengths ten times the nominal diameter of the sensor and straight downstream section lengths five times the nominal diameter of the sensor should be provided in accordance with EN 29104 / ISO 9104.

Valves or other shut-off devices should be installed in the downstream section.

Butterfly valves must be installed so that the valve plate does not extend into the flow sensor.

Free inlet or outlet

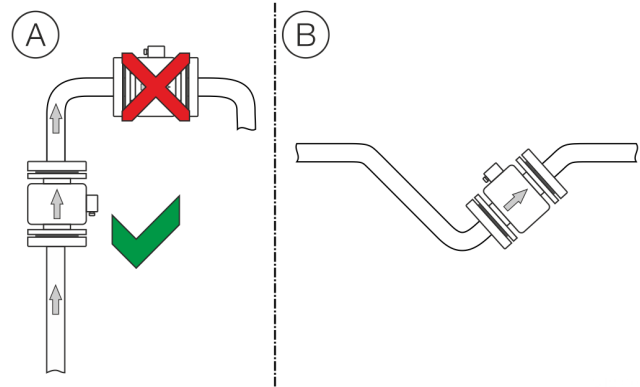


Figure 20: Free inflow and outflow

- Ⓐ For a free outflow, do not install flowmeter at the highest point of the piping or on its outflow side, since the measuring tube may run empty, creating air bubbles.
 Ⓑ For free inflow/outflow, provide an invert to make sure that the piping is always full

Mounting with heavily contaminated measuring media

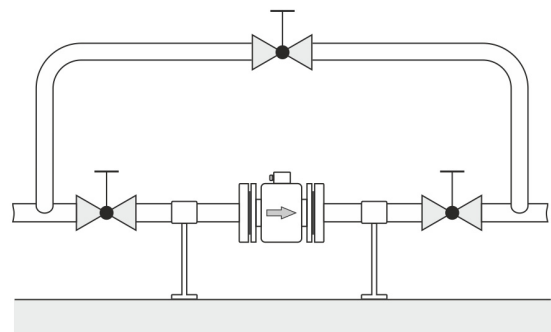
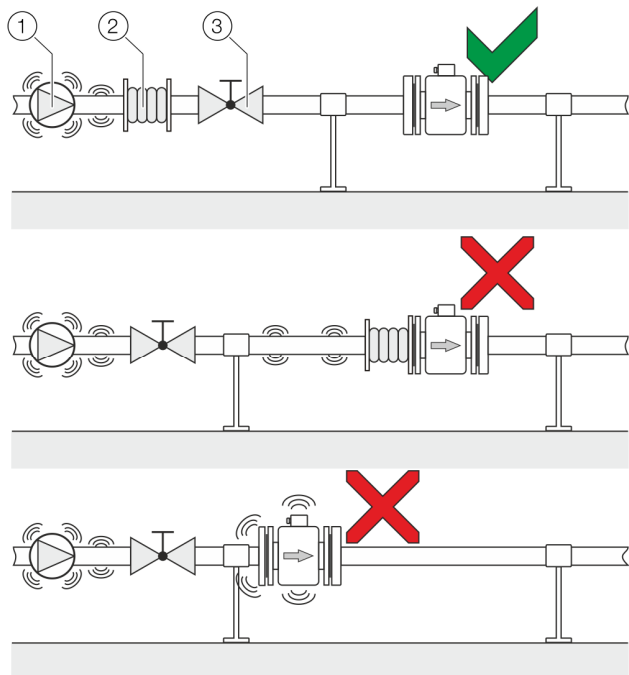


Figure 21: Bypass line

For strongly contaminated measuring media, a bypass line in accordance with the figure is recommended so that operation of the system can continue to run without interruption during mechanical cleaning.



Mounting with pipe vibration



- ① Pump
 ② Damping device
 ③ Turn-off device

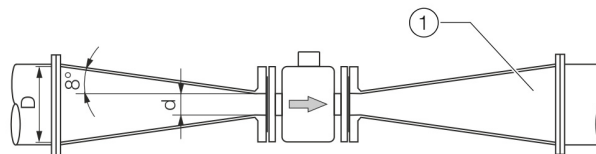
Figure 22: Vibration damping

If pipe vibration occurs, it needs to be damped using damping devices.

The damping devices must be installed outside the support section and outside of the piping section between the turn-off devices.

Avoid connecting damping devices directly to the flowmeter sensor.

Installation in piping with larger nominal diameter



- ① Reducer

Figure 23: Using reducers

Determine the resulting pressure loss when using reducers:

1. Determine diameter ratios d/D .
2. Determine the flow velocity based on the flow rate nomogram (Figure 24).
3. Read the pressure loss on the Y-axis in Figure 24.

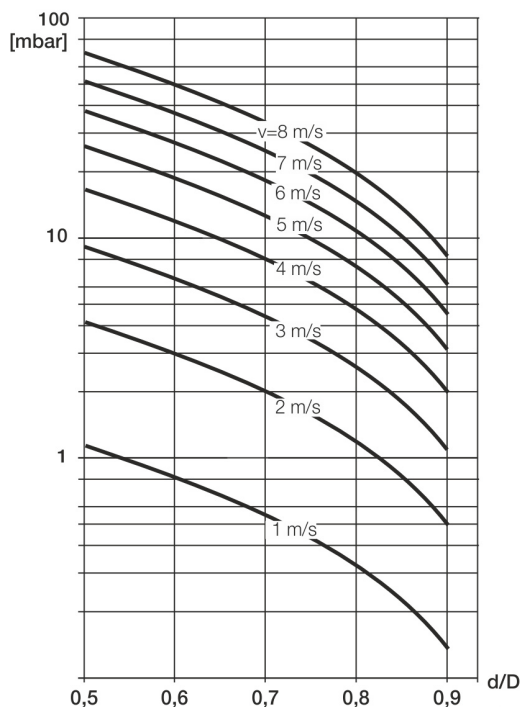


Figure 24: Flow rate nomogram for flange transition piece at $\alpha/2 = 8^\circ$

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Dimensions

Flange, DN 3 to 100 ($\frac{1}{10}$ to 4 in.), variant 1 sensor with aluminum housing (double shell housing)

All dimensions and weights are indicated in mm (in.) or kg (lb).

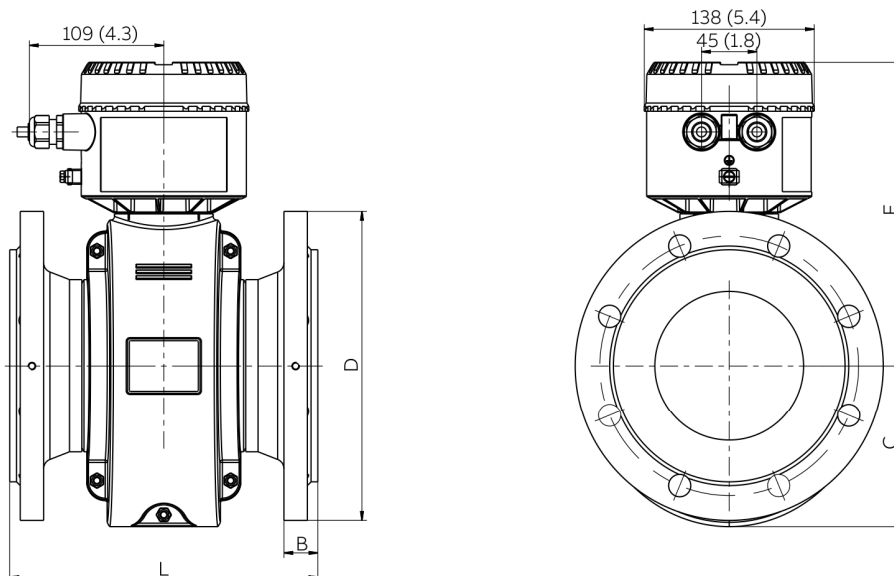


Figure 25: Flange, DN 3 to 100 ($\frac{1}{10}$ to 4 in.)

Dimensions – Flange device, variant 1 sensor with aluminum housing (double shell housing)							Approx. weight	
Nominal diameter	Process connection	D	B	L ^{2 3}	C	F	Remote mount	Integral mount
DN 3 to 8 ⁴	EN 1092-1 ⁶ , PN 10 to 40 ¹	90 (3.54)	19 (0.75)	200 (7.84)	82 (3.23)	191 (7.52)	5.5 (12.1)	6.5 (14.3)
($\frac{1}{8}$ to $\frac{5}{16}$ in. ⁵)	ASME B16.5, CL 150	90 (3.54)	14.2 (0.56)					
DN 10	ASME B16.5, CL 300	95 (3.74)	17.3 (0.68)					
($\frac{3}{8}$ in. ⁵)	JIS 10K	90 (3.54)	15 (0.59)					
DN 15 ($\frac{1}{2}$ in.)	EN 1092-1 ⁶ , PN 10 to 40 ¹	95 (3.74)	19 (0.75)	200 (7.84)	82 (3.23)	191 (7.52)	5.5 (12.1)	6.5 (14.3)
	ASME B16.5, CL 150	90 (3.54)	14.2 (0.56)					
	ASME B16.5, CL 300	95.2 (3.75)	17.3 (0.68)					
	JIS 10K	95 (3.74)	15 (0.59)					
DN 20 ($\frac{3}{4}$ in.)	EN 1092-1 ⁶ , PN 10 to 40 ¹	105 (4.13)	21 (0.83)	200 (7.84)	82 (3.23)	191 (7.52)	7 (15.4)	7.5 (16.5)
	ASME B16.5, CL 150	98.6 (3.88)	15.7 (0.62)					
	ASME B16.5, CL 300	117.3 (4.62)	18.7 (0.74)					
	JIS 10K	100 (3.94)	17 (0.67)					

Tolerance range for L: +0 / -3 mm (+0 / -0.018 in.)

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Dimensions – Flange device, variant 1 sensor with aluminum housing (double shell housing)							Approx. weight	
Nominal diameter	Process connection	D	B	L ^{2 3}	C	F	Remote mount	Integral mount
DN 25 (1 in.)	EN 1092-1 ⁶ , PN 10 to 40 ¹	115 (4.53)	21 (0.83)	200 (7.84)	82 (3.23)	191 (7.52)	8 (17.5)	8.5 (18.5)
	ASME B16.5, CL 150	108 (4.25)	17.2 (0.68)					
	ASME B16.5, CL 300	124 (4.88)	20.5 (0.81)					
	JIS 10K	125 (4.92)	17 (0.67)					
DN 32 (1 ¼ in.)	EN 1092-1 ⁶ , PN 10 to 40 ¹	140 (5.51)	21 (0.83)	200 (7.84)	92 (3.62)	198 (7.80)	9 (20.0)	9.5 (21.0)
	ASME B16.5, CL 150	117.3 (4.62)	18.7 (0.74)					
	ASME B16.5, CL 300	133.4 (5.25)	22.1 (0.87)					
	JIS 10K	135 (5.31)	19 (0.75)					
DN 40 (1 ½ in.)	EN 1092-1 ⁶ , PN 10 to 40 ¹	150 (5.91)	21 (0.83)	200 (7.84)	92 (3.62)	198 (7.80)	10 (22)	10.5 (22.0)
	ASME B16.5, CL 150	127 (5.00)	20.5 (0.81)					
	ASME B16.5, CL 300	155.4 (6.12)	23.6 (0.93)					
	JIS 10K	140 (5.51)	19 (0.75)					
DN 50 (2 in.)	EN 1092-1 ⁶ , PN 10 to 40 ¹	165 (6.50)	23 (0.91)	200 (7.87)	97.5 (3.84)	204 (8.0)	11 (24)	12 (26.5)
	ASME B16.5, CL 150	152.4 (6.00)	22.1 (0.87)					
	ASME B16.5, CL 300	165.1 (6.50)	25.4 (1.0)					
	JIS 10K	155 (6.10)	19 (0.75)					
	AS2129 tables D, E	150 (5.91)	–				9 (19.8)	9.5 (21.0)
DN 65 (2 ½ in.)	EN 1092-1 ⁶ , PN 16 ¹	185 (7.28)	22 (0.87)	200 (7.87)	108.5 (4.25)	215 (8.46)	12 (26.5)	12.5 (27.6)
	EN 1092-1 ⁶ , PN 40 ¹	185 (7.28)	26 (1.02)				14 (30.9)	14.5 (32.0)
	ASME B16.5, CL 150	177.8 (7.00)	25.4 (1.0)				12 (26.5)	12.5 (27.6)
	ASME B16.5, CL 300	190.5 (7.50)	28.4 (1.12)				14 (30.9)	14.5 (32.0)
	JIS 10K	175 (6.89)	21 (0.83)				14 (30.9)	14.5 (32.0)
	AS2129 tables D, E	165 (6.50)	–				–	–
DN 80 (3 in.)	EN 1092-1 ⁶ , N 10 to 40 ¹	200 (7.87)	28 (1.10)	200 (7.87)	108.5 (4.27)	215 (8.46)	16 (35.3)	16.5 (36.4)
	ASME B16.5, CL 150	190.5 (7.50)	26.9 (1.06)				16 (35.3)	16.5 (36.4)
	ASME B16.5, CL 300	210 (8.27)	31.4 (1.24)				18 (39.7)	18.5 (40.8)
	JIS 10K	185 (7.28)	21 (0.83)				18 (39.7)	18.5 (40.8)
	AS2129 tables D, E	185 (7.28)	–				–	–

Tolerance range for L: +0 / –3 mm (+0 / –0.018 in.)

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Dimensions – Flange device, variant 1 sensor with aluminum housing (double shell housing)							Approx. weight	
Nominal diameter	Process connection	D	B	L ^{2 3}	C	F	Remote mount	Integral mount
DN 100 (4 in.)	EN 1092-1 ⁶ PN 16 ¹	220 (8.66)	24 (0.94)	250 (9.84)	122.5 (4.82)	237 (9.33)	18 (39.7)	18.5 (40.8)
	EN 1092-1 ⁶ PN 25 to 40 ¹	235 (9.25)	28 (1.10)				22 (48.5)	22.5 (49.6)
	ASME B16.5 CL 150	228.6 (9.00)	27.4 (1.08)				20 (44.1)	20.5 (45.2)
	ASME B16.5 CL 300	254 (10.0)	35.8 (1.41)				29 (63.9)	29.5 (65.0)
	JIS 10K	210 (8.72)	21 (0.83)				18 (39.7)	18.5 (40.8)
	AS2129 tables D, E	215 (8.46)	–				–	–

Tolerance range for L: +0 / –3 mm (+0 / –0.018 in.)

- 1 Other pressure ratings on request.
- 2 If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 3 to 100 by 3 mm (0.118 in.), for DN 125 by 5 mm (0.197 in.).
- 3 If protective panes are installed (attached to both sides of the flange), this increases dimension L as follows: DN 3 to 100 by 6 mm (0.236 in.) for DN 125 by 10 mm (0.394 in.).
- 4 Process connection, flange size: DN 10.
- 5 Process connection, flange size: ½ in.
- 6 Dimensions in accordance with EN 1092-1. For DN 65, PN 16 in acc. with EN 1092-1, please order PN 40.

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Flange, DN 125 to 400 (6 to 16 in.), variant 1 sensor with aluminum housing (double shell housing)

All dimensions and weights are indicated in mm (in.) or kg (lb).

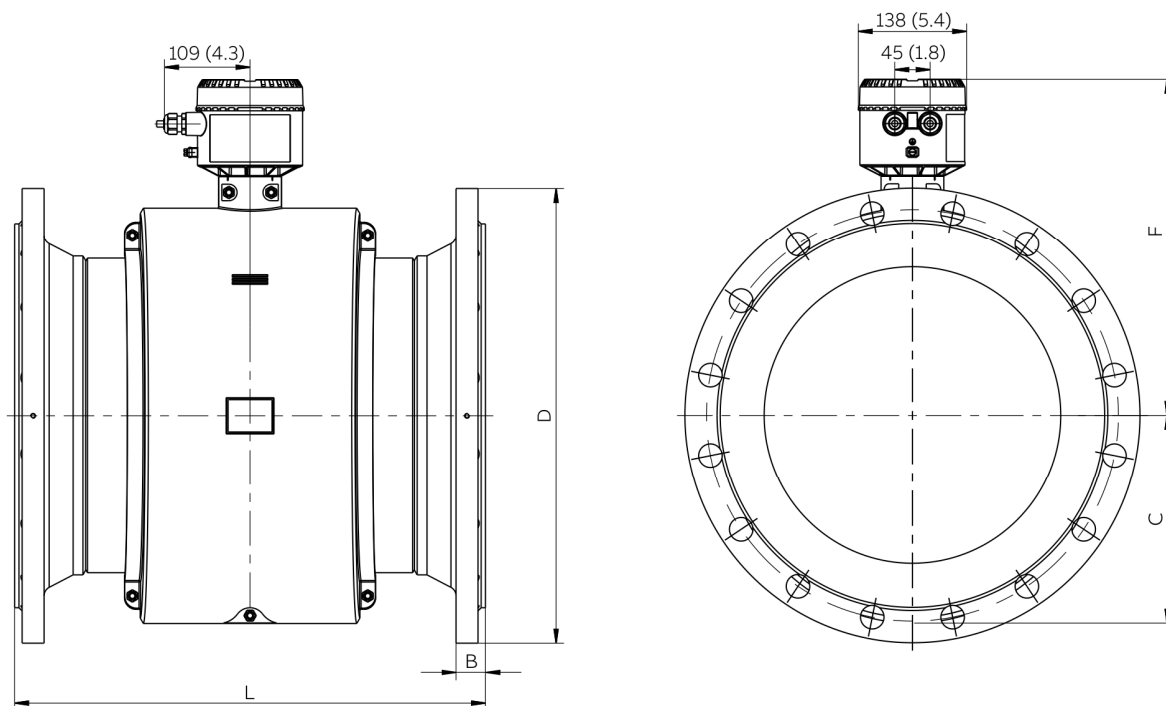


Figure 26: Flange, DN 125 to 400 (6 to 16")

Dimensions – Flange device, variant 1 sensor with aluminum housing (double shell housing)							Approx. weight	
Nominal diameter	Process connection	D	B	L ^{2 3}	C	F	Remote mount	Integral mount
DN 125 (5 in.)	EN 1092-1 ⁶ PN 16 ¹	250 (9.84)	25 (0.98)	250 (9.84)	130 (5.12)	247 (9.72)	21 (46.3)	21.5 (47.4)
	EN 1092-1 ⁶ PN 25 to 40 ¹	270 (10.63)	29 (1.14)				28 (61.7)	28.5 (62.8)
	ASME B16.5 CL 150	254 (10.0)	27.9 (1.10)				21 (46.3)	21.5 (47.4)
	ASME B16.5 CL 300	279.4 (11.0)	39.1 (1.54)	450 (17.72)			34 (75.0)	34.5 (76.1)
	JIS 10K	250 (9.84)	27 (1.06)	250 (9.84)			21 (46.3)	21.5 (47.4)
	AS2129 tables D, E	255 (10.04)	–				–	–
DN 150 (6 in.)	EN 1092-1 PN 16 ¹	285 (11.22)	25 (0.98)	300 (11.81)	146 (5.75)	294 (11.57)	32 (70.5)	32.5 (71.7)
	EN 1092-1 PN 25 to 40 ¹	300 (11.81)	31 (1.22)				38 (83.8)	38.5 (82.5)
	ASME B16.5 CL 150	279.4 (11.0)	29.4 (1.16)				32 (70.5)	32.5 (71.7)
	ASME B16.5 CL 300	317.5 (12.5)	40.5 (1.59)				46 (101.4)	46.5 (102.5)
	JIS 10K	280 (11.02)	28 (1.10)				32 (70.5)	32.5 (71.7)
	AS2129 tables D, E	280 (11.02)	–				32 (70.5)	32.5 (71.7)

Tolerance range for L: +0 / –3 mm (+0 / –0.018 in.)

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Dimensions – Flange device, variant 1 sensor with aluminum housing (double shell housing)								Approx. weight
Nominal diameter	Process connection	D	B	L ^{2 3}	C	F	Remote mount	Integral mount
DN 200 (8 in.)	EN 1092-1 ⁶ , PN 10 to 16 ¹	340 (13.39)	28 (1.10)	350 (13.78)	170.5 (6.71)	334 (13.15)	42 (92.6)	42.5 (93.7)
	EN 1092-1 ⁶ , PN 25 ¹	360 (14.17)	34 (1.34)				54 (119)	54.5 (120.2)
	EN 1092-1, PN 40 ¹	375 (14.76)	38 (1.50)				64 (141.1)	64.5 (142.2)
	ASME B16.5, CL 150	345 (13.58)	33.6 (1.32)				49 (108)	49.5 (109.1)
	ASME B16.5, CL 300	380 (14.96)	46.1 (1.81)				71 (156.5)	71.5 (157.6)
	JIS 10K	330 (12.99)	33 (1.30)				42 (92.6)	42.5 (93.7)
	AS2129 tables D, E	335 (13.19)	–				49 (108)	49.5 (109.1)
DN 250 (10 in.)	EN 1092-1, PN 10 ¹	395 (15.55)	30 (1.18)	450 (17.72)	198 (7.80)	349 (13.74)	60 (132.3)	60.5 (133.4)
	EN 1092-1, PN 16 ¹	405 (15.94)	30 (1.18)				64 (141.1)	64.5 (142.2)
	EN 1092-1, PN 25 ¹	425 (16.73)	36 (1.42)				83 (183)	83.5 (184.1)
	EN 1092-1, PN 40 ¹	450 (17.72)	42 (1.65)				94 (207.2)	94.5 (208.3)
	ASME B16.5, CL 150	405 (15.94)	35.2 (1.39)				69 (152.1)	69.5 (153.2)
	ASME B16.5, CL 300	445 (17.52)	52.8 (2.08)				104 (229.3)	104.5 (230.4)
	JIS 10K	400 (15.75)	37 (1.46)				64 (141.1)	64.5 (142.2)
	AS2129 tables D, E	405 (15.94)	–				69 (152.1)	69.5 (153.2)
DN 300 (12 in.)	EN 1092-1, PN 10 ¹	445 (17.52)	31 (1.22)	500 (19.68)	228 (8.98)	372 (14.62)	73 (160.9)	73.5 (162)
	EN 1092-1, PN 16 ¹	460 (18.11)	33 (1.30)				78 (172)	78.5 (173)
	EN 1092-1, PN 25 ¹	485 (19.09)	39 (1.54)				99 (218.3)	99.5 (219.4)
	EN 1092-1, PN 40 ¹	515 (20.28)	47 (1.85)	600 (23.62)			139 (306.4)	139.5 (307.5)
	ASME B16.5, CL 150	485 (19.09)	36.8 (1.45)	500 (19.68)			104 (229.3)	104.5 (230.4)
	ASME B16.5, CL 300	520 (20.47)	55.8 (2.20)				149 (328.5)	149.5 (329.6)
	JIS 10K	450 (17.72)	40 (1.57)				79 (174.2)	79.5 (175.3)
	AS2129 tables D, E	455 (17.19)	–				104 (229.3)	104.5 (230.4)
DN 350 (14 in.)	EN 1092-1, PN 10 ¹	505 (19.88)	31 (1.22)	550 (21.65)	267 (10.51)	416 (16.38)	94 (207.2)	94.5 (208.3)
	EN 1092-1, PN 16 ¹	520 (20.47)	35 (1.38)				109 (240.3)	109.5 (241.4)
	EN 1092-1, PN 25 ¹	555 (21.85)	43 (1.69)				144 (317.5)	144.5 (318.6)
	ASME B16.5, CL 150	535 (21.06)	40.1 (1.58)				129 (284.4)	129.5 (285.5)
	ASME B16.5, CL 300	585 (23.03)	58.8 (2.31)				197 (434.3)	197.5 (435.4)
	JIS 10K	490 (19.29)	–				109 (240.3)	109.5 (241.4)
	AS2129 tables D, E	525 (20.67)	–				104 (229.3)	104.5 (230.4)
DN 400 (16 in.)	EN 1092-1 PN 10 ¹	565 (22.24)	31 (1.22)	600 (23.62)	267 (10.51)	416 (16.38)	102 (224.9)	102.5 (226)
	EN 1092-1 PN 16 ¹	580 (22.83)	37 (1.46)				125 (275.6)	125.5 (276.7)
	EN 1092-1 PN 25 ¹	620 (24.41)	45 (1.77)				169 (372.6)	169.5 (373.7)
	ASME B16.5 CL 150	595 (23.43)	41.6 (1.64)				174 (383.6)	174.5 (384.7)
	ASME B16.5 CL 300	650 (25.59)	62.2 (2.45)				264 (582)	264.5 (583.1)
	JIS 10K	560 (22.05)	–				125 (275.6)	125.5 (276.7)
	AS2129 tables D, E	580 (22.83)	–				174 (383.6)	174.5 (384.7)

Tolerance range for L: DN 150 to 200: +0 / –3 mm (+0 / –0.018 in.), DN 250 to 400: +0 / –5 mm (+0 / –0.197 in.)

- 1 Other pressure ratings on request.
- 2 If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 3 to 100 by 3 mm (0.118 in.).
- 3 If protective panes are installed (attached to both sides of the flange), this increases dimension L as follows: DN 3 to 100 by 6 mm (0.236 in.).
- 6 Dimensions in accordance with EN 1092-1. For DN 65, PN 16 in acc. with EN 1092-1, please order PN 40.

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Flange, DN 450 to 2000 (18 to 80 in.), variant 1 sensor with steel housing

All dimensions and weights are indicated in mm (in.) or kg (lb).

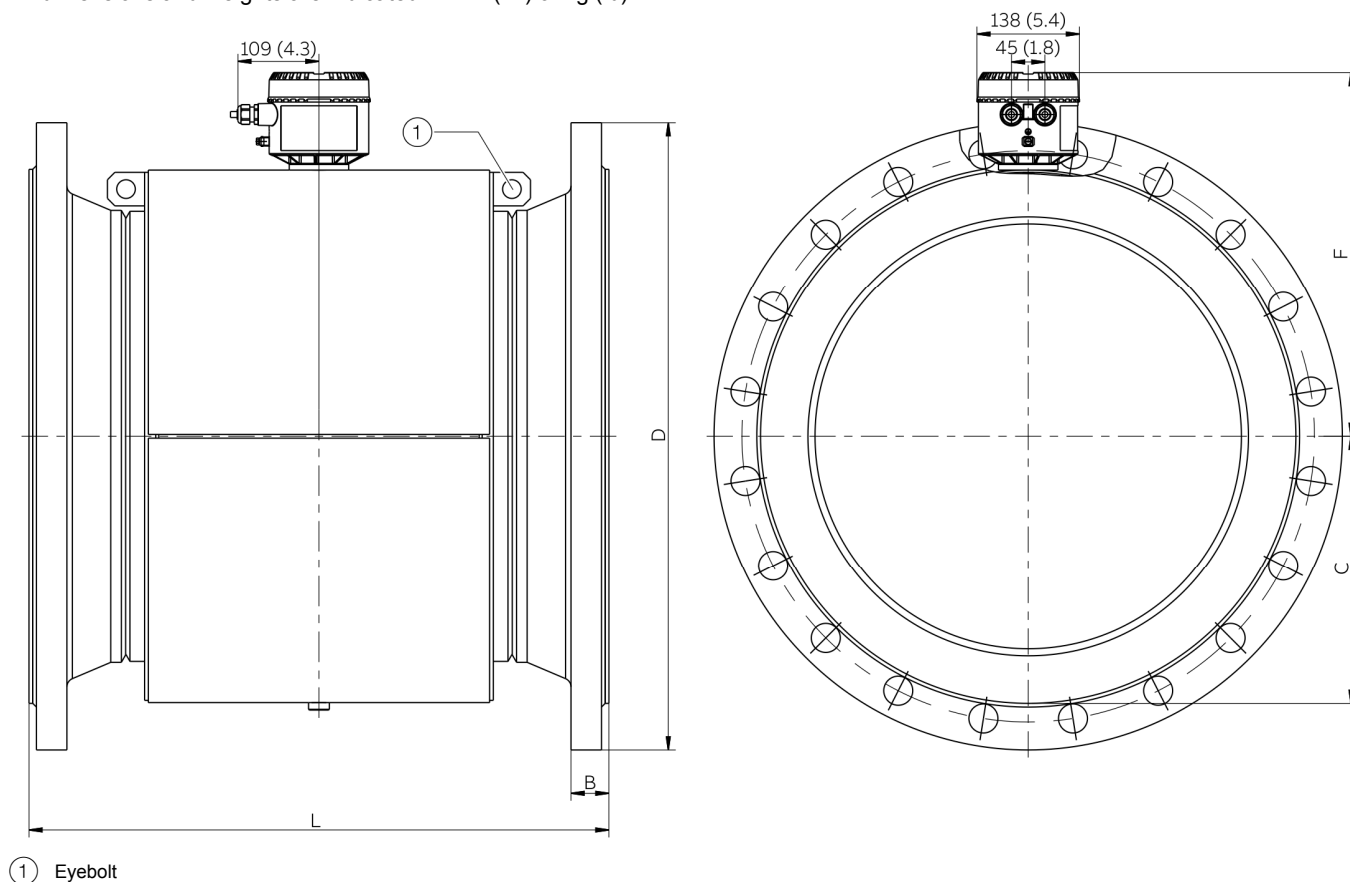


Figure 27: Flange, DN 450 to 2000 (18 to 80 in.)

Dimensions – Flange device, variant 1 sensor with steel housing							Approx. weight	
Nominal diameter	Process connection	D	B	L ^{*, **}	C	F	Remote mount	Integral mount
DN 450 (18 in.)	ASME B16.5, CL 150	635 (25.0)	44.6 (1.76)	686 (27.01)	310 (12.20)	437 (17.20)	259 (571)	259.5 (572)
	AS2129 tables D, E	640 (25.20)	–					
DN 500 (20 in.)	EN 1092-1, PN 10 [*]	670 (26.38)	33 (1.30)	650 (25.59)	310 (12.20)	437 (17.20)	189 (417)	189.5 (418)
	EN 1092-1, PN 16 [*]	715 (28.15)	39 (1.54)				239 (527)	239.5 (528)
	ASME B16.5, CL 150	698.5 (27.50)	47.9 (1.89)	762 (30.0)			299 (659)	299.5 (660)
	AS2129 tables D, E	705 (27.76)	–	650 (25.59)				
DN 600 (24 in.)	EN 1092-1, PN 10 [*]	780 (30.71)	33 (1.30)	780 (30.71)	361 (14.21)	490 (19.29)	339 (747)	339.5 (748)
	EN 1092-1, PN 16 [*]	840 (33.07)	41 (1.61)				317 (699)	317.5 (700)
	ASME B16.5, CL 150	812.8 (32.0)	52.8 (2.08)	914 (35.98)			424 (935)	424.5 (936)
	AS2129 tables D, E	825 (32.48)	–	780 (30.71)				

Tolerance range for L: DN 450 to 500: +0 / –3 mm (+0 / –0.018 in.), DN 600 to 2000: +0 / –10 mm (+0 / –0.394 in.)

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Dimensions – Flange device, variant 1 sensor with steel housing **Approx. weight**

Nominal diameter	Process connection	D	B	L **, ***	C	F	Remote mount	Integral mount
DN 700 (28 in.)	EN 1092-1, PN 10*	895 (35.24)	35 (1.38)	910 (35.83)	405 (15.94)	534 (21.02)	319 (703)	319.5 (704)
	EN 1092-1, PN 16*	910 (35.83)	36 (1.42)				439 (968)	439.5 (969)
	ASME B16.47, CL 150	836.7 (32.94)	49.5 (1.95)				349 (769)	349.5 (770)
DN 750 (30 in.)	ASME B16.5, CL 150	888 (34.96)	44.5 (1.75)	990 (38.96)	431 (16.97)	560 (22.05)	475 (1047)	475.5 (1048)
DN 800 (32 in.)	EN 1092-1, PN 10*	1015 (39.96)	37 (1.46)	1040 (40.94)	455 (17.91)	584 (22.99)	419 (924)	419.5 (925)
	EN 1092-1, PN 16*	1025 (40.35)	43 (1.69)				489 (1078)	489.5 (1079)
	ASME B16.47, CL 150	942 (37.09)	51 (2.01)				499 (1100)	499.5 (1101)
DN 900 (36 in.)	EN 1092-1, PN 10*	1115 (43.90)	39 (1.54)	1170 (46.06)	505 (19.88)	635 (25.0)	504 (1111)	504.5 (1112)
	EN 1092-1, PN 16*	1125 (44.29)	45 (1.77)				589 (1298)	589.5 (1299)
	ASME B16.47, CL 150	1157.1 (41.62)	57.3 (2.26)				679 (1497)	679.5 (1498)
DN 1000 (40 in.)	EN 1092-1, PN 10*	1230 (48.43)	39 (1.54)	1300 (51.18)	555 (21.85)	685 (26.97)	689 (1518)	689.5 (1519)
	EN 1092-1, PN 16*	1255 (49.41)	47 (1.85)				849 (1871)	849.5 (1872)
	ASME B16.47, CL 150	1174.8 (46.25)	60.6 (2.39)				879 (1938)	879.5 (1939)
DN 1050 (42 in.)	ASME B16.47, CL 150	1067 (42.01)	58.7 (2.31)	1365 (53.74)	607 (23.90)	737 (29.02)	931 (2052)	931.5 (2053)
DN 1100 (44 in.)	ASME B16.47, CL 150	1118 (44.02)	60.5 (2.38)	1430 (56.30)	607 (23.90)	737 (29.02)	961 (2118)	961.5 (2119)
DN 1200 (48 in.)	EN 1092-1, PN 10*	1455 (57.28)	43 (1.69)	1560 (61.42)	660 (25.98)	791 (31.14)	929 (2048)	929.5 (2049)
	EN 1092-1, PN 16*	1485 (58.46)	53 (2.09)				1119 (2467)	1119.5 (2468)
DN 1400 (56 in.)	EN 1092-1 PN 10*	1675 (65.94)	47 (1.85)	1820 (71.65)	755 (29.72)	885 (34.84)	1209 (2665)	1209.5 (2666)
	EN 1092-1 PN 16*	1685 (66.34)	57 (2.24)				1759 (3878)	1759.5 (3879)
DN 1500 (60 in.)	ASME B16.47, CL 150	1676 (65.98)	76.2 (3.00)	1950 (76.77)	807 (31.77)	937 (36.89)	1951 (4301)	1951.5 (4302)
DN 1600 (64 in.)	EN 1092-1 PN 10*	1915 (75.39)	51 (2.01)	2080 (81.89)	865 (34.06)	996 (39.21)	1629 (3591)	1629.5 (3592)
	EN 1092-1 PN 16*	1930 (75.98)	63 (2.48)				2149 (4738)	2149.5 (4739)
DN 1800 (72 in.)	EN 1092-1 PN 10*	2115 (83.27)	55 (2.17)	2340 (92.13)	980 (38.58)	1111 (43.74)	2229 (4914)	2229.5 (4915)
	EN 1092-1 PN 16*	2130 (83.86)	67 (2.64)				2899 (6391)	2899.5 (6392)
DN 2000 (80 in.)	EN 1092-1 PN 10*	2325 (91.54)	59 (2.32)	2600 (102.36)	1090 (42.91)	1221 (48.07)	1879 (4142)	1879.5 (4143)
	EN 1092-1 PN 16*	2345 (92.32)	71 (2.80)				2649 (5840)	2649.5 (5841)

Tolerance range for L: DN 600 to 2000: +0 / -10 mm (+0 / -0.394 in.)

* Other pressure ratings on request.

** If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 3 to 100 by 3 mm (0.118 in.).

*** If protective panes are installed (attached to both sides of the flange), this increases dimension L as follows: DN 3 to 100 by 6 mm (0.236 in.).

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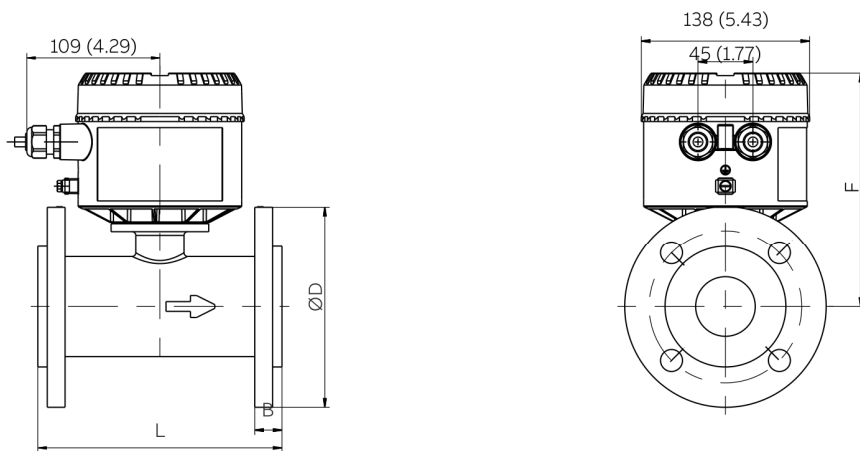
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Flange, DN 25 to 125 (1 to 5 in.), variant 2 sensor with cast steel housing

All dimensions and weights are indicated in mm (in.) or kg (lb).



G12044

Figure 28: Flange, DN 25 to 125 (1 to 5")

Dimensions – Flange device, variant 2 sensor with cast steel housing							Approx. weight
Nominal diameter	Process connection	D	B	L ^{*, **}	F	Remote mount	Integral mount
DN 25 (1 in.)	EN 1092-1, PN 40 [*]	115 (4.53)	23.1 (0.91)	200 (7.84)	180 (7.09)	6 (13)	7 (15)
	ASME B16.5, CL 150	115 (4.53)	23.1 (0.91)				
	ASME B16.5, CL 300	125 (4.92)	22 (0.87)				
	JIS 5K	95 (3.74)	15.5 (0.61)			5 (11)	6 (13)
	JIS10K, 20K	115 (4.53)	23.1 (0.91)			6 (13)	7 (15)
	AS2129 tables D, E	115 (4.53)	23.1 (0.91)				
DN 32 (1 ¼ in.)	EN 1092-1, PN 40 [*]	150 (5.91)	25 (0.98)	200 (7.84)	185 (7.28)	7 (15)	8 (17)
	ASME B16.5 CL 150	150 (5.91)	25 (0.98)				
	ASME B16.5 CL 300	135 (5.31)	23 (0.91)				
	JIS 5K, 10K, 20K	150 (5.91)	25 (0.98)				
	AS2129 tables D, E	150 (5.91)	25 (0.98)				
DN 40 (1 ½ in.)	EN 1092-1, PN 40 [*]	150 (5.91)	23.5 (0.93)	200 (7.84)	190 (7.48)	8 (17)	9 (20)
	ASME B16.5 CL 150	150 (5.91)	23.5 (0.93)				
	ASME B16.5 CL 300	155 (6.10)	25 (0.98)			9 (20)	10 (22)
	JIS 5K	120 (4.72)	17.5 (0.69)			6 (13)	7 (15)
	JIS 10K	140 (5.51)	21.5 (0.85)			7 (15)	8 (17)
	JIS 20K	140 (5.51)	23.5 (0.93)				
	AS2129 table D	150 (5.91)	23.5 (0.93)			8 (17)	9 (20)
	AS2129 table E	135 (5.31)	23.5 (0.93)			6 (13)	7 (15)

Tolerance range for L: +0 / -3 mm (+0 / -0.018 in.)

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Dimensions – Flange device, variant 2 sensor with cast steel housing							Approx. weight
Nominal diameter	Process connection	D	B	L ^{**, ***}	F	Remote mount	Integral mount
DN 50 (2 in.)	EN 1092-1, PN 40°	165 (6.50)	27 (1.06)	200 (7.84)	193 (7.60)	10 (22)	11 (24)
	ASME B16.5 CL 150	165 (6.50)	27 (1.06)				
	ASME B16.5 CL 300	165 (6.50)	27 (1.06)				
	JIS 5K	130 (5.12)	20 (0.79)			7 (15)	8 (17)
	JIS 10K	165 (6.50)	27 (1.06)			8 (17)	9 (20)
	JIS 20K	155 (6.10)	24 (0.94)				
	AS2129 tables D, E	150 (5.91)	18.5 (0.73)				
DN 65 (2 ½ in.)	EN 1092-1, PN16, PN 40°	185 (7.28)	30 (1.18)	200 (7.87)	207 (8.15)	12 (26)	13 (29)
	ASME B16.5 CL 150	180 (7.09)	30 (1.18)			12 (26)	13 (29)
	ASME B16.5 CL 300	190 (7.48)	29 (1.14)			13 (29)	14 (31)
	JIS 5K, 10K, 20K	185 (7.28)	30 (1.18)			12 (26)	13 (29)
	AS2129 tables D, E	165 (6.50)	18 (0.71)			10 (22)	11 (24)
DN 80 (3 in.)	EN 1092-1, PN 40°	205 (8.07)	30 (1.18)	200 (7.87)	211 (8.31)	14 (31)	15 (33)
	ASME B16.5 CL 150	205 (8.07)	30 (1.18)			14 (31)	15 (33)
	ASME B16.5 CL 300	210 (8.27)	33 (1.30)			17 (37)	18 (40)
	JIS 5K, 10K	205 (8.07)	30 (1.18)			14 (31)	15 (33)
	JIS 20K	200 (7.87)	28.5 (1.12)			13 (29)	14 (31)
	AS2129 tables D, E	205 (8.07)	30 (1.18)			13 (29)	14 (31)
DN 100 (4 in.)	EN 1092-1, PN 16°	235 (9.25)	29 (1.14)	250 (9.84)	242 (8.53)	16 (35)	16.5 (36)
	EN 1092-1, PN 40°	235 (9.25)	28 (1.10)			18 (39)	18.5 (40)
	ASME B16.5 CL 150	235 (9.25)	29 (1.14)			16 (35)	16.5 (36)
	ASME B16.5 CL 300	255 (10.04)	38.5 (1.52)			26 (57)	26.5 (58)
	JIS 5K	200 (7.87)	24 (0.94)			13 (29)	14 (31)
	JIS 10K, 20K	235 (9.25)	29 (1.14)			16 (35)	17 (37)
	AS2129 tables D, E	235 (9.25)	29 (1.14)			16 (35)	17 (37)
DN 125 (5 in.)	EN 1092-1, PN 16°	270 (10.63)	38.5 (1.52)	250 (9.84)	254 (10.0)	21 (46)	22 (48)
	EN 1092-1, PN 40°	270 (10.63)	36 (1.42)			21 (46)	22 (48)
	ASME B16.5 CL 150	270 (10.63)	38.5 (1.52)			21 (46)	22 (48)
	ASME B16.5 CL 300	280 (11.02)	42 (1.65)			32 (70)	33 (72)
	JIS 5K, 10K, 20K	270 (10.63)	38.5 (1.52)			21 (46)	22 (48)
	AS2129 tables D, E	270 (10.63)	38 (1.50)			21 (46)	22 (48)

Tolerance range for L: +0 / –3 mm (+0 / –0.018 in.)

* Other pressure ratings on request.

** If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 3 to 100 by 3 mm (0.118 in.).

*** If protective panes are installed (attached to both sides of the flange), this increases dimension L as follows: DN 3 to 100 by 6 mm (0.236 in.).

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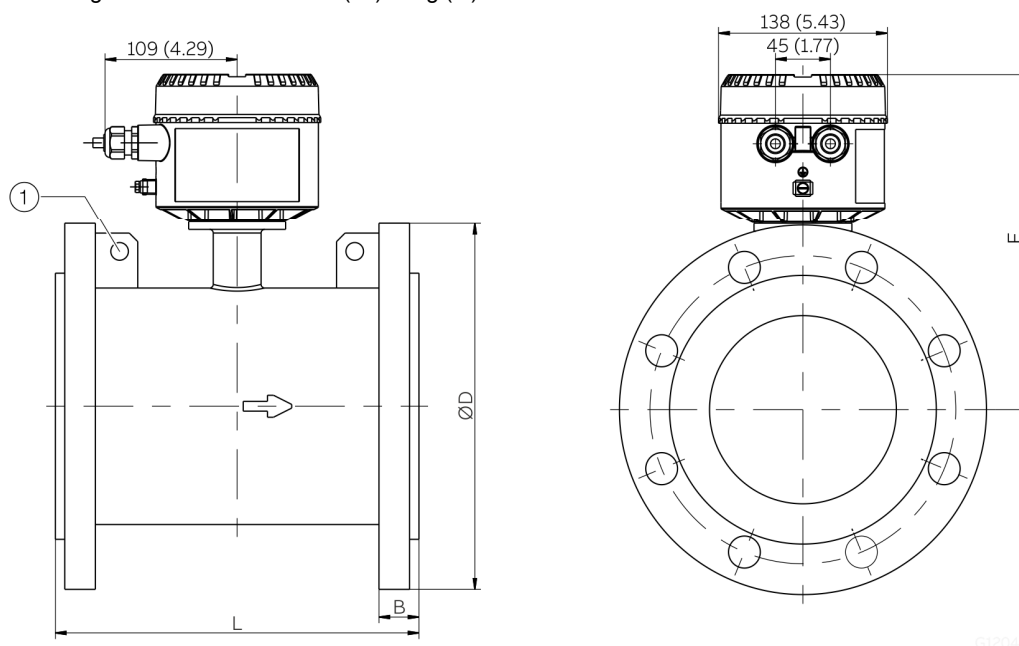
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Flange, DN 150 to 600 (1 to 24 in.), variant 2 sensor with cast steel housing

All dimensions and weights are indicated in mm (in.) or kg (lb).



① Eyebolt

Figure 29: Flange, DN50 to 600 (1 to 24 in.)

Dimensions – Flange device, variant 2 sensor with cast steel housing							Approx. weight
Nominal diameter	Process connection	D	B	L ^{**, ***}	F	Remote mount	Integral mount
DN 150 (6 in.)	EN 1092-1, PN 16*	300 (11.81)	31.5 (1.24)	300 (11.81)	275 (10.83)	41 (90)	42 (92)
	EN 1092-1, PN 40*	300 (11.81)	38.5 (1.52)			41 (90)	42 (92)
	ASME B16.5 CL 150	300 (11.81)	32.5 (1.28)			36 (79)	37 (82)
	ASME B16.5 CL 300	320 (12.60)	44 (1.73)			47 (104)	48 (106)
	JIS 5K, 10K	300 (11.81)	31 (1.22)			41 (90)	42 (92)
	JIS 20K	305 (12.01)	36.5 (1.44)			37 (82)	38 (84)
	AS2129 table D	300 (11.81)	31 (1.22)			41 (90)	42 (92)
	AS2129 table E	280 (11.02)	24 (0.94)			31 (68)	32 (70)
DN 200 (8 in.)	EN 1092-1, PN 10, PN 16*	375 (14.76)	35 (1.38)	350 (13.78)	301 (11.85)	66 (145)	67 (147)
	EN 1092-1 PN 25*	360 (14.17)	40 (1.57)			52 (115)	53 (117)
	EN 1092-1 PN 40*	375 (14.76)	44 (1.73)			59 (130)	60 (132)
	ASME B16.5 CL 150	375 (14.76)	35 (1.38)			66 (146)	67 (148)
	ASME B16.5 CL 300	380 (14.96)	51 (2.01)			67 (148)	68 (150)
	JIS 5K	320 (12.60)	28 (1.10)			38 (84)	39 (86)
	JIS 10K	330 (12.99)	30 (1.18)			40 (88)	41 (90)
	JIS 20K	375 (14.76)	35 (1.38)			66 (145)	67 (147)
	AS2129 tables D, E	335 (13.19)	35 (1.38)			51 (112)	52 (114)

Tolerance range for L: DN 150 to 200 +0 / -3 mm (+0 / -0.018 in.), DN 250 to 600 +0 / -5 mm (+0 / -0.197 in.)

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Dimensions – Flange device, variant 2 sensor with cast steel housing

Approx. weight

Nominal diameter	Process connection	D	B	L ^{**, ***}	F	Remote mount	Integral mount
DN 250 (10 in.)	EN 1092-1, PN 10*	395 (15.55)	37 (1.46)	450 (17.72)	326 (12.83)	49 (108)	50 (110)
	EN 1092-1, PN 16*	405 (15.94)	37 (1.46)			49 (108)	50 (110)
	EN 1092-1, PN 25*	425 (16.73)	40 (1.57)			60 (132)	61 (135)
	EN 1092-1, PN 40*	450 (17.72)	47 (1.85)			90 (198)	91 (200)
	ASME B16.5, CL 150	405 (15.94)	45.5 (1.79)			71 (156)	72 (158)
	ASME B16.5, CL 300	444.5 (17.50)	61 (2.40)			96 (211)	97 (213)
	JIS 5K, 10K	405 (15.94)	37 (1.46)			49 (108)	50 (110)
	JIS 20K	430 (16.93)	39 (1.45)			61 (135)	62 (137)
	AS2129 tables D, E	405 (15.94)	37 (1.46)			49 (108)	50 (110)
DN 300 (12 in.)	EN 1092-1, PN 10, PN 16*	475 (18.70)	38.5 (1.52)	500 (19.68)	351 (13.82)	71 (156)	72 (158)
	EN 1092-1, PN 25*	485 (19.09)	44 (1.73)			85 (187)	86 (189)
	EN 1092-1, PN 40*	515 (20.28)	58 (2.28)			95 (209)	96 (211)
	ASME B16.5, CL 150	485 (19.09)	50.5 (1.99)			111 (245)	112 (247)
	ASME B16.5, CL 300	521 (20.51)	69 (2.72)			141 (311)	142 (313)
	JIS 5K, 10K	475 (18.70)	38.5 (1.52)			61 (135)	62 (137)
	JIS 20K	480 (18.90)	42 (1.65)			81 (178)	82 (180)
	AS2129 tables D, E	475 (18.70)	38.5 (1.52)			61 (135)	62 (137)
DN 350 (14 in.)	EN 1092-1, PN 10*	505 (19.88)	35 (1.38)	550 (21.65)	374 (14.72)	75 (165)	76 (167)
	EN 1092-1, PN 16*	520 (20.47)	40 (1.57)			87 (192)	88 (194)
	EN 1092-1, PN 25*	555 (21.85)	47 (1.85)			122 (269)	123 (271)
	ASME B16.5, CL 150	533 (20.98)	54 (2.13)			104 (229)	105 (231)
	ASME B16.5, CL 300	584 (22.99)	80 (3.15)			197 (434)	198 (436)
	JIS 5K	480 (18.90)	29 (1.14)			60 (132)	61 (134)
	JIS 10K	490 (19.29)	31 (1.22)			64 (141)	66 (143)
	JIS 20K	540 (21.26)	45 (1.77)			101 (222)	102 (224)
	AS2129 table D	525 (20.67)	27 (1.06)			69 (152)	70 (154)
	AS2129 table E	525 (20.67)	38 (1.50)			87 (192)	88 (194)
DN 400 (16 in.)	EN 1092-1, PN 10*	565 (22.24)	37 (1.46)	600 (23.62)	398 (15.67)	94 (207)	95 (209)
	EN 1092-1, PN 16*	580 (22.83)	43 (1.69)			110 (242)	111 (244)
	EN 1092-1, PN 25*	620 (24.41)	53 (2.09)			163 (359)	164 (361)
	ASME B16.5, CL 150	597 (23.50)	57 (2.24)			131 (289)	132 (291)
	ASME B16.5, CL 300	648 (25.50)	88 (3.46)			263 (579)	264 (581)
	JIS 5K	540 (21.26)	29 (1.14)			73 (160)	74 (162)
	JIS 10K	560 (22.05)	33 (1.30)			85 (187)	86 (189)
	JIS 20K	605 (23.82)	51 (2.01)			138 (304)	139 (306)
	AS2129 table D	580 (22.83)	30 (1.20)			87 (191)	88 (193)
	AS2129 table E	580 (22.83)	39 (1.54)			103 (227)	104 (229)

Tolerance range for L: DN 150 to 200 +0 / -3 mm (+0 / -0.018 in.), DN 250 to 600 +0 / -5 mm (+0 / -0.197 in.)

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Dimensions – Flange device, variant 2 sensor with cast steel housing **Approx. weight**

Nominal diameter	Process connection	D	B	L **, ***	F	Remote mount	Integral mount
DN 450 (18 in.)	EN 1092-1, PN 10"	615 (24.21)	41 (1.61)	600 (23.62)	423 (16.65)	112 (247)	113 (249)
	EN 1092-1, PN 16"	640 (25.20)	47 (1.85)			137 (302)	138 (304)
	EN 1092-1, PN 25"	670 (26.38)	59 (2.32)			209 (460)	210 (462)
	ASME B16.5, CL 150	635 (25.00)	66 (2.60)			145 (319)	146 (321)
	ASME B16.5, CL 300	711 (27.99)	93 (3.66)			312 (687)	313 (689)
	JIS 5K	605 (23.82)	29 (1.14)			87 (192)	88 (194)
	JIS 10K	620 (24.41)	35 (1.38)			102 (224)	104 (226)
	JIS 20K	675 (26.75)	53 (2.09)			174 (383)	175 (384)
	AS2129 table D	640 (25.20)	30 (1.18)			101 (222)	102 (224)
	AS2129 table E	640 (25.20)	40 (1.57)			124 (273)	125 (275)
DN 500 (20 in.)	EN 1092-1, PN 10"	670 (26.38)	43 (1.96)	600 (23.62)	450 (17.72)	129 (284)	130 (286)
	EN 1092-1, PN 16"	715 (28.15)	51 (2.01)			189 (416)	190 (418)
	EN 1092-1, PN 25"	730 (28.74)	63 (2.48)			248 (546)	249 (548)
	ASME B16.5, CL 150	698.5 (27.50)	69 (2.72)			172 (379)	173 (381)
	ASME B16.5, CL 300	775 (30.51)	99 (3.90)			365 (804)	366 (806)
	JIS 5K	655 (25.79)	24 (0.94)			95 (209)	96 (211)
	JIS 10K	675 (26.57)	35 (1.38)			128 (282)	129 (284)
	JIS 20K	730 (28.74)	47 (1.85)			199 (438)	200 (440)
	AS2129 table D	705 (27.76)	34 (1.34)			127 (280)	128 (282)
	AS2129 table E	705 (27.76)	43 (1.69)			166 (366)	167 (368)
DN 600 (24 in.)	EN 1092-1, PN 10"	780 (30.71)	47 (1.85)	800 (31.50)	505 (19.88)	185 (407)	186 (410)
	EN 1092-1, PN 16"	840 (33.07)	60 (2.36)			299 (659)	300 (261)
	EN 1092-1, PN 25"	845 (33.27)	73 (2.87)			396 (873)	397 (875)
	ASME B16.5, CL 150	813 (32.01)	80 (3.15)			277 (610)	278 (612)
	ASME B16.5, CL 300	914 (35.98)	118 (4.65)			617 (1360)	618 (1362)
	JIS 5K	770 (30.31)	31 (1.22)			139 (306)	140 (308)
	JIS 10K	795 (31.30)	37 (1.46)			187 (412)	188 (414)
	JIS 20K	845 (33.27)	59 (2.32)			271 (597)	272 (599)
	AS2129 table D	825 (32.48)	47 (1.85)			187 (412)	188 (414)
	AS2129 table E	825 (32.48)	53 (2.09)			264 (582)	265 (584)

Tolerance range for L: DN 250 to 600 +0 / -5 mm (+0 / -0.197 in.)

* Other pressure ratings on request.

** If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 3 to 100 by 3 mm (0.118 in.).

*** If protective panes are installed (attached to both sides of the flange), this increases dimension L as follows: DN 3 to 100 by 6 mm (0.236 in.).

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Transmitter

Features

- Current output: 4 to 20 mA.
- Current output can be set to 21 to 22.6 mA (NAMUR NE43) in the case of an alarm.
- Measuring range: Can be adjusted from 0.02 to $2 \times Q_{\max DN}$.
- Operating mode is adjustable for measuring the flow.
- Programmable digital output. Can be configured as frequency, pulse or binary output.
- Damping: Adjustable from 0 to 100 s (1 τ).
- Low flow cut-off: From 0 to 20 % for current and pulse output.
- Empty pipe detector*.
- Simulation of current binary output (manual process control).

* Requirements for the "empty pipe detector" function:

- Conductivity of the medium being measured: $\geq 20 \mu S/cm$
- Signal cable length: $\leq 50 m$ (164 ft)
- Nominal diameter: $\geq DN 10$

LCD display (optional)

- High-contrast LCD display.
- Displays current and total flow quantity
- The user can select application-specific representations. Two operator pages can be configured to display several values simultaneously.
- Plain text error diagnostics tool
- Menu-driven parameter settings using four buttons.*
- Easy setup function for rapid commissioning.
- Operation via front pane via capacitive buttons.

Integral mount design
without LCD Display



Integral mount design
with LCD Display



Figure 30: Optional LCD display

* For devices without an LCD display, an accessory LCD display is available (part number: 00706388) that can be connected for making parameter settings. Refer to **Accessories** on page 36

IP degree of protection

- IP 65 / IP 67 as per EN 60529

Vibration

In accordance with EN 60068-2

- Maximum deflection: 0.15 mm (0.006 in.) in frequency range from 10 to 58 Hz
- Maximum acceleration: $2 g^*$, in frequency range from 58 to 150 Hz

* Peak load

Temperature data

Ambient temperature

-30 to 60 °C (-22 to 140 °F)

Storage temperature

-30 to 70 °C (-22 to 158 °F)

Note

At operation below -20 °C (-4 °F), the LCD can no longer be read and the electronic unit should be operated with as few vibrations as possible.

Full functionality is assured at temperatures above -20 °C (-4 °F).

Housing design

Integral mount design

Housing	Cast aluminum (painted), Cobalt Blue, RAL 5013
Cable gland	Polyamide

Remote mount design

Housing	Cast aluminum, painted
Paint	Thickness: $\geq 80 \mu m$, Cobalt Blue, RAL 5013
Cable gland	Polyamide
Weight	1.8 kg (3.97 lb)

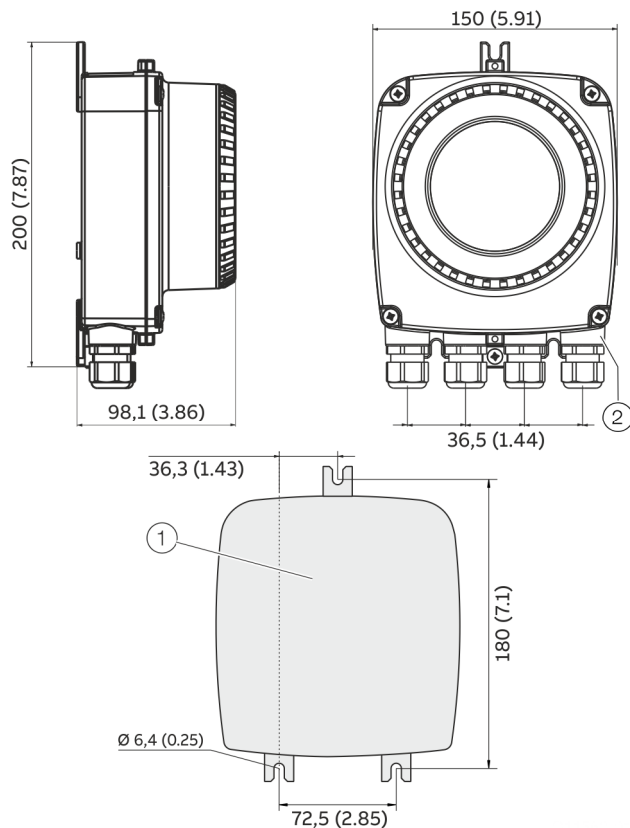
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Dimensions



① Hole pattern for mounting holes

② Female thread (either ½ in NPT or M20 x 1.5), see model coding. In the case of a ½ in NPT, there is a plug instead of a cable gland.

Figure 31: Mounting dimensions single-compartment housing

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Electrical connections

Connection diagram

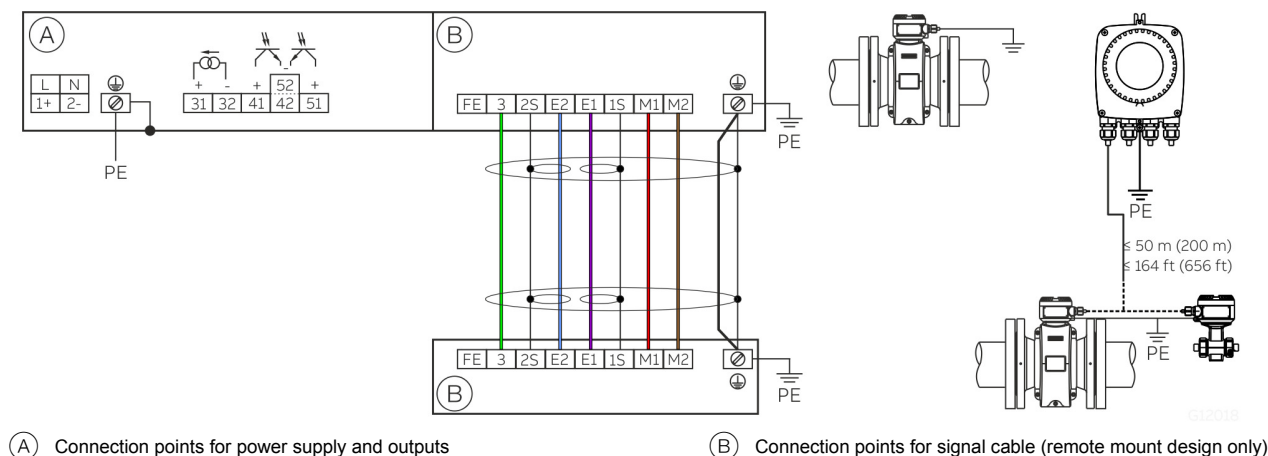


Figure 32: Electrical connection points

Note

For detailed information on grounding the transmitter and the sensor, please refer to the operating or commissioning instruction!

Connections for the power supply

AC power supply

Terminal	Function / comments
L	Phase
N	Neutral conductor
PE / ⊕	Protective earth (PE)

DC voltage supply

Terminal	Function / comments
1+	+
2-	-
PE / ⊕	Protective earth (PE)

Output connections

Terminal	Function / Comment
31 / 32	Active current output The current output is designed as an active output. The power supply for the current output is integrated in the transmitter.
41 / 42	Passive digital output DO1 The output can be configured at the site as a pulse, frequency or switching output.
51 / 52	Passive digital output DO2 The output can be configured at the site as a pulse, frequency or switching output.
⏏	Functional ground

Signal cable connections

Only for remote mount design.

Terminal	Function / Comment	Color
FE	Not assigned	–
3	Measurement potential	Green
2S	Shield for E2	–
E2	Signal lead	Blue
E1	Signal lead	Violet
1S	Shield for E1	–
M1	Solenoid	Brown
M2	Solenoid	Red
SE / ⊕	Shield	–
–	Not assigned	Orange / Yellow



Electrical data for inputs and outputs

Power supply, L / N, 1+ / 2-

Alternating voltage (AC) supply

Terminals	L / N
Operating voltage	100 to 240 V AC (−15 % / +10 %), 47 to 64 Hz
Power consumption	< 20 VA
Switch-on current	8.8 A

Direct voltage (DC) supply

Terminals	1+ / 2-
Operating voltage	24 to 48V DC (−10 % / +10 %)
Residual ripple	< 5 %
Power consumption	< 10 W
Switch-on current	5.6 A

Current output, 31 / 32

Can be configured for the output of mass flow and volumetric flow.

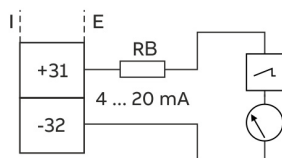
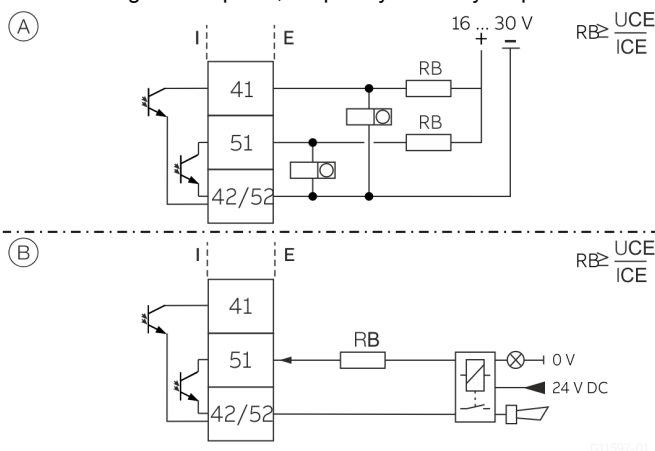


Figure 33: Connection example for active 31 / 32 current output
 (I = internal, E = external, R_B = load)

Current output	Active
Terminals	31 / 32
Output signal	4 to 20 mA
Load: R_B	$0 \Omega \leq R_B \leq 650 \Omega$

Digital output, 41 / 42, 51 / 52

Can be configured as pulse, frequency or binary output.



(A) 41 / 42, 51 / 52 passive digital output as pulse or frequency
 (B) 51 / 52 passive digital output as binary output

Figure 34: Connection example (I = internal, E = external, R_B = load)

Note

- The terminals 42 / 52 have the same potential. The digital outputs 41 / 42 and 51 / 52 are not electrically isolated from one another.
- If you are using a mechanical meter, we recommend setting a pulse width of ≥ 30 ms and a maximum frequency of $f_{\max} \leq 3$ kHz.

Pulse output / Frequency output (passive)

Terminals	41 / 42, 51 / 52
U_{\max}	30 V DC
I_{\max}	25 mA
f_{\max}	10.5 kHz
Pulse width	0.1 to 2000 ms

Binary output (passive)

Terminals	41 / 42, 51 / 52
U_{\max}	30 V DC
I_{\max}	25 mA
Switching function	Can be configured via software as: General alarm, empty pipe alarm, min. or max. alarm, flow direction signal, among other options

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Ordering information – JUMO flowTRANS MAG S10

Further product information can be found at www.jumo.de

(1) Basic type	
406060	electromagnetic flowmeter
(2) Design type	
1	compact (sensor and transmitter)
2	remote (only external sensor)
(3) ex zone	
00	without (general purpose)
(4) housing Type / housing Material / cable glands	
01	1-chamber housing / aluminum / M20 x 1.5
02	1-chamber housing / aluminum / NPT 1/2 in.
05	remote / aluminum / M20 x 1.5
06	remote / aluminum / NPT 1/2 in.
(5) nominal width	
0003	DN 3 (1/10 in.)
0004	DN 4 (5/32 in.)
0006	DN 6 (1/4 in.)
0008	DN 8 (5/16 in.)
0010	DN 10 (3/8 in.)
0015	DN 15 (1/2 in.)
0020	DN 20 (3/4 in.)
0025	DN 25 (1 in.)
0032	DN 32 (1-1/4 in.)
0040	DN 40 (1-1/2 in.)
0050	DN 50 (2 in.)
0065	DN 65 (2-1/2 in.)
0080	DN 80 (3 in.)
0100	DN 100 (4 in.)
0125	DN 125 (5 in.)
0150	DN 150 (6 in.)
0200	DN 200 (8 in.)
0250	DN 250 (10 in.)
0300	DN 300 (12 in.)
0350	DN 350 (14 in.)
0400	DN 400 (16 in.)
0450	DN 450 (18 in.)
0500	DN 500 (20 in.)
0600	DN 600 (24 in.)
0700	DN 700 (28 in.)
0750	DN 750 (30 in.)
0800	DN 800 (32 in.)
0900	DN 900 (36 in.)
1000	DN 1000 (40 in.)
1050	DN 1050 (42 in.)
1100	DN 1100 (44 in.)
1200	DN 1200 (48 in.)
1400	DN 1400 (54 in.)
1500	DN 1500 (60 in.)
1600	DN 1600 (66 in.)
1800	DN 1800 (72 in.)
2000	DN 2000 (80 in.)

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(6) process connection	
10	flange DIN PN 6
11	flange DIN PN 10
12	flange DIN PN 16
13	flange DIN PN 25
14	flange DIN PN 40
20	flange ASME CL 150
21	flange ASME CL 300
23	flange JIS 10K
24	flange JIS 5K
25	flange JIS 20K
(7) lining material	
01	PTFE
03	ETFE
06	hard rubber
08	PFA
09	soft rubber
(8) material process connection	
01	steel
02	stainless steel
(9) electrode version	
1	standard
5	pointed head
(10) measuring electrode material	
02	NiMo C-4 (2.4610)
03	titanium
04	tantalum
05	NiMo B-3 (2.4600)
06	platinum-iridium
07	stainless steel 1.4571
(11) grounding Electrode / full Pipe Detection	
0	without grounding electrode / without full pipe detection
2	with grounding electrode / without full pipe detection
(12) grounding accessories	
0	without
4	protection rings
(13) transmitter / sensor protection type	
1	IP67 (NEMA 4X)
2	IP67 (NEMA 4X) / IP68 (NEMA6P)
3	IP67 / IP68, signal cable connected, potted
(14) voltage supply	
0	without
5	100 ... 230 AC / 24 V DC, 50Hz
6	100 ... 230 AC / 24 V DC, 60Hz
(15) display and keypad	
0	without
2	with display, with keypad
(16) signal inputs / outputs	
00	without
01	20mA output active, digital output 1+2 passive
(17) material certificate	
0	without
2	inspection cert. 3.1 as per EN 10204

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(18) calibration certificate
1 standard
2 3rd party witnessed calibration
(19) approvals
1 meas. tube with PED approval
(20) supply frequency
0 without (compact design only)
1 50 Hz
2 60 Hz
(21) insertion length
6 standard
(22) further options
0 without
(23) language documentation
01 German
02 English
03 French
04 Spanish
(24) tests and reports
0 without
4 pressure test to AD-2000
(25) configuration
8 default setting
(26) calibration
3 accuracy 0,5%
(27) signal cable length
00 without signal cable
01 5 m (about 15 ft.)
02 10 m (about 30 ft.)
03 15 m (about 49 ft.)
04 20 m (about 66 ft.)
05 25 m (about 82 ft.)
06 30 m (about 98 ft.)
07 35 m (about 115 ft.)
08 40 m (about 131 ft.)
10 50 m (about 164 ft.)
(28) instrument label
1 adhesive label
(29) temperatur range sensor / ambient temperature
1 standard / -20 to 60 °C (-4 to 140 °F)
(30) number of test points
2 2 test points
3 3 test points
5 5 test points
(31) validation function
0 validation function not activated

Order code

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	
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(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)								
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Ordering information – JUMO flowTRANS MAG 10 external transmitter

Further product information can be found at www.jumo.de

(1) Basic type	
406067	external transmitter
(2) Design type	
2	only external sensor
(3) ex zone	
00	without (general purpose)
(4) housing Type / housing Material / cable glands	
09	field-mount / 1-chamber housing / aluminum / M20 x1.5
10	field-mount / 1-chamber housing / aluminum / NPT 1/2in.
(5) transmitter / sensor protection type	
1	IP67 (NEMA 4X)
(6) voltage supply	
5	100 ... 230 AC / 24 V DC, 50 Hz
6	100 ... 230 AC / 24 V DC, 60 Hz
(7) display and keypad	
0	without
2	with display, with keypad
(8) signal inputs / outputs	
01	20mA output active, digital output 1+2passive
(9) Food & Beverage Approvals	
0	without
(10) further options	
0	without
(11) language documentation	
01	German
02	English
03	French
04	Spanish
(12) instrument label	
1	adhesive label
(13) temperatur range sensor / ambient temperature	
1	standard / -20 to 60 °C (-4 to 140 °F)
(14) mounting set transmitter	
0	without

Order code

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)
 / - - - - - - - - - - - - -




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Accessories

Description	Part number
Installation set for cable gland NPT ½ in. For sealing the cable conduit in the case of outdoor installation.	00645908
	
M20x1.5 adapter on ½ in. NPT	00706384
	
LCD adapters (HMI) – for integral and remote mount designs	00706388
	
Signal cable	00645914

Trademark information

Hastelloy® is a registered trademark of Haynes International, Inc., Kokomo Ind., US.

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JUMO flowTRANS MAG H10

Electromagnetic flowmeter

for hygienic applications

Brief description

The electromagnetic JUMO flowTRANS MAG H10 flowmeter is specifically designed to meet the requirements relevant to hygienic for applications in the food and pharmaceuticals industries and it is available in numerous nominal diameters.

The sensor is made completely of stainless steel, it facilitates cleaning tasks and it meets all the requirements of 3A sanitary standards.

The variable connection concept with a standardized sensor provides for flexibility and easy installation.

Users are afforded a cost-effective and customized flowmeter with the JUMO flowTRANS MAG H10, which can be used in a wide range of applications, complete with a clear and straightforward documentation.

Model variants

Integral mount design

The transmitter and the flow sensor form a mechanical unit in devices featuring a compact (integral mount) design.

Remote mount design

The transmitter and the flow sensor are mounted physically separated from one another in devices featuring a separate (remote mount) design.

The electrical connection between the transmitter and the sensor is provided by a signal cable. With a minimum conductivity of 20 µS/cm of the medium being measured, a maximum signal cable length of 50 m (164 ft) is possible.

Refer to **Overview – models** on page 2.

Customer benefits

- Integral or remote mount design
- Variable connection concept
- Large selection of industry-specific process connections
- Uniform transmitter electronics for all versions
- Rotatable LCD display (optional) can be operated via capacitive control buttons
- Ongoing self-monitoring of sensor, transmitter and process
- Diagnostics-related help texts for the quick and target-oriented elimination of errors (e. g. empty pipe detection)

Approvals/Certification marks



Type 406061/1...

Features

- Ease of use
- Verification option based on fingerprint technology
- Display of service interval
- Nominal pressure ratings:
PN 10 to PN 40, ASME CL150/CL300, JIS 10K
- Various process connections
- Lining material: PFA
- Temperature range of medium:
-25 to +130 °C (-13 to +266 °F)

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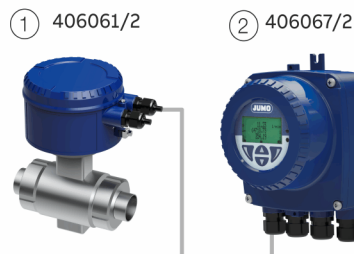


Overview – models

Integral mount design



Remote mount design



① Sensor

② External transmitter

Figure 1: Designs

Sensor	
Model	JUMO flowTRANS MAG H10
Design	Integral mount design (406061/1), remote mount design (406061/2)
Measuring accuracy for liquids	0.5 % of rate
Permissible temperature of the medium being measured, T_{medium}	-25 to 130 °C (-13 to 266 °F)
Minimum conductivity	> 20 µS/cm (20 µS/cm for demineralized water)
Nominal pressure rating	PN 10 to 40, ASME CL 150, 300, JIS 10K
Nominal diameter	DN 3 to 100 (1/8 in. to 4 in.)
Process connection	Wafer-type design: DN 3 to 100 (1/8 to 4 in.) Flange in acc. with DIN, ASME or JIS: DN 3 to 100 (1/8 to 4 in.), PN 10 to 40 Threaded pipe connection in acc. with DIN 11851: DN 3 to 100 (1/8 to 4 in.), PN 10 to 40 Weld stubs: DN 3 to 100 (1/8 to 4 in.), PN 10 to 40 Tri-Clamp in acc. with DIN 32676: DN 3 to 100 (1/8 to 4 in.), PN 10 to 16 Tri-Clamp in acc. with ASME BPE: DN 3 to 100 (1/8 to 4 in.), PN 10 External thread in acc. with ISO 228 / DIN 2999: DN 3 to 25 (1/8 to 1 in.), PN 16
Process connection material	Stainless steel
Lining material	PFA (vacuum-proof)
Electrode material	CrNi steel 1.4571 (AISI 316Ti), 1.4539 [904L], Hastelloy B, Hastelloy C, platinum-iridium, tantalum, titanium
IP degree of protection	Integral mount design: IP 65 / IP 67 Remote mount design: IP 65 / IP 67 / IP 68 (only for sensors(s))

Approvals	
Pressure Equipment Directive 2014/68/EU	Conformity assessment in accordance with category III, fluid group 1
Hygienic approvals	FDA-compliant materials
Further approvals	Are available in the download section at www.jumo.de , or on request.

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Transmitter

Model	JUMO flowTRANS MAG 10
Design	Remote mount design (406067/2)
IP degree of protection	IP 65 / IP 67
Signal cable length	Maximum 50 m (164 ft), remote mount design only
Power supply	100 to 240 V AC (–15% / +10 %), 24 to 48 V DC (–10% / +10 %)
Outputs	Current output: 4 to 20 mA, active Digital output 1: Passive, can be configured as pulse, frequency or switching output Digital output 2: Passive, can be configured as pulse or switching output
Local display	Graphical display, can be configured (optional)

Approvals

Further approvals	Are available in the download section at www.jumo.de , or on request.
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Measuring principle

Measurements performed by the electromagnetic flowmeter are based on Faraday's law of induction. A voltage is generated in a conductor when it moves through a magnetic field.

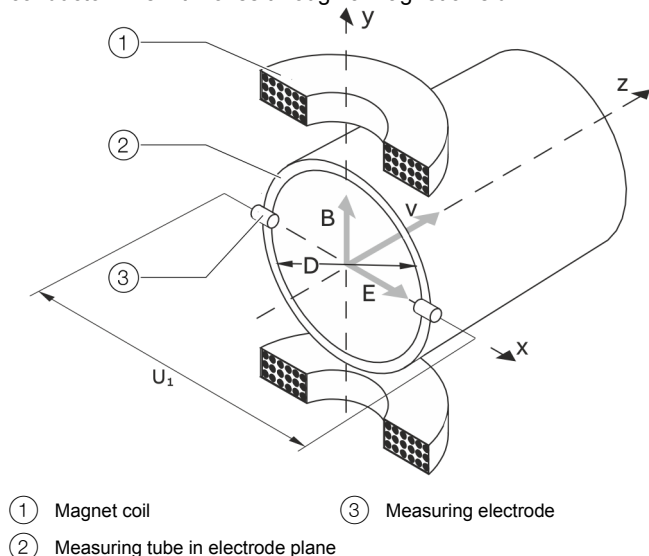


Figure 2: Electromagnetic flowmeter diagram

$U_1 \sim B \times D \times v$	$qv = \frac{D^2 \times \pi}{4} \times v$	$U_1 \sim qv$
U_1 Measuring span	v Average flow velocity	
B Magnetic induction	qv Volume flow rate	
D Electrode spacing		

With the device-relevant application of this measuring principle, a conductive measuring medium flows through a tube in which a magnetic field is generated perpendicular to the flow direction (see Figure 2).

The voltage induced in the measuring medium is tapped by two diametrically opposed electrodes. This measurement voltage is proportional to the magnetic induction, the electrode spacing and the average medium velocity.

Taking into account that the magnetic induction and the electrode spacing are constant values results in a proportion between the measurement voltage U_1 and the average medium velocity. From the calculation of the volume flow rate follows that the measurement voltage is linear and proportional to the volume flow rate

The induced voltage is converted by the transmitter to standardized, analog and digital signals.

Flowmeter sensor

Measuring accuracy

Reference conditions

In accordance with EN 29104

Temperature of medium being measured	20 °C (68 °F) ±2 K
Ambient temperature	20 °C (68 °F) ±2 K
Power supply	Rated voltage as per rating plate $U = \pm 1\%$; frequency $f = \pm 1\%$
Installation conditions	<ul style="list-style-type: none"> Upstream: > 10 x DN straight section Downstream: > 5 x DN straight section
Warm-up phase	30 minutes

Measurement value deviation and reproducibility

Measuring accuracy

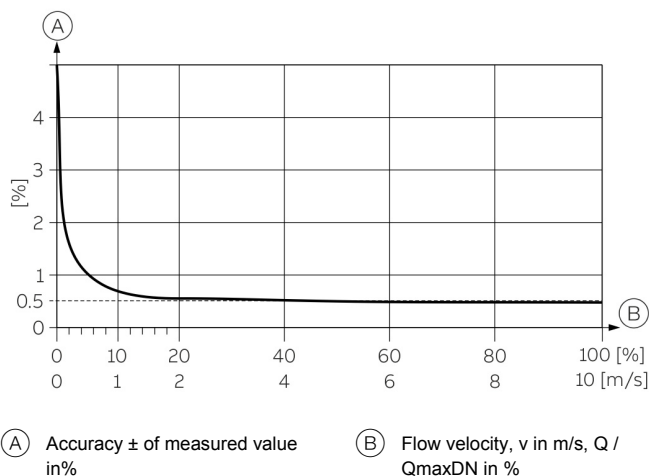


Figure 3: Measuring accuracy

Pulse output

±0.5 % of measured value, ±0.02 % $Q_{\max}DN^*$

* $Q_{\max}DN$: Refer to **Measuring range table** on page 6.

Current output

Same as pulse output plus ± 0.1 % of measured value ± 0.01 mA.

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Reproducibility, response time

Reproducibility	$\leq 0.11\%$ of measured value, $t_{\text{meas}} = 100\text{ s}$, $v = 0.5$ to 10 m/s
Response time*	As step function, 0 to 99 % $5\tau \geq 200\text{ ms}$ at 25 Hz excitation frequency $5\tau \geq 400\text{ ms}$ at 12.5 Hz excitation frequency $5\tau \geq 500\text{ ms}$ at 6.25 Hz excitation frequency

* For current output with damping of 0.02 seconds.

Permitted pipe vibration

In accordance with EN 60068-2-6

Valid for sensors in remote mount and integral mount design.

- Maximum deflection: 0.15 mm (0.006 in) in the frequency range of 10 to 58 Hz
- Maximum acceleration: 2 g in the frequency range of 58 to 150 Hz

IP degree of protection

- IP 65 / IP 67 in accordance with EN 60529
- IP 68 in accordance with EN 60529 (for remote mount design only)
- NEMA 4X

Signal cables

Only for remote mount design.

The maximum signal cable length between the flow sensor and the transmitter is 50 m (164 ft).

A 5 m (16.4 ft) long signal cable is included in the standard scope of supply.

Should a signal cable longer than 5 m (16.4 ft) be required, this can be ordered separately (part number: 00645914).

Temperature data

The temperature range offered by the device is dependent on a number of different factors.

These factors include the measuring medium temperature

T_{medium} , the ambient temperature T_{amb} , operating pressure

P_{medium} , liner material and the approval for explosion protection.

Storage temperature range

-30 to 70 °C (-22 to 158 °F)

Maximum permissible cleaning temperature

CIP media	Liner	Cleaning temperature
Steam	PTFE, PFA	150 °C (302 °F)
Cleaning fluid	PTFE, PFA	140 °C (284 °F)

- The maximum cleaning temperature specified applies to a maximum ambient temperature of 25 °C (77 °F).
If the ambient temperature up-scales > 25 °C (> 77 °F), then the temperature difference to the current temperature must be subtracted from the max. cleaning temperature.
- The specified cleaning temperature may have an effect for a maximum of 60 minutes.

Maximum Allowable Temperature Shock

Maximum allowable temperature shock difference in °C: Any

Temperature gradient °C/min: Any

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Maximum ambient temperature depending on measuring medium temperature

Process connection	Ambient temperature (T _{amb.})		Temperature of medium being measured (T _{medium})	
	Minimum	Maximum	Minimum	Maximum*
Flange	-20 °C (-4 °F)	60 °C (140 °F)	-25 °C (-13 °F)	95 °C (203 °F)
	-20 °C (-4 °F)	45 °C (113 °F)	-25 °C (-13 °F)	130 °C (266 °F)
Variable process connections	-20 °C (-4 °F)	60 °C (140 °F)	-25 °C (-13 °F)	95 °C (203 °F)
	-20 °C (-4 °F)	45 °C (113 °F)	-25 °C (-13 °F)	130 °C (266 °F)

* For CIP/SIP cleaning, higher temperatures are permitted for limited periods; refer to **Maximum permissible cleaning temperature** on page 5.

Measuring range table

The full-scale value can be set between $0.02 \times Q_{\max} \text{ DN}$ and $2 \times Q_{\max} \text{ DN}$.

Nominal diameter		Lower range value	$Q_{\max} \text{ DN}$	Upper range value
DN	in.	$0.02 \times Q_{\max} \text{ DN} (\approx 0.2 \text{ m/s})$	0 to $\approx 10 \text{ m/s}$	$2 \times Q_{\max} \text{ DN} (\approx 20 \text{ m/s})$
3	$\frac{1}{10}$	0.08 l/min (0.02 US gal/min)	4 l/min (1.06 US gal/min)	8 l/min (2.11 US gal/min)
4	$\frac{5}{32}$	0.16 l/min (0.04 US gal/min)	8 l/min (2.11 US gal/min)	16 l/min (4.23 US gal/min)
6	$\frac{1}{4}$	0.4 l/min (0.11 US gal/min)	20 l/min (5.28 US gal/min)	40 l/min (10.57 US gal/min)
8	$\frac{5}{16}$	0.6 l/min (0.16 US gal/min)	30 l/min (7.93 US gal/min)	60 l/min (15.85 US gal/min)
10	$\frac{3}{8}$	0.9 l/min (0.24 US gal/min)	45 l/min (11.9 US gal/min)	90 l/min (23.78 US gal/min)
15	$\frac{1}{2}$	2 l/min (0.53 US gal/min)	100 l/min (26.4 US gal/min)	200 l/min (52.8 US gal/min)
20	$\frac{3}{4}$	3 l/min (0.79 US gal/min)	150 l/min (39.6 US gal/min)	300 l/min (79.3 US gal/min)
25	1	4 l/min (1.06 US gal/min)	200 l/min (52.8 US gal/min)	400 l/min (106 US gal/min)
32	1 $\frac{1}{4}$	8 l/min (2.11 US gal/min)	400 l/min (106 US gal/min)	800 l/min (211 US gal/min)
40	1 $\frac{1}{2}$	12 l/min (3.17 US gal/min)	600 l/min (159 US gal/min)	1200 l/min (317 US gal/min)
50	2	1.2 m ³ /h (5.28 US gal/min)	60 m ³ /h (264 US gal/min)	120 m ³ /h (528 US gal/min)
65	2 $\frac{1}{2}$	2.4 m ³ /h (10.57 US gal/min)	120 m ³ /h (528 US gal/min)	240 m ³ /h (1057 US gal/min)
80	3	3.6 m ³ /h (15.9 US gal/min)	180 m ³ /h (793 US gal/min)	360 m ³ /h (1585 US gal/min)
100	4	4.8 m ³ /h (21.1 US gal/min)	240 m ³ /h (1057 US gal/min)	480 m ³ /h (2113 US gal/min)

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Process connections

For an overview of available process connection versions, see **Overview – models** on page 2.

Insertion length

The flange devices comply with the insertion lengths specified in ISO 13359, or according to DVGW (process sheet W420, design WP, ISO 4064 short).

For further details, refer to chapter **Dimensions** on page 15.

Materials

Parts in contact with the medium

Part	Standard	Option
Lining	PFA	–
Signal and grounding electrode		
	CrNi steel 1.4539 (AISI 904L)	CrNi steel 1.4571 (AISI 316Ti), Hastelloy C-4 (2.4610), Hastelloy B-3 (2.4600), Titanium, tantalum, platinum-iridium
Gaskets (for weld stubs, threaded pipe connections, Tri-Clamp, external thread)		
	EPDM (Ethylene-Propylene) with FDA approval (CIP-resistant, no oils or greases)	Silicone with FDA approval (resistant to oils and greases) PTFE with FDA approval (DN 3 to 8)
Process connection		
Welded stub, Tri-Clamp, etc.	CrNi steel 1.4404 (AISI 316L)	–
OD tubing	CrNi steel 1.4435 (AISI 316L)	–

Parts not in contact with the medium

Part	Standard	Option
Flange	CrNi steel 1.4571 (AISI 316Ti)	–

Sensor housing

Part	Material
Housing	Deep-drawn housing CrNi steel 1.4301 (AISI 304), 1.4308
Meter tube	Stainless steel
Terminal box	Aluminum alloy, painted, Cobalt Blue, RAL 5013, ≥ 80 µm thick
Cable gland*	Polyamide

* For a cable gland with M20 x 1.5 or NPT thread, select the appropriate part number.

Material load for process connections

The limits of the permissible measuring medium temperature (T_{medium}) and permissible pressure (P_{medium}) are calculated on the basis of the liner and flange material used in the device (see device name plate).

Minimum permissible operating pressure

The minimum permissible operating pressure (P_{medium}) dependent on the temperature of the medium being measured (T_{medium}) and the liner material is indicated in the table below.

Liner material	Nominal diameter	P_{medium} [mbar abs]	T_{medium} *
PFA	DN 3 to 100 ($\frac{1}{16}$ to 4 in.)	0	< 130 °C (266 °F)

* For CIP/SIP cleaning, higher temperatures are permitted for limited periods; refer to table **Maximum permissible cleaning temperature** on page 5.

Approvals for liners available on request; please contact the manufacturer.

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Overview of material load

Process connection	DN	P _{medium} max.	T _{medium}
Wafer type	DN 3 to 50 ($\frac{1}{10}$ to 2 in.)	40 bar (580 psi)	-25 to 130 °C (-13 to 266 °F)
	DN 65 to 100 (2 $\frac{1}{2}$ to 4 in.)	16 bar (232 psi)	
Weld stub DIN 2463, ISO 1127, DIN 11850	DN 3 to 40 ($\frac{1}{10}$ to 1 $\frac{1}{2}$ in.)	40 bar (580 psi)	-25 to 130 °C (-13 to 266 °F)
	DN 50, DN 80 (2 in., 3 in.)	16 bar (232 psi)	
	DN 65, DN 100 (2 $\frac{1}{2}$ in., 4 in.)	10 bar (145 psi)	
Weld stub SMS 1145	DN 25, DN 40 to 100 (1 in., 1.5 to 4 in.)	6 bar (87 psi)	-25 to 130 °C (-13 to 266 °F)
Threaded pipe connection DIN 11851	DN 3 to 40 ($\frac{1}{10}$ to 1 $\frac{1}{2}$ in.)	40 bar (580 psi)	-25 to 130 °C (-13 to 266 °F)
	DN 50, DN 80 (2 in., 3 in.)	16 bar (232 psi)	
	DN 65, DN 100 (2 $\frac{1}{2}$ in., 4 in.)	10 bar (145 psi)	
Tri-Clamp DIN 32676	DN 3 to 50 ($\frac{1}{10}$ to 2 in.)	16 bar (232 psi)	-25 to 130 °C (-13 to 266 °F)
	DN 65 to 100 (2 $\frac{1}{2}$ to 4 in.)	10 bar (145 psi)	
Tri-Clamp ASME BPE	DN 3 to 80 ($\frac{1}{10}$ to 3 in.)	10 bar (145 psi)	-25 to 121 °C (-13 to 250 °F)
	DN 100 (4 in.)	8.6 bar (124.7 psi)	
External thread ISO 228, DIN 2999	DN 3 to 25 ($\frac{1}{10}$ to 1 in.)	16 bar (232 psi)	-25 to 130 °C (-13 to 266 °F)
Weld stub OD tubing	DN 3 to 50 ($\frac{1}{10}$ to 2 in.)	10 bar (145 psi)	-25 to 130 °C (-13 to 266 °F)

Flange design

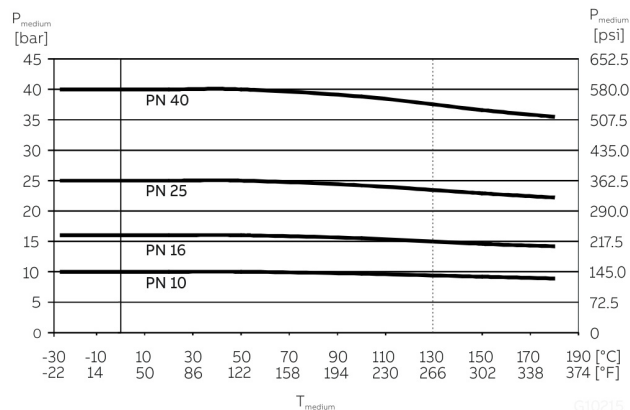


Figure 4: DIN flange, stainless steel up to DN 100 (4 in.)

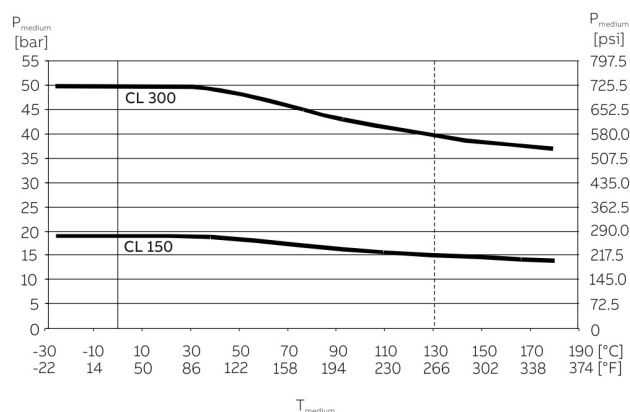


Figure 5: ASME flange, stainless steel up to DN 100 (4 in.) (CL 150 / CL 300)

JIS 10K-B2210 flange

DN	Material	PN	T _{medium}	P _{medium}
DN 25 to 100 (1 to 4 in.)	Stainless steel	10	-25 to 130 °C (-13 to 266 °F)	10 bar (145 psi)

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Wafer type design

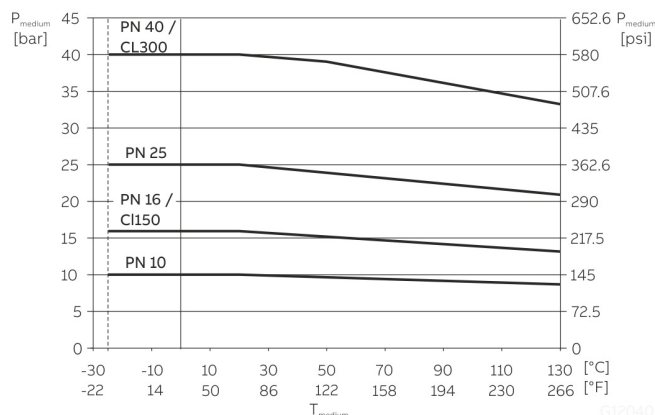


Figure 6: Wafer type design

JIS 10K-B2210 wafer type design

DN	Material	PN	T _{medium}	P _{medium}
DN 32 to 100 (1 ¼ to 4 in.)	1.4404	10	-25 to 130 °C	10 bar
	1.4435		(-13 to 266 °F)	(145 psi)
	1.4301			

Installation conditions

General

Compliance with the following points is required for installation:

- Ensure that the flow direction corresponds to the marking, if there is one.
- Ensure that the maximum torque specification is maintained for all flange screws. See chapter "**Torque information**" in the operating instruction..
- Secure flange screws and nuts against pipe vibrations.
- Install devices without mechanical tension (torsion, bend).
- Install flange and wafer-type devices with coplanar counter flanges and use only appropriate gaskets.
- Use only gaskets made from a material that is compatible with the medium being measured and its temperature.
- Ensure that gaskets do not extend into the flow area since possible turbulence could influence the device accuracy.
- Ensure that no impermissible forces or moments act on the device owing to the piping.
- Ensure that the temperature limits for the device are being adhered to during operation.
- Avoid vacuum shocks in the piping. Vacuum shocks can destroy the liner and the device.
- Do not remove the plugs for the cable glands until you are ready to install the electrical cables.
- Make sure that the gaskets for the housing cover are seated properly. Carefully close the cover. Tighten the cover screws.
- Install the remote-mount transmitter at a location that is free of vibrations to a large extent.
- Do not expose the transmitter or the sensor to direct sunlight; provide protection from the sun as needed.
- Ensure that sufficient cooling is provided whenever installing the transmitter in a control cabinet.
- Ensure that the remote-mount transmitter and the associated sensor are correctly assigned (paired). Devices that form a pair have the same numeric suffix; e.g., the X001 sensor is paired with the Y001 transmitter or the X002 sensor is paired with the Y002 transmitter; this is indicated on the rating plate.

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Gaskets

The following points must be observed when installing gaskets:

- To achieve the best results, make sure that the gaskets and meter tube fit concentrically.
- To make sure that the flow profile is not distorted, the gaskets may not intrude in the piping cross-section.
- The use of graphite with the flange or process connection gaskets is prohibited. This is because, in some instances, an electrically conductive coating may form on the inside of the meter tube.

Devices with lining made of PFA

- No additional gaskets are required for devices with lining made of PFA.

Devices with a wafer-type design

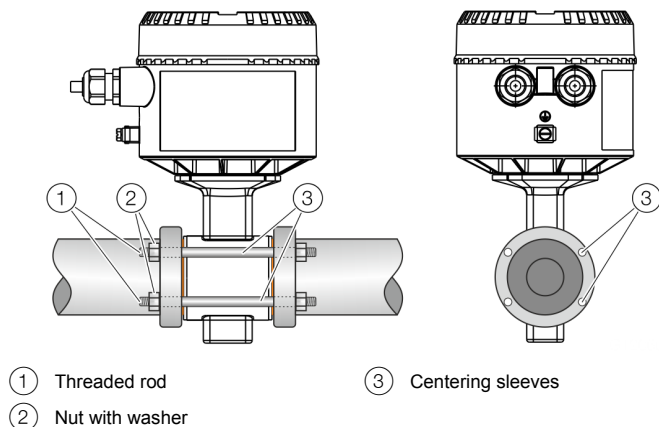


Figure 7: Installation set for wafer-type design (example)

For devices that feature a wafer-type design, the manufacturer offers an installation set as an accessory part that consists of threaded rods, nuts, washers and centering sleeves to facilitate installation.

Flow direction

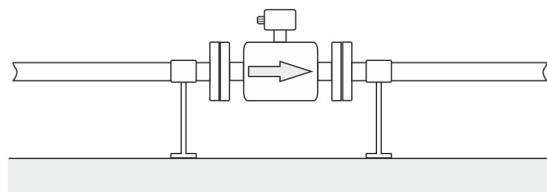


Figure 8: Flow direction

The device measures the flow rate in both flow directions. Forward flow is the factory setting, as shown in Figure 8.

Electrode axis

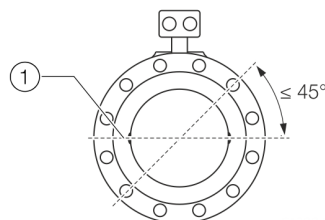


Figure 9: Orientation of the electrode axis

The flowmeter sensor should be mounted in the piping in such a manner that the electrode axis is oriented as horizontally as possible.

A maximum deviation of 45° from the horizontal position is permissible.

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Mounting position

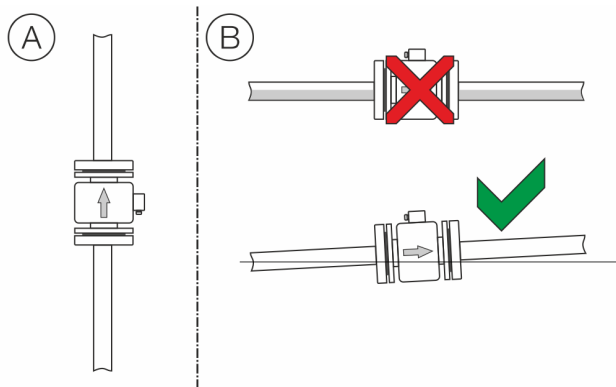


Figure 10: Mounting position

- (A) Vertical installation for measuring abrasive materials, preferably with flow in upward direction.
- (B) For a horizontal installation, the meter tube must always be completely filled with the measuring medium.
Provide for a slight incline of the connection for degassing.

Note

The vertical installation position should be given preference for hygienic applications.
 Ensure that the sensor is installed in a self-draining position in the case of horizontal installation.

Minimum spacing of the devices

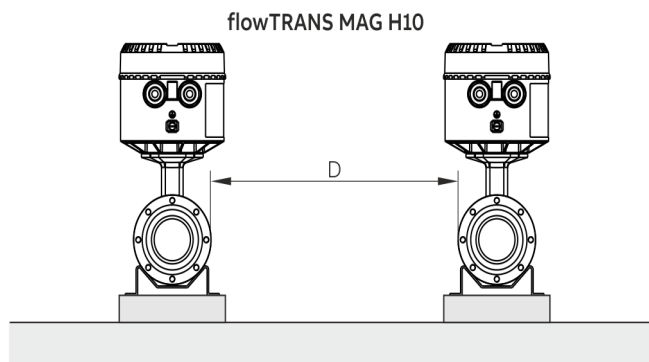
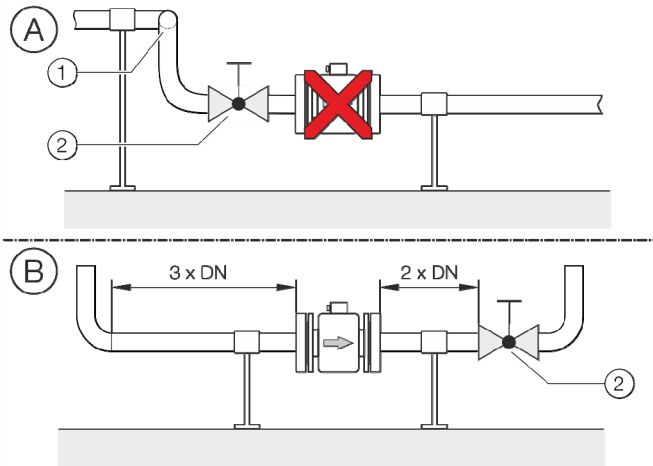


Figure 11: Distance (D): $\geq 1.0 \text{ m}$ ($\geq 3.3 \text{ ft}$)

- To rule out that the devices interfere with one another, ensure that the minimum distance between the devices shown in Figure 11 is maintained.
- Do not operate the sensor in the vicinity of strong electromagnetic fields, e.g., motors, pumps, transformers, etc. Keep a minimum distance of approx. 1 m (3.28 ft).
- When installing on or at steel parts (e. g. steel joists) maintain a minimum distance of 100 mm (3.94 in.). (These values were determined based on IEC 801-2 and/or IEC TC77B).



Inlet and outlet sections



① 90° out-of-plane double bend ② Shut-off device

Figure 12: Upstream and downstream sections, shut-off devices

The metering principle is independent of the flow profile as long as stationary eddies do not extend into the metering section, such as may occur downstream of 90° out-of-plane double bends, in the event of tangential inflow, or where half-open gate valves are located upstream of the sensor. Such cases require measures to be put in place to normalize the flow profile.

- (A) Do not install connections, elbows, valves, etc. directly upstream of the sensor.
- (B) Upstream section / Downstream section: Length of the straight pipe at the inlet and the outlet of the sensor. Experience has shown that, in most installations, a straight upstream section length of three times the nominal diameter of the flow sensor and a straight downstream section length of two times the nominal diameter of the flow sensor are sufficient.

For test stands, the reference conditions of straight upstream section lengths ten times the nominal diameter of the sensor and straight downstream section lengths five times the nominal diameter of the sensor should be provided in accordance with EN 29104 / ISO 9104.

Valves or other shut-off devices should be installed in the downstream section.

Butterfly valves must be installed so that the valve plate does not extend into the flow sensor.

Free inlet or outlet

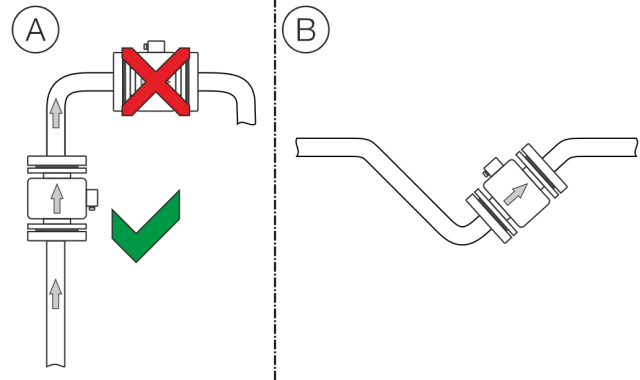


Figure 13: Free inflow and outflow

- (A) For a free outflow, do not install flowmeter at the highest point of the piping or on its outflow side, since the measuring tube may run empty, creating air bubbles.
- (B) For free inflow/outflow, provide an invert to make sure that the piping is always full

Mounting with heavily contaminated measuring media

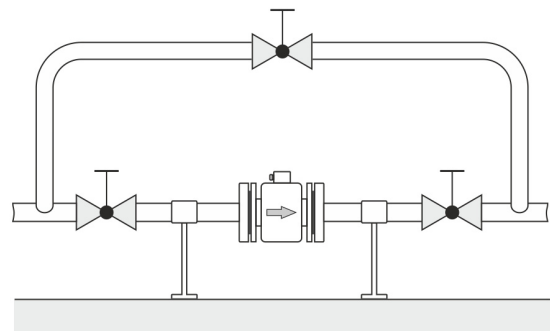
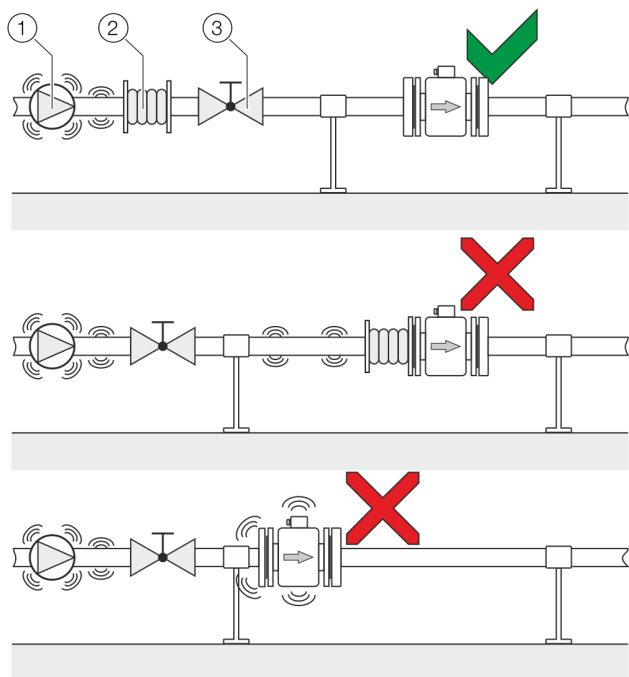


Figure 14: Bypass line

For strongly contaminated measuring media, a bypass line in accordance with the figure is recommended so that operation of the system can continue to run without interruption during mechanical cleaning.

Mounting with pipe vibration



- ① Pump
 ② Damping device
 ③ Turn-off device

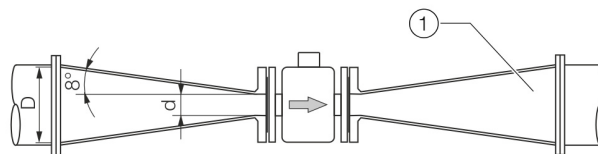
Figure 15: Vibration damping

If pipe vibration occurs, it needs to be damped using damping devices.

The damping devices must be installed outside the support section and outside of the piping section between the turn-off devices.

Avoid connecting damping devices directly to the flowmeter sensor.

Installation in piping with larger nominal diameter



- ① Reducer

Figure 16: Using reducers

Determine the resulting pressure loss when using reducers:

1. Determine diameter ratios d/D .
2. Determine the flow velocity based on the flow rate nomogram (Figure 17).
3. Read the pressure loss on the Y-axis in Figure 17.

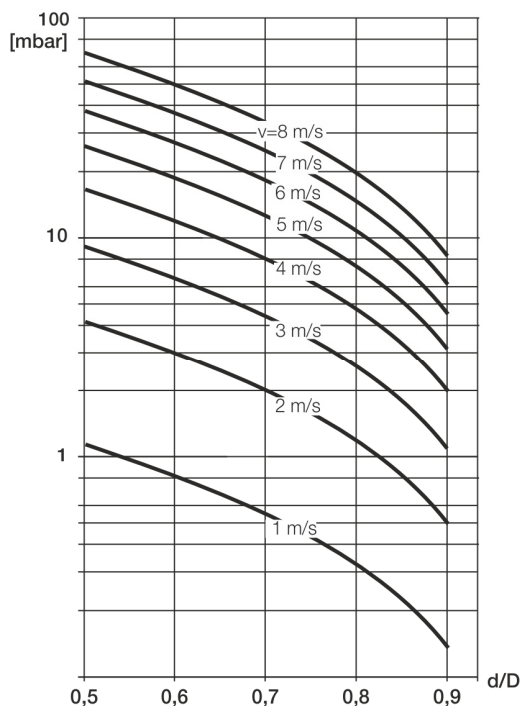


Figure 17: Flow rate nomogram for flange transition piece at $\alpha/2 = 8^\circ$

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Installation in 3A compliant installations

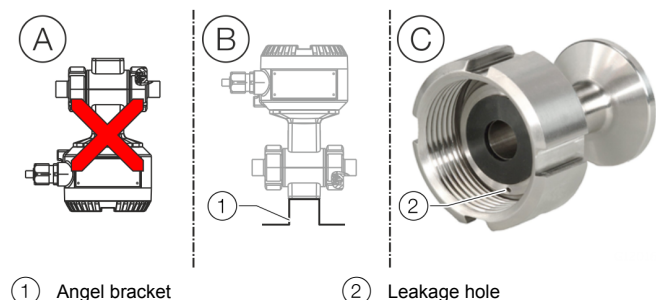


Figure 18: 3A compliant installation

Please observe the following points:

- Ⓐ Do not install the device vertically with the terminal box or transmitter housing pointing downward.
 - Ⓑ The 'angel bracket' option is not 3A compliant.
 - Ⓒ Please make sure that the leakage hole of the process connection is located at the lowest point of the installed device.
- A vertical mounting position is preferred. For a horizontal mounting position, make sure that the sensor is installed to be self-draining.
 - Make sure that the cover of terminal box and / or transmitter housing is properly sealed. There can be no gaps between the housing and the cover.

Only devices with the following process connections fulfill 3A compliance.

- Welded spuds
- Tri-clamp

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Dimensions

Flange, DN 3 to 100 (1/10 to 4 in.)

All dimensions and weights are indicated in mm (in.) or kg (lb).

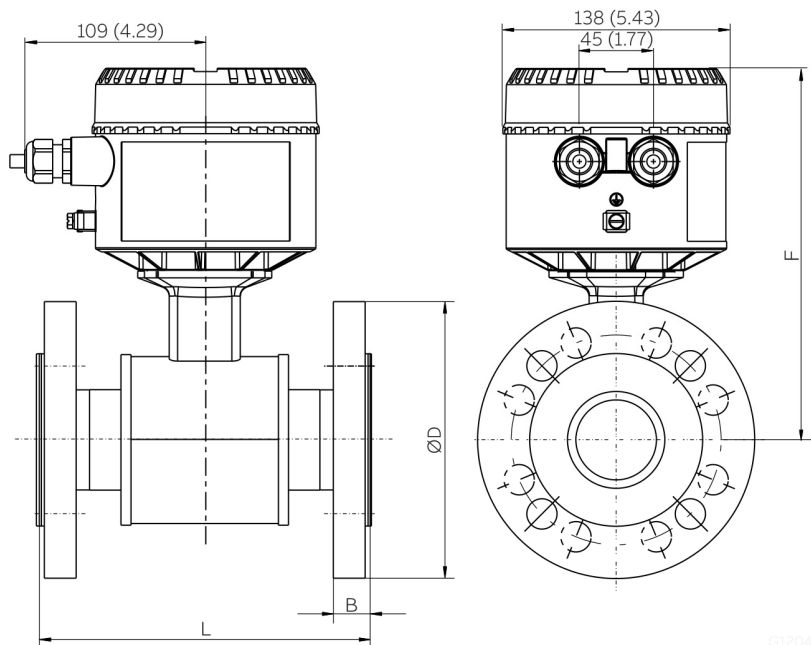


Figure 19: Flange, DN3 to 100 (1/10 to 4 in.)

Dimensions – flange devices							Approx. weight
Nominal diameter	Process connection	D	B	L	F	Remote mount	Integral mount
DN 3 to 10* (1/8 to 1/2 in.**)	EN 1092-1 PN 40	90 (3.54)	19 (0.75)	200 (7.84)	190 (7.56)	5.5 (12)	6 (13.2)
	ASME B16.5, CL 150	90 (3.54)	14.2 (0.56)				
	ASME B16.5, CL 300	95 (3.74)	17.3 (0.68)				
	JIS 10K	90 (3.54)	15 (0.59)				
DN 15 (1/2 in.)	EN 1092-1 PN 40	95 (3.74)	19 (0.75)	200 (7.84)	190 (7.56)	8.5 (18.7)	9 (19.8)
	ASME B16.5, CL 150	90 (3.54)	14.2 (0.56)				
	ASME B16.5, CL 300	95 (3.74)	17.3 (0.68)				
	JIS 10K	95 (3.74)	15 (0.59)				
DN 20 (3/4 in.)	EN 1092-1 PN 40	105 (4.13)	21 (0.83)	200 (7.84)	199 (7.83)	8.5 (18.7)	9 (19.8)
	ASME B16.5, CL 150	98.6 (3.88)	15.7 (0.62)				
	ASME B16.5, CL 300	117.3 (4.62)	18.7 (0.74)				
	JIS 10K	100 (3.94)	17 (0.67)				

Tolerance range for L: +0 / -3 mm (+0 / -0.018 in.)

* Process connection, flange size: DN 10.

** Process connection, flange size: 1/2 in.

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Dimensions – flange devices							Approx. weight
Nominal diameter	Process connection	D	B	L	F	Remote mount	Integral mount
DN 25 (1 in.)	EN 1092-1 PN 40	115 (4.53)	21 (0.83)	200 (7.84)	205 (8.07)	9.5 (20.9)	10 (22)
	ASME B16.5, CL 150	108 (4.25)	17.2 (0.68)				
	ASME B16.5, CL 300	124 (4.88)	20.5 (0.81)				
	JIS 10K	125 (4.92)	17 (0.67)				
DN 32 (1 ¼ in.)	EN 1092-1 PN 40	140 (5.51)	21 (0.83)	200 (7.84)	210 (8.27)	11.5 (25.4)	12 (26.5)
	ASME B16.5, CL 150	117.3 (4.62)	18.7 (0.74)				
	ASME B16.5, CL 300	133.4 (5.25)	22.1 (0.87)				
	JIS 10K	135 (5.31)	19 (0.75)				
DN 40 (1 ½ in.)	EN 1092-1 PN 40	150 (5.91)	21 (0.83)	200 (7.84)	215 (8.46)	11.5 (25.4)	12 (26.5)
	ASME B16.5, CL 150	127 (5.00)	20.5 (0.81)				
	ASME B16.5, CL 300	155.4 (6.12)	23.6 (0.93)				
	JIS 10K	140 (5.51)	19 (0.75)				
DN 50 (2 in.)	EN 1092-1 PN 40	165 (6.50)	23 (0.91)	200 (7.84)	225 (8.86)	11.5 (25.4)	12 (26.5)
	ASME B16.5, CL 150	152.4 (6.00)	22.1 (0.87)				
	ASME B16.5, CL 300	165.1 (6.50)	25.4 (1.00)				
	JIS 10K	155 (6.10)	19 (0.75)				
DN 65 (2 ½ in.)	EN 1092-1 PN 40	185 (7.28)	22 (0.87)	200 (7.84)	233 (9.17)	15.5 (34.2)	16 (35.3)
	EN 1092-1 PN 40	185 (7.28)	26 (1.02)				
	ASME B16.5, CL 150	177.8 (7.00)	25.4 (1.00)				
	ASME B16.5, CL 300	190.5 (7.50)	28.4 (1.12)				
	JIS 10K	175 (6.89)	21 (0.83)				
DN 80 (3 in.)	EN 1092-1 PN 40	200 (7.87)	28 (1.10)	200 (7.84)	242 (9.53)	18.5 (40.8)	19 (41.9)
	ASME B16.5, CL 150	190.5 (7.50)	26.9 (1.06)				
	ASME B16.5, CL 300	209.6 (8.25)	31.4 (1.24)				
	JIS 10K	185 (7.28)	21 (0.83)				
DN 100 (4 in.)	EN 1092-1 PN 40	220 (8.66)	24 (0.94)	200 (7.84)	256 (10.08)	21.5 (47.4)	22 (48.5)
	EN 1092-1 PN 40	235 (9.25)	28 (1.10)				
	ASME B16.5, CL 150	228.6 (9.00)	27.4 (1.08)				
	ASME B16.5, CL 300	254 (10.00)	35.8 (1.41)				
	JIS 10K	210 (8.27)	21 (0.83)				

Tolerance range for L: +0 / -3 mm (+0 / -0.018 in.)

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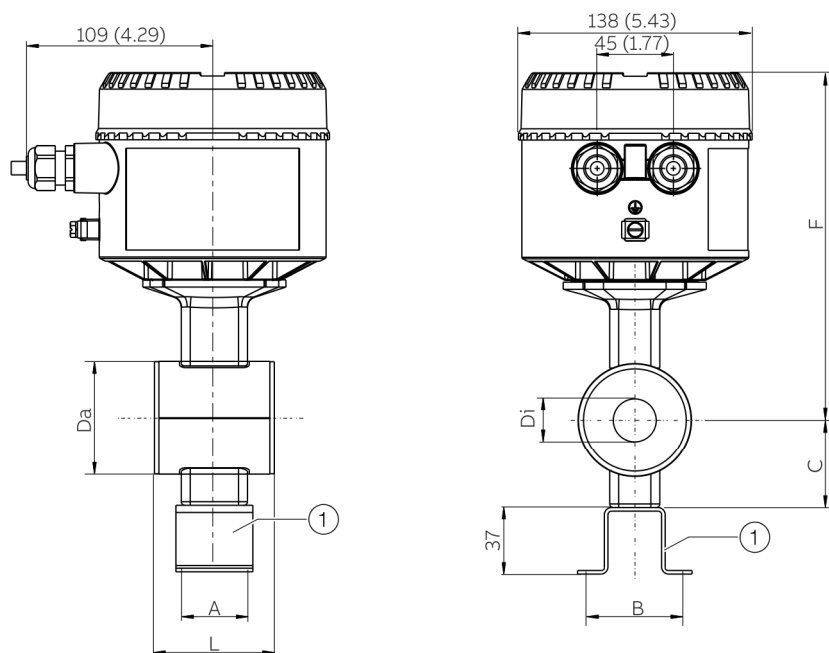
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Wafer-type design, DN 3 to 40 (1/10 to 1 1/2 in.)

All dimensions and weights are indicated in mm (in.) or kg (lb).



① Mounting bracket (optional)

Figure 20: Wafer-type design, DN3 to 40 (1/10 to 1 1/2 in.)

Dimensions – wafer-type design							Approx. weight	
Nominal diameter	Pressure rating	Do	Di	C	F	L	Remote mount	Integral mount
DN 3 to 8 (1/8 in. to 5/16 in.)	Refer to Overview of material load on page 8	45 (1.77)	3 to 8 (0.12 to 0.31)	39 (1.54)	190 (7.48)	68 (2.68)	4 (8.8)	4.5 (9.9)
DN 10 (3/8 in.)			10 (0.39)				4 (8.8)	4.5 (9.9)
DN 15 (1/2 in.)			13 (0.51)				4 (8.8)	4.5 (9.9)
DN 20 (3/4 in.)		54 (2.13)	18 (0.71)	44 (1.73)	199 (7.83)	78 (3.07)	4.5 (9.9)	5 (11.0)
DN 25 (1 in.)		63.4 (2.50)	24 (0.94)	48 (1.89)	205 (8.07)	90 (3.54)	5 (11.0)	5.5 (12.1)
DN 32 (1 1/4 in.)		73 (2.87)	30 (1.18)	53 (2.09)	210 (8.27)	98 (3.86)	5 (11.0)	5.5 (12.1)
DN 40 (1 1/2 in.)		82 (3.23)	36 (1.42)	57 (2.24)	215 (8.46)	103 (4.06)	5.5 (12.1)	6 (13.2)

Installation hole spacing		
Nominal diameter	A	B
DN 3 to 20 (1/8 in. to 3/4 in.)	37 (1.46)	50 (1.97)
DN 25 to 40 (1 in. to 1 1/2 in.)	42 (1.65)	70 (2.76)

Tolerance range for L: +0 / -3 mm (+0 / -0.018 in.)

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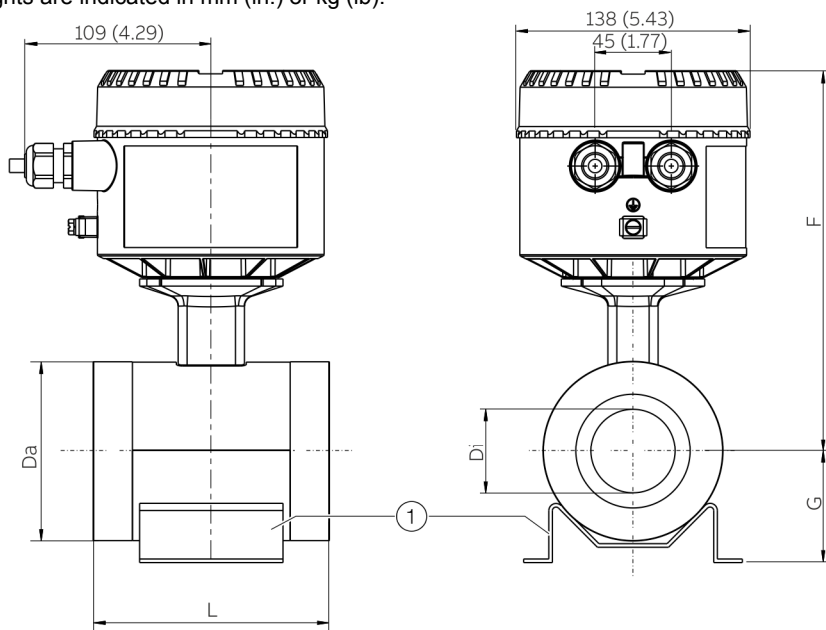
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Wafer-type design, DN 50 to 100 (2 to 4 in.)

All dimensions and weights are indicated in mm (in.) or kg (lb).



1 Mounting bracket (optional)

Figure 21: Wafer-type design, DN50 to 100 (2 to 4 in.)

Dimensions – wafer-type design								Approx. weight	
Nominal diameter	Pressure rating	Do	Di	F	G	L	L*	Remote mount	Integral mount
DN 50 (2 in.)	Refer to Overview of material load on page 8	99.6 (3.92)	47 (1.85)	225 (8.86)	62 (2.44)	117 (4.61)	117 (4.61)	6 (13.2)	6.5 (14.3)
DN 65 (2 ½ in.)		116 (4.57)	62 (2.44)	233 (9.17)	74 (2.91)	103 (4.06)	200 (7.87)	6.5 (14.3)	7 (15.4)
DN 80 (3 in.)		133 (5.24)	74 (2.91)	242 (9.53)	86 (3.39)	103 (4.06)	200 (7.87)	7.5 (16.5)	8 (17.6)
DN 100 (4 in.)		160.4 (6.31)	96 (3.78)	256 (10.08)	105 (4.13)	133 (5.24)	250 (9.84)	9.5 (20.9)	10 (22.0)

Tolerance range for L: +0 / -3 mm (+0 / -0.018 in.)

* New insertion length.

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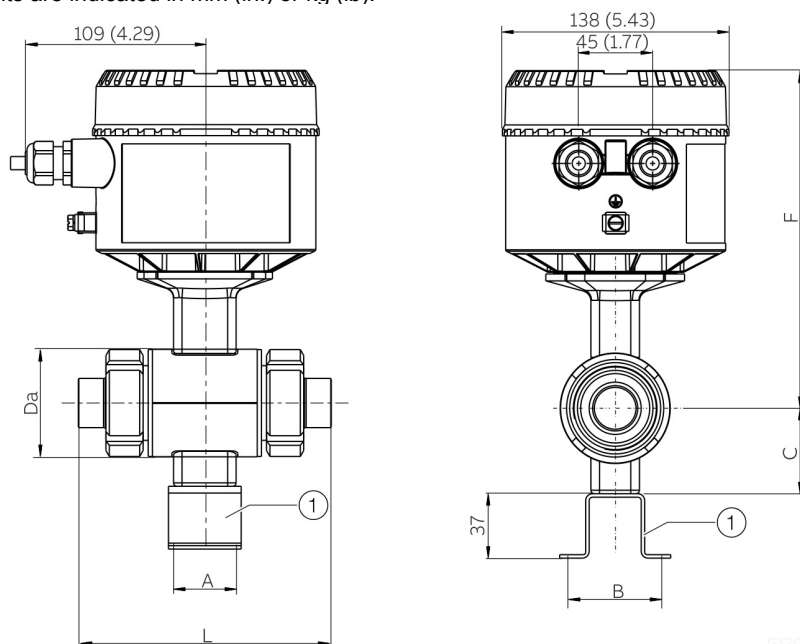
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Variable process connections, DN 3 to 40 (1/10 to 1 1/2 in.)

All dimensions and weights are indicated in mm (in.) or kg (lb).



① Mounting bracket (optional)

Figure 22: Variable process connections, DN 3 to 40 (1/10 to 1 1/2 in.)

Dimensions					Approx. weight*	
Nominal diameter	Pressure rating	Do	C	F L	Remote mount	Integral mount
DN 3 to 8 (1/8 in. to 5/16 in.)	Refer to Overview of material load on page 8	45 (1.77)	39 (1.54)	190 (7.48)	3 (6.6)	3.5 (7.7)
DN 10 (3/8 in.)						
DN 15 (1/2 in.)						
DN 20 (3/4 in.)		54 (2.13)	44 (1.73)	199 (7.83)	3.5 (7.7)	4 (8.8)
DN 25 (1 in.)		63.4 (2.50)	48 (1.89)	205 (8.07)	4 (8.8)	4.5 (9.9)
DN 32 (1 1/4 in.)		73 (2.87)	53 (2.09)	210 (8.27)		
DN 40 (1 1/2 in.)		82 (3.23)	57 (2.24)	215 (8.46)	4.5 (9.9)	5 (11.0)

Tolerance range for L: +0 / -3 mm (+0 / -0.018 in.)

* Plus weight of connection adapter, see **Adapters for variable process connections, DN 3 to 100 (1/8 in. to 4 in.)** on page 21.

Installation hole spacing

Nominal diameter	A	B
DN 3 to 20 (1/8 in. to 3/4 in.)	28 (1.1)	50 (1.97)
DN 25 to 40 (1 in. to 1 1/2 in.)	46 (1.81)	70 (2.76)

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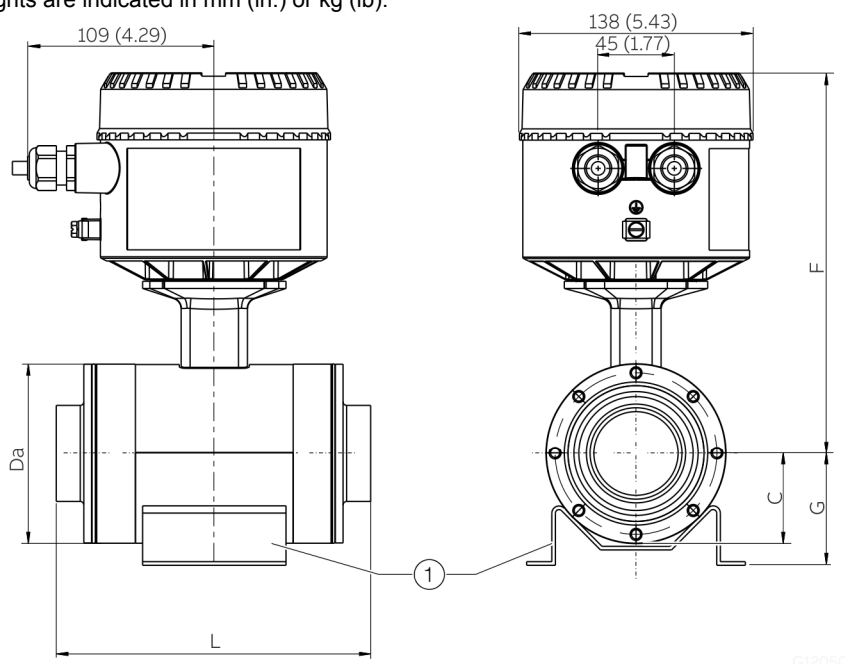
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Variable process connections, DN 50 to 100 (2 to 4 in.)

All dimensions and weights are indicated in mm (in.) or kg (lb).



1 Mounting bracket (optional)

Figure 23: Variable process connections, DN50 to 100 (2 to 4 in.)

Dimensions						Approx. weight*		
Nominal diameter	Pressure rating	Do	F	C	G L	Remote mount	Integral mount	
DN 50 (2 in.)	Refer to Overview of material load on page 8	99.6 (3.92)	225 (8.86)	50 (1.97)	62 (2.44)	Insertion length including connection adapter, see Adapters for variable process connections, DN 3 to 100 (½ in. to 4 in.) on page 21	6 (13.2)	6.5 (14.3)
DN 65 (2 ½ in.)		116 (4.57)	233 (9.17)	58 (2.28)	74 (2.91)		6.5 (14.3)	7 (15.4)
DN 80 (3 in.)		133 (5.24)	242 (9.53)	66.5 (2.62)	86 (3.39)		8 (17.6)	8.5 (18.7)
DN 100 (4 in.)		160.4 (6.31)	256 (10.08)	80.2 (3.16)	105 (4.13)		10.5 (23.1)	11 (24.3)

Tolerance range for L: +0 / -3 mm (+0 / -0.018 in.)

* Plus weight of connection adapter, see **Adapters for variable process connections, DN 3 to 100 (½ in. to 4 in.)** on page 21.

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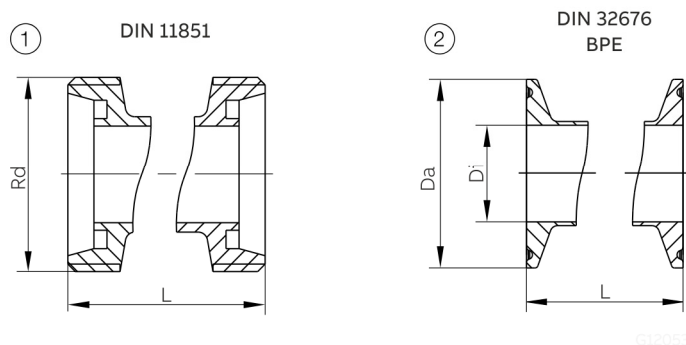
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Adapters for variable process connections, DN 3 to 100 (1/8 in. to 4 in.)

All dimensions and weights are indicated in mm (in.) or kg (lb).



G12053

① Threaded pipe connection in acc. with DIN 11851

② Tri-Clamp

Figure 24: Adapters for variable process connections

Threaded pipe connection in acc. with DIN 11851

Nominal diameter	Pressure rating	L (old*)	L (new**)	Thread	Ø Di	Weight
DN 3 to 10 (1/8 to 3/8 in.)	Refer to Overview of material load on page 8	169 (6.65)	—	28 x 1/8 in.	10 (0.39)	0.5 (1.1)
DN 15 (1/2 in.)				34 x 1/8 in.	16 (0.63)	
DN 20 (3/4 in.)		180 (7.09)	—	44 x 1/6 in.	20 (0.79)	0.9 (2.0)
DN 25 (1 in.)		207 (8.15)	—	52 x 1/6 in.	26 (1.02)	
DN 32 (1 1/4 in.)		230 (9.06)	—	58 x 1/6 in.	32 (1.26)	1.4 (3.1)
DN 40 (1 1/2 in.)		237 (9.33)	—	65 x 1/6 in.	38 (1.50)	
DN 50 (2 in.)		243 (9.57)	—	78 x 1/6 in.	50 (1.97)	
DN 65 (2 1/2 in.)		245 (9.65)	330.5 (13.01)	96 x 1/6 in.	66 (2.60)	2.2 (4.9)
DN 80 (3 in.)		259 (10.20)	344.5 (13.56)	110 x 1/4 in.	81 (3.19)	3.2 (7.1)
DN 100 (4 in.)		307 (12.09)	412.5 (16.24)	130 x 1/4 in.	100 (3.94)	4.4 (9.7)

* Old insertion length, for replacement purposes only. Please take note of the ordering information.

** New insertion length.

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Tri-clamp

Nominal diameter	Pressure rating	In accordance with DIN 32676					In accordance with ASME BPE				
		L	Ø Do	Ø Di	Series	Weight	Process variable	L	Ø Do	Ø Di	Weight
DN 3 to 10 (½ to ¾ in.)	Refer to Overview of material load on page 8	163 (6.42)	34 (1.34)	10 (0.39)	3	0.5 (1.1)	½ in.	143 (5.63)	25 (0.98)	9.4 (0.37)	0.5 (1.1)
DN 15 (½ in.)				16 (0.63)			¾ in.			15.7 (0.62)	
DN 20 (¾ in.)		168 (6.61)		20 (0.79)	3	0.7 (1.5)	1 in.	50.4 (1.98)	22.1 (0.87)		0.7 (1.5)
DN 25 (1 in.)		192 (7.56)	50.5 (1.99)	26 (1.02)	3	0.8 (1.8)	1 ½ in.	277 (34.8)		22.1 (0.87)	1.2 (2.7)
DN 32 (1 ¼ in.)		209 (8.23)		32 (1.26)	3	1.5 (3.3)	–	–	–	–	–
DN 40 (1 ½ in.)		214 (8.43)		38 (1.50)	3	1.4 (3.1)	1 ½ in.	277 (34.8)	50.4 (1.98)	34.8 (1.37)	1.8 (4.0)
DN 50 (2 in.)		216 (8.50)	64 (2.52)	50 (1.97)	3	1.2 (2.7)	2 in.		63.9 (2.52)	47.5 (1.87)	
DN 65 (2 ½ in.)		221 (8.70)*	91 (3.58)	66 (2.60)	1	1.6 (3.5)	2 ½ in.		77.4 (3.05)	60.2 (2.37)	2.0 (4.4)
		306.5 (12.07)**									
DN 80 (3 in.)		225 (8.86)*	106 (4.17)	81 (3.19)	1	2.4 (5.3)	3 in.	337 (13.27)	90.9 (3.58)	72.9 (2.87)	3.6 (8.0)
		310.5 (12.22)**									
DN 100 (4 in.)		255 (8.86)*	119 (4.69)	100 (3.94)	1	3.1 (6.8)	4 in.		118.8 (4.68)	97.4 (3.83)	4.1 (9.1)
		360.5 (14.19)**									

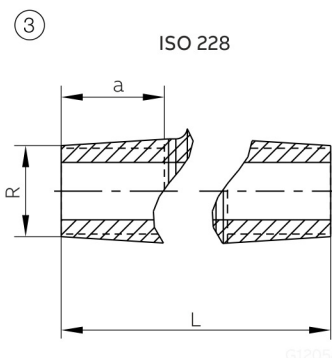
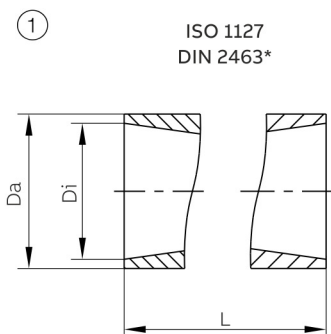
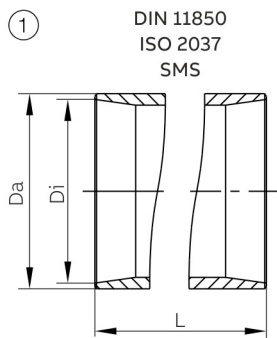
* Old insertion length, for replacement purposes only. Please take note of the ordering information.

** New insertion length.

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① Weld stub

② External thread

Figure 25: Adapters for variable process connections

Weld stubs

Nominal diameter	Pressure rating	L In accordance with DIN 11850				In accordance with ISO 1127			In accordance with SMS		Weight
		Ø Do	Ø Di	Series		Ø Do	Ø Di	Series	Ø Do	Ø Di	
DN 3 to 10 (½ to ¾ in.)	Refer to Overview of material load on page 8	127 (5.0)	13 (0.51)	10 (0.39)	2	13.5 (0.53)	10.3 (0.41)	1	–	–	0.4 (0.9)
DN 15 (½ in.)		19 (0.75)	16 (0.63)			21.3 (0.84)	18.1 (0.71)		–	–	0.4 (0.9)
DN 20 (¾ in.)		132 (5.2)	23 (0.91)	20 (0.79)		26.9 (1.06)	23.7 (0.93)		–	–	0.7 (1.5)
DN 25 (1 in.)		149 (5.87)	29 (1.14)	26 (1.02)		26.9 (1.06)	23.7 (0.93)		25 (0.98)	22.6 (0.89)	0.7 (1.5)
DN 32 (1 ¼ in.)		166 (6.54)	34 (1.34)	32 (1.26)	1	33.7 (1.33)	30.5 (1.20)		–	–	1.0 (2.2)
DN 40 (1 ½ in.)		171 (6.73)	41 (1.61)	38 (1.50)	2	42.2 (1.66)	39 (1.54)	1	38 (1.50)	35.6 (1.40)	1.0 (2.2)
DN 50 (2 in.)		173 (6.81)	54 (2.13)	50 (1.97)	3	51 (2.01)	47.8 (1.88)	2	51 (2.01)	48.6 (1.91)	1.0 (2.2)
DN 65 (2 ½ in.)		165 (6.50)*	70 (2.76)	66 (2.60)	2	70 (2.76)	66 (2.60)	2	63.5 (2.50)	60.3 (2.37)	1.4 (3.1)
		250.5 (9.86)**									
DN 80 (3 in.)		169 (6.65)*	85 (3.35)	81 (3.19)		76.1 (3.00)	72.9 (2.87)	1	76.1 (3.00)	72.9 (2.87)	2.0 (4.4)
		254.5 (10.02)**									
DN 100 (4 in.)		199 (7.83)*	104 (4.09)	100 (3.94)		101.6 (4.00)	97.6 (3.84)	2	104 (4.09)	100 (3.94)	2.6 (5.7)
		304.5 (11.99)**									

* Old insertion length, for replacement purposes only. Please take note of the ordering information.

** New insertion length.

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Weld stubs

Nominal diameter	Pressure rating	L	In accordance with DIN EN ISO 2037		In accordance with DIN 2463		Weight
			Ø Do	Ø Di	Ø Do	Ø Di	
DN 3 to 10 (½ to ¾ in.)	Refer to Overview of material load on page 8	127 (5.0)	12 (0.47)	10 (0.39)	13.5 (0.53)	10.3 (0.41)	0.4 (0.9)
DN 15 (½ in.)			17.2 (0.68)	15.2 (0.60)	21.3 (0.84)	18.1 (0.71)	0.4 (0.9)
DN 20 (¾ in.)		132 (5.2)	21.3 (0.84)	19.3 (0.76)	26.9 (1.06)	23.7 (0.93)	0.7 (1.5)
DN 25 (1 in.)		149 (5.87)	25 (0.98)	22.6 (0.89)	28 (1.10)	25 (0.98)	0.7 (1.5)
DN 32 (1 ¼ in.)		166 (6.54)	33.7 (1.33)	31.3 (1.23)	35 (1.38)	32 (1.26)	1.0 (2.2)
DN 40 (1 ½ in.)		171 (6.73)	38 (1.5)	35.6 (1.40)	40 (1.57)	36.8 (1.45)	1.0 (2.2)
DN 50 (2 in.)		173 (6.81)	51 (2.01)	48.6 (1.91)	52 (2.05)	49 (1.93)	1.0 (2.2)
DN 65 (2 ½ in.)		165 (6.50)*	63.5 (2.50)	60.3 (2.37)	70 (2.76)	66 (2.60)	1.4 (3.1)
		250.5 (9.86)**					
DN 80 (3 in.)		169 (6.65)*	76.1 (3.00)	72.9 (2.87)	85 (3.35)	81 (3.19)	2.0 (4.4)
		254.5 (10.02)**					
DN 100 (4 in.)		199 (7.83)*	101.6 (4.00)	97.6 (3.84)	104 (4.09)	100 (3.94)	3.0 (6.6)
		304.5 (11.99)**					

* Old insertion length, for replacement purposes only. Please take note of the ordering information.

** New insertion length.

External thread in acc. with ISO 228 / DIN 2999

Nominal diameter	Pressure rating	L	R	a	Weight
DN 3 to 10 (½ to ¾ in.)	Refer to Overview of material load on page 8	139 (5.47)	¾ in.	18 (0.71)	0.4 (0.9)
DN 15 (½ in.)		139 (5.47)	½ in.	18 (0.71)	0.4 (0.9)
DN 20 (¾ in.)		164 (6.46)	¾ in.	25 (0.98)	0.8 (1.8)
DN 25 (1 in.)		179 (7.05)	1 in.	25 (0.98)	0.8 (1.8)

Weld stubs suitable for OD tubing

Nominal diameter	Pressure rating	Weld stub size	Di	Do	L	Weight
10 (¾ in.)	Refer to Overview of material load on page 8	½ in.	9.40 (0.37)	12.70 (0.70)	127 (5.00)	0.4 (0.9)
15 (½ in.)		¾ in.	15.75 (0.62)	19.05 (0.75)	127 (5.00)	0.4 (0.9)
20 (1 in.)		1 in.	22.10 (0.87)	25.40 (1.00)	132 (5.20)	0.7 (1.5)
25 (1 in.)		1 in.	22.10 (0.87)	25.40 (1.00)	149 (5.87)	1.0 (2.2)
40 (1 ½ in.)		1 ½ in.	34.80 (1.37)	38.10 (1.50)	171 (6.73)	
50 (2 in.)		2 in.	47.50 (1.87)	50.80 (2.00)	173 (6.81)	

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Transmitter

Features

- Current output: 4 to 20 mA.
- Current output can be set to 21 to 22.6 mA (NAMUR NE43) in the case of an alarm.
- Measuring range: Can be adjusted from 0.02 to $2 \times Q_{\max DN}$.
- Operating mode is adjustable for measuring the flow.
- Programmable digital output. Can be configured as frequency, pulse or binary output.
- Damping: Adjustable from 0 to 100 s (1 τ).
- Low flow cut-off: From 0 to 20 % for current and pulse output.
- Empty pipe detector*.
- Simulation of current binary output (manual process control).

* Requirements for the "empty pipe detector" function:

- Conductivity of the medium being measured: $\geq 20 \mu S/cm$
- Signal cable length: $\leq 50 m$ (164 ft)
- Nominal diameter: $\geq DN 10$

LCD display (optional)

- High-contrast LCD display.
- Displays current and total flow quantity
- The user can select application-specific representations. Two operator pages can be configured to display several values simultaneously.
- Plain text error diagnostics tool
- Menu-driven parameter settings using four buttons.*
- Easy setup function for rapid commissioning.
- Operation via front pane via capacitive buttons.

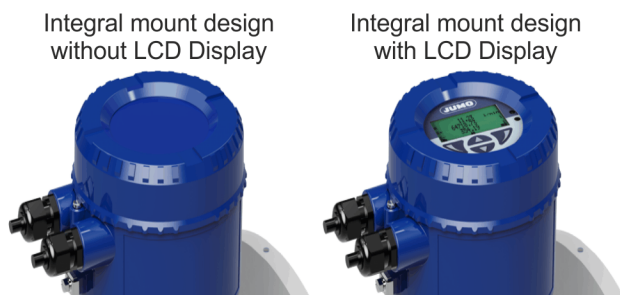


Figure 26: Optional LCD display

* For devices without an LCD display, an accessory LCD display is available (part number: 00706388) that can be connected for making parameter settings. Refer to

IP degree of protection

- IP 65 / IP 67 as per EN 60529

Vibration

In accordance with EN 60068-2

- Maximum deflection: 0.15 mm (0.006 in.) in frequency range from 10 to 58 Hz
- Maximum acceleration: $2 g^*$, in frequency range from 58 to 150 Hz

* Peak load

Temperature data

Ambient temperature

-30 to 60 °C (-22 to 140 °F)

Storage temperature

-30 to 70 °C (-22 to 158 °F)

Note

At operation below -20 °C (-4 °F), the LCD can no longer be read and the electronic unit should be operated with as few vibrations as possible.

Full functionality is assured at temperatures above -20 °C (-4 °F).

Housing design

Integral mount design

Housing	Cast aluminum (painted), Cobalt Blue, RAL 5013
Cable gland	Polyamide

Remote mount design

Housing	Cast aluminum, painted
Paint	Thickness: $\geq 80 \mu m$, Cobalt Blue, RAL 5013
Cable gland	Polyamide
Weight	1.8 kg (3.97 lb)

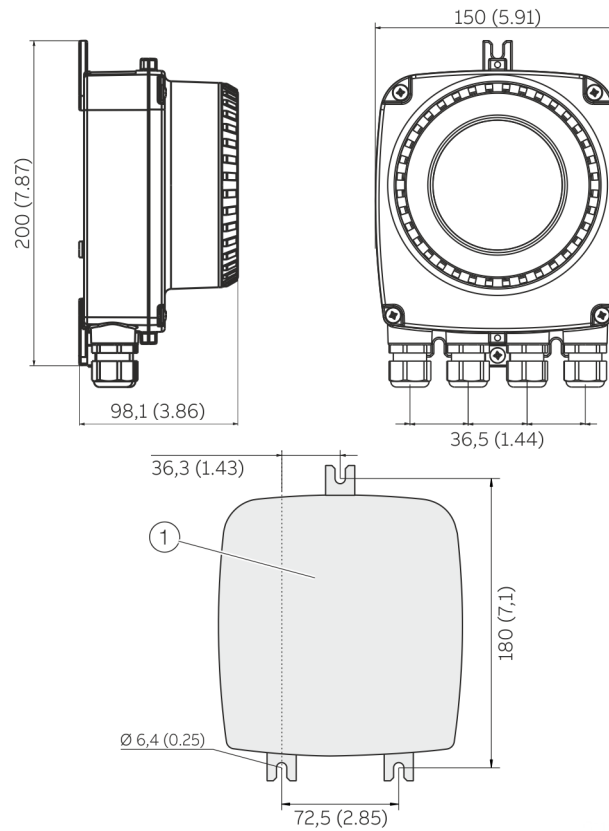
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Dimensions



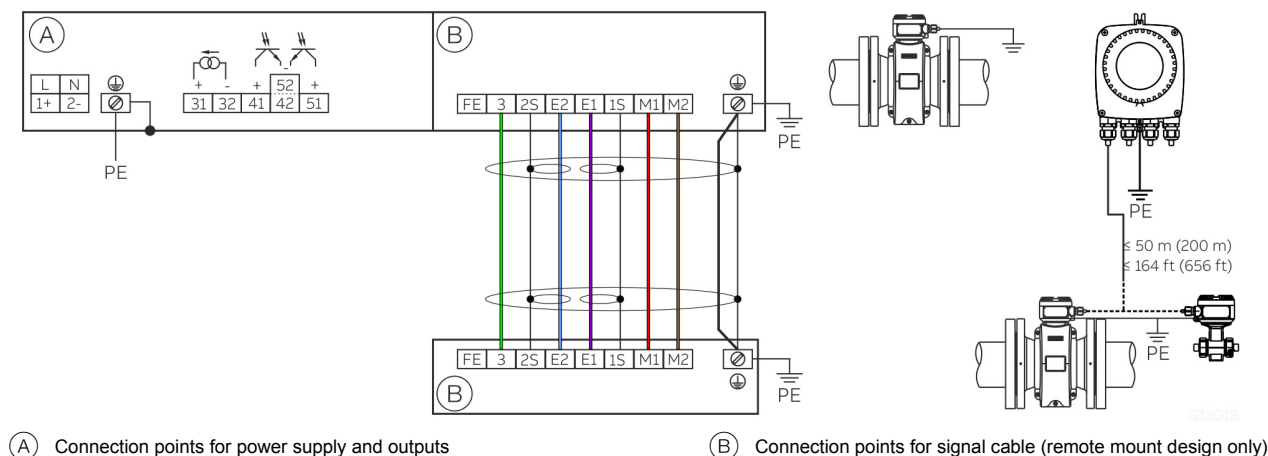
① Fixing hole pattern

Figure 27: Installation dimensions (remote mount design)



Electrical connections

Connection diagram



(A) Connection points for power supply and outputs

(B) Connection points for signal cable (remote mount design only)

Figure 28: Electrical connection points

Note

For detailed information on grounding the transmitter and the sensor, please refer to the operating or commissioning instruction!

Connections for the power supply

AC power supply

Terminal	Function / comments
L	Phase
N	Neutral conductor
PE / ⊕	Protective earth (PE)

DC voltage supply

Terminal	Function / comments
1+	+
2-	-
PE / ⊕	Protective earth (PE)

Output connections

Terminal	Function / Comment
31 / 32	Active current output The current output is designed as an active output. The power supply for the current output is integrated in the transmitter.
41 / 42	Passive digital output DO1 The output can be configured at the site as a pulse, frequency or switching output.
51 / 52	Passive digital output DO2 The output can be configured at the site as a pulse, frequency or switching output.
⏏	Functional ground

Signal cable connections

Only for remote mount design.

Terminal	Function / Comment	Color
FE	Not assigned	—
3	Measurement potential	Green
2S	Shield for E2	—
E2	Signal lead	Blue
E1	Signal lead	Violet
1S	Shield for E1	—
M1	Solenoid	Brown
M2	Solenoid	Red
SE / ⊕	Shield	—
—	Not assigned	Orange / Yellow

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Electrical data for inputs and outputs

Power supply, L / N, 1+ / 2-

Alternating voltage (AC) supply

Terminals	L / N
Operating voltage	100 to 240 V AC (–15 % / +10 %), 47 to 64 Hz
Power consumption	< 20 VA
Switch-on current	8.8 A

Direct voltage (DC) supply

Terminals	1+ / 2-
Operating voltage	24 to 48V DC (–10 % / +10 %)
Residual ripple	< 5 %
Power consumption	< 10 W
Switch-on current	5.6 A

Current output, 31 / 32

Can be configured for the output of mass flow and volumetric flow.

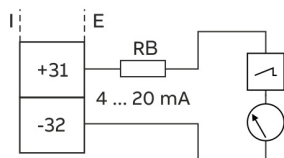
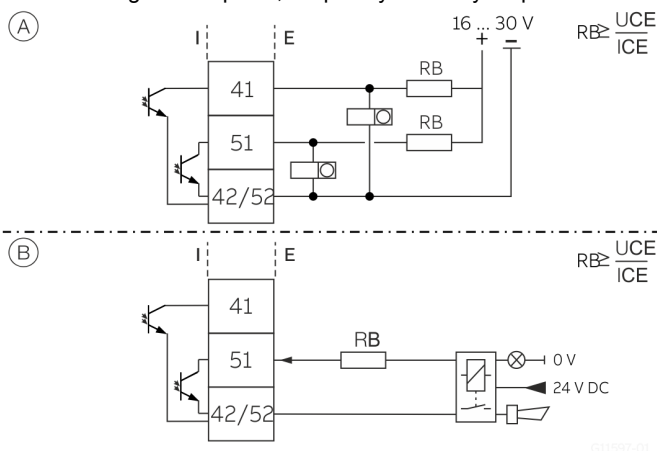


Figure 29: Connection example for active 31 / 32 current output
 (I = internal, E = external, R_B = load)

Current output	Active
Terminals	31 / 32
Output signal	4 to 20 mA
Load: R_B	$0 \Omega \leq R_B \leq 650 \Omega$

Digital output, 41 / 42, 51 / 52

Can be configured as pulse, frequency or binary output.



(A) 41 / 42, 51 / 52 passive digital output as pulse or frequency
 (B) 51 / 52 passive digital output as binary output

Figure 30: Connection example (I = internal, E = external, R_B = load)

Note

- The terminals 42 / 52 have the same potential. The digital outputs 41 / 42 and 51 / 52 are not electrically isolated from one another.
- If you are using a mechanical meter, we recommend setting a pulse width of ≥ 30 ms and a maximum frequency of $f_{\max} \leq 3$ kHz.

Pulse output / Frequency output (passive)

Terminals	41 / 42, 51 / 52
U_{\max}	30 V DC
I_{\max}	25 mA
f_{\max}	10.5 kHz
Pulse width	0.1 to 2000 ms

Binary output (passive)

Terminals	41 / 42, 51 / 52
U_{\max}	30 V DC
I_{\max}	25 mA
Switching function	Can be configured via software as: General alarm, empty pipe alarm, min. or max. alarm, flow direction signal, among other options

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Ordering information – JUMO flowTRANS MAG H10

Further product information can be found at www.jumo.de

(1) Basic type	
406061	electromagnetic flowmeter
(2) Design type	
1	compact (sensor und transmitter)
2	remote (only external sensor)
(3) ex zone	
00	without (general purpose)
(4) housing Type / housing Material / cable glands	
01	1-chamber housing / aluminum / M20 x 1.5
02	1-chamber housing / aluminum / NPT 1/2 in.
05	remote / aluminum / M20 x 1.5
06	remote / aluminum / NPT 1/2 in.
(5) nominal width	
0003	DN 3 (1/10 in.)
0004	DN 4 (5/32 in.)
0006	DN 6 (1/4 in.)
0008	DN 8 (5/16 in.)
0010	DN 10 (3/8 in.)
0015	DN 15 (1/2 in.)
0020	DN 20 (3/4 in.)
0025	DN 25 (1 in.)
0032	DN 32 (1-1/4 in.)
0040	DN 40 (1-1/2 in.)
0050	DN 50 (2 in.)
0065	DN 65 (2-1/2 in.)
0080	DN 80 (3 in.)
0100	DN 100 (4 in.)
(6) process connection	
30	outer thread ISO 228/DIN 2999 (conical)
40	screw connection as per DIN 11851
50	weld stub as per ISO 2037
51	weld stub as per DIN 2463
52	weld stub as per DIN 11850
53	weld stub as per ISO 1127
54	weld stub as per OD Tubing
55	weld stub as per SMS
60	Tri clamp as per DIN 32676
61	Tri clamp as per ASME BPE
70	wafer
(7) lining material	
08	PFA
(8) material process connection	
03	stainless steel with EPDM seal
04	stainless steel, EPDM seal, fixing
05	stainless steel, silicone seal
06	stainless steel, silicone seal, fixing
09	without PA, without seal, with fixing
10	without PA, seal and fixing
(9) electrode version	
1	standard
5	pointed head



(10) measuring electrode material	
01	stainless steel 1.4539
02	NiMo C-4 (2.4610)
03	titanium
04	tantalum
05	NiMo B-3 (2.4600)
06	platinum-iridium
07	stainless steel 1.4571
(11) grounding Electrode / full Pipe Detection	
0	without grounding electrode / without full pipedetection
2	with grounding electrode / without full pipedetection
(12) grounding accessories	
0	without
(13) transmitter / sensor protection type	
1	IP67 (NEMA 4X)
2	IP67 (NEMA 4X) / IP68 (NEMA 6P)
3	IP67 / IP68, signal cable connected, potted
(14) voltage supply	
0	without
5	100 ... 230 AC / 24 V DC, 50 Hz
6	100 ... 230 AC / 24 V DC, 60 Hz
(15) display and keypad	
0	without
2	with display, with keypad
(16) signal inputs / outputs	
00	without
01	20mA output active, digital output 1+2 passive
(17) material certificate	
0	without
2	inspection cert. 3.1 as per EN 10204
(18) calibration certificate	
1	standard
2	3rd party witnessed calibration
(19) approvals	
1	meas. tube with PED approval
(20) Food & Beverage Approvals	
0	without
(21) supply frequency	
0	without (compact design only)
1	50 Hz
2	60 Hz
(22) insertion length	
4	Old insertion length for DN 1-100
5	New insertion length for DN 65, DN 80, DN 100
(23) further options	
0	without
(24) language documentation	
01	German
02	English
03	French
04	Spanish
(25) tests and reports	
0	Ohne
(26) configuration	
8	Default setting

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(27) calibration	
3	accuracy 0,5%
(28) signal cable length	
00	without signal cable
01	5 m (about 15 ft.)
02	10 m (about 30 ft.)
03	15 m (about 49 ft.)
04	20 m (about 66 ft.)
05	25 m (about 82 ft.)
06	30 m (about 98 ft.)
07	35 m (about 115 ft.)
08	40 m (about 131 ft.)
10	50 m (about 164 ft.)
(29) instrument label	
1	adhesive label
(30) temperatur range sensor / ambient temperature	
1	standard / -20 to 60 °C (-4 to 140 °F)
(31) number of test points	
2	2 test points
3	3 test points
5	5 test points
(32) validation function	
0	validation function notactivated

Order code

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	
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Ordering information – JUMO flowTRANS MAG 10 external transmitter

Further product information can be found at www.jumo.de

(1) Basic type	
406067	external transmitter
(2) Design type	
2	only external sensor
(3) ex zone	
00	without (general purpose)
(4) housing Type / housing Material / cable glands	
09	field-mount / 1-chamber housing / aluminum / M20 x1.5
10	field-mount / 1-chamber housing / aluminum / NPT 1/2in.
(5) transmitter / sensor protection type	
1	IP67 (NEMA 4X)
(6) voltage supply	
5	100 ... 230 AC / 24 V DC, 50 Hz
6	100 ... 230 AC / 24 V DC, 60 Hz
(7) display and keypad	
0	without
2	with display, with keypad
(8) signal inputs / outputs	
01	20mA output active, digital output 1+2passive
(9) Food & Beverage Approvals	
0	without
(10) further options	
0	without
(11) language documentation	
01	German
02	English
03	French
04	Spanish
(12) instrument label	
1	adhesive label
(13) temperatur range sensor / ambient temperature	
1	standard / -20 to 60 °C (-4 to 140 °F)
(14) mounting set transmitter	
0	without

Order code

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)
 / - - - - - - - - - - - - -

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Accessories

Wafer-type accessories

The threaded rods, nuts, washers, and centering sleeves required for mounting the wafer-type design are included in the wafer-type accessories.

Nominal diameter	Pressure rating	Part number
DN 3 to DN 10 ($\frac{1}{10}$ to $\frac{3}{8}$ in.)	PN 10 to PN 40	00706886
	ASME CL 150	00706886
	ASME CL 300	00706891
DN 15 ($\frac{1}{2}$ in.)	PN 10 to PN 40	00706886
	ASME CL 150	00706909
	ASME CL 300	00706911
DN 20 ($\frac{3}{4}$ in.)	PN 10 to PN 40	00706912
	ASME CL 150	00706913
	ASME CL 300	00706914
DN 25 (1 in.)	PN 10 to PN 40	00706916
	ASME CL 150	00706917
	ASME CL 300	00706918
DN 32 (1- $\frac{1}{4}$ in.)	PN 10 to PN 40	00706954
	ASME CL 150	00706955
	ASME CL 300	00706957
DN 40 (1- $\frac{1}{2}$ in.)	PN 10 to PN 40	00706959
	ASME CL 150	00706961
	ASME CL 300	00706962
DN 50 (2 in.)	PN 10 to PN 40	00706971
	ASME CL 150	00706972
	ASME CL 300	00706976
DN 65 (2- $\frac{1}{2}$ in.)	PN 10 to PN 16	00707035
New insertion length	PN 25 to PN 40	00707036
	ASME CL 150	00707037
	ASME CL 300	00707038
DN 80 (3 in.)	PN 10 to PN 40	00707039
New insertion length	ASME CL 150	00707040
	ASME CL 300	00707042
DN 100 (4 in.)	PN 10 to PN 16	00707044
New insertion length	PN 25 to PN 40	00707045
	ASME CL 150	00707046

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Welding adapter

The welding adapter is an auxiliary tool for sensors that feature a “weld stub” as process connection. It enables these weld stubs to be welded into the pipe in a coplanar manner.

The adapter is made of stainless steel 1.4301 (AISI 304).

Nominal diameter	Part number
DN 3 to DN 10 (1/10 to 3/8 in.)	00706391
DN 15 (1/2 in.)	00706473
DN 20 (3/4 in.)	00706474
DN 25 (1 in.)	00706476
DN 32 (1-1/4 in.)	00706493
DN 40 (1-1/2 in.)	00706506
DN 50 (2 in.)	00706507
DN 65 (2-1/2 in.), old insertion length	00706521
DN 65 (2-1/2 in.), new insertion length	00706522
DN 80 (3 in.), old insertion length	00706573
DN 80 (3 in.), new insertion length	00706574
DN 100 (4 in.), old insertion length	00706575
DN 100 (4 in.), new insertion length	00706576

Description	Part number
Installation set for cable gland NPT ½ in. For sealing the cable conduit in the case of outdoor installation.	00645908



M20x1.5 adapter on ½ in. NPT	00706384
------------------------------	----------



LCD adapters (HMI) – for integral and remote mount designs	00706388
--	----------



Signal cable	00645914
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Trademark information

Hastelloy® is a registered trademark of Haynes International, Inc., Kokomo Ind., US.

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Fittings for flowmeters

Brief description

These fittings allow the connection of the following flowmeters in tubes:

- JUMO flowTRANS MAG I01
Electromagnetic flowmeter, type 406010
- JUMO flowTRANS MAG I02
Electromagnetic flowmeter with display, type 406011
- JUMO flowTRANS PW I01
Paddlewheel flowmeter, type 406020



Type 406090, stainless steel T-fitting



Type 406090, PVC T-fitting

Special features

- Large selection of process connections
DN 15 to DN 400
- Available in plastic or stainless steel
- Simple mounting
- For neutral, aggressive, or contaminated
liquids

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PVC T-fitting according to DIN 8063

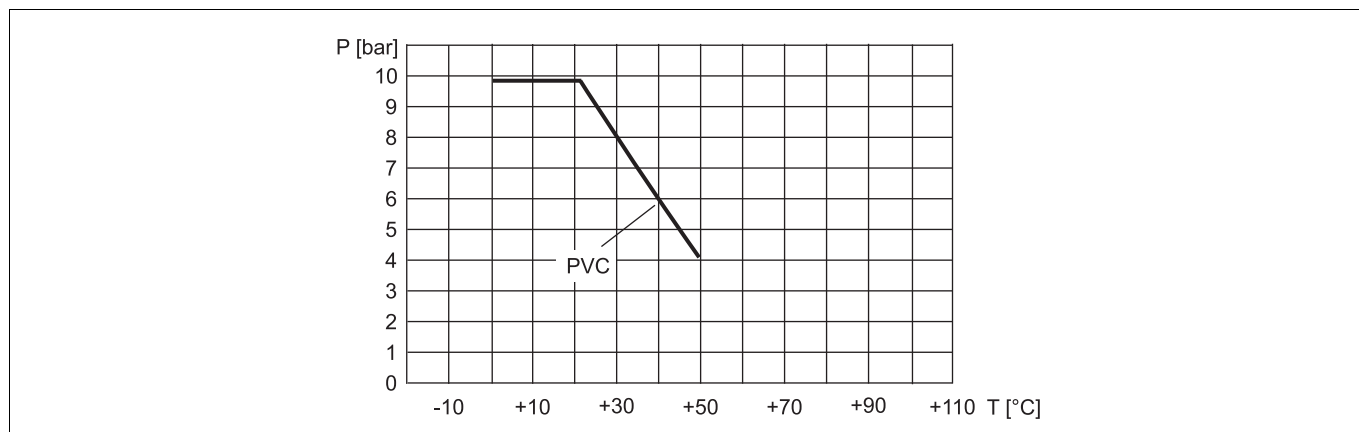
Technical data

Nominal widths	DN 15 to DN 50	
Maximum pressure	PN 10	
Medium temperature	0 to 50 °C	
Fitting material	PVC	
Sealing material	FKM	

Nominal width	Sensor version	Q _{max} ^a [l/s]	Part no.
DN 15	Short	3.19	00689250
DN 20		3.48	00689253
DN 25		5.42	00689255
DN 32		10.30	00689263
DN 40		17.52	00689265
DN 50		30.00	00689268

^a Maximum flow rate with flow velocity of 10 m/s

Pressure temperature diagram



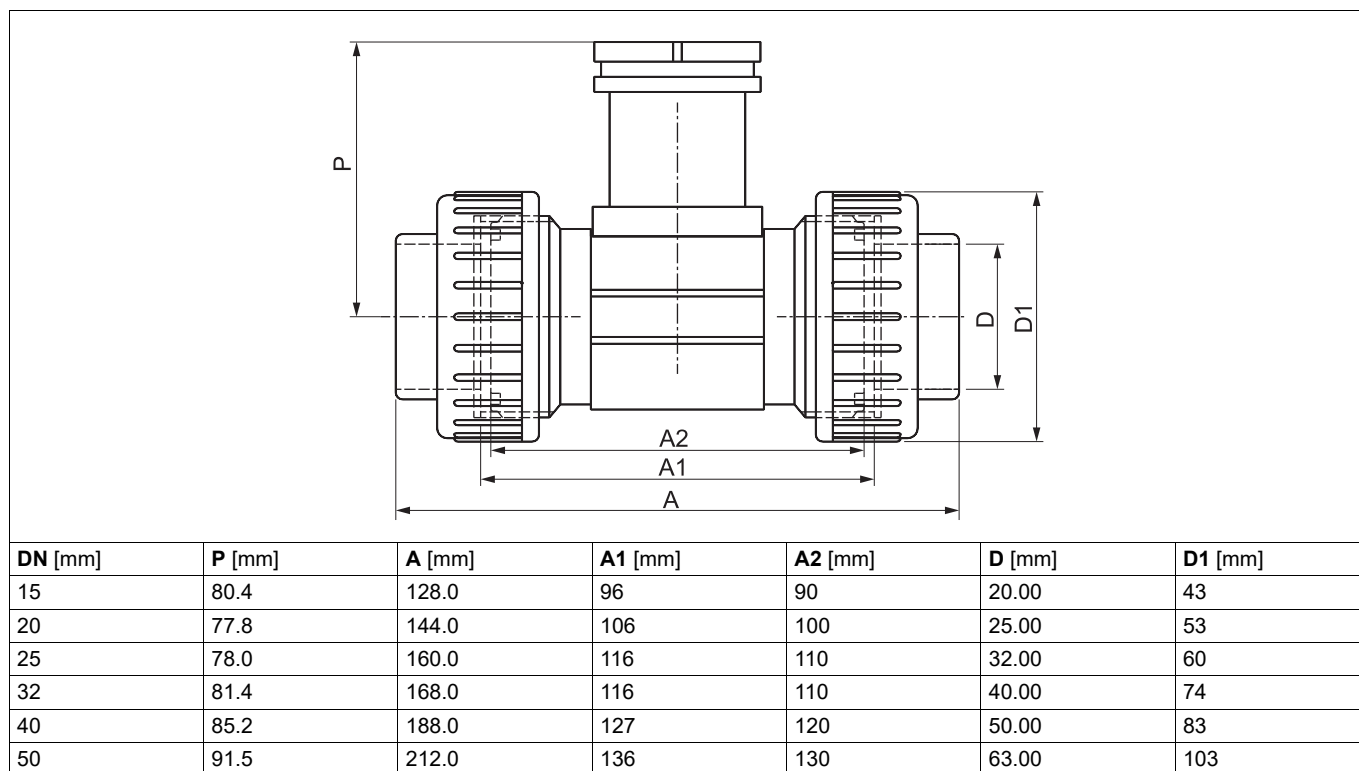
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Dimensions



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Stainless steel T-fitting with internal thread connection

Technical data

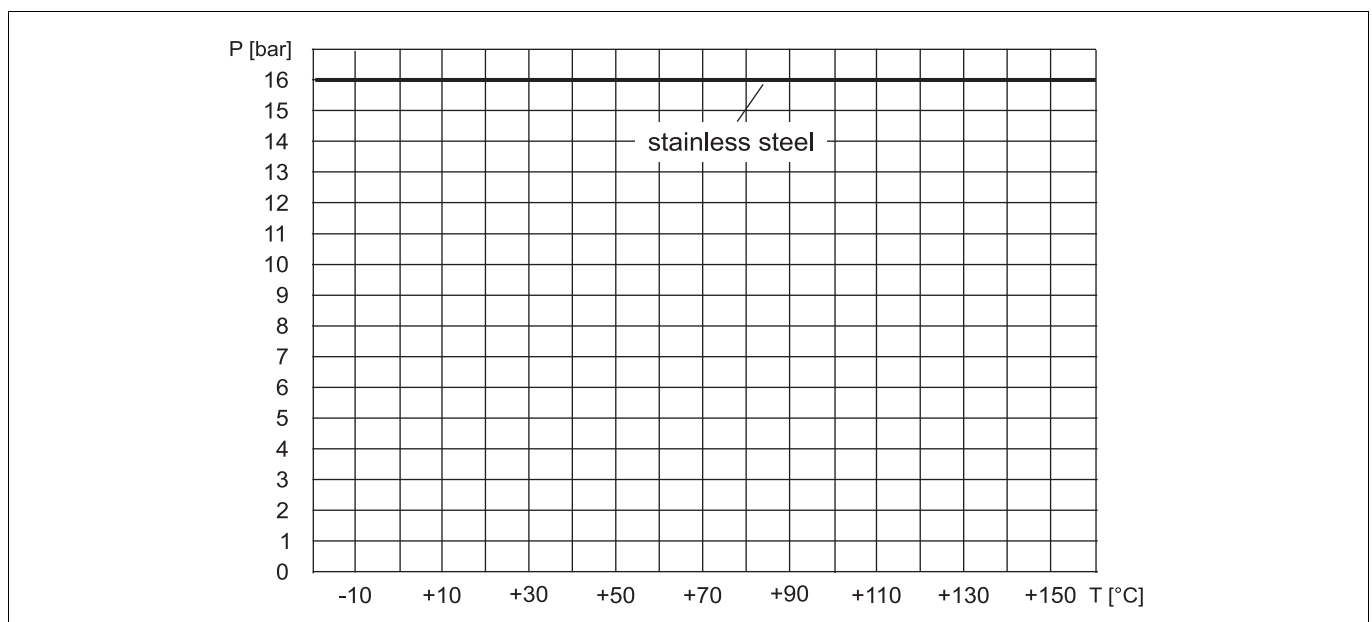
Nominal widths	DN 15 to DN 50	
Maximum pressure	PN 16	
Medium temperature	150 °C ^a	
Fitting material	316 L (1.4404)	

^a Observe installed sensor's limit values!

Nominal width	Sensor version	Q _{max} ^a [l/s]	Part no.
DN 15	Short	4.06	00689273
DN 20		4.75	00689277
DN 25		6.84	00689278
DN 32		10.37	00689279
DN 40		16.03	00689280
DN 50		27.12	00689281

^a Maximum flow rate with flow velocity of 10 m/s

Pressure temperature diagram



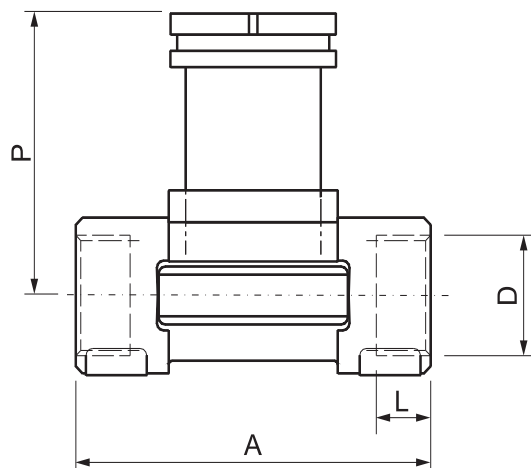
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Dimensions



DN [mm]	P [mm]	A [mm]	D [inch]	L [mm]
15	80.3	84.0	G 1/2	16
20	77.8	94.0	G 3/4	17
25	78.0	104.0	G 1	23.5
32	81.4	119.0	G 1 1/4	23.5
40	85.4	129.0	G 1 1/2	23.5
50	91.5	148.5	G 2	27.5

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PE welded socket

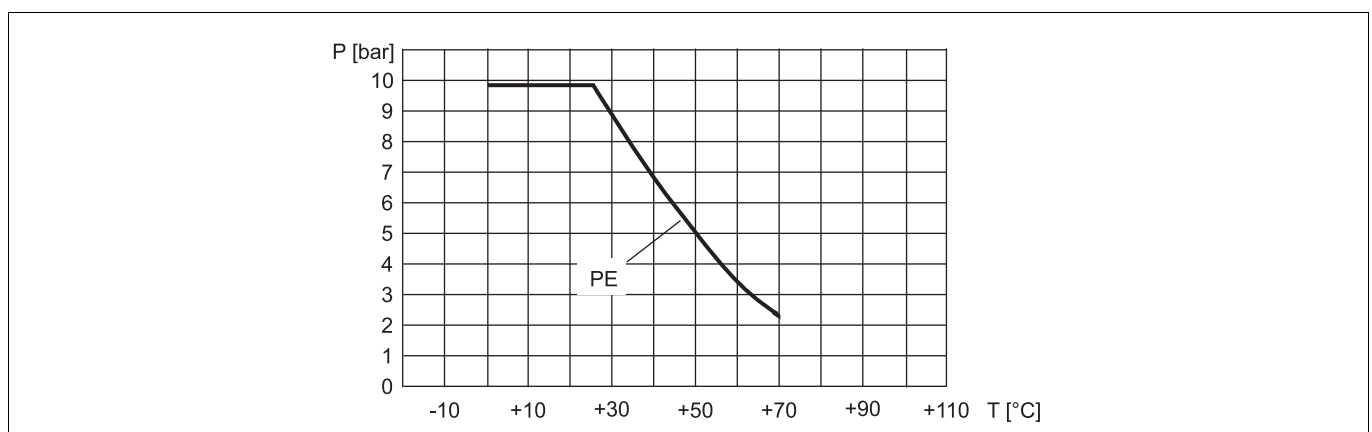
Technical data

Nominal widths	DN 65 to DN 400	
Maximum pressure	PN 10	
Medium temperature	0 to 70 °C	
Fitting material	PE	

Nominal width	Sensor version	Q _{max} ^a [l/s]	Part no.
DN 65	Short	42.72	00523060
DN 80		61.44	00537732
DN 100		91.44	00537733
DN 125	Long	196.08	00537734
DN 150		247.20	00537735
DN 200		537.60	00537737
DN 250		832.80	00537738
DN 300		1224.00	00537740
DN 350		1692.00	00537741
DN 400		2234.40	00537742

^a Maximum flow rate with flow velocity of 10 m/s

Pressure temperature diagram



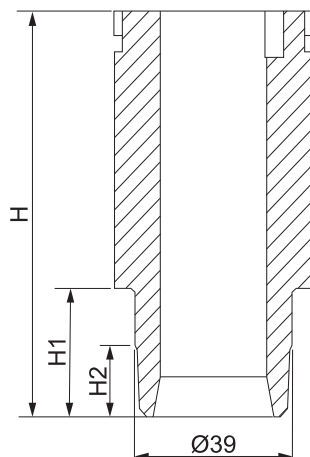
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 Internet: www.jumousa.com



Dimensions



DN [mm]	H [mm]	H1 [mm]	H2 [mm]
65	72.5	13.0	-
80	72.5	15.6	-
100	72.5	19.0	5.0
125	102.0	24.2	8.0
150	102.0	27.7	10.0
200	102.0	38.9	16.0
250	102.0	48.4	21.0
300	102.0	54.5	24.0
350	120.0	61.3	28.0
400	102.0	69.1	31.5

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Stainless steel welded socket with radius

Technical data

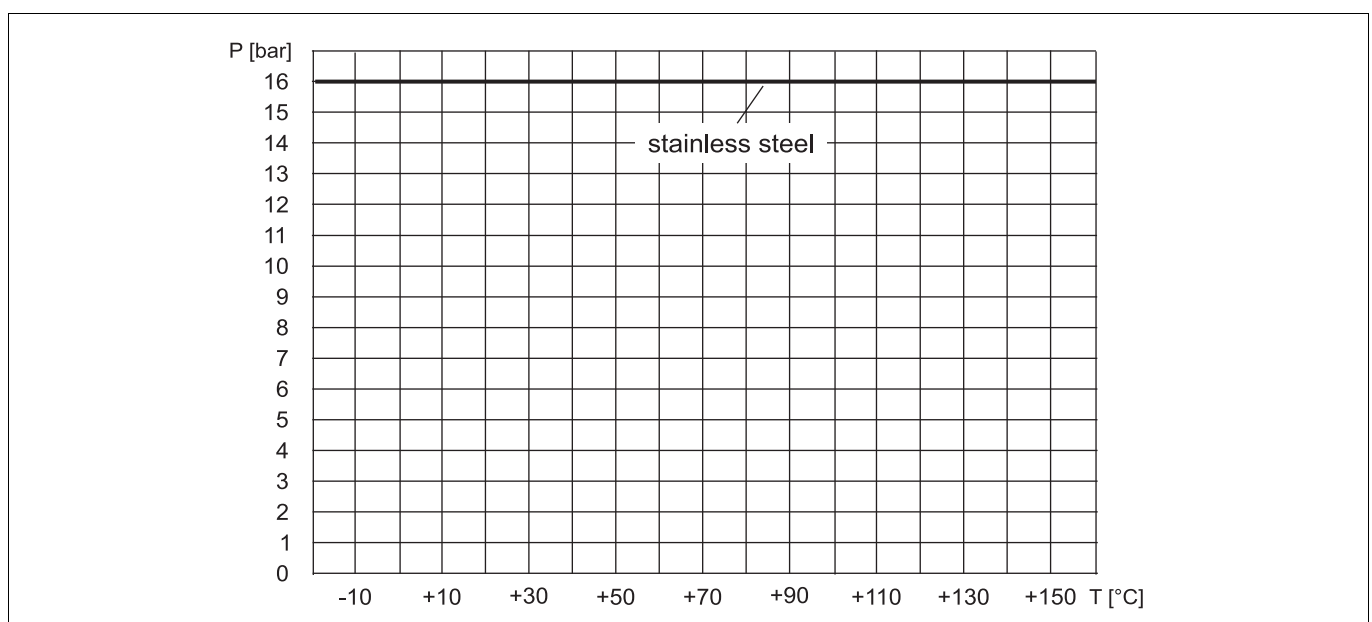
Nominal widths	DN 50 to DN 350	
Maximum pressure	PN 16 ^a	
Medium temperature	0 to 150 °C ^a	
Fitting material	316 L (1.4404)	

^a Observe installed sensor's limit values!

Nominal width	Sensor version	Q _{max} ^a [l/s]	Part no.
DN 50	Short	27.84	00553874
DN 65		48.00	00553875
DN 80		68.40	00553877
DN 100		118.08	00553878
DN 125		187.20	00553879
DN 150		236.16	00553881
DN 200		504.00	00553882
DN 250	Long	746.40	00553883
DN 300		1072.80	00553885
DN 350		1461.60	00553887

^a Maximum flow rate with flow velocity of 10 m/s

Pressure temperature diagram



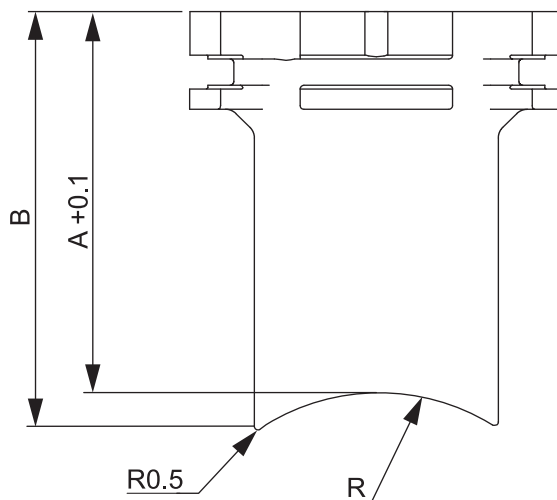
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Dimensions



DN [mm]	A [mm]	W [mm]	R [mm]
50	56.6	61.6	30.2
65	54.5	58.6	36.7
80	53.1	56.4	44.5
100	50.7	53.2	57.2
125	48.2	50.3	70.7
150	45.7	47.4	84.2
200	41.0	42.3	109.6
250	73.6	74.7	136.6
300	67.8	68.7	162.0
350	63.9	64.7	177.8

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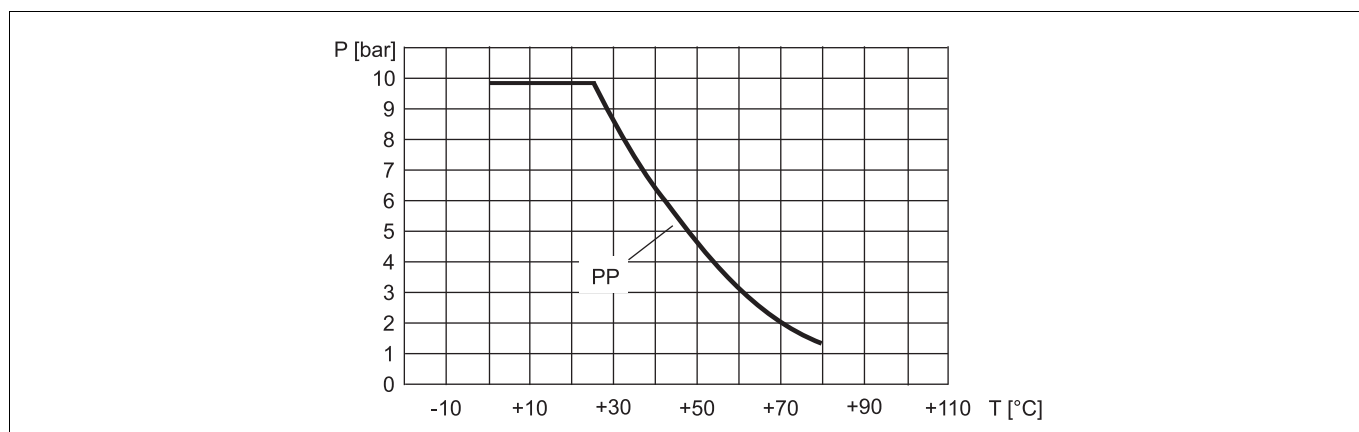
PP connection clamp

Technical data

Nominal widths	DN 50 to DN 200	
Maximum pressure	PN 10	
Medium temperature	0 to 80 °C	
Fitting material	PP (housing) and PVC (clamp)	
Sealing material	EPDM	

Nominal width	Sensor version	Part no.
DN 50	Long	00553889
DN 65		00553890
DN 80		00553891
DN 100		00553893
DN 110		00553894
DN 125		00553895
DN 150		00553898
DN 180		00553900
DN 200		00553901

Pressure temperature diagram



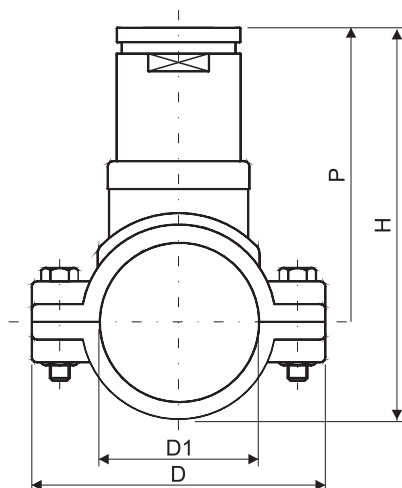
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Dimensions



DN [mm]	P [mm]	H [mm]	D [mm]	D1 [mm]
50	116.0	155	116	63
65	115.0	160	129	75
80	119.0	171	144	90
100	124.0	187	166	110
110	120.0	191	181	125
125	127.0	205	196	140
150	137.0	225	216	160
180	161.0	271	266	200
200	173.0	291	290	225

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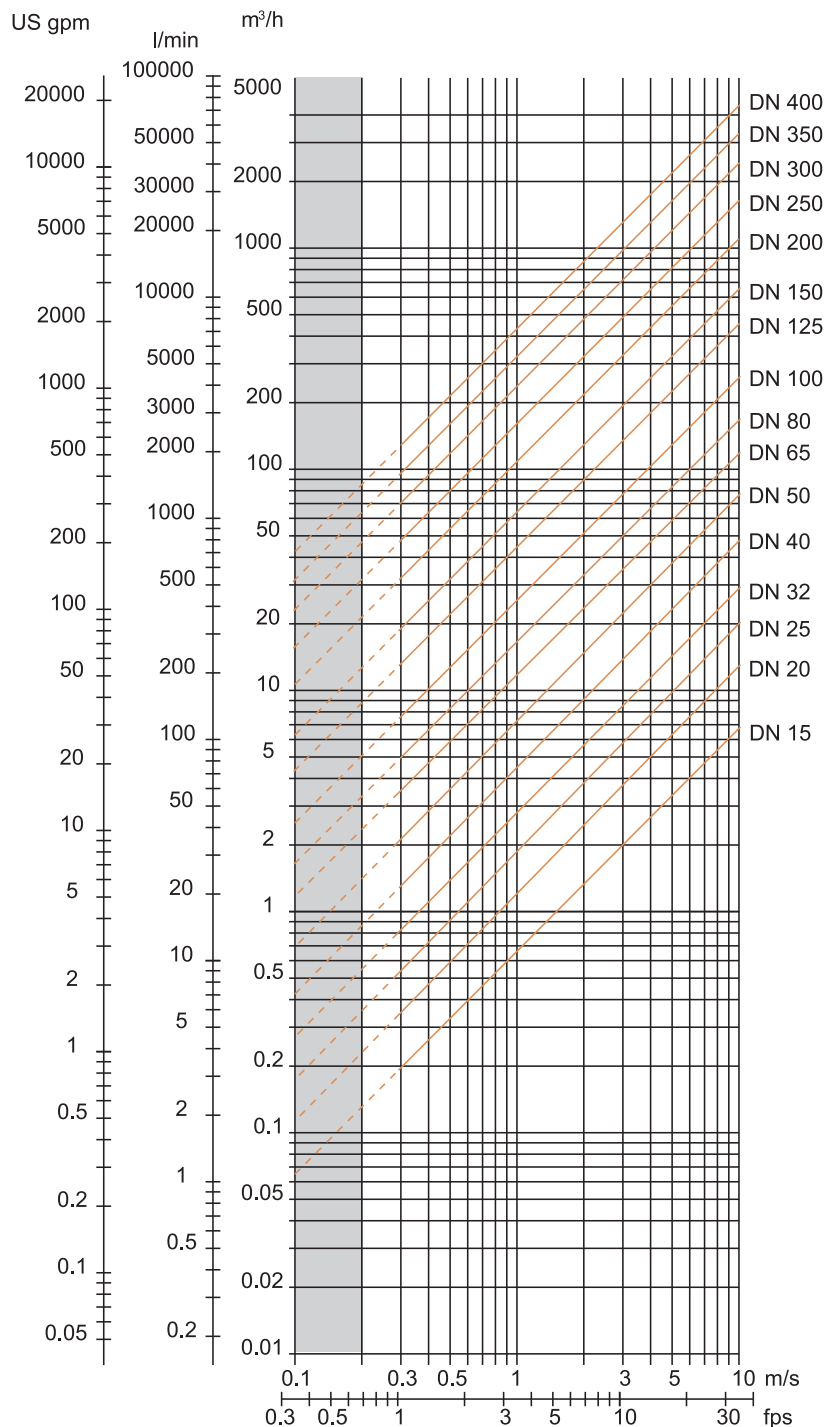


Selection of the nominal pipe width

Example

Nominal flow	10 m ³ /h
Desired medium velocity	2 to 3 m/s
Suitable pipe	DN 40

Flow rate of the medium



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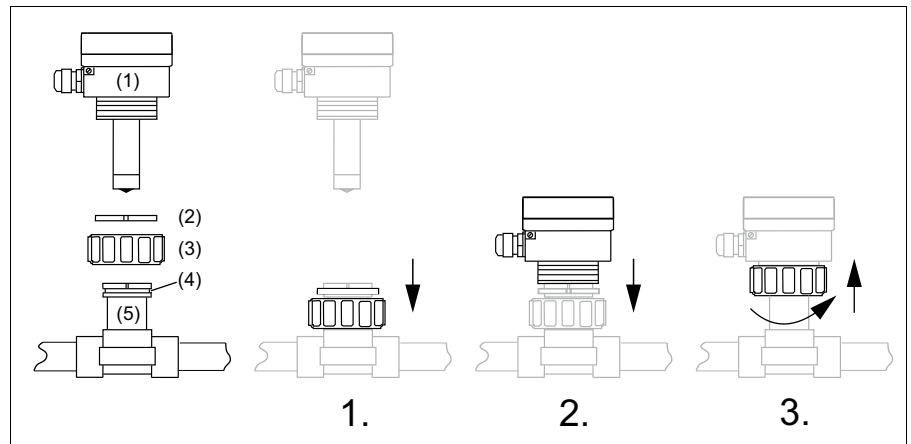
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Mounting example

- (1) Flowmeter
- (2) Circlip
- (3) Union nut
- (4) Groove for circlip
- (5) Fitting 406090

The detailed description of device installation is contained in the chapter on mounting in the operating manual of the device.



JUMO NESOS R01 LS

Float Switch in Miniature Form

Applications

- Point level measurement of liquids in storage tanks, containers, oil sumps, and tanks
- Water and wastewater treatment
- Mechanical and plant engineering
- Shipbuilding
- Energy technology
- Tempering equipment

Brief description

The point level measurement is carried out according to the Archimedes' principle for liquids. The float moves along the guide tube as the level rises or falls. The magnet in the float actuates the reed contact(s) installed in the guide tube with its magnetic field. The switching status of the reed contact can be evaluated and processed through downstream electronic components, relays or contactors. Alarms, pumps, signal lamps, valves, and horns are typically switched via a contact protection relay.

Compact versions with diameters from 27 mm are available for applications involving low installation heights and tank openings. Variants with a connecting plug help to minimize mounting work.

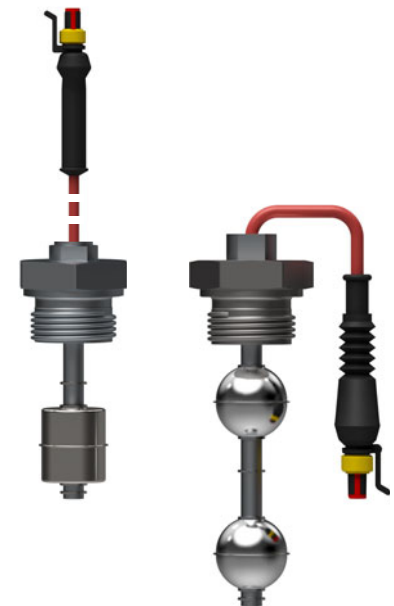
Depending on the variant ordered, various electrical connections, process connections, guide tube lengths, floats, and number of and positions of contacts as well as their function (SPST-NO [N/O contact], SPST-NC [N/C contact], SPDT-CO [changeover contact], and bistable contacts) are available.

With the optional temperature sensor, both the point level measurement and the temperature can be acquired via just one measuring point. Variants for monitoring the reed contact temperature are also available.

Variants with an intrinsically safe [Ex i] design and flameproof enclosure [Ex d] are available for applications involving explosion protection, as are approvals for shipbuilding. No isolating switch amplifier is required for installations with a flameproof enclosure.

Customer benefits

- Cost-effective installation and mounting, due to spring-cage terminals (Push-In®), for example
- Reduced operating costs due to maintenance-free device design
- Price-performance ratio optimized through the use of standard components
- No isolating switch amplifier required for [Ex d] (flameproof enclosure) applications



Type 408301

Special features

- Approvals and certificates available for explosion protection, shipbuilding, rail-road applications and German Water Resources Act (WHG)
- High switching voltages and switching currents
- Wide media temperature range from -52 to +240 °C
- Wide pressure range from -1 to +35 bar
- Up to 4 switching outputs are user-definable as N/O contact, N/C contact, changeover contact, and bistable contact
- Temperature sensor/temperature switch are available

Approvals and approval marks



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Technical data

General Information

Function principle	Magnetic float switch with reed contact					
Installation position (vertical)	±30°					
Switching point accuracy ^a	±2 mm					
Switching function (potential-free)	01 SPST-NO		02 SPST-NC		03 SPDT-CO	
Switching voltage (max.) ^b	AC 175 V	DC 175 V	AC 175 V	DC 175 V	AC 175 V	DC 175 V
Switching power (max.) ^b	10 VA	10 W	10 VA	10 W	10 VA	10 W
Switching current (max.) ^b	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A

Switching function	10 SPST-NO		11 SPST-NC		15 SPST-NO, bistable	
Switching voltage (max.) ^b	AC 230 V	DC 230 V	AC 230 V	DC 230 V	AC 230 V	DC 230 V
Switching power (max.) ^b	100 VA	100 W	100 VA	100 W	100 VA	100 W
Switching current (max.) ^b	1 A	1 A	1 A	1 A	1 A	1 A

^a measured, dry

^b The values must also be adhered to in combination.

	Pt100	Pt1000
Measuring range	-40 to +150 °C	-40 to +150 °C
Accuracy	DIN class B According to DIN EN 60751 the limit deviation in °C is: $\pm(0.3 + 0.005 t)$ $ t $ = temperature in °C regardless of prefix sign	

Special features for products with protection rating 3 (see "Connection diagram") ^a	Switching voltage (max.)	AC ≤ 33 V (AC 46 V peak value)	DC 70 V
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^a Limit values according to EN 61010-1

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Mechanical features

Float	Form	Material	Outer diameter	Min. density kg/m ³	Pressure range (nominal pressure) in bar	Weight in grams
022	Cylinder	AISI 316 series	22	860	-1 to +16	7
027	Cylinder	AISI 316 series	27	800	-1 to +16	8
028	Cylinder, e-polished	AISI 316 series	27	800	-1 to +16	8
029	Spherical	AISI 316 series	29	900	-1 to +35	8
030	Spherical, e-polished	AISI 316 series	29	900	-1 to +35	8
729	Spherical	Titanium grade 2	29	700	-1 to +15	7

Float	Medium density kg/m ³					
	700	800	900	1000	1200	1400
	Immersion depth mm					
022			28.7	25.8	21.5	18.4
027		23.6	21	18.9	15.8	13.5
028		23.6	21	18.9	15.8	13.5
029			20.3	18.5	16.2	14.6
030			20.3	18.5	16.2	14.6
729	21.9	19.3	17.5	16.3	14.4	13.1

Materials of parts in contact with medium For example, process connection, float 022, 027, 028, 029, 030, guide tube Float 729	The chemical resistance of the materials should be considered for the application. AISI 316 series Titanium grade 2
Materials of parts not in contact with medium Cable Cable socket Round plug M12 × 1 Terminal head Ex d Connection housing, cube-shaped, small Connection housing, cube-shaped, large	The chemical resistance of the materials should be considered for the application. PVC or silicone or PUR or RADOX® PBT-GF30 PBT-GF30 Aluminum, painted Aluminum, painted Aluminum, painted
Clamping range Cable fitting Terminal block	Diameter 6 to 12 mm for connection housing, cube-shaped, small, and connection housing, cube-shaped, large Diameter 6.5 to 11.9 mm for terminal head Ex d Diameter 6 to 8 mm for cable socket 0.14 to 2.5 mm ² for connection housing, cube-shaped, small 0.14 to 1.5 mm ² for terminal head Ex d, and connection housing, cube-shaped, large
Weight	300 g for a guide tube length of 100 mm, process connection G 1, and assembled cable measuring 0.4 m with AMP Superseal connector

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Environmental influences

Moisture	
Operation	100 % rel. humidity including condensation on the product outer shell
Storage	90 % rel. humidity without condensation
Protection type for electrical connection	According to DIN EN 60529
Cable	IP68
Cable with AMP Superseal connector	IP67
Cable with M12 connector	IP66
Round plug M12 × 1	IP66
Cable socket	IP65
Terminal head Ex d	IP68
Connection housing, cube-shaped, small	IP66
Connection housing, cube-shaped, large	IP66
Vibration	0.7 g at 13.2 to 100 Hz, according to IEC 60068-2-6
Ambient temperature for electrical connection	Note dependency of extension tube length on process temperature, see diagrams below.
PVC cable	-5 to +80 °C
Silicone cable	-50 to +180 °C
PUR cable	-40 to +90 °C
RADOX® cable	-40 to +120 °C
PVC cable, with AMP Superseal connector	-5 to +80 °C
Silicone cable, with AMP Superseal connector	-40 to +125 °C
PUR cable, with AMP Superseal connector	-40 to +90 °C
PVC cable, with M12 connector	-5 to +80 °C
Silicone cable, with M12 connector	-40 to +85 °C
PUR cable, with M12 connector	-40 to +85 °C
Round plug M12 × 1	-30 to +90 °C
Cable socket	-40 to +125 °C
Terminal head Ex d	-40 to +100 °C
Connection housing, cube-shaped, small	-40 to +100 °C
Connection housing, cube-shaped, large	-40 to +100 °C
Process temperature	
Parts in contact with medium (e.g. guide tube with float)	-40 to +150 °C (standard) -52 to +240 °C (upon request)

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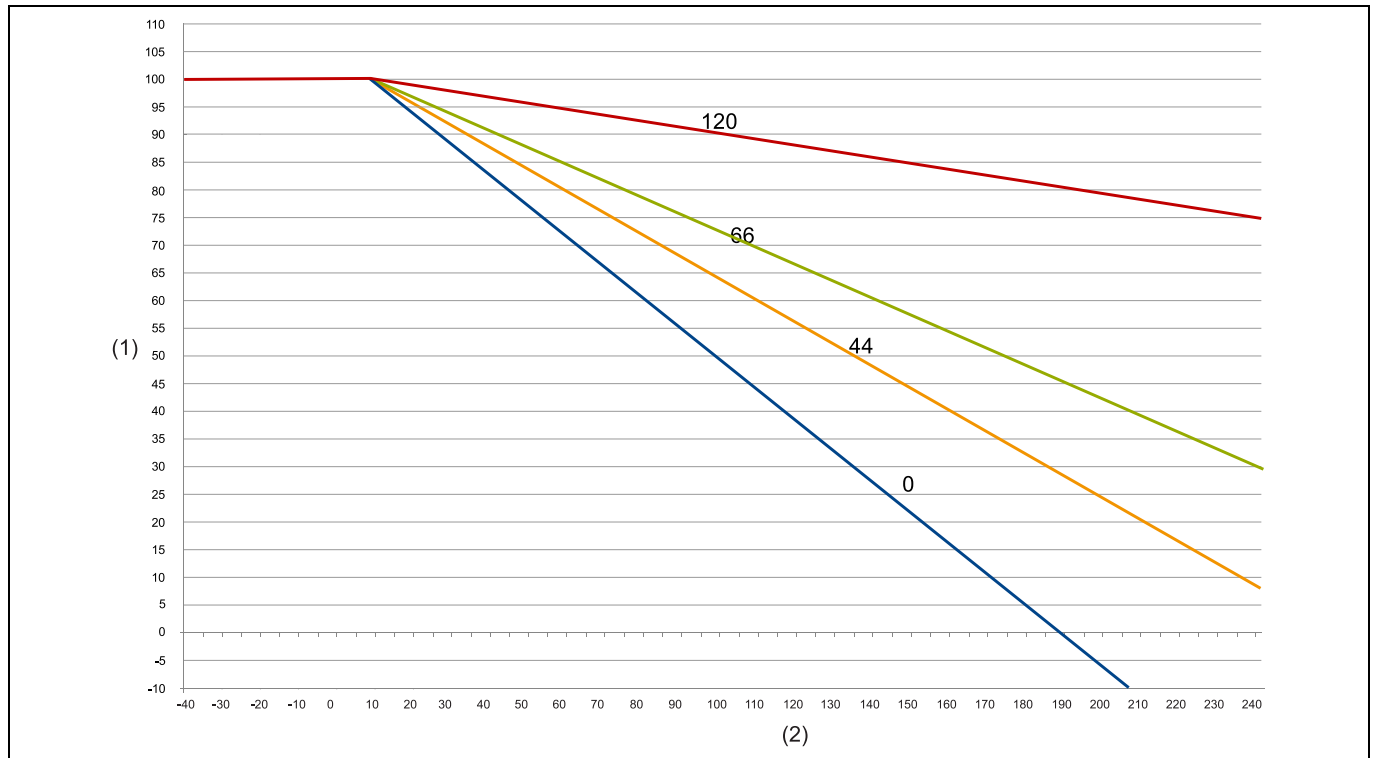
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Maximum ambient temperature depending on extension tube length and process temperature

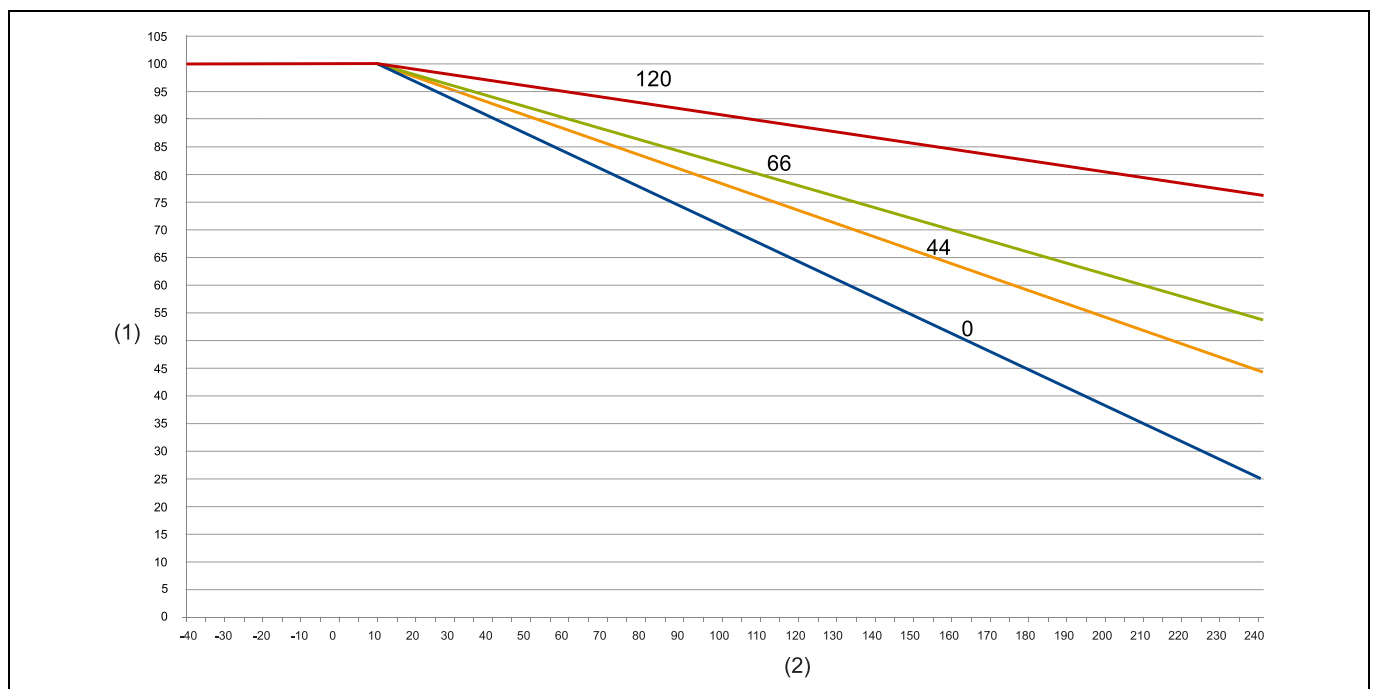
Connection housing small and large, extension tube in mm



(1) Maximum ambient temperature

(2) Medium temperature

Connection housing Ex d, extension tube in mm



(1) Maximum ambient temperature

(2) Medium temperature

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Approvals and approval marks

ATEX, IEC Ex, intrinsically safe, Ex i Testing agency Certificate/certification numbers Inspection basis Valid for	Eurofins Electrosuisse Product Testing AG SEV 18 ATEX 0134 X, IECEx SEV 18.0011X IEC/EN 60079-0, IEC/EN 60079-11, IEC/EN 60079-26, DIN EN ISO 80079-36, DIN EN ISO 80079-37 Type 408301/263, Type 408301/362, Type 408301/662
ATEX, IEC Ex, flameproof enclosure, Ex d Testing agency Certificate/certification numbers Inspection basis Valid for	Eurofins Electrosuisse Product Testing SEV 18 ATEX 0133 X, IECEx SEV 18.0010X IEC/EN 60079-0, IEC/EN 60079-1, IEC/EN 60079-26, IEC/EN 60079-31, DIN EN ISO 80079-36, DIN EN ISO 80079-37 Type 408301/264, Type 408301/462, Type 408301/962
DNV GL Testing agency Certificate/certification numbers Inspection basis Valid for	DNV GL TAA00001VR Class Guidelines CG 0339, November 2016 Type 408301/062, Type 408301/662, Type 408301/962
German Water Resources Act (WHG) Testing agency Certificate/certification numbers Inspection basis Valid for	DIBT Z-65.11-608 Approval principles for safety devices for tanks and pipelines, overfill protection (ZG-ÜS) Type 408301/262, Type 408301/263, Type 408301/264
EAC ^a Testing agency Certificate/certification numbers Inspection basis Valid for	СИСТЕМА КАЧЕСТВА Д-DE.HP15.B.06254/20 Standard TR TS 020/2011 Type 408301/...
EAC-Ex ^a Testing agency Certificate/certification numbers Inspection basis Valid for	ПрофиТест ЕАЭС RU C-DE.HB07.B.00316/20 TR TS 012/2011 Type 408301/263, Type 408301/264, Type 408301/362, Type 408301/462, Type 408301/662, Type 408301/962 – each with extra code 240
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^a Russian documentation upon request

NOTE!

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

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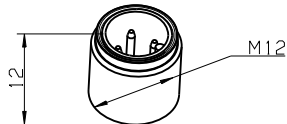
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Phone: +1 315 437 5866
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Email: info.us@jumo.net
Internet: www.jumousa.com



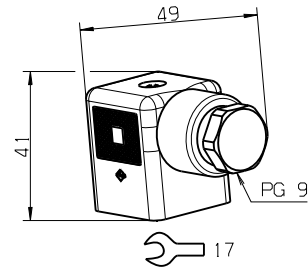
Dimensions

Electrical connection

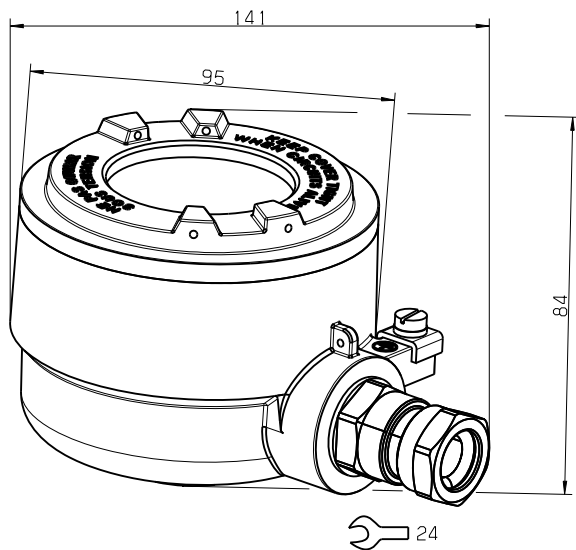
036
Round plug M12 × 1



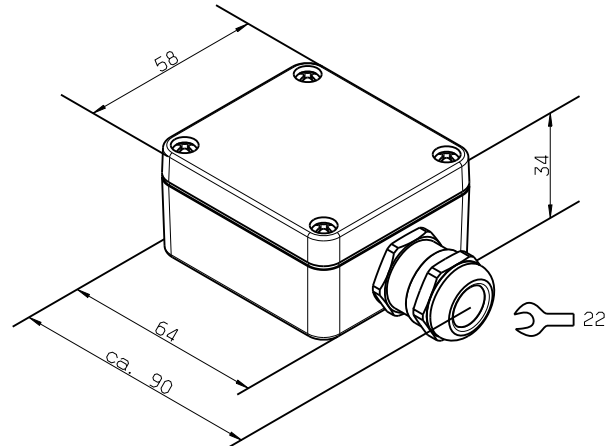
061
Cable socket DIN EN 175301-803



115
Terminal head Ex d



130
Connection housing, cube-shaped, small



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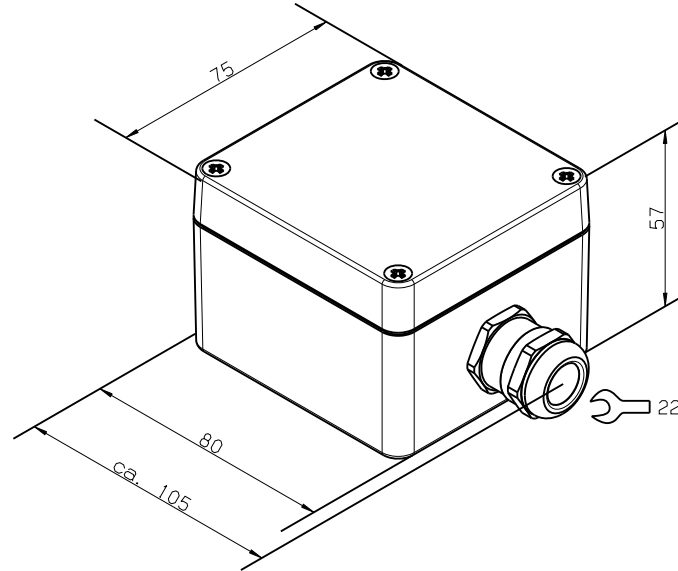
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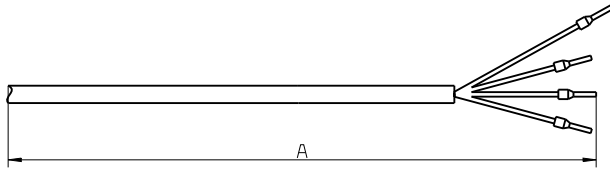
131

Connection housing, cube-shaped, large



150 PVC, 160 silicone, 170 PUR, 180 RADOX®

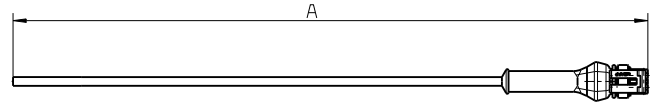
Cable with ferrules



A Cable length, see order details

151 PVC, 161 silicone, 171 PUR

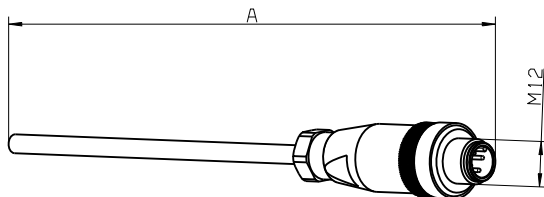
Cable with AMP Superseal connector



A Cable length, see order details

152 PVC, 162 silicone, 172 PUR

Cable with M12 connector



A Cable length, see order details

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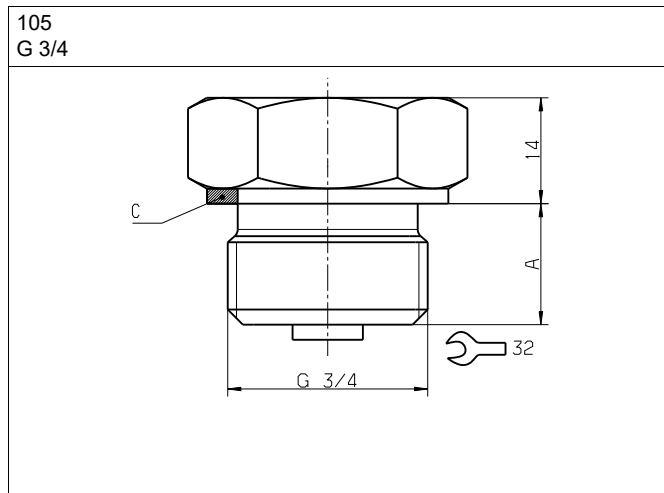
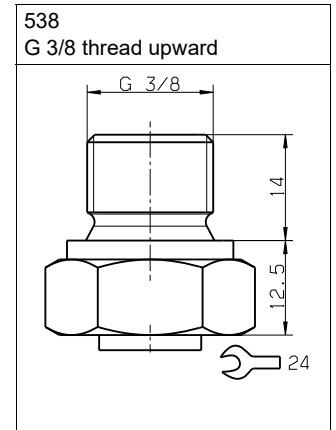
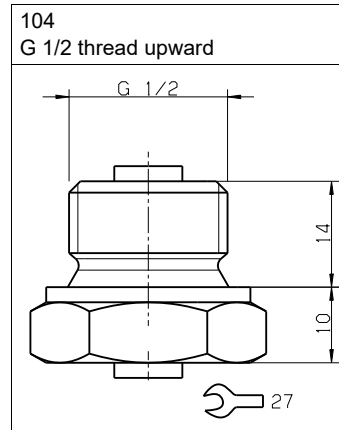
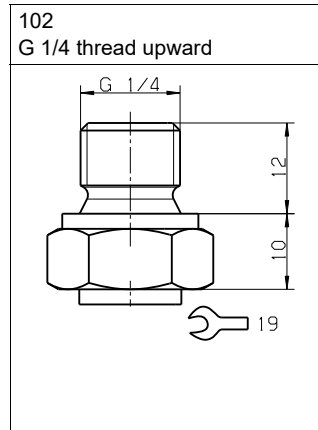
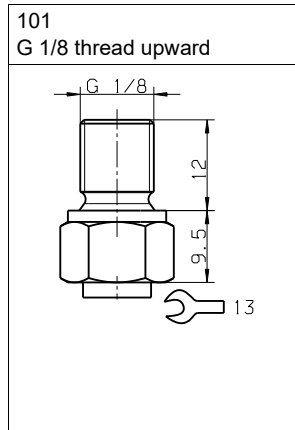
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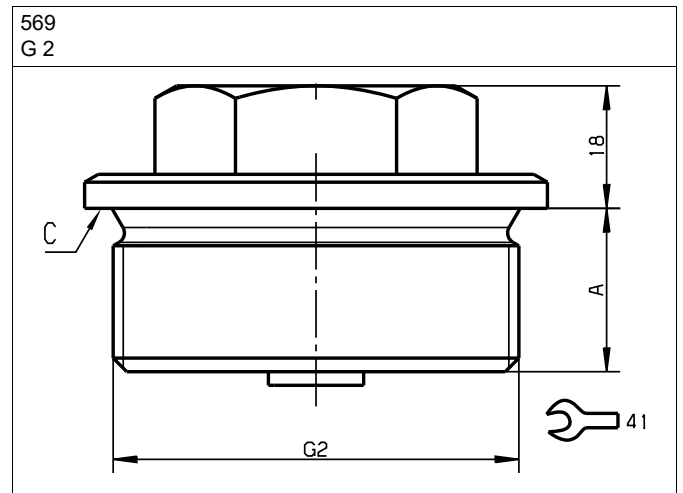
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**Process connections**

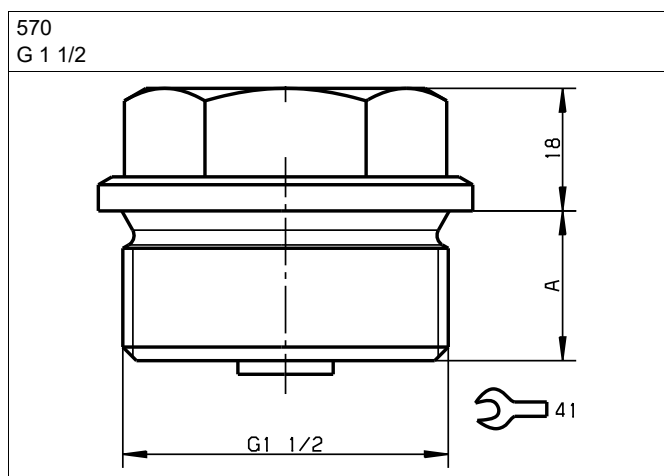
A 16

C A seal/O-ring with a thickness of at least 1.5 mm is recommended.

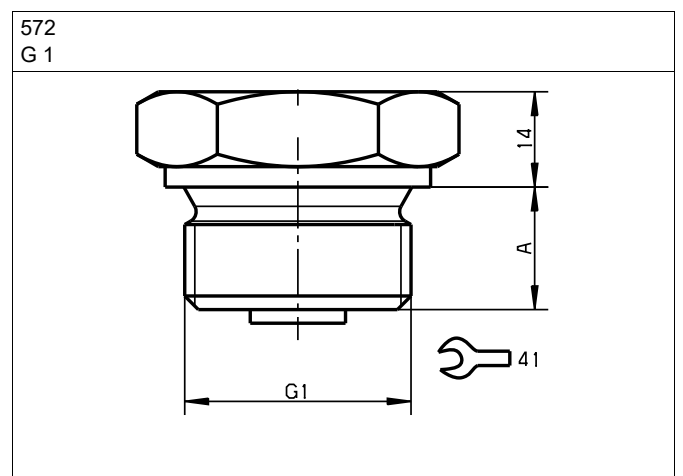


A 24 (25.5 for Ex d)

C A seal/O-ring with a thickness of at least 2 mm is recommended.



A 22 (25.5 for Ex d)



A 18 (25.5 for Ex d)

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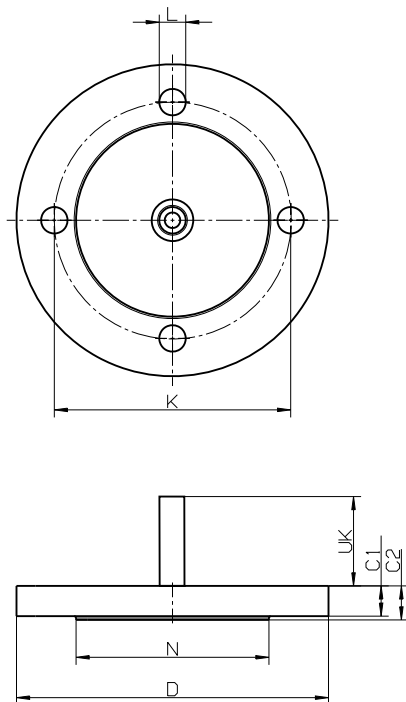
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Flange according to the following table



Example for extension tube, also available for other process connections;
UK = extension tube length + 9 mm

Order code	Flange designation	Hole circle K	Number of holes	Diameter of holes L	Exterior diameter D	Diameter of sealing strip N	Strength of flange C1	Strength of flange including sealing strip C2
729	Flange DN 50, PN40, EN 1092-1, form B1	125	4	18	165	102	17	20

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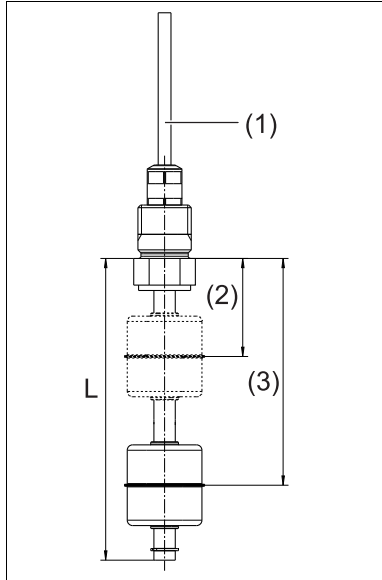
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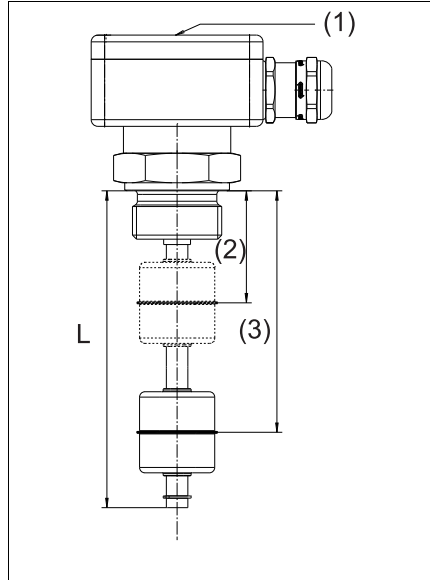
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**Notes to the order details**

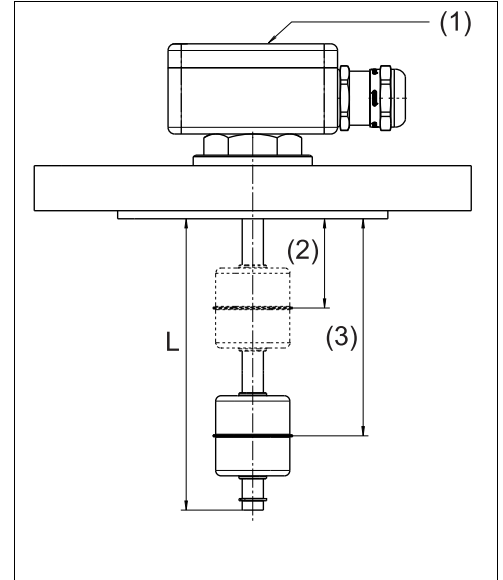
Below are examples for the dimensioning of the guide tube length L, the measuring range start (3) as well as measuring range end (2) depending on the respective process connection.



(1) Process connection
„thread upward“



(1) Process connection
„thread“



(1) Process connection
„flange“

- (2) Position contact 1 (switching point) in mm
- (3) Position contact 2 (switching point) in mm
- L Guide tube length in mm

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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

For product configurations with more than one switching contact, the mixing of hazardous network circuits and SELV circuits is not permitted.


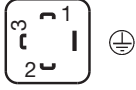
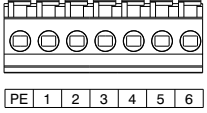

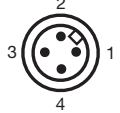
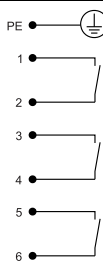
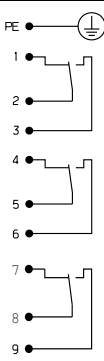
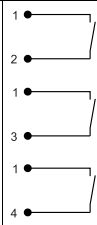
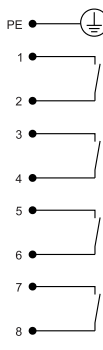
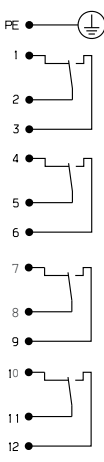
Number of contacts										
	Cable		Cable socket		Connection housing		AMP Superseal connector		Round plug M12	
	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO
1	Silicone RD WH PUR BN WH PVC BN WH	Silicone RD WH RD/BU PUR BN BU BK PVC BN WH GN								
2	Silicone RD WH RD/BU WH/BU PVC BN WH GN YE	Silicone ^a RD WH BU RD/BU WH/BU BU PVC ^b RD BK BN OG GN YE PUR ^c PK WH YE BN GN GY								

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Number of contacts										
	Cable		Cable socket		Connection housing		AMP Superseal connector		Round plug M12	
	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO
3	Silicone ^a RD WH RD/BU WH/BU BU BU PVC ^b RD BK BN OG GN YE	-	-	-			-	-		-
4	-	-	-	-			-	-	-	-
Protection rating ^d	prepared for 2 according to EN 61010-1		1	1	1	1	3	3	3	3

^a According to VDE 0298-4 max. current 0.5 A at max. 175 °C or 1 A at max. 170 °C

^b According to VDE 0298-4 max. current 0.8 A at max. 75 °C or 1 A at max. 70 °C, not available with shipbuilding approval, shipbuilding approval and explosion protection, intrinsically safe, Ex i, and shipbuilding approval and explosion protection, flameproof enclosure, Ex d.

^c Only available with protection class 3.

^d According to DIN EN 61140

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	Cable	Cable socket	Connection housing	AMP Superseal connector	Round plug M12
Temperature sensor Pt100 ^{a, b}	Silicone ^c Silicone ^d 	-		-	
Temperature sensor Pt1000 ^{a, b}	PVC ^c 				

^a Connect all measuring circuits of a product to SELV circuits.

^b Assignment is always to terminals with the highest numbers

^c For 1× SPST-NO/NC switching contacts

^d For 1× SPDT-CO switching contacts

NAMUR circuit, switching signal according to DIN EN 60947-5-6

Versions with NAMUR circuitry may only be operated with switching voltages DC ≤ 15 V. A NAMUR circuit is assigned to each switching contact. Depending on the selected electrical connection, the wiring diagram is identical to the above. The NAMUR circuit can be used to detect line faults (line break, short-circuit) in a suitable evaluation unit (e.g. see Ex-i isolating amplifier accessories).

	SPST-NO/NC	SPDT-CO
Scheme		
Example: 1 switching contact with silicone cable		

Legend: cable	BN	Brown	GN	Green
	WH	White	RD	Red
	BU	Blue	YE	Yellow
	PK	Pink	GY	Gray

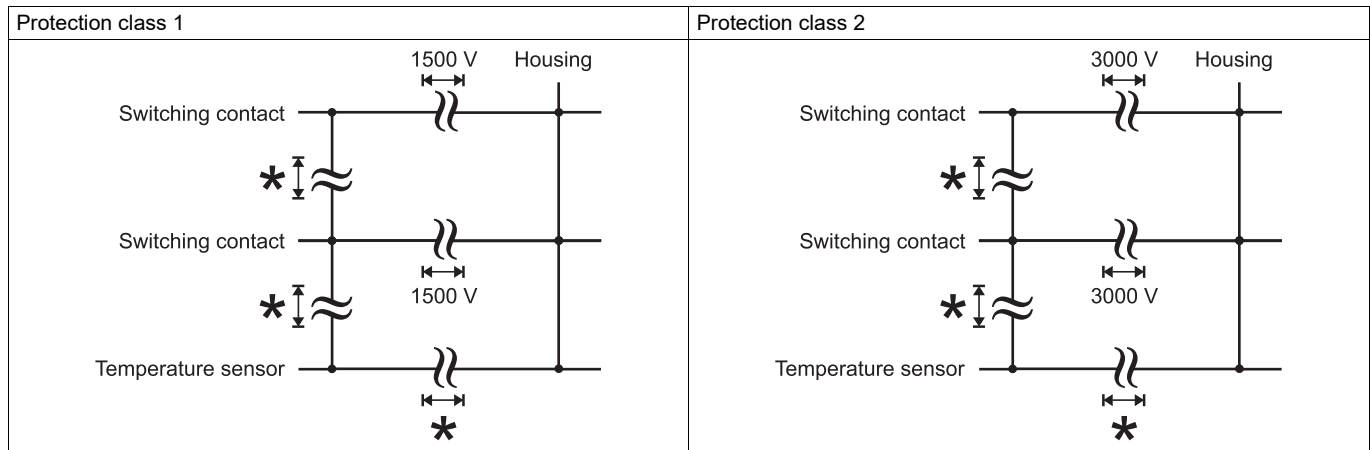
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The galvanic isolation is realized according as follows:



Caution:

* Functional galvanic isolation

If connected to a certified intrinsically safe electrical circuit Ex i, the following maximum values are admissible.

Contact function	Max. voltage U_i in V	Max. current U_i in mA	Max. power P_i in mW	Internal inductance in μ H	Internal capacity in pF
SPST-NO	≤ 30	≤ 100	≤ 750	~0 for cable version 1 μ H/m connecting cable	~0 for cable version 200 pF/m connecting cable
SPST-NC					
SPDT-CO					

When using explosion-proof versions (intrinsically safe, Ex i, and flameproof enclosure, Ex d) the following values are given.

Contact function	Max. voltage U_i in V	Max. current U_i in mA	Max. power P_i in mW	Internal inductance in μ H	Internal capacity in pF
Pt100	≤ 30	≤ 55	≤ 413	~0 for cable version 1 μ H/m connecting cable	~0 for cable version 200 pF/m connecting cable
Pt1000					
NAMUR circuit	≤ 15	≤ 60	≤ 225		

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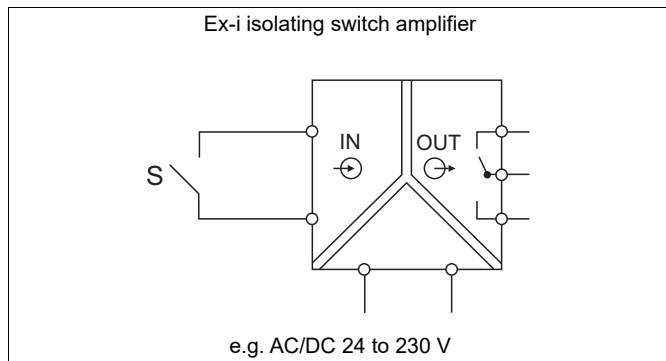
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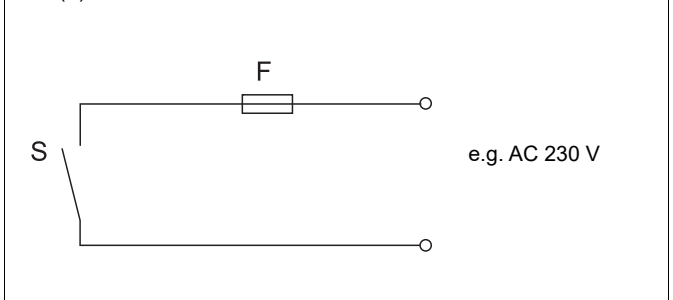


Connection examples of versions with explosion protection

Float switch (S)

Ex i**Ex d**

According to operating manual 408301, chapter 6 on "Installation", the fuse (F) must be selected.



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Order details

	(1) Basic type
408301	JUMO NESOS R01 LS – Float switch in miniature form
	(2) Basic type extension
000	None
062	Shipbuilding approval
262	WHG approval (German Water Resources Act)
263	WHG approval (German Water Resources Act), explosion protection, intrinsically safe, Ex i
264	WHG approval (German Water Resources Act), explosion protection, flameproof enclosure, Ex d
362	Explosion protection, intrinsically safe, Ex i
462	Explosion protection, flameproof enclosure, Ex d
662	Shipbuilding approval and explosion protection, intrinsically safe, Ex i
962	Shipbuilding approval and explosion protection, flameproof enclosure, Ex d
999	Special version
	(3) Electrical connection
036	Round plug M12 × 1
061	Cable socket DIN EN 175301-803, form A
115	Terminal head Ex d
130	Connection housing, cube-shaped, small
131	Connection housing, cube-shaped, large
150	Cable, PVC
151	Cable, PVC with AMP Superseal connector ^a
152	Cable, PVC with M12 connector
160	Cable, silicone
161	Cable, silicone with AMP Superseal connector ^a
162	Cable, silicone with M12 connector
170	Cable, PUR
171	Cable, PUR with AMP Superseal connector ^a
172	Cable, PUR with M12 connector
180	Cable, RADOX®
999	Special version
	(4) Cable length
0	None
2000	2000 mm
5000	5000 mm
100 - 5000	Specifications in plain text (increments of 100 mm)
	(5) Process connection
101	G 1/8 thread upward
102	G 1/4 thread upward
104	G 1/2 thread upward
105	G 3/4
538	G 3/8 thread upward
569	G 2
570	G 1 1/2
572	G 1
729	Flange DN 50, PN40, EN 1092-1, form B1
999	According to customer requirements
	(6) Guide tube length L, diameter 8 mm^b
30 - 500	Specifications in plain text (increments of 50 mm)

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(7)	Float
022	Cylinder, stainless steel, diameter 27, density 860 kg/m ³
027	Cylinder, stainless steel, diameter 27, density 800 kg/m ³
028	Cylinder, stainless steel, diameter 27, density 800 kg/m ³ , e-polished
029	Spherical, stainless steel, diameter 29, density 900 kg/m ³
030	Spherical, stainless steel, diameter 29, density 800 kg/m ³ , e-polished
729	Spherical, titanium, diameter 29, density 700 kg/m ³
(8)	Number of floats
1	1 piece
2	2 pieces
3	3 pieces
4	4 pieces
(9)	Switching function
01	SPST-NO, NO contact (10 VA/AC 175 V/0.5 A)
02	SPST-NC, NC contact (10 VA/AC 175 V/0.5 A)
03	SPDT-CO, single-pole changeover contact (10 VA/AC 175 V/0.5 A)
10	SPST-NO, NO contact (100 VA/AC 230 V/1 A)
11	SPST-NC, NC contact (100 VA/AC 230 V/1 A)
15	SPST-NO, NO contact, bistable (100 VA/AC 230 V/1 A)
99	According to customer requirements
(10)	Number of contacts
1	1 contact
2	2 contacts
3	3 contacts
4	4 contacts
(11)	Position of contact 1^c
20 - 470	Specifications in plain text
(12)	Position of contact 2^c
0	None
20 - 470	Specifications in plain text
(13)	Position of contact 3^c
0	None
40 - 470	Specifications in plain text
(14)	Position of contact 4^c
0	None
40 - 470	Specifications in plain text
(15)	Extra codes
000	None
005	Integrated temperature sensor Pt1000 ^d
007	Integrated temperature sensor Pt100 ^d
019	Temperature monitoring of reed contact, Pt1000
240	EAC-Ex approval
307	Extension tube ^e
663	NAMUR circuit ^a
950	Railroad application ^f
954	Technical passport

^a Not available for shipbuilding approval, shipbuilding approval and explosion protection, intrinsically safe, Ex i, and shipbuilding approval and explosion protection, flameproof enclosure, Ex d.

^b The dimensioning is in mm in relation to the contact/reference surface (threaded bushing of the container/tank wall) of the selected process connection.

^c The contact positions are observed from the process connection toward the guide tube end.

^d The temperature sensor is positioned at the end of the guide tube

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^e Specify the extension tube length as a function of the process and ambient temperature (see chapter "Maximum ambient temperature depending on extension tube length and process temperature") in plain text.

^f The extra code railroad application is only available in connection with electrical connection M12 plug or RADOX® cable.

⇒ For details on the dimensioning of the guide tube length L depending on the respective process connection, see Operating manual B 408301, chapter 3.2.


	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)											
Order code	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>
Order example	408301	/	000	-	160	-	1000	-	101	-	47	-	027	-	1	-			

Minimum order quantity: 1 piece

Stock version

Order code	Part no.
408301/000-160-1000-104-80-027-1-03-1-55-0-0-0/000	00707701

Accessories

Designation	Description	Part no.
Ex-i repeater power supply and input isolating amplifier 	The intrinsically safe isolation switching amplifier ensures reliable, galvanic isolation and safe transmission of switching signals in Ex applications. It can be mounted in Ex zone 2. When using the NAMUR circuitry, line break and short circuit can be detected. Further technical data and the relevant safety regulations can be found in the operating instructions B 707540.0	00734357

Trademark information

- RADOX® is a registered trademark of Huber+Suhner AG, DE.

JUMO NESOS R02 LS

Standard version float switch

Applications

- Point level measurement of liquids in storage tanks, containers, oil sumps, and tanks
- Water and wastewater treatment
- Mechanical and plant engineering
- Shipbuilding
- Energy technology
- Diesel tanks

Brief description

The point level measurement is carried out according to Archimedes' principle for liquids. The float moves along the guide tube as the level rises or falls. The magnet in the float actuates the reed contact(s) installed in the guide tube with its magnetic field. The switching status of the reed contact can be evaluated and processed through downstream electronic components, relays, or contactors. Alarms, pumps, signal lamps, valves, and horns are typically switched via a contact protection relay.

Float switches of up to 4 m in length and with up to 5 switching points are available for applications involving high filling heights. Variants with a connecting plug help to minimize mounting effort.

Depending on the variant ordered, various electrical connections, process connections, guide tube lengths, floats, number and positions of contacts as well as their function (SPST-NO [N/O contact], SPST-NC [N/C contact], SPDT-CO [changeover contact], and bistable contacts) are available.

With the optional temperature sensor or temperature switch, both the point level measurement and the temperature can be acquired via just one measuring point. Variants for monitoring the reed contact temperature are also available.

Variants in an intrinsically safe [Ex i] design and flameproof enclosure [Ex d] are available for applications involving explosion protection, as are approvals for shipbuilding. No isolating switch amplifier is required for installations with a flameproof enclosure.

Customer benefits

- Cost-effective installation and mounting, due to spring-cage terminals (Push-In®), for example
- Reduced operating costs due to maintenance-free device design
- Price-performance ratio optimized through the use of standard components
- No isolating switch amplifier required for [Ex d] (flameproof enclosure) applications



Type 408302

Special features

- Approvals and certificates available for explosion protection, shipbuilding, railroad applications and German Water Resources Act (WHG)
- High switching voltages and switching currents
- Large operating temperature range for media from -52 to +240 °C
- Large pressure range from -1 to +37 bar
- Up to 5 switching outputs can be freely defined as N/O contact, N/C contact, changeover contact, or bistable contact
- Temperature sensor/temperature switch are available

Approvals and approval marks



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Technical data

General Information

Function principle	Magnetic float switch with reed contact					
Installation position (vertical)	±30°					
Switching point accuracy ^a	±2 mm					
Switching function (potential-free)	03 SPDT-CO		07 SPDT-CO, bistabile		10 SPST-NO	
Switching voltage (max.) ^b	AC 175 V	DC 175 V	AC 230 V	DC 200 V	AC 230 V	DC 230 V
Switching capacity (max.) ^b	10 VA	10 W	40 VA	40 W	100 VA	100 W
Switching current (max.) ^b	0.5 A	0.5 A	0.5 A	0.5 A	1 A	1 A

Switching function	11 SPST-NC		12 SPDT-CO		15 SPST-NO, bistabile	
Switching voltage (max.) ^b	AC 230 V	DC 230 V	AC 230 V	DC 230 V	AC 230 V	DC 230 V
Switching capacity (max.) ^b	100 VA	100 W	60 VA	60 W	100 VA	100 W
Switching current (max.) ^b	1 A	1 A	1 A	1 A	1 A	1 A

^a Measured, dry

^b The values must also be adhered to in combination.

	Pt100	Pt1000	Temperature switch, N/C contact, max. 2.5 A, AC 230 V, cos φ 0.95 [0.6], 2.5 A [1.6 A]
Measuring range	-40 to +150 °C	-40 to +150 °C	Indicate switching point specification in plain text
Accuracy	DIN class B according to DIN EN 60751 the limit deviation in °C is as follows: ±(0.3 + 0.005 t) t = temperature in °C regardless of prefix sign		Tolerance ±5 K Hysteresis 30 K ±15 K

Special features for products with protection rating 3 (see "Connection diagram") ^a	Switching voltage (max.)	AC ≤ 33 V (AC 46 V peak value)	DC 70 V
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^a Limit values according to EN 61010-1

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Mechanical features

Float	Form	Material	Outer diameter	Min. density kg/m ³	Pressure range (nominal pressure) in bar	Weight in grams
044	Cylinder	AISI 316 series	44	750	-1 to +24	43
045	Cylinder, e-polished	AISI 316 series	44	750	-1 to +24	43
052	Spherical	AISI 316 series	52	680	-1 to +37	36
053	Spherical, e-polished	AISI 316 series	52	680	-1 to +37	36
752	Spherical	Titanium grade 2	52	650	-1 to +24	35

Float	Density of medium kg/m ³					
	700	800	900	1000	1200	1400
	Immersion depth mm					
044		44.5	39.5	35.6	29.6	25.4
045		44.5	39.5	35.6	29.6	25.4
052	38.6	34.1	31.1	28.8	25.5	23.1
053	38.6	34.1	31.1	28.8	25.5	23.1
752	39.1	34.4	31.3	29	25.6	23.3

Materials of parts in contact with medium e.g. process connection, float 044, 045, 052, 053, guide tube Float 752	The chemical resistance of the materials should be taken into account for the application. AISI 316 series Titanium Grade 2
Materials of parts not in contact with medium Cable Cable socket Round plug M12 × 1 Terminal head Ex d Connection housing, cube-shaped, small Connection housing, cube-shaped, large	The chemical resistance of the materials should be taken into account for the application. PVC or silicone or PUR or RADOX® PBT-GF30 PBT-GF30 Aluminum, painted Aluminum, painted Aluminum, painted
Clamping range Cable fitting Terminal block	Diameter 6 to 12 mm for connection housing, cube-shaped, small (electrical connection 130) and connection housing, cube-shaped, large (electrical connection 131) Diameter 6.5 to 11.9 mm for terminal head Ex d Diameter 6 to 8 mm for cable socket 0.14 to 2.5 mm ² for connection housing, cube-shaped, small 0.14 to 1.5 mm ² for terminal head Ex d and connection housing, cube-shaped, large
Weight	650 g for guide tube length of 400 mm, process connection G 1 1/2 and connection housing, cube-shaped, small

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Environmental influences

Moisture	
Operation	100 % rel. humidity including condensation on the product outer shell
Storage	90 % rel. humidity without condensation
Protection type for electrical connection	According to DIN EN 60529
Cable	IP68
Cable with AMP Superseal connector	IP67
Cable with M12 connector	IP66
Round plug M12 × 1	IP66
Cable socket	IP65
Terminal head Ex d	IP68
Connection housing, cube-shaped, small	IP66
Connection housing, cube-shaped, large	IP66
Vibration	0.7 g for 13.2 to 100 Hz and freely oscillating guide tube length up to max. 2.5 m, according to IEC 60068-2-6
Ambient temperature for electrical connection	Note dependency of extension tube length on process temperature, see diagrams below.
PVC cable	-5 to +80 °C
Silicone cable	-50 to +180 °C
PUR cable	-40 to +90 °C
RADOX® cable	-40 bis +120 °C
PVC cable, with AMP Superseal connector	-5 to +80 °C
Silicone cable, with AMP Superseal connector	-40 to +125 °C
PUR cable, with AMP Superseal connector	-40 to +90 °C
PVC cable, with M12 connector	-5 to +80 °C
Silicone cable, with M12 connector	-40 to +85 °C
PUR cable, with M12 connector	-40 to +85 °C
Round plug M12 × 1	-30 to +90 °C
Cable socket	-40 to +125 °C
Terminal head Ex d	-40 to +100 °C
Connection housing, cube-shaped, small	-40 to +100 °C
Connection housing, cube-shaped, large	-40 to +100 °C
Process temperature	
Parts in contact with medium (e.g. guide tube with float)	-40 to +150 °C (standard) -52 to +240 °C (upon request)

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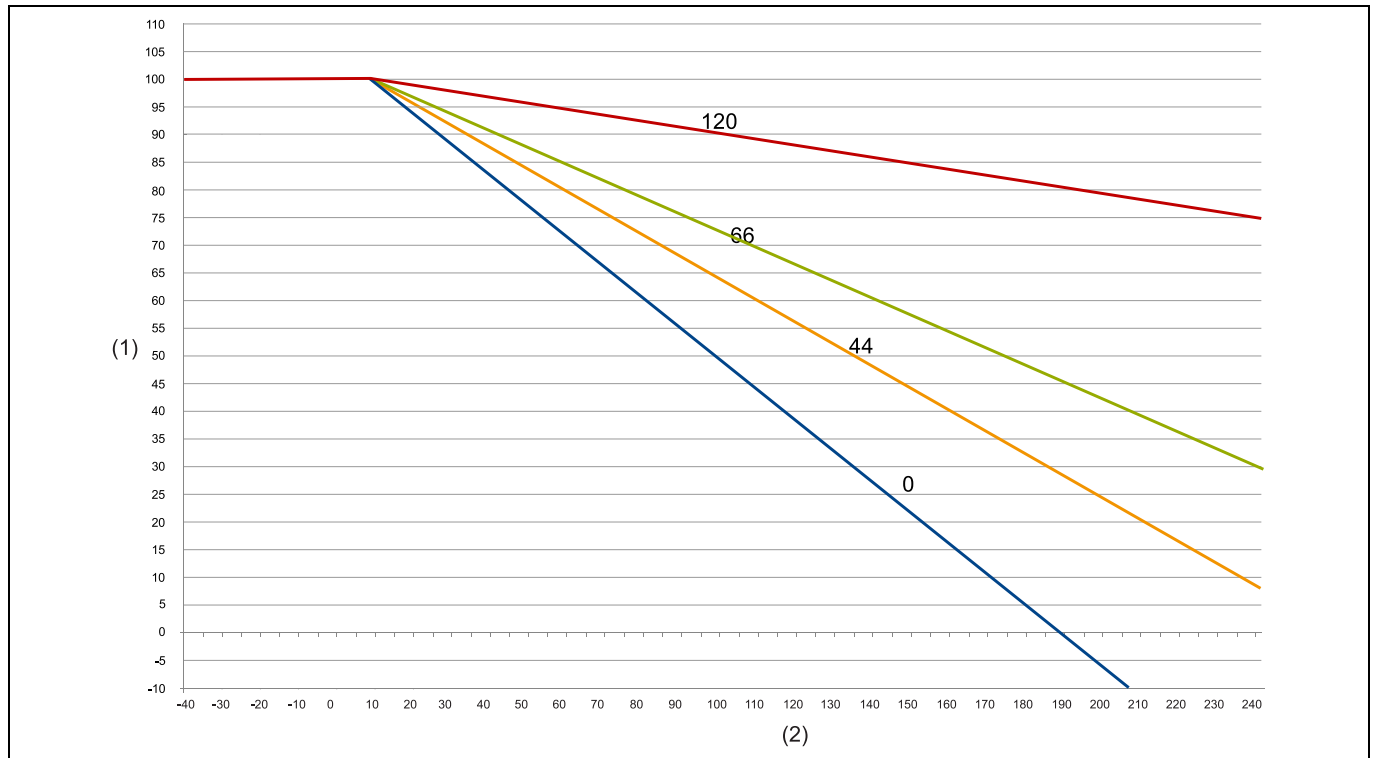
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Maximum ambient temperature depending on extension tube length and process temperature

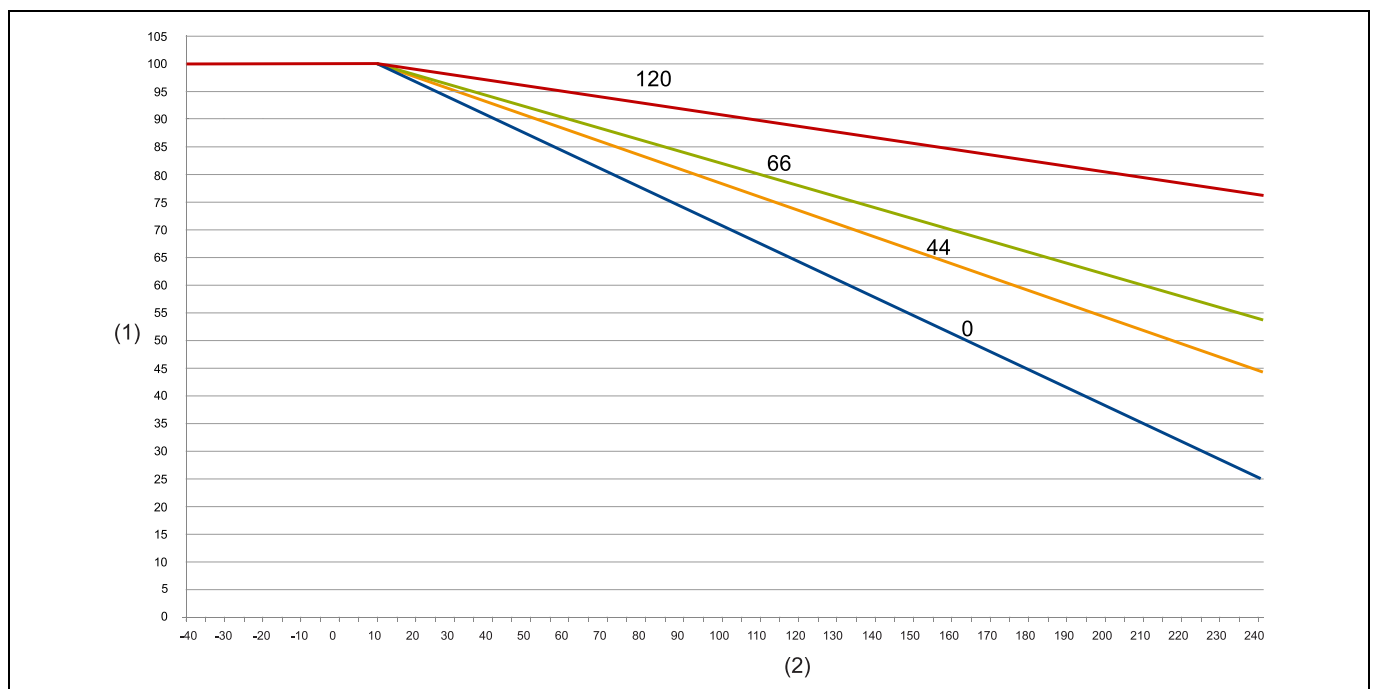
Connection housing small and large, extension tube in mm



(1) Maximum ambient temperature

(2) Medium temperature

Connection housing Ex d, extension tube in mm



(1) Maximum ambient temperature

(2) Medium temperature

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Approvals and approval marks

ATEX, IEC Ex, intrinsically safe, Ex i Testing agency Certificate/certification numbers Inspection basis Valid for	Eurofins Electrosuisse Product Testing AG SEV 18 ATEX 0134 X, IECEx SEV 18.0011X IEC/EN 60079-0, IEC/EN 60079-11, IEC/EN 60079-26, DIN EN ISO 80079-36, DIN EN ISO 80079-37 Type 408302/263, Type 408302/362, Type 408302/662
ATEX, IEC Ex, flameproof enclosure, Ex d Testing agency Certificate/certification numbers Inspection basis Valid for	Eurofins Electrosuisse Product Testing SEV 18 ATEX 0133 X, IECEx SEV 18.0010X IEC/EN 60079-0, IEC/EN 60079-1, IEC/EN 60079-26, IEC/EN 60079-31, DIN EN ISO 80079-36, DIN EN ISO 80079-37 Type 408302/264, Type 408302/462, Type 408302/962
DNV GL Testing agency Certificate/certification numbers Inspection basis Valid for	DNV GL TAA00001VR Class Guidelines CG 0339, November 2016 Type 408302/062, Type 408302/662, Type 408302/962
German Water Resources Act (WHG) Testing agency Certificate/certification numbers Inspection basis Valid for	DIBT Z-65.11-608 Approval principles for safety devices for tanks and pipelines, overfill protection (ZG-ÜS) Type 408302/262, Type 408302/263, Type 408302/264
EAC ^a Testing agency Certificate/certification numbers Inspection basis Valid for	СИСТЕМА КАЧЕСТВА Д-DE.HP15.B.06254/20 Standard TR TS 020/2011 Type 408302/...
EAC-Ex ^a Testing agency Certificate/certification numbers Inspection basis Valid for	ПрофиТест ЕАЭС RU C-DE.HB07.B.00316/20 TR TS 012/2011 Type 408302/263, Type 408302/264, Type 408302/362, Type 408302/462, Type 408302/662, Type 408302/962 – each with extra code 240
Railroad application Testing agency Certificate/certification numbers Inspection basis Valid for	RST Rail System Testing, JUMO NESOS Certificate Railroad application DIN EN 50155, DIN EN 50121-3-2, EN 45545-1, EN 45545-2 Extra code 950

^a Russian documentation upon request

NOTE!

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

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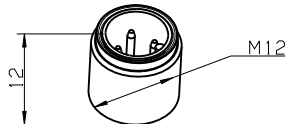


Dimensions

Electrical connection

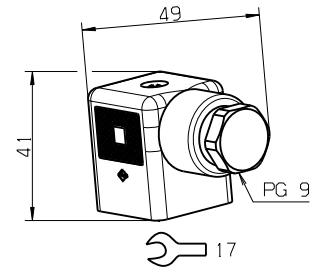
036

Round plug M12 × 1



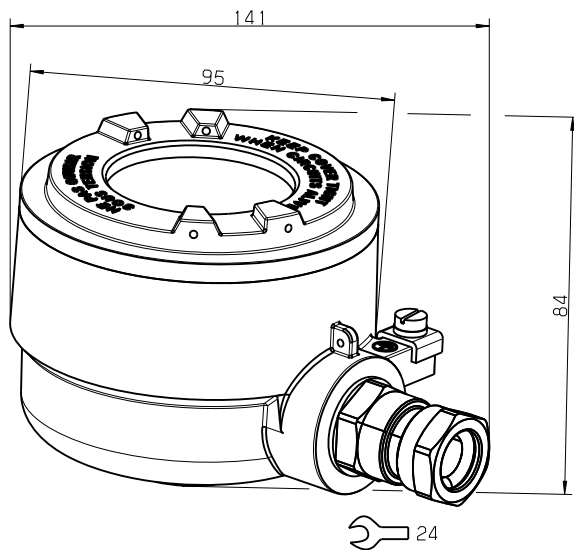
061

Cable socket DIN EN 175301-803



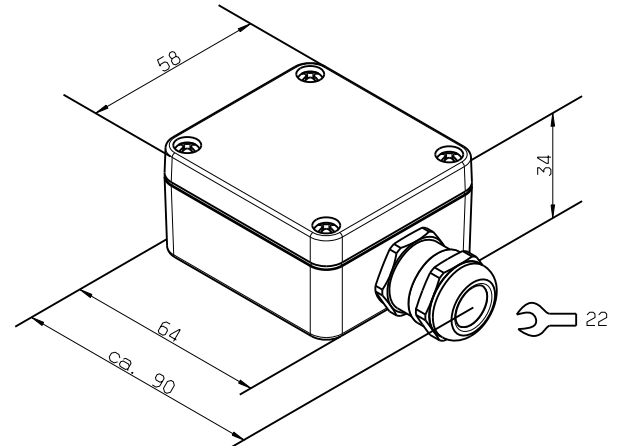
115

Terminal head Ex d



130

Connection housing, cube-shaped, small



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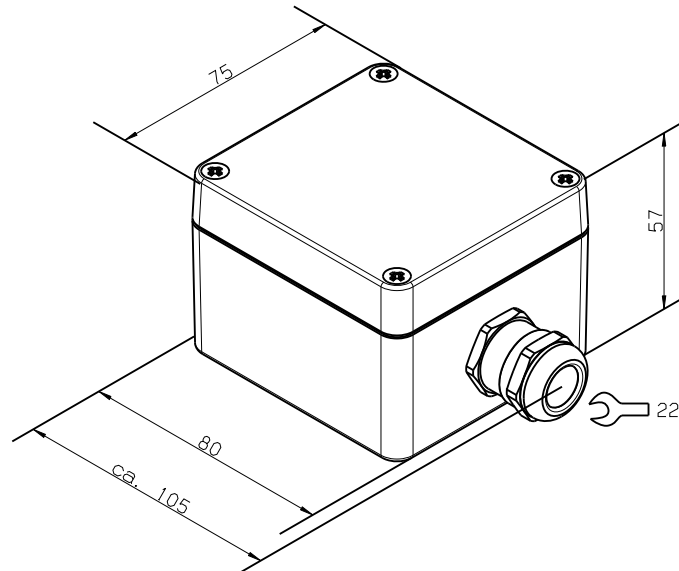
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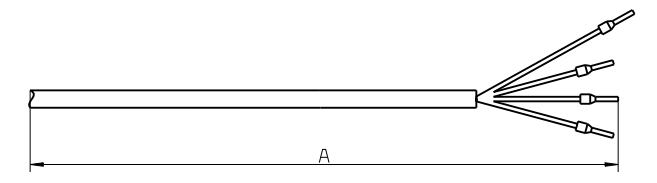


131

Connection housing, cube-shaped, large

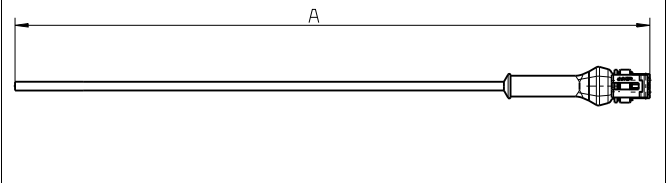


150 PVC, 160 silicone, 170 PUR, 180 RADOX®
Cable with ferrules



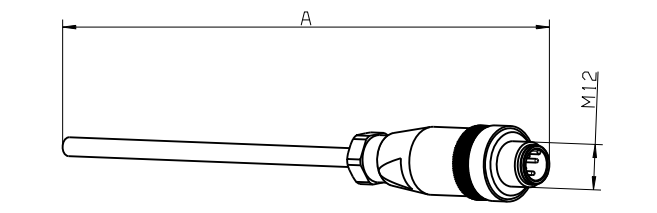
A Cable length, see order details

151 PVC, 161 silicone, 171 PUR
Cable with AMP Superseal connector



A Cable length, see order details

152 PVC, 162 silicone, 172 PUR
Cable with M12 connector



A Cable length, see order details

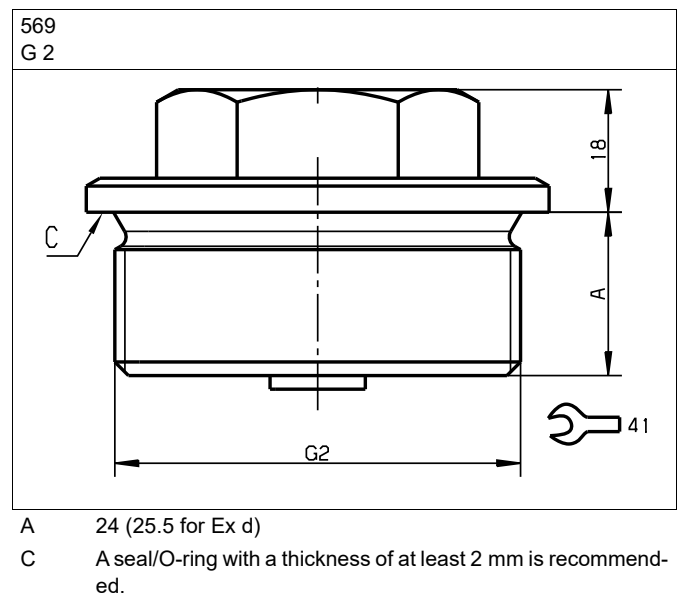
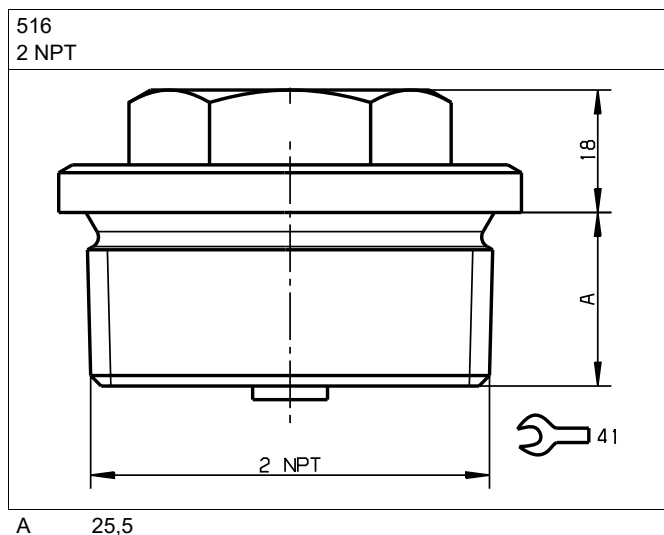
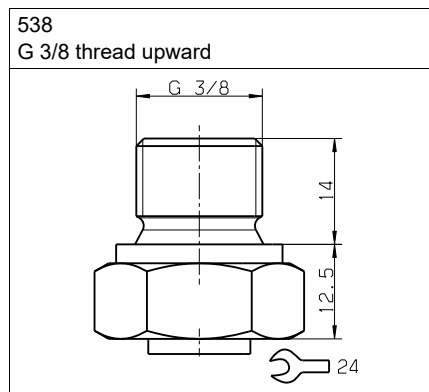
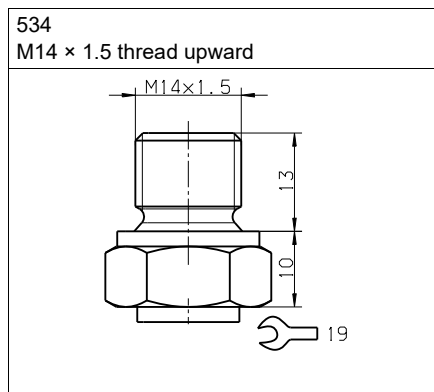
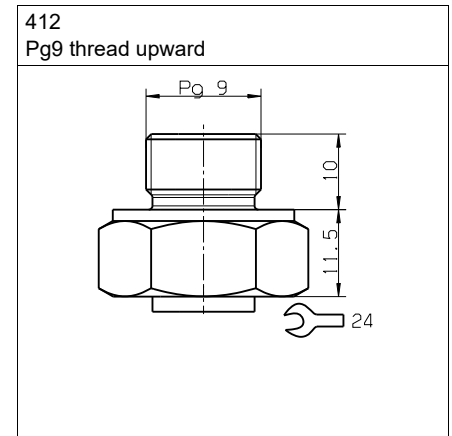
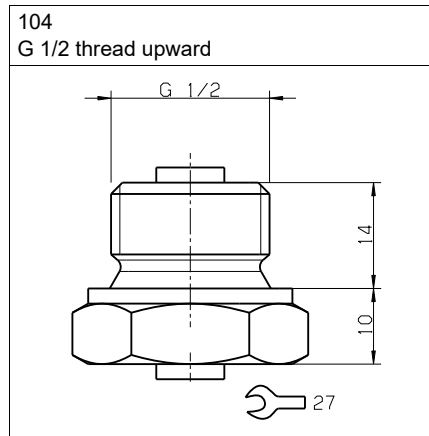
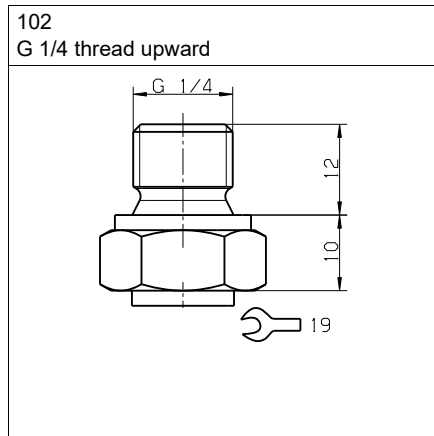
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Process connections



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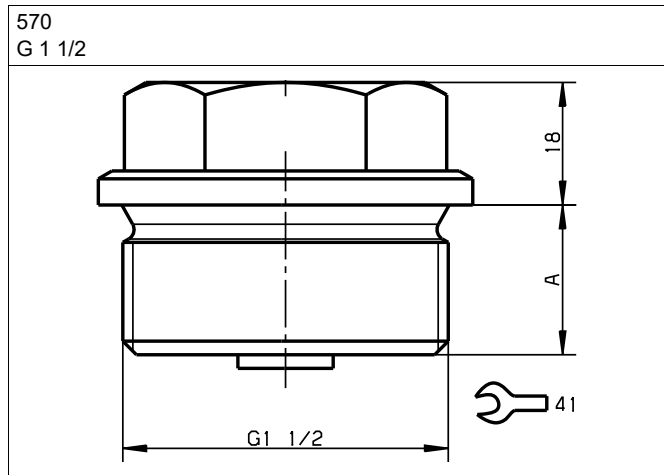
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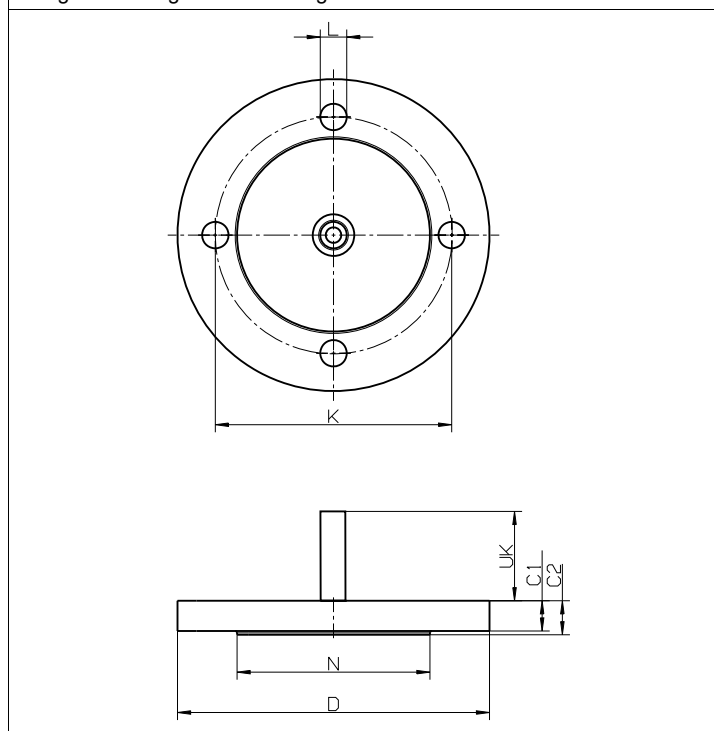
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A 22 (25.5 for Ex d)

Flange according to the following table



Example for extension tube, also available for other process connections;
UK = extension tube length + 9 mm

Order code	Flange designation	Hole circle K	Number of holes	Diameter of holes L	Exterior diameter D	Diameter of sealing strip N	Strength of flange C1	Strength of flange including sealing strip C2
703	Flange 2.5" 150 lbs ANSI B 16.5 RF	139.7	4	19.1	177.8	104.6	26.8	28.4
713	Flange 2" 150 lbs ANSI B 16.5 RF	120.7	4	19.1	152.4	91.9	23.8	25.4
714	Flange 2" 300 lbs ANSI B 16.5 RF	127	8	19	165.1	92.1	20.6	22.2
729	Flange DN 50, PN40, EN 1092-1, form B1	125	4	18	165	102	17	20
784	Flange DN 65, PN40, EN 1092-1, form B1	145	8	18	185	122	19	22
785	Flange DN 80, PN40, EN 1092-1, form B1	160	8	18	200	138	21	24
786	Flange DN 100, PN40, EN 1092-1, form B1	190	8	22	235	162	21	24

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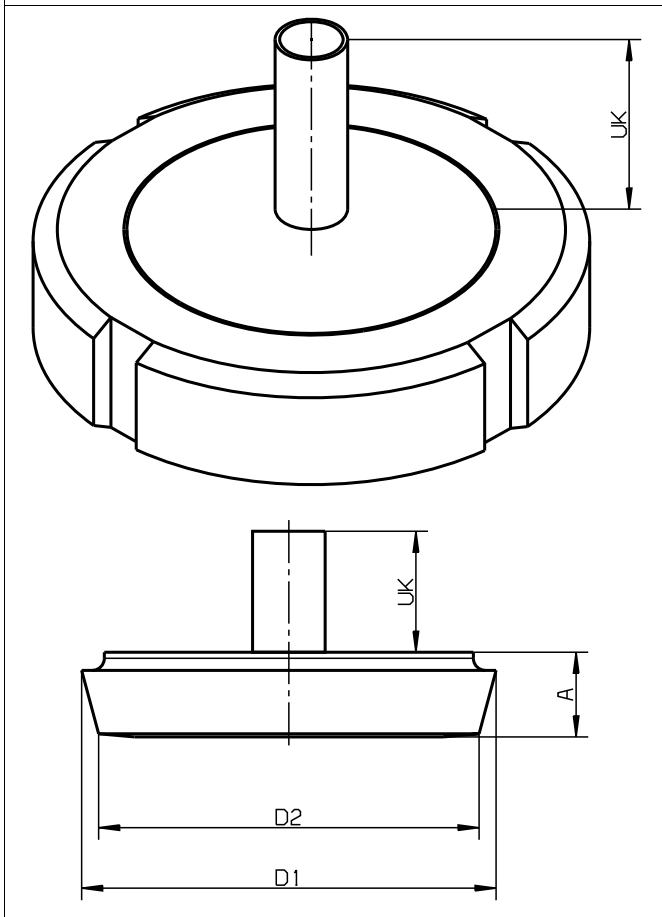
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Internet: www.jumousa.com



Taper socket according to following table



Example of extension tube; also available for other process connections;
UK = extension tube length + 9 mm

Order code	Designation	A	D1	D2
607	Taper socket with union nut DN 50, DIN 11851 (dairy pipe fitting)	14 mm	68.5 mm	62.9 mm
608	Taper socket with union nut DN 65, DIN 11851 (dairy pipe fitting)	16 mm	86 mm	79.6 mm

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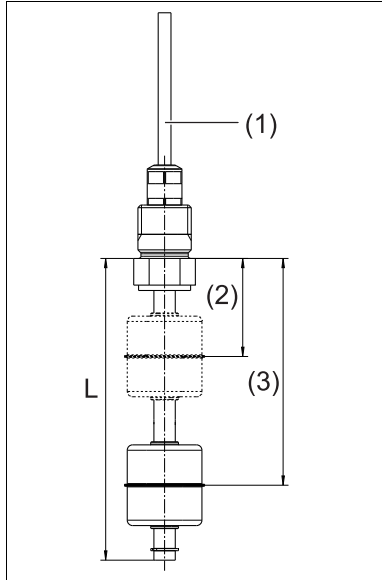
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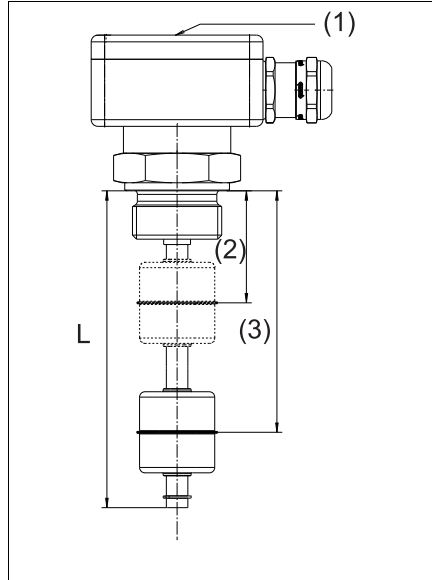
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**Notes to the order details**

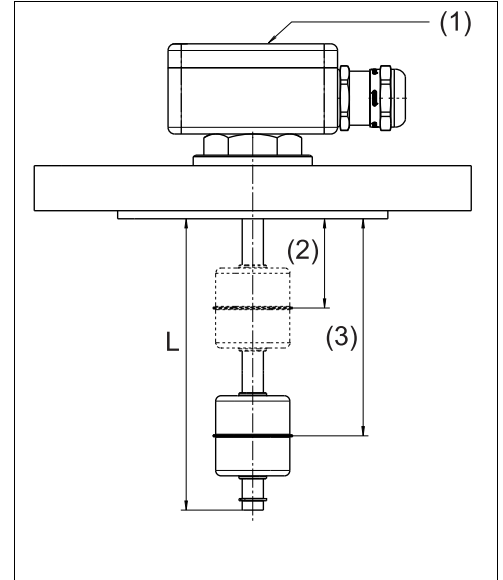
Below are examples for the dimensioning of the guide tube length L, the measuring range start (3) as well as measuring range end (2) depending on the respective process connection.



(1) Process connection
„thread upward“



(1) Process connection
„thread“



(1) Process connection
„flange“

- (2) Position contact 1 (switching point) in mm
- (3) Position contact 2 (switching point) in mm
- L Guide tube length in mm

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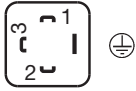
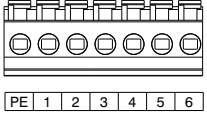

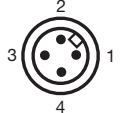
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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.


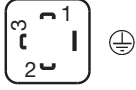
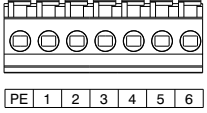

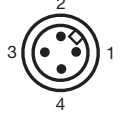
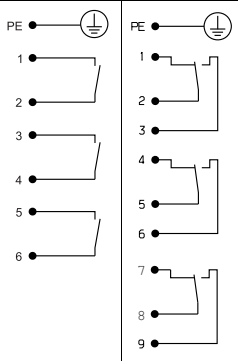
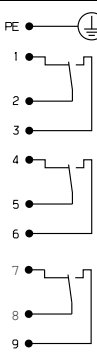
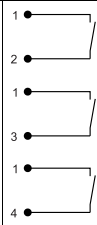
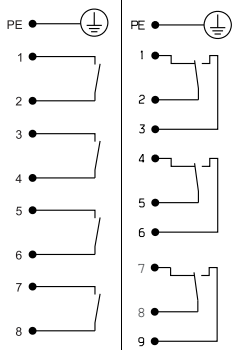
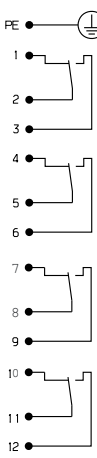
Number of contacts										
	Cable		Cable socket		Connection housing		AMP Superseal connector		Round plug M12	
	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO
1	Silicone RD WH PUR BN WH PVC BN WH	Silicone RD WH RD/BU PUR BN BU BK PVC BN WH GN	PE 1 2	PE 1 2 3	PE 1 2	PE 1 2 3	1 2	1 2 3	1 2 3	1 2 3
2	Silicone RD WH RD/BU WH/BU PVC BN WH GN YE	Silicone^a RD WH BU RD/BU WH/BU BU PVC^b RD BK BN OG GN YE PUR^c PK WH YE BN GN GY	PE 1 2 3	-	PE 1 2 3 4	PE 1 2 3 4 5 6	-	-	1 2 3 4	-

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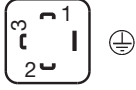
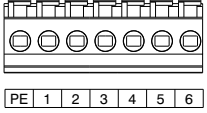

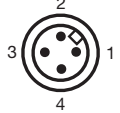
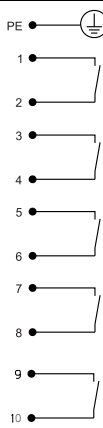
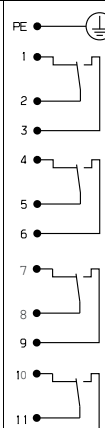
Number of contacts										
	Cable		Cable socket		Connection housing		AMP Superseal connector		Round plug M12	
	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO
3	Silicone ^a RD WH RD/BU WH/BU BU BU PVC ^b RD BK BN OG GN YE		-	-			-	-		-
4	-	-	-	-			-	-	-	-

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Number of contacts										
	Cable		Cable socket		Connection housing		AMP Superseal connector		Round plug M12	
	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO
5										
Protection rating ^d	prepared for 2 according to EN 61010-1		1	1	1	1	3	3	3	3

^a According to VDE 0298-4 max. current 0.8 A at max. 175 °C or 1 A at max. 170 °C

^b According to VDE 0298-4 max. current 0.8 A at max. 75 °C or 1 A at max. 70 °C, not available with the basic type extensions shipbuilding approval, shipbuilding approval and explosion protection, intrinsically safe, Ex i, and shipbuilding approval and explosion protection, flameproof enclosure, Ex d.

^c Only available with protection class 3.

^d According to DIN EN 61140

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	Cable	Cable socket	Connection housing	AMP Superseal connector	Round plug M12
Temperature sensor Pt100 ^a	Silicone ^b Silicone ^b 	-		-	
Temperature sensor Pt1000 ^a	PVC ^b 				
Temperature switch ^a	Silicone ^{c, d} PVC ^{c, e} 				

^a Assignment is always to terminals with the highest numbers

^b For 1× SPST-NO/NC switching contacts

^c For 2× SPST-NO/NC or 1x SPDT-CO switching contacts

^d According to VDE 0298-4 max. current 0.8 A for max. 175 °C or 2 A for max. 150 °C

^e According to VDE 0298-4 max. current 0.8 A for max. 75 °C or 2 A for max. 50 °C

NAMUR circuit, switching signal according to DIN EN 60947-5-6

Versions with NAMUR circuitry may only be operated with switching voltages DC ≤ 15 V. A NAMUR circuit is assigned to each switching contact. Depending on the selected electrical connection, the wiring diagram is identical to the above. The NAMUR circuit can be used to detect line faults (line break, short-circuit) in a suitable evaluation unit (e.g. see Ex-i isolating amplifier accessories).

	SPST-NO/NC	SPDT-CO
Scheme		
Example: 1 switching contact with silicone cable		

Legend: cable	BN	Brown	GN	Green
	WH	White	RD	Red
	BU	Blue	YE	Yellow
	PK	Pink	GY	Gray

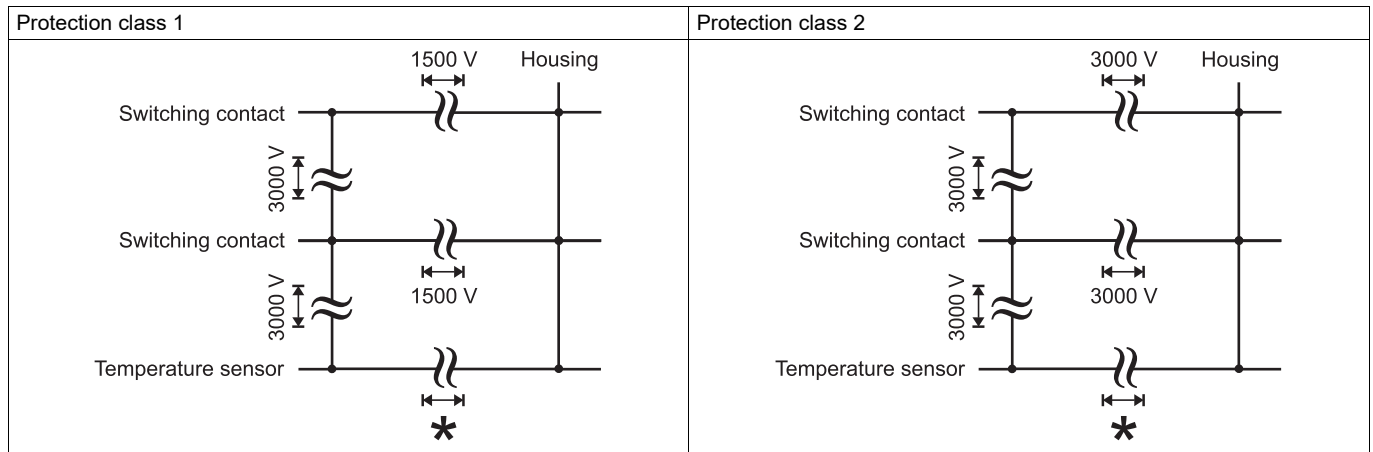
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The galvanic isolation is realized according as follows:



Caution:

* Functional galvanic isolation

If connected to a certified intrinsically safe electrical circuit Ex i, the following maximum values are admissible.

Contact function	Max. voltage U_i in V	Max. current I_i in mA	Max. power P_i in mW	Internal inductance in μ H	Internal capacity in pF
SPST-NO	≤ 30	≤ 100	≤ 750	~0 for cable version 1 μ H/m connecting cable	~0 for cable version 200 pF/m connecting cable
SPST-NC					
SPDT-CO					

When using explosion-proof versions (intrinsically safe, Ex i, and flameproof enclosure, Ex d) the following values are given.

Contact function	Max. voltage U_i in V	Max. current I_i in mA	Max. power P_i in mW	Internal inductance in μ H	Internal capacity in pF
Pt100	≤ 30	≤ 55	≤ 413	~0 for cable version 1 μ H/m connecting cable	~0 for cable version 200 pF/m connecting cable
Pt1000					
NAMUR circuit	≤ 15	≤ 60	≤ 225		

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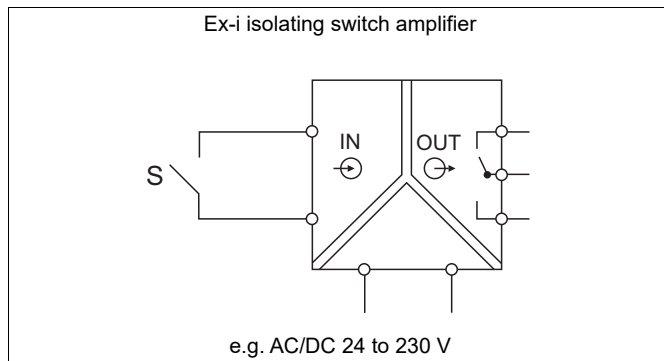
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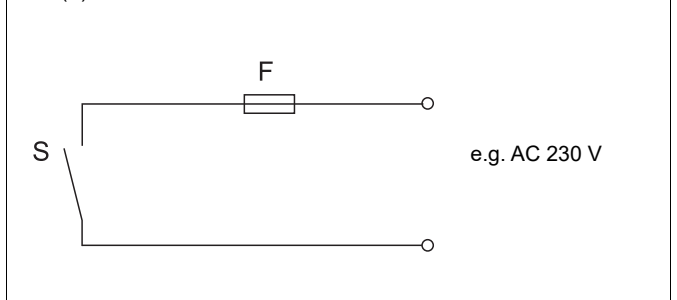


Connection examples of versions with explosion protection

Float switch (S)

Ex i**Ex d**

According to operating manual 408301, chapter 6 on "Installation", the fuse (F) must be selected.



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Order details

	(1) Basic type
408302	JUMO NESOS R02 LS – Float switch in standard version
	(2) Basic type extension
000	None
062	Shipbuilding approval
262	WHG approval (German Water Resources Act)
263	WHG approval (German Water Resources Act), explosion protection, intrinsically safe, Ex i
264	WHG approval (German Water Resources Act), explosion protection, flameproof enclosure, Ex d
362	Explosion protection, intrinsically safe, Ex i
462	Explosion protection, flameproof enclosure, Ex d
662	Shipbuilding approval and explosion protection, intrinsically safe, Ex i
962	Shipbuilding approval and explosion protection, flameproof enclosure, Ex d
999	Special version
	(3) Electrical connection
036	Round plug M12 × 1
061	Cable socket DIN EN 175301-803, form A
115	Terminal head Ex d
130	Connection housing, cube-shaped, small
131	Connection housing, cube-shaped, large
150	Cable, PVC
151	Cable, PVC with AMP Superseal connector ^a
152	Cable, PVC with M12 connector
160	Cable, silicone
161	Cable, silicone with AMP Superseal connector ^a
162	Cable, silicone with M12 connector
170	Cable, PUR
171	Cable, PUR with AMP Superseal connector ^a
172	Cable, PUR with M12 connector
180	Cable, RADOX®
999	Special version
	(4) Cable length
0000	None
2000	2000 mm
5000	5000 mm
100 - 5000	Specifications in plain text (increments of 100 mm)
	(5) Process connection
102	G 1/4 thread upward
104	G 1/2 thread upward
412	Pg9
516	2 NPT
534	M14 x 1.5 thread upward
538	G 3/8 thread upward
569	G 2
570	G 1 1/2
607	Taper socket with union nut DN 50, DIN 11851 (dairy pipe fitting)
608	Taper socket with union nut DN 65, DIN 11851 (dairy pipe fitting)
703	Flange 2,5" 150 lbs ANSI B 16.5 RF
713	Flange 2" 150 lbs ANSI B 16.5 RF
714	Flange 2" 300 lbs ANSI B 16.5 RF

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729	Flange DN 50, PN40, EN 1092-1, form B1
784	Flange DN 65, PN40, EN 1092-1, form B1
785	Flange DN 80, PN40, EN 1091-1, form B1
786	Flange DN 100, PN40, EN 1091-1, form B1
999	According to customer specification
(6)	Guide tube length L^b
100 - 4000	Specifications in plain text (increments of 50 mm)
(7)	Float
044	Cylinder, stainless steel, diameter 44, density 750 kg/m ³
045	Cylinder, stainless steel, diameter 44, density 750 kg/m ³ , e-polished
052	Spherical, stainless steel, diameter 52, density 680 kg/m ³
053	Spherical, stainless steel, diameter 52, density 680 kg/m ³ , e-polished
752	Spherical, titanium, diameter 52, density 650 kg/m ³
(8)	Number of floats
1	1 piece
2	2 pieces
3	3 pieces
4	4 pieces
5	5 pieces
(9)	Switching function
03	SPDT-CO, changeover contact (10 VA/AC 175 V/0.5 A)
07	SPDT-CO, single-pole changeover contact, bistable (40 VA/AC 230 V/0.5 A)
10	SPST-NO, NO contact (100 VA/AC 230 V/1 A)
11	SPST-NC, NC contact (100 VA/AC 230 V/1 A)
12	SPDT, single-pole changeover contact (60 VA/AC 230 V/1 A)
15	SPST-NO, NO contact, bistable (100 VA/AC 230 V/1 A)
99	According to customer specification
(10)	Number of contacts
1	1 contact
2	2 contacts
3	3 contacts
4	4 contacts
5	5 contacts
(11)	Position of contact 1^c
20 - 3970	Specifications in plain text
(12)	Position of contact 2^c
0	None
20 - 3970	Specifications in plain text
(13)	Position of contact 3^c
0	None
40 - 3970	Specifications in plain text
(14)	Position of contact 4^c
0	None
40 - 3970	Specifications in plain text
(15)	Position of contact 5^c
0	None
40 - 3970	Specifications in plain text

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(16)	Extra codes
000	None
005	Integrated temperature sensor Pt1000 ^d
007	Integrated temperature sensor Pt100 ^d
009	Temperature switch, NC contact ^e
019	Temperature monitoring of reed contact, Pt1000
240	EAC-Ex approval
307	Extension tube ^f
663	NAMUR circuit ^a
950	Railroad application ^g
954	Technical passport
976	Guide tube diameter 14 mm

^a Not available for shipbuilding approval, shipbuilding approval and explosion protection, intrinsically safe, Ex i, and shipbuilding approval and explosion protection, flameproof enclosure, Ex d.

^b The dimensioning is in mm in relation to the contact/locating surface (threaded bushing of the container/tank wall) of the selected process connection.

^c The contact positions are observed from the process connection toward the guide tube end.

^d The temperature sensor is positioned at the end of the guide tube.

^e Specify switching temperature in plain text. The temperature switch is positioned at the end of the guide tube.

^f Specify extension tube length in plain text, depending on ambient temperature and process temperature (see chapter „Maximum ambient temperature depending on extension tube length and process temperature“).


^g The extra code railroad application is only available in conjunction with M12 connector or RADOX® cable.

⇒ For details on the dimensioning of the guide tube length L depending on the respective process connection, see Operating manual B 408301, chapter 3.2.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
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					</					

Minimum order quantity: 1 piece

Accessories

Designation	Description	Part no.
Ex-i repeater power supply and input isolation amplifier 	The intrinsically safe isolation switching amplifier ensures reliable, galvanic isolation and safe transmission of switching signals in Ex applications. It can be mounted in Ex zone 2. When using the NAMUR circuitry, line break and short circuit can be detected. Further technical data and the relevant safety regulations can be found in the operating instructions B 707540.0	00734357

Trademark information

- RADOX® is a registered trademark of Huber+Suhner AG, DE.



JUMO NESOS R03 LS

Float switch with reference vessel

Applications

- Limit level measurement of liquids in storage tanks, containers, oil sumps, and tanks
- Water and wastewater treatment
- Mechanical and plant engineering
- Shipbuilding
- Energy technology
- Swimming pool technology

Brief description

Limit level measurement is carried out according to Archimedes' principle for liquids. The float moves along the guide tube as the level rises or falls. The magnet in the float actuates the reed contact(s) installed in the guide tube with its magnetic field. The switching status of the reed contact can be evaluated and further processed by downstream electronic components, relays, or contactors. Alarms, pumps, signal lamps, valves, and horns are typically switched via a contact protection relay.

For applications where there is a shortage of space during installation in the tank from above, the float switch is suitable for side mounting due to the type of design. This means that the design type can also be used for reliable limit level measurement in applications with unstable media.

Depending on the variant ordered, various electrical connections, floats, numbers of contacts, positions of contacts, and contact functions (SPST-NO [N/O contact], SPST-NC [N/C contact], SPDT-CO [changeover contact]) are available.

With the optional temperature sensor or temperature switch, both the limit level measurement and the temperature can be recorded via just one measuring point. Variants for monitoring the reed contact temperature are also available.



Type 408303

Customer benefits

- Cost-effective installation and mounting, e.g. due to spring-cage terminals (Push In®)
- Reduced operating costs due to maintenance-free device design
- Price-performance ratio optimized through the use of standard components

Special features

- Shipbuilding approval available
- Limit level measurement if there is a shortage of space or unstable media
- Painted aluminum housing for improved chemical resistance
- Temperature sensor/switch available

Approvals and approval marks



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Technical data

General Information

Function principle	Magnetic float switch with reed contact					
Installation position (vertical)	±30°					
Switching point accuracy ^a	±2 mm					
Pressure range (nominal pressure)	-1 to +6 bar					
Switching function (potential-free)	10 SPST-NO		11 SPST-NC		12 SPDT-CO	
Switching voltage (max.) ^b	AC 230 V	DC 230 V	AC 230 V	DC 230 V	AC 230 V	DC 230 V
Switching capacity (max.) ^b	100 VA	100 W	100 VA	100 W	60 VA	60 W
Switching current (max.) ^b	1 A	1 A	1 A	1 A	1 A	1 A

^a Measured, dry

^b The values must also be adhered to in combination.

	Pt100	Pt1000	Temperature switch, N/C contact, max. 2.5 A, AC 230 V, cos φ 0.95 [0.6], 2.5 A [1.6 A]
Measuring range	-30 to +150 °C	-30 to +150 °C	Indicate switching point specification in plain text
Accuracy	DIN Class B according to DIN EN 60751 the limit deviation in °C is as follows: ±(0.3 + 0.005 t) t = temperature in °C regardless of prefix sign		Tolerance ±5 K Hysteresis 30 K ±15 K

Mechanical features

Float	Shape	Material	Outer diameter	min. density kg/m ³	Weight in grams
044	Cylinder	AISI 316	44	750	43
045	Cylinder, e-polished	AISI 316	44	750	43

Float	Medium density kg/m ³					
	700	800	900	1000	1200	1400
	Immersion depth mm					
044		44.5	39.5	35.6	29.6	25.4
045		44.5	39.5	35.6	29.6	25.4

Materials	The chemical resistance of the materials should be considered for the application.					
Parts in contact with medium For example, process connection, float 044, 045, guide tube	Aluminum, AISI 316, zinc-plated steel					
Parts not in contact with medium						
Connection housing, cube-shaped, small	Aluminum, painted					
Connection housing, cube-shaped, large	Aluminum, painted					
Clamping range						
Cable fitting	Diameter 6 to 12 mm					
Terminal block	0.14 to 2.5 mm ²					
Weight	1200 g					

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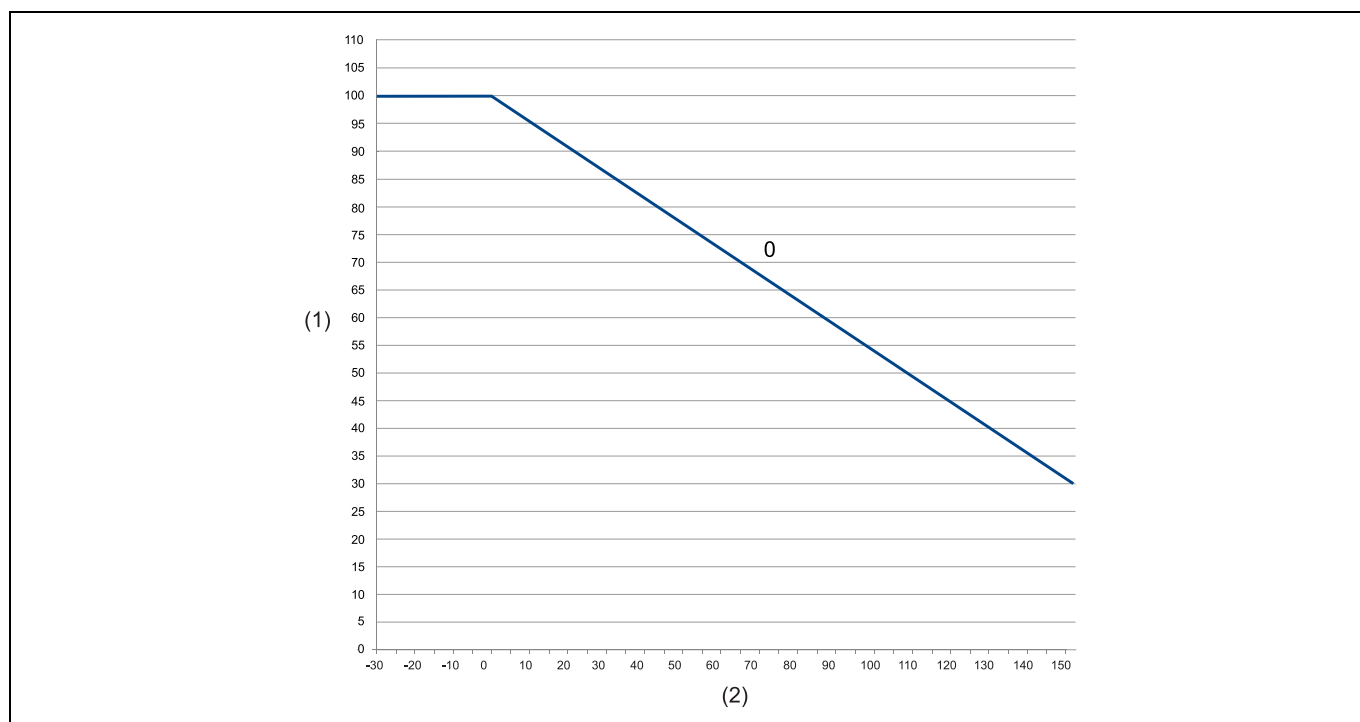


Environmental influences

Moisture	
Operation	100 % rel. humidity including condensation on the product outer shell
Storage	90 % rel. humidity without condensation
Protection type	IP66, according to IEC 60529
Vibration	0.7 g at 2 to 13.2 Hz, according to IEC 60068-2-6
Ambient temperature for electrical connection	Note dependency of extension tube length on process temperature, see diagram below.
Connection housing, cube-shaped, small	-30 to +100 °C
Connection housing, cube-shaped, large	-30 to +100 °C
Process temperature	for guide tube with float
Parts in contact with medium (e.g. guide tube with float)	-30 to +150 °C

Maximum ambient temperature depending on the extension tube length and process temperature

Connection housing small and large, extension tube length in mm



(1) Maximum ambient temperature

(2) Medium temperature

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Approvals and approval marks

DNV GL Testing agency Certificate/certification numbers Inspection basis Valid for	DNV GL TAA00001VR Class Guidelines CG 0339, November 2016 Type 408303/062
EAC^a Testing agency Certificate/certification numbers Inspection basis Valid for	СИСТЕМА КАЧЕСТВА Д-DE.HP15.B.06254/20 Standard TR TS 020/2011 Type 408303/...

^a Russian documentation upon request

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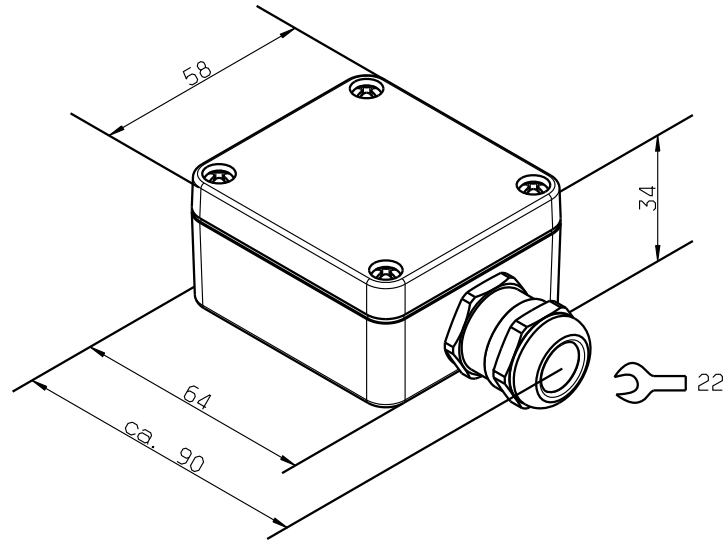


Dimensions

Electrical connection

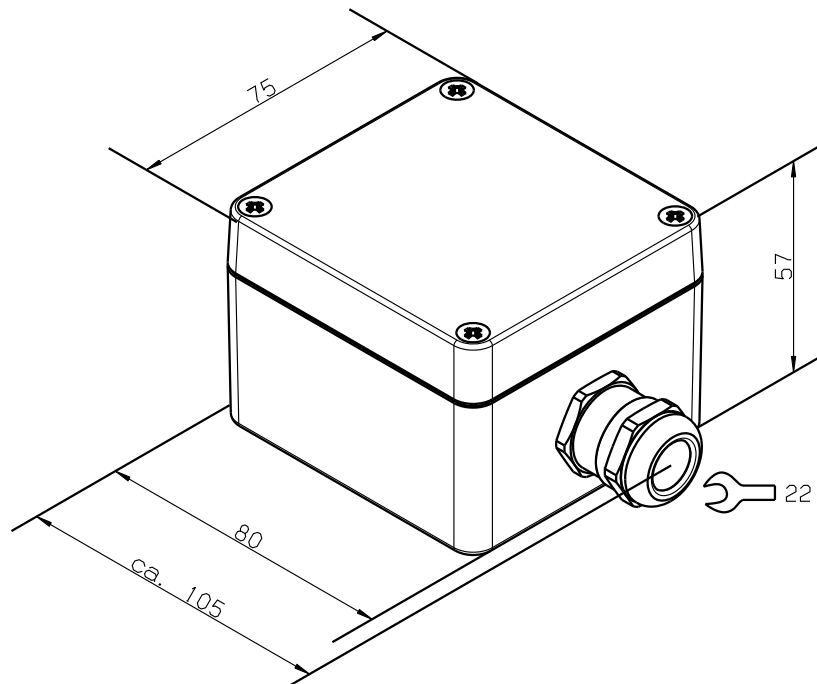
130

Connection housing, cube-shaped, small



131

Connection housing, cube-shaped, large



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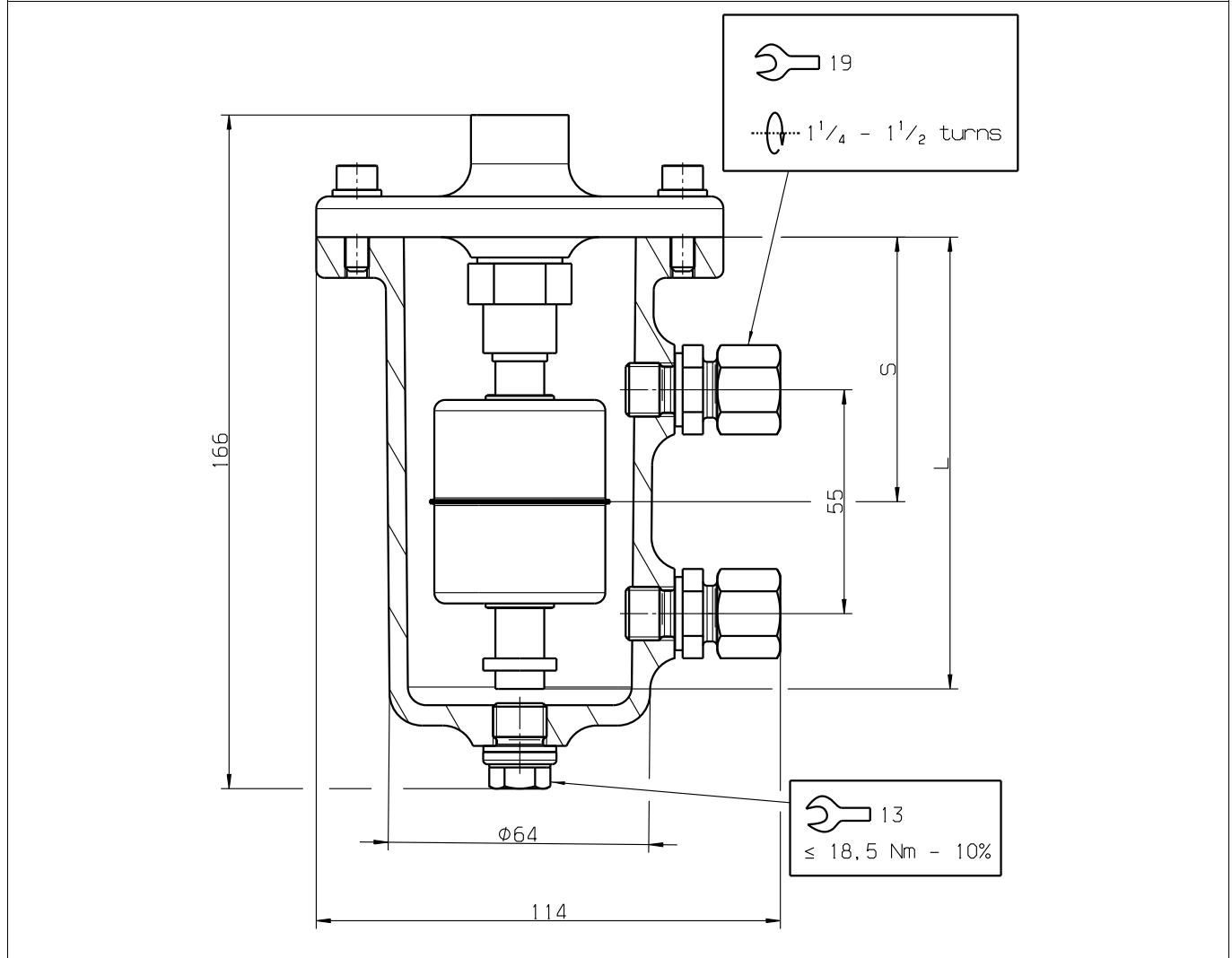
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**Process connection****Housing with process connection**

309

GE10-LR, compression fitting



L Guide tube length

S Contact position (switching point) in mm

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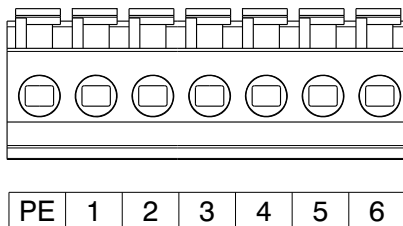
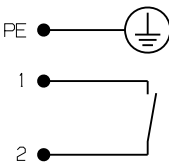
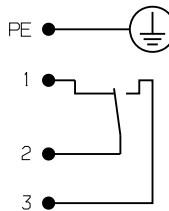
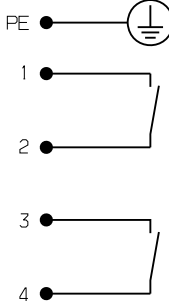
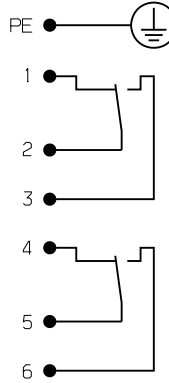
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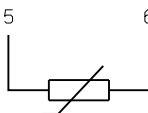
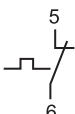
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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Number of contacts		
	Identical for small connection housing (electrical connection 130) and large connection housing (electrical connection 131)	
	SPST-NO/NC	SPDT-CO
1		
2		
Protection rating according to DIN EN 61140	1	1
Creepage distances in mm according to DIN EN 61010-1	1.5	1.5

Pt100 ^a	
Pt1000 ^a	
Temperature switch ^a	

^a Variant only possible with 1 contact, only available with basic type extension 000

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NAMUR circuit, switching signal according to DIN EN 60947-5-6

Versions with NAMUR circuitry may only be operated with switching voltages $DC \leq 15\text{ V}$. A NAMUR circuit is assigned to each switching contact. Depending on the selected electrical connection, the wiring diagram is identical to the above. The NAMUR circuit can be used to detect line faults (line break, short-circuit) in a suitable evaluation unit (e.g. see Ex-i isolating amplifier accessories).

	SPST-NO/NC	SPDT-CO
Scheme		
Example: 1 switching contact with silicone cable		

The galvanic isolation is realized according to the following figure:

The specified voltages are test voltages according to EN 61010-1 for protection class 1	

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Order details

	(1) Basic type
408303	JUMO NESOS R03 LS – Float switch with reference vessel
	(2) Basic type extension
000	None
062	Shipbuilding approval
999	Special version
	(3) Electrical connection
130	Connection housing, cube-shaped, small
131	Connection housing, cube-shaped, large
999	Special version
	(4) Housing material
20	CrNi (stainless steel)
66	Al (aluminum)
	(5) Process connection
309	GE10-LR, compression fitting
999	According to customer requirements
	(6) Guide tube length L
20 - 114	20 to 114 mm
	(7) Float
044	Cylinder, stainless steel, diameter 44, density 750 kg/m ³
045	Cylinder, stainless steel, diameter 44, density 750 kg/m ³ , e-polished
	(8) Switching function
10	SPST-NO, NO contact (100 VA/AC 230 V/1 A)
11	SPST-NC, NC contact (100 VA/AC 230 V/1 A)
12	SPDT-CO, single-pole changeover contact (60 VA/AC 230 V/1 A)
	(9) Number of contacts
1	1 contact
2	2 contacts
	(10) Position of contact 1^a
65	65 mm
10 - 84	Specifications in plain text
	(11) Position of contact 2^a
0	None
65	65 mm
10 - 84	Specifications in plain text
	(12) Extra codes
000	None
005	Integrated temperature sensor Pt1000 ^b
007	Integrated temperature sensor Pt100 ^b
009	Temperature switch, NC contact ^c
019	Temperature monitoring of reed contact, Pt1000 ^b
663	NAMUR circuit ^d
954	Technical passport
976	Guide tube diameter 14 mm

^a The contact positions are observed from the process connection toward the guide tube end.

^b The temperature sensor is positioned at the end of the guide tube.

^c Specify switching temperature in plain text. The temperature switch is positioned at the end of the guide tube.

^d Not available for shipbuilding approval.

⇒ For details on the dimensioning of the guide tube length L depending on the respective process connection, see Operating manual B 408301, chapter 3.2.

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	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
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Order example	408303	/	000	-	130	-	66	-	309	-	111	-	044	-
			(8)		(9)		(10)		(11)		(12)			
			<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>			
			12	-	1	-	65	-	00	/	000			

Stock version

Order code	Part no.
408303/000-130-66-309-111-044-12-1-65-0/000	00697547
408303/062-130-66-309-111-044-12-2-65-65/000	00699604
408303/062-999-66-309-111-044-12-2-65-65/000	00701215
408303/062-130-66-309-111-044-12-1-65-0/000	00704746

JUMO NESOS R04 LS

Float switch in bend version

Applications

- Point level measurement of liquids in storage tanks, containers, oil sumps, and tanks
- Water and wastewater treatment
- Mechanical and plant engineering
- Shipbuilding
- Energy technology
- Diesel tanks

Brief description

The point level measurement is carried out according to Archimedes' principle for liquids. The float moves along the guide tube as the level rises or falls. The magnet in the float actuates the reed contact(s) installed in the guide tube with its magnetic field. The switching status of the reed contact can be evaluated and processed through downstream electronic components, relays, or contactors. Alarms, pumps, signal lamps, valves, and horns are typically switched via a contact protection relay.

Float switches of up to 2 m in length and with up to 5 switching points are available for applications involving high filling heights. The product is installed on the side of the tank or container wall and, in the case of versions with a thread, it is fixed with a lock nut.

Depending on the variant ordered, various electrical connections, process connections, guide tube lengths, floats, number and positions of contacts as well as their function (SPST-NO [N/O contact], SPST-NC [N/C contact], SPDT-CO [changeover contact], and bistable contacts) are available.

With the optional temperature sensor or temperature switch, both the point level measurement and the temperature can be acquired via just one measuring point. Variants for monitoring the reed contact temperature are also available.

Variants in an intrinsically safe [Ex i] design and flameproof enclosure [Ex d] are available for applications involving explosion protection. No isolating switch amplifier is required for installations with a flameproof enclosure.

Customer benefits

- Cost-effective installation and mounting, due to spring-cage terminals (Push-In®), for example
- Reduced operating costs due to maintenance-free device design
- Price-performance ratio optimized through the use of standard components
- No isolating switch amplifier required for [Ex d] (flameproof enclosure) applications



Type 408304 with thread (top),
with flange (bottom)

Special features

- Approvals and certificates available for explosion protection and German Water Resources Act (WHG)
- High switching voltages and switching currents
- Large operating temperature range for media from -52 to +240 °C
- Large pressure range of -1 to +37 bar
- Up to 5 switching outputs can be freely defined as N/O contact, N/C contact, changeover contact, or bistable contact
- Temperature sensor/temperature switch are available

Approvals and approval marks



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Technical data

General Information

Function principle	Magnetic float switch with reed contact					
Installation position (vertical)	±30°					
Switching point accuracy ^a	±2 mm					
Switching function (potential-free)	02 SPST-NC		03 SPDT-CO		10 SPST-NO	
Switching voltage (max.) ^b	AC 175 V	DC 175 V	AC 175 V	DC 175 V	AC 230 V	DC 230 V
Switching capacity (max.) ^b	10 VA	10 W	10 VA	10 W	100 VA	100 W
Switching current (max.) ^b	0.5 A	0.5 A	0.5 A	0.5 A	1 A	1 A

Switching function (potential-free)	11 SPST-NC		12 SPDT-CO		15 SPST-NO, bistable	
Switching voltage (max.) ^b	AC 230 V	DC 230 V	AC 230 V	DC 230 V	AC 230 V	DC 230 V
Switching capacity (max.) ^b	100 VA	100 W	60 VA	60 W	100 VA	100 W
Switching current (max.) ^b	1 A	1 A	1 A	1 A	1 A	1 A

Switching function (potential-free)	16 SPST-NC, bistable	
Switching voltage (max.) ^b	AC 230 V	DC 230 V
Switching capacity (max.) ^b	100 VA	100 W
Switching current (max.) ^b	1 A	1 A

^a Measured, dry

^b The values must also be adhered to in combination.

	Pt100	Pt1000	Temperature switch ^a , N/C contact, max. 2.5 A, AC 230 V, cos φ 0.95 [0.6], 2.5 A [1.6 A]
Measuring range	-40 to +150 °C	-40 to +150 °C	Indicate switching point specification in plain text
Accuracy	DIN class B according to DIN EN 60751 the limit deviation in °C is as follows: ±(0.3 + 0.005 t) t = temperature in °C regardless of prefix sign		Tolerance ±5 K Hysteresis 30 K ±15 K

^a Only available with guide tube diameter 12 mm.

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Mechanical features

Float	Form	Material	Outer diameter	Min. density kg/m ³	Pressure range (nominal pressure) in bar	Weight in g
027	Cylinder	AISI 316 series	27	800	-1 to +16	8
028	Cylinder, e-polished	AISI 316 series	27	800	-1 to +16	8
029	Spherical	AISI 316 series	29	900	-1 to +35	8
030	Spherical, e-polished	AISI 316 series	29	900	-1 to +35	8
044	Cylinder	AISI 316 series	44	650	-1 to +24	43
045	Cylinder, e-polished	AISI 316 series	44	650	-1 to +24	43
052	Spherical	AISI 316 series	52	680	-1 to +37	36
053	Spherical, e-polished	AISI 316 series	52	680	-1 to +37	36
729	Spherical	Titanium grade 2	29	700	-1 to +15	7
752	Spherical	Titanium grade 2	52	650	-1 to +24	35

Float	Density of medium kg/m ³					
	700	800	900	1000	1200	1400
	Immersion depth mm					
027		23.6	21	18.9	15.8	13.5
028		23.6	21	18.9	15.8	13.5
029			20.3	18.5	16.2	14.6
030			20.3	18.5	16.2	14.6
044		44.5	39.5	35.6	29.6	25.4
045		44.5	39.5	35.6	29.6	25.4
052	38.6	34.1	31.1	28.8	25.5	23.1
053	38.6	34.1	31.1	28.8	25.5	23.1
729	21.9	19.3	17.5	16.3	14.4	13.1
752	39.1	34.4	31.3	29	25.6	23.3

Materials of parts in contact with medium e.g. process connection, float 027, 028, 029, 030, 044, 045, 052, 053, guide tube Float 729, 752	The chemical resistance of the materials should be taken into account for the application. AISI 316 series Titanium Grade 2
Materials of parts not in contact with medium Cable Terminal head Ex d Connection housing, cube-shaped, small Connection housing, cube-shaped, large	The chemical resistance of the materials should be taken into account for the application. PVC or silicone or PUR Aluminum, painted Aluminum, painted Aluminum, painted
Clamping range Cable fitting Terminal block	Diameter 6 to 12 mm for connection housing, cube-shaped, small, and connection housing, cube-shaped, large Diameter 6.5 to 11.9 mm for terminal head Ex d 0.14 to 2.5 mm ² for connection housing, cube-shaped, small 0.14 to 1.5 mm ² for terminal head Ex d, and connection housing, cube-shaped, large
Weight	85 g for a guide tube length of 40+90 mm, process connection G 1/4, and cable, silicone, measuring 500 mm

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Environmental influences

Moisture	
Operation	100 % rel. humidity including condensation on the product outer shell
Storage	90 % rel. humidity without condensation
Protection type for electrical connection	According to DIN EN 60529
Cable	IP68
Cable with M12 connector	IP66
Terminal head Ex d	IP68
Connection housing, cube-shaped, small	IP66
Connection housing, cube-shaped, large	IP66
Vibration	0.7 g at 13.2 to 100 Hz with guide tube diameter 12 mm, 0.7 g at 13.2 to 100 Hz with guide tube diameter 8 mm and freely oscillating guide tube length up to max. 150 mm, according to IEC 60068-2-6
Ambient temperature for electrical connection	Observe dependency of extension tube length with process temperature, see following diagrams.
PVC cable	-5 to +80 °C
Silicone cable	-50 to +180 °C
PUR cable	-40 to +90 °C
Silicone cable, with M12 connector	-40 to +85 °C
Terminal head Ex d	-40 to +100 °C
Connection housing, cube-shaped, small	-40 to +100 °C
Connection housing, cube-shaped, large	-40 to +100 °C
Process temperature	
of parts in contact with medium (e.g. guide tube with float)	-40 to +150 °C (standard) -52 to +240 °C (upon request)

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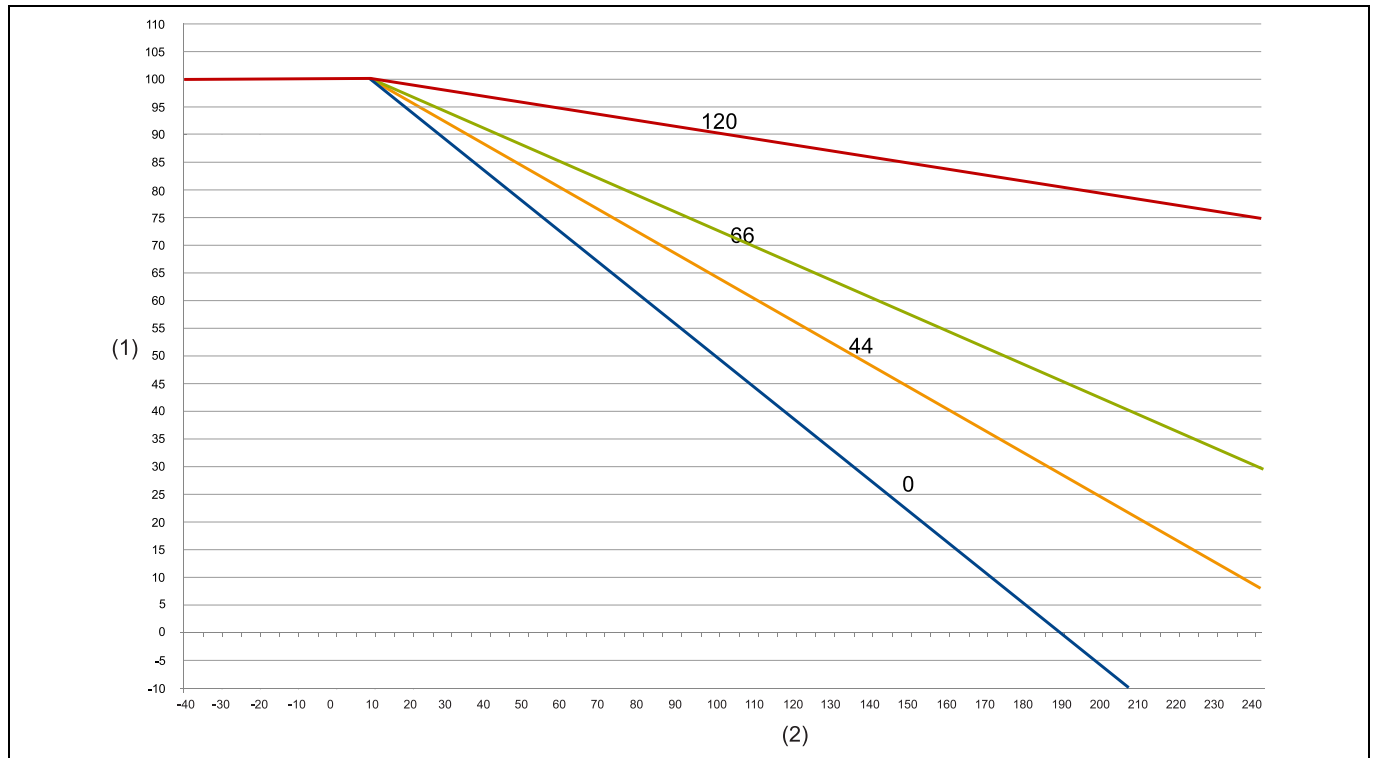
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Maximum ambient temperature depending on the extension tube length and process temperature

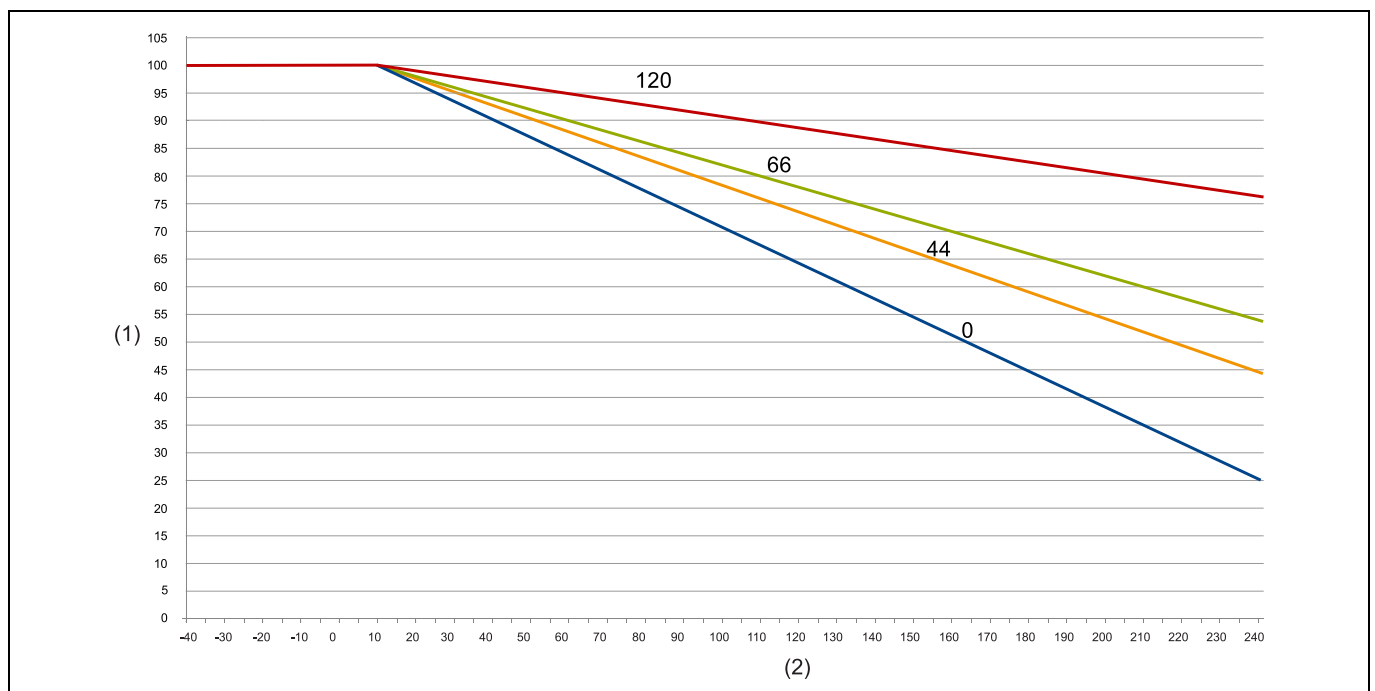
Small and large connection housing, extension tube lengths in mm



(1) Maximum ambient temperature

(2) Media temperature

Connection housing Ex d, extension tube lengths in mm



(1) Maximum ambient temperature

(2) Media temperature

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Approvals and approval marks

ATEX, IEC Ex, intrinsically safe, Ex i Testing agency Certificate/certification numbers Inspection basis Valid for	Eurofins Electrosuisse Product Testing AG SEV 18 ATEX 0134 X, IECEx SEV 18.0011X IEC/EN 60079-0, IEC/EN 60079-11, IEC/EN 60079-26, DIN EN ISO 80079-36, DIN EN ISO 80079-37 Type 408304/263, Type 408304/362, Type 408304/662
ATEX, IEC Ex, flameproof enclosure, Ex d Testing agency Certificate/certification numbers Inspection basis Valid for	Eurofins Electrosuisse Product Testing SEV 18 ATEX 0133 X, IECEx SEV 18.0010X IEC/EN 60079-0, IEC/EN 60079-1, IEC/EN 60079-26, IEC/EN 60079-31, DIN EN ISO 80079-36, DIN EN ISO 80079-37 Type 408304/264, Type 408304/462
German Water Resources Act (WHG) Prüfstelle Zertifikat/Prüf-Nr. Prüfgrundlage gilt für	DIBT Z-65.11-608 Approval principles for safety devices for tanks and pipelines, overfill protection (ZG-ÜS) Type 408304/262, Type 408304/263, Type 408304/264
EAC ^a Testing agency Certificate/certification numbers Inspection basis Valid for	СИСТЕМА КАЧЕСТВА Д-DE.HP15.B.06254/20 Standard TR TS 020/2011 Type 408304/...
EAC-Ex ^a Testing agency Certificate/certification numbers Inspection basis Valid for	ПрофиТест ЕАЭС RU C-DE.HB07.B.00316/20 TR TS 012/2011 Type 408304/263, Type 408302/264, Type 408304/362, Type 408304/462 – each with extra code 240

^a Russian documentation upon request

NOTE!

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

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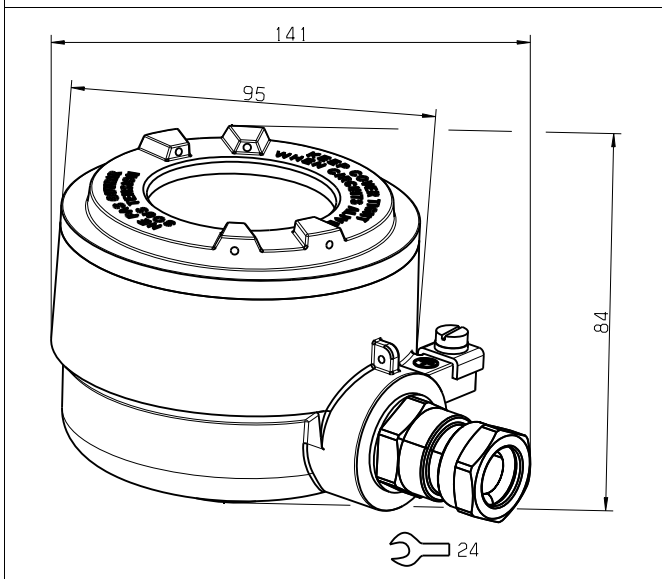
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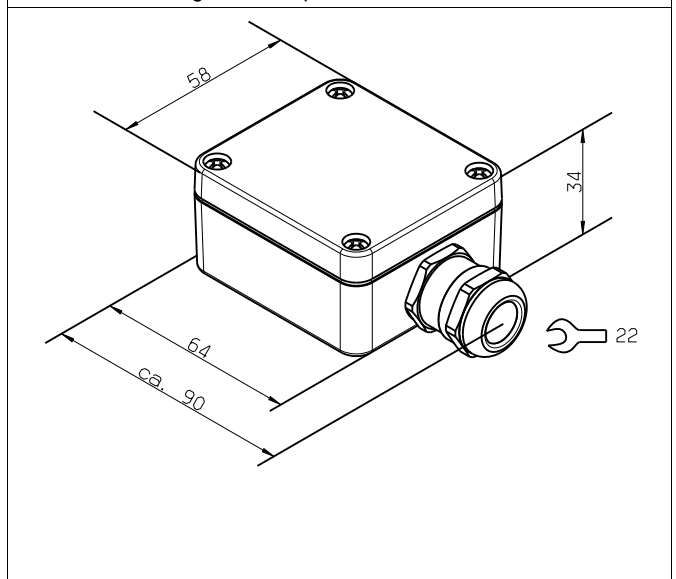
Dimensions

Electrical connection

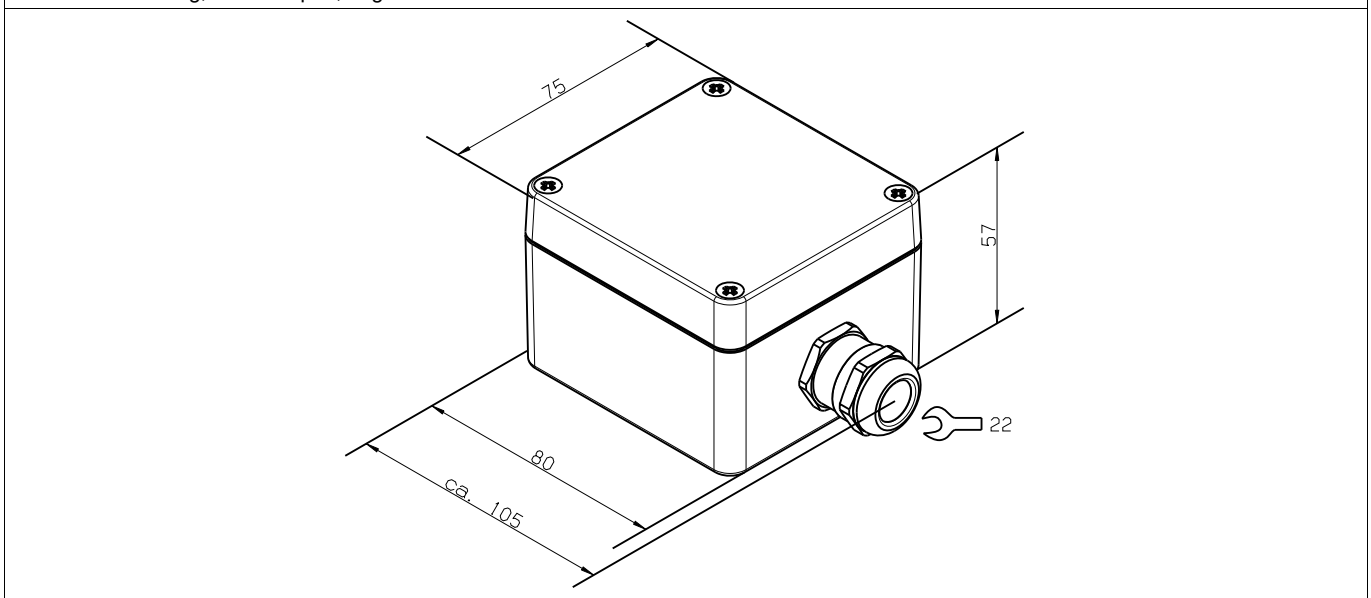
115
Terminal head Ex d



130
Connection housing, cube-shaped, small



131
Connection housing, cube-shaped, large



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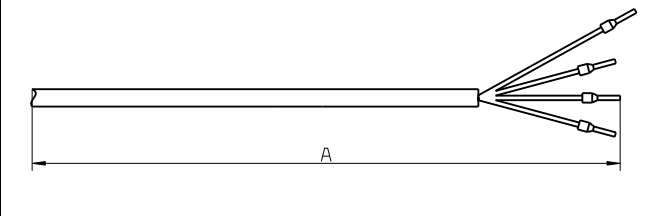
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150 PVC, 160 silicone, 170 PUR

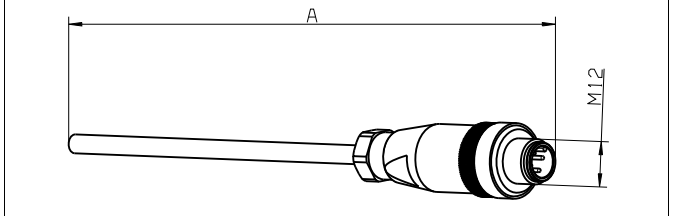
Cable with ferrules



A Cable length, see order details

162 silicone

Cable with M12 connector

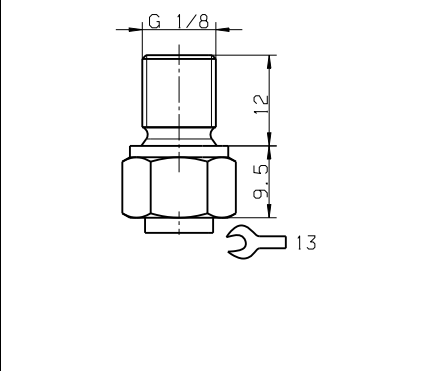


A Cable length, see order details

Process connections

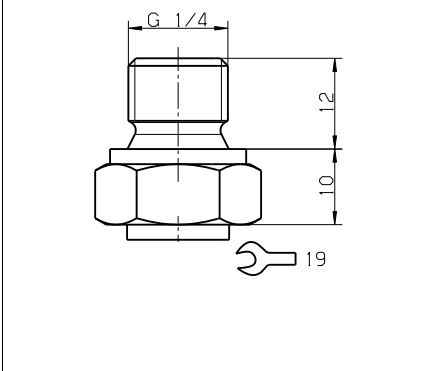
101

G 1/8 thread upward



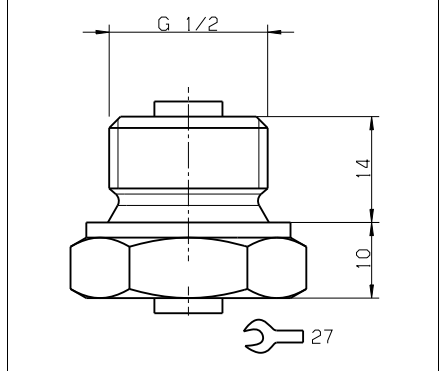
102

G 1/4 thread upward



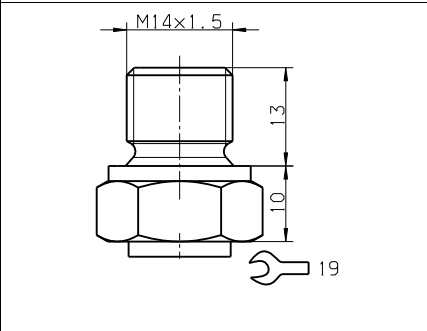
104

G 1/2 thread upward



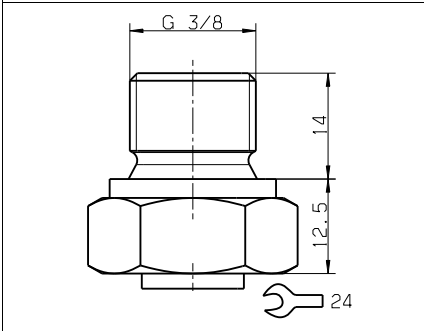
534

M14 × 1.5 thread upward



538

G 3/8 thread upward



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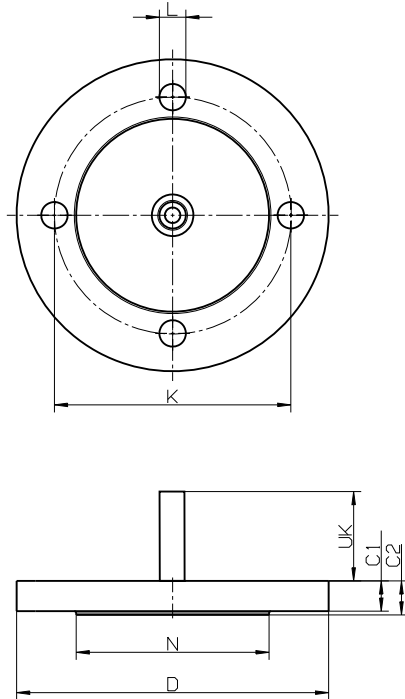
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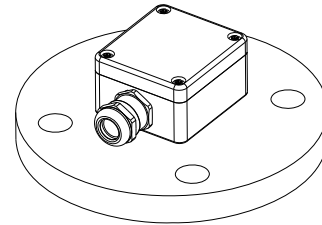
Flange according to following table



Example of extension tube; also available for other process connections;

UK = extension tube length + 9 mm

Alignment cable gland between flange holes



Order code	Flange designation	Hole circle K	Number of holes	Diameter of holes L	Exterior diameter D	Diameter of sealing strip N	Strength of flange C1	Strength of flange including sealing strip C2
703	Flange 2.5" 150 lbs ANSI B 16.5 RF	139.7	4	19.1	177.8	104.6	26.8	28.4
713	Flange 2" 150 lbs ANSI B 16.5 RF	120.7	4	19.1	152.4	91.9	23.8	25.4
714	Flange 2" 300 lbs ANSI B 16.5 RF	127	8	19	165.1	92.1	20.6	22.2
729	Flange DN 50, PN40, EN 1092-1, form B1	125	4	18	165	102	17	20
784	Flange DN 65, PN40, EN 1092-1, form B1	145	8	18	185	122	19	22
785	Flange DN 80, PN40, EN 1092-1, form B1	160	8	18	200	138	21	24
786	Flange DN 100, PN40, EN 1092-1, form B1	190	8	22	235	162	21	24

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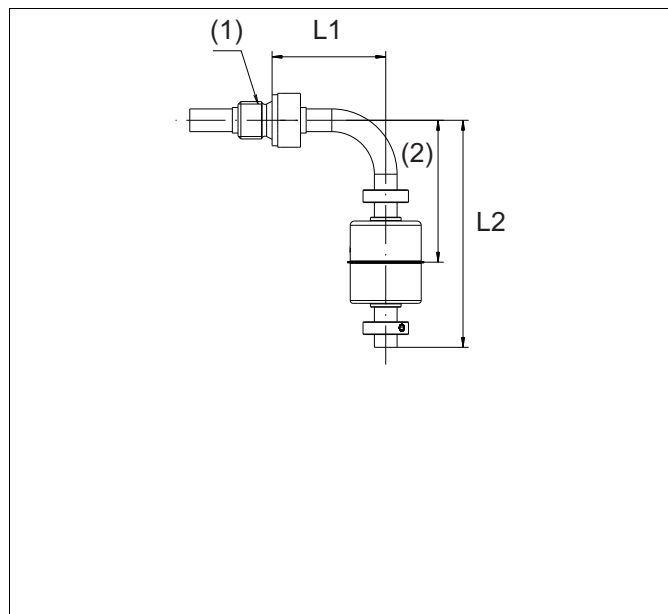
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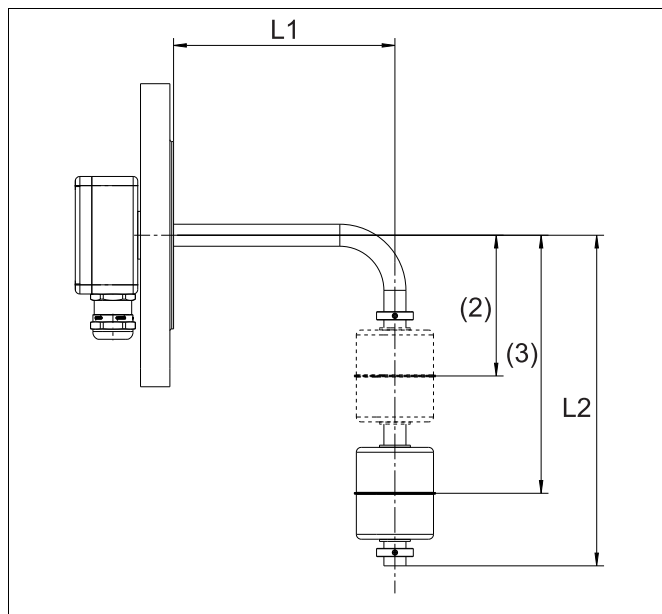


Important information about the order details

Below are examples for the dimensioning of the horizontal guide tube length L1, the vertical guide tube length L2, and the switching point (2) depending on the respective process connection.



- (1) Process connection "thread upward"
 (2) Position of contact 1 (switching point) in mm
 L1/L2 Guide tube length in mm



- (1) Process connection "flange"
 (2) Position of contact 1 (switching point) in mm
 (3) Position of contact 2 (switching point) in mm
 L1/L2 Guide tube length in mm

	Guide tube diameter 8 mm		Guide tube diameter 12 mm	
	Thread upward	Flange	Thread upward	Flange
Min. L1	70 mm	60 mm	90 mm	80 mm
Min. L2	80 mm	80 mm	125 mm	125 mm

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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

In the event of product configurations with a guide tube diameter of 8 mm and more than one switching contact, mixing hazardous contact supply circuits and SELV circuits is not permitted.


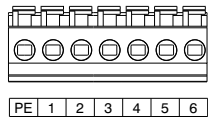
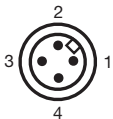
Number of contacts						
	Cable SPST-NO/NC	SPDT-CO	Connection housing SPST-NO/NC	SPDT-CO	Round plug M12 ^a SPST-NO/NC	SPDT-CO
1	<p>Silicone</p> <p>PUR</p> <p>PVC</p>	<p>Silicone</p> <p>PUR</p> <p>PVC</p>				
2	<p>Silicone</p> <p>PVC</p>	<p>Silicone^b</p> <p>PVC^c</p> <p>PUR^d</p>				-

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Number of contacts						
	Cable SPST-NO/NC	SPDT-CO	Connection housing SPST-NO/NC	SPDT-CO	Round plug M12 ^a SPST-NO/NC	SPDT-CO
3	Silicone ^b RD ● WH ● RD/BU ● WH/BU ● BU ● BU ● PVC ^c RD ● BK ● BN ● OG ● GN ● YE ●	-	PE ● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ●	PE ● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ●	1 ● 2 ● 1 ● 3 ● 1 ● 4 ●	-
4	-	-	PE ● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ●	PE ● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 ● 11 ● 12 ●	-	-

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Number of contacts						
	Cable SPST-NO/NC	SPDT-CO	Connection housing SPST-NO/NC	SPDT-CO	Round plug M12 ^a SPST-NO/NC	SPDT-CO
5						
Protection rating according to DIN EN 61140	prepared for 2 according to EN 61010-1		1	1	2	2

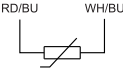
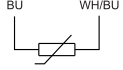


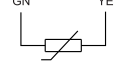




- ^a In the event of product configurations with more than one switching contact, mixing hazardous contact supply circuits and SELV circuits is not permitted.
- ^b According to VDE 0298-4 max. current 0.8 A at max. 175 °C or 1 A at max. 170 °C
- ^c According to VDE 0298-4 max. current 0.8 A at max. 75 °C or 1 A at max. 70 °C
- ^d Only available with protection class 3.

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	Cable	Connection housing	Round plug M12
Temperature sensor Pt100 ^{a, b}	Silicone ^c  Silicone 		
Temperature sensor Pt1000 ^{a, b}	PVC ^c 		
Temperature switch ^a	Silicone ^{d, e}  PVC ^{d, f} 		

^a Assignment is always to terminals with the highest numbers.

^b Connect all measuring circuits of a product with a guide tube diameter of 8 mm to SELV electrical circuits.

^c For 1x SPST-NO/NC switching contacts

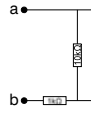
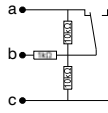
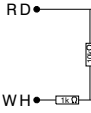
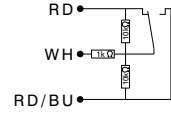
^d For 2x SPST-NO/NC or 1x SPDT-CO switching contacts

^e According to VDE 0298-4 max. current 0.8 A at max. 175 °C or 2 A to max. 150 °C

^f According to VDE 0298-4 max. current 0.8 A at max. 75 °C or 2 A to max. 50 °C

NAMUR circuit, switching signal according to DIN EN 60947-5-6

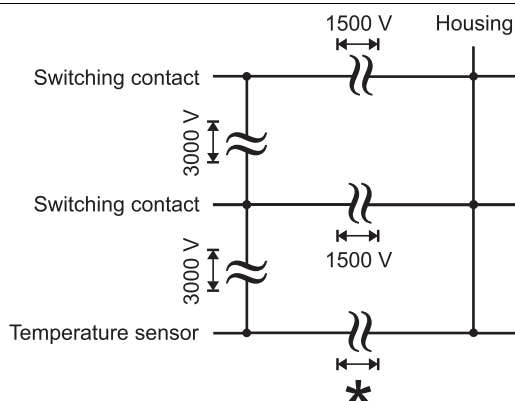
Versions with NAMUR circuitry may only be operated with switching voltages $DC \leq 15 V$. A NAMUR circuit is assigned to each switching contact. Depending on the selected electrical connection, the wiring diagram is identical to the above. The NAMUR circuit can be used to detect line faults (line break, short-circuit) in a suitable evaluation unit (e.g. see Ex-i isolating amplifier accessories).

	SPST-NO/NC	SPDT-CO
Scheme		
Example: 1 switching contact with silicone cable		
Legend: cable	BN Brown WH White BU Blue PK Pink	GN Green RD Red YE Yellow GY Gray

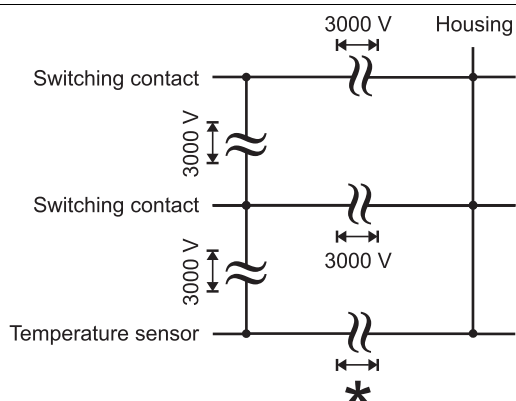


The galvanic isolation is realized as follows:

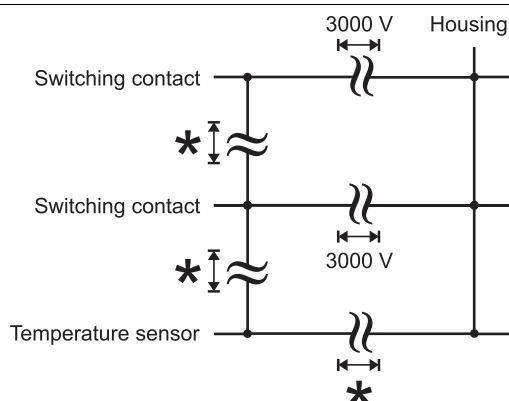
Protection rating 1 – guide tube diameter 12 mm



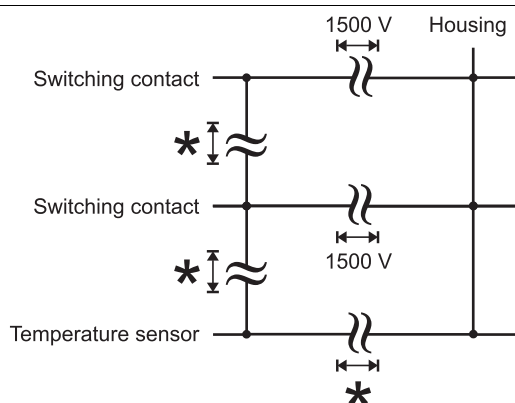
Protection rating 2 – guide tube diameter 12 mm



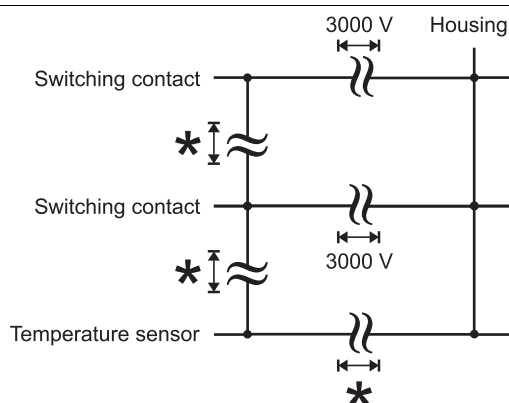
Protection rating 2 – guide tube diameter 12 mm –
electrical connection M12 plug



Protection rating 1 – guide tube diameter 8 mm



Protection rating 2 – guide tube diameter 8 mm



Caution:

* Functional galvanic isolation

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If connected to a certified intrinsically safe electrical circuit Ex i, the following values are given.

Contact function	Max. voltage U_i in V	Max. current I_i in mA	Max. power P_i in mW	Internal inductance in μH	Internal capacitance in pF
SPST-NO	≤ 30	≤ 100	≤ 750	~ 0 for cable version 1 $\mu\text{H}/\text{m}$ connecting cable	~ 0 for cable version 200 pF/m connecting cable
SPST-NC					
SPDT-CO					

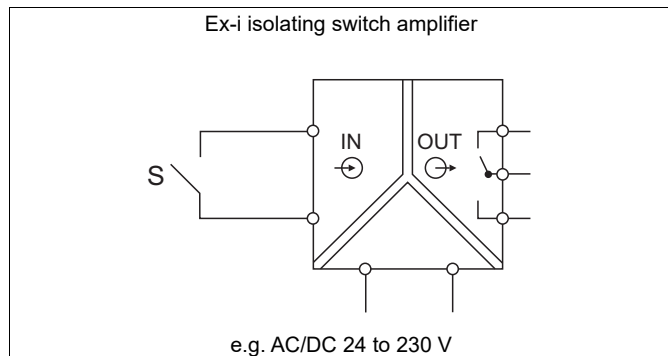
When using explosion-proof versions (intrinsically safe, Ex i, and flameproof enclosure, Ex d), the following values are given.

Contact function	Max. voltage U_i in V	Max. current I_i in mA	Max. power P_i in mW	Internal inductance in μH	Internal capacitance in pF
Pt100	≤ 30	≤ 55	≤ 413	~ 0 for cable version 1 $\mu\text{H}/\text{m}$ connecting cable	~ 0 for cable version 200 pF/m connecting cable
Pt1000					
NAMUR circuit	≤ 15	≤ 60	≤ 225		

Connection examples of versions with explosion protection

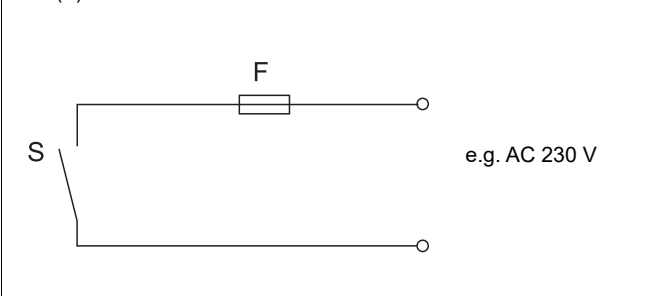
Float switch (S)

Ex i



Ex d

According to operating manual 408301, chapter 6 on "Installation", the fuse (F) must be selected.



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Order details

	(1) Basic type
408304	JUMO NESOS R04 LS – Float switch in bend version
	(2) Basic type extension
000	None
262	WHG approval (German Water Resources Act)
263	WHG approval (German Water Resources Act), explosion protection, intrinsically safe, Ex i
264	WHG approval (German Water Resources Act), explosion protection, flameproof enclosure, Ex d
362	Explosion protection, intrinsically safe, Ex i
462	Explosion protection, flameproof enclosure, Ex d
999	Special version
	(3) Electrical connection
115	Terminal head Ex d
130	Connection housing, cube-shaped, small
131	Connection housing, cube-shaped, large
150	PVC cable
160	Silicone cable
162	Silicone cable, with M12 connector
170	PUR cable
	(4) Cable length
0000	None
2000	2000 mm
5000	5000 mm
0100 - 5000	Specifications in plain text (increments of 100 mm)
	(5) Process connection
101	G 1/8 thread upward
102	G 1/4 thread upward
104	G 1/2 thread upward
534	M14 x 1.5 thread upward
538	G 3/8 thread upward
703	Flange 2.5" 150lbs ANSI B 16.5 RF
713	Flange 2" 150lbs ANSI B 16.5 RF
714	Flange 2" 300 lbs ANSI B 16.5 RF
729	Flange DN 50, PN40, DIN EN 1092-1, form B1
784	Flange DN 65, PN40, DIN EN 1092-1, form B1
785	Flange DN 80, PN40, DIN EN 1092-1, form B1
786	Flange DN 100, PN40, DIN EN 1092-1, form B1
	(6) Guide tube diameter
8	8 mm
12	12 mm
	(7) Guide tube length L1, horizontal^a
40 - 200	Specifications in plain text (increments of 50 mm)
	(8) Guide tube length L2, vertical^a
50 - 2000	Specifications in plain text (increments of 50 mm)
	(9) Float
027	Cylinder, stainless steel, diameter 27, density 800 kg/m ³
028	Cylinder, stainless steel, diameter 27, density 800 kg/m ³ , e-polished
029	Spherical, stainless steel, diameter 29, density 900 kg/m ³
030	Spherical, stainless steel, diameter 29, density 900 kg/m ³ , e-polished
044	Cylinder, stainless steel, diameter 44, density 750 kg/m ³

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045	Cylinder, stainless steel, diameter 44, density 750 kg/m ³ , e-polished
052	Spherical, stainless steel, diameter 52, density 680 kg/m ³
053	Spherical, stainless steel, diameter 52, density 680 kg/m ³ , e-polished
729	Spherical, titanium, diameter 29, density 700 kg/m ³
752	Spherical, titanium, diameter 52, density 650 kg/m ³
(10)	Number of floats
1	1 piece
2	2 pieces
3	3 pieces
4	4 pieces
(11)	Switching function
02	SPST-NC, NC contact (10 VA/AC 175 V/0.5 A)
03	SPDT-CO, single-pole changeover contact (10 VA/AC 175 V/0.5 A)
10	SPST-NO, NO contact (100 VA/AC 230 V/1 A)
11	SPST-NC, NC contact (100 VA/AC 230 V/1 A)
12	SPDT, single-pole changeover contact (60 VA/AC 230 V/1 A)
15	SPST-NO, NO contact bistable (100 VA/AC 230 V/1 A)
16	SPST-NC, NC contact bistable (100 VA/AC 230 V/1 A)
99	According to customer specification
(12)	Number of contacts
1	1 contact
2	2 contacts
3	3 contacts
4	4 contacts
(13)	Position of contact 1^b
54 - 1970	Specifications in plain text (for guide tube diameter 8 mm at least position contact 1 54 mm, for guide tube diameter 12 mm at least position contact 1 88 mm)
(14)	Position of contact 2^b
0	None
64 - 1970	Specifications in plain text (for guide tube diameter 8 mm at least position contact 2 64 mm, for guide tube diameter 12 mm at least position contact 2 98 mm)
(15)	Position of contact 3^b
0	None
104 - 1970	Specifications in plain text (for guide tube diameter 8 mm at least position contact 3 104 mm, for guide tube diameter 12 mm at least position contact 3 188 mm)
(16)	Position of contact 4^b
0	None
114 - 1970	Specifications in plain text (for guide tube diameter 8 mm at least position contact 4 114 mm, for guide tube diameter 12 mm at least position contact 4 198 mm)
(17)	Extra codes
000	None
005	Integrated temperature sensor Pt1000 ^c
007	Integrated temperature sensor Pt100 ^c
009	Temperature switch, NC contact ^d
019	Temperature monitoring of reed contact, Pt1000
240	EAC-Ex approval
663	NAMUR circuit ^a
954	Technical passport

^a The dimensioning is in mm in relation to the contact/locating surface (threaded bushing of the container/tank wall) of the selected process connection.

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- ^b The contact positions are viewed from the process connection toward the guide tube end.
^c The temperature sensor is positioned at the end of the guide tube.
^d Specify switching temperature in plain text. The temperature switch is positioned at the end of the guide tube. Only available with guide tube diameter 12 mm.
- ⇒ For details on the dimensioning of the guide tube length L depending on the respective process connection, see Operating manual B 408301, chapter 3.2.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Order code	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-
Order example	408304	/	000	-	160	-	2000	-	102	-
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)		
	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/
	1	-	10	-	1	-	50	-	0	-
										000

Accessories

Designation	Description	Part no.
Ex-i repeater power supply and input isolating amplifier 	The intrinsically safe isolation switching amplifier ensures reliable, galvanic isolation and safe transmission of switching signals in Ex applications. It can be mounted in Ex zone 2. When using the NAMUR circuitry, line break and short circuit can be detected. Further technical data and the relevant safety regulations can be found in the operating instructions B 707540.0	00734357

JUMO NESOS R20 LT

Level transmitter via float

Applications

- Level measurement of liquids in storage tanks, containers, oil sumps, and tanks
- Water and wastewater treatment
- Mechanical and plant engineering
- Shipbuilding
- Energy technology
- Diesel tanks

Brief description

Level measurement is carried out according to the Archimedes' principle for liquids in a semi continuous manner. The float moves along the guide tube as the level rises or falls. With its magnetic field, the magnet in the float actuates the reed chain that is installed in the guide tube. As a result, a resistance value is converted into a standard signal 4 to 20 mA and transmitted. The signal can be evaluated and processed further by downstream electronic components. The output signal always refers to increasing level.

In the case of applications with large filling heights, level transmitters of up to 4 m in length are available. In the event of limited space or too high temperatures at the connection housing in the application, the potentiometric output signal, for example in the PLC or in the control cabinet, can be realized using transmitters (separate version).

Depending on the variant ordered, various electrical connections, process connections, guide tube lengths, floats, and resolutions are available.

With the optional temperature sensor or temperature switch, the temperature can also be recorded via just one measuring point in addition to the level measurement.

Variants in an intrinsically safe [Ex i] design and flameproof enclosure [Ex d] are available for applications involving explosion protection, as are approvals for shipbuilding. No supply isolator is required for installations with a flameproof enclosure.

Customer benefits

- Cost-effective installation and mounting; amongst other things, no programming or configuration required
- Reduced operating costs due to maintenance-free device design
- Price-performance ratio optimized through the use of standard components
- No supply isolator required for [Ex d] (flameproof enclosure) applications
- In the event of an optional temperature switch, no isolating switch amplifier is required for [Ex d] (flameproof enclosure) applications
- Customer-specific linearization for tank volume calculation possible upon request



Type 408320

Special features

- Approvals and certificates available for explosion protection, shipbuilding and railroad applications
- High resolutions up to 5.5 mm available
- Large operating temperature range for media of -52 to +180 °C
- Large pressure range of -1 to +37 bar
- Temperature sensor/temperature switch are available
- Error current according to NAMUR 43
- Reverse voltage protection

Approvals and approval marks



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Technical data

General Information

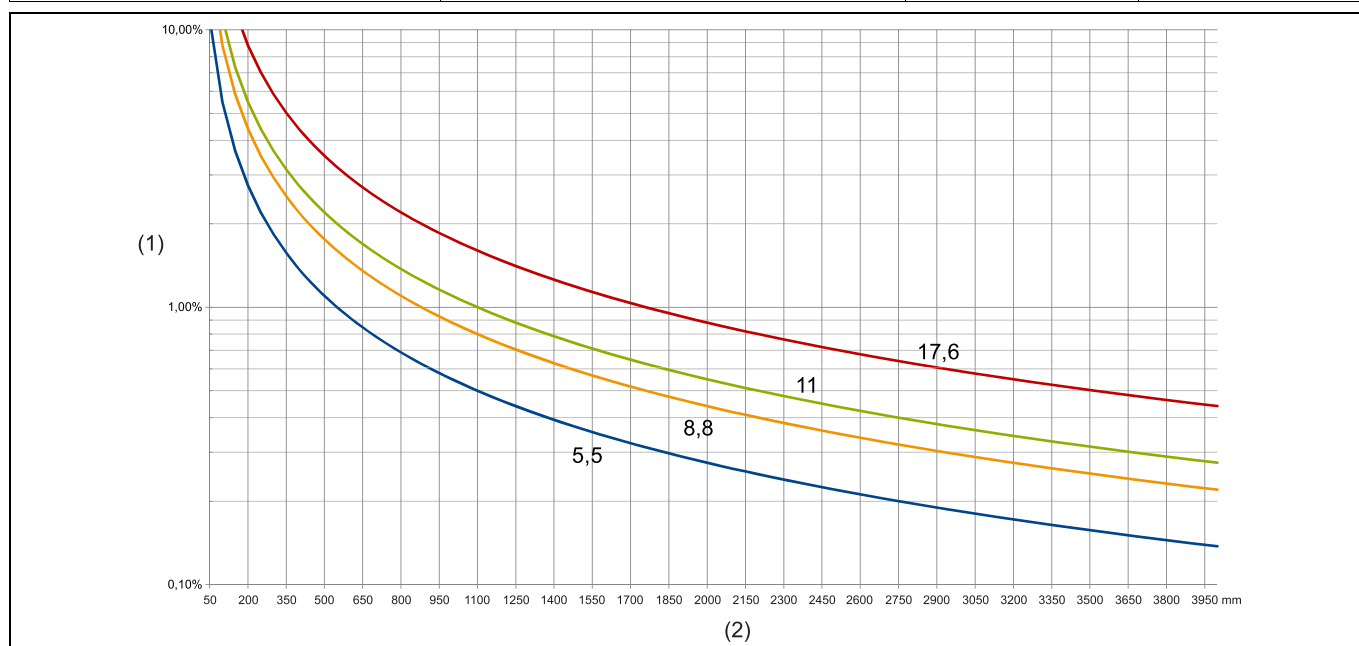
Reference conditions	DIN EN 60770 and DIN EN 61298
Function principle	Level transmitter via float and reed chain
Installation position (vertical)	±30°

Output

Analog output	4 to 20 mA, two-wire (including optional temperature transmitters)
Step response t_{90}	≤ 135 ms (filling level) ≤ 50 s (temperature)
Reverse voltage protection	Yes
Error current	NAMUR NE43, 3.5 mA and 23 mA
Burden	$R_L \leq (U_B - 8 \text{ V}) \div 0.023 \text{ A } (\Omega)$

Resistance output	Resistance value (ohm), potentiometric, three-wire
Resistance value	Depending on the length and resolution, see "Important information about the order details", Page 13

	Pt100	Pt1000	Temperature switch, N/C contact, 1 A, 50 mA min. load	Temperature transmitter
Measuring range	-40 to +150 °C	-40 to +150 °C	Indicate switching point specification in plain text	0 to 100 °C configured as default setting
Accuracy	DIN class B According to DIN EN 60751, the limit deviation in °C is: $\pm(0.3 + 0.005 t)$ $ t $ = temperature in °C regardless of prefix sign		Tolerance ±5 K Hysteresis 30 K ±15 K	±0.2 K $\sqrt{[(0.2)^2 + (0.3 + 0.005 t)^2]}$



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Mechanical features

Float	Form	Material	Outer diameter	Min. density kg/m ³	Pressure range (nominal pressure) in bar	Weight in grams
044	Cylinder	AISI 316 series	44	750	-1 to +24	41
045	Cylinder, e-polished	AISI 316 series	44	750	-1 to +24	41
052	Spherical	AISI 316 series	52	680	-1 to +37	38
053	Spherical, e-polished	AISI 316 series	52	680	-1 to +37	38
752	Spherical	Titanium Grade 2	52	650	-1 to +24	32

Float	Density of medium kg/m ³					
	700	800	900	1000	1200	1400
	Immersion depth mm					
044		44.5	39.5	35.6	29.6	25.4
045		44.5	39.5	35.6	29.6	25.4
052	38.6	34.1	31.1	28.8	25.5	23.1
053	38.6	34.1	31.1	28.8	25.5	23.1
752	39.1	34.4	31.3	29	25.6	23.3

Materials of parts in contact with medium e.g. process connection, float 044, 045, 052, 053, guide tube Float 752	The chemical resistance of the materials should be taken into account for the application. AISI 316 series Titanium Grade 2
Materials of parts not in contact with medium Cable Round plug M12 × 1 Cable socket Terminal head BUZ Terminal head BUZ-H Terminal head Ex d Terminal head Form BEGF with M12 connector Connection housing, cube-shaped, large	The chemical resistance of the materials should be taken into account for the application. PVC or silicone or PUR or RADOX® PBT GF30 PBT GF30 Aluminum, painted Aluminum, painted Aluminum, painted AISI 321, CuZn, PA Aluminum, painted
Clamping range Cable fitting	Diameter 6 to 12 mm for connection housing, cube-shaped, large, terminal head BUZ, and terminal head BUZ-H Diameter 6.5 to 11.9 mm for terminal head Ex d

Electrical data

Voltage supply 4 to 20 mA, temperature transmitter, analog	DC 8 to 30 V, nominal voltage DC 24 V
Power consumption	5 to 800 mW
Current consumption	≤ 23 mA
Voltage supply Resistance value (ohm) Temperature switch	Limit values according to DIN EN 61010-1 Voltage value (rms): AC ≤ 33 V Peak value: AC ≤ 46 V; DC ≤ 70 V DC ≤ 60 V
Electrical circuit SELV	The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

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Environmental influences

Moisture	
Operation	100 % rel. humidity including condensation on the product outer shell
Storage	90 % rel. humidity without condensation
Electromagnetic compatibility	
Interference emission	Class B ^a , according to DIN EN 61326-1
Interference immunity	Industrial requirements, according to DIN EN 61326-2-3
Protection type for electrical connection	According to DIN EN 60529
Cable	IP68
Cable with M12 connector	IP66
Round plug M12 × 1	IP66
Cable socket	IP65
Terminal head BUZ	IP65
Terminal head BUZ-H	IP65
Terminal head Ex d	IP68
Terminal head Form BEGF with M12 connector	IP65
Connection housing, cube-shaped, large	IP66
Vibration	0.7 g for 13.2 to 100 Hz and freely oscillating guide tube length up to max. 2.5 m, according to IEC 60068-2-6
Ambient temperature for electrical connection	Observe dependency of extension tube length with process temperature, see following diagrams
PVC cable	-5 to +80 °C
Silicone cable	-50 to +180 °C
PUR cable	-40 to +90 °C
PVC cable, with M12 connector	-5 to +80 °C
Silicone cable, with M12 connector	-40 to +85 °C
PUR cable, with M12 connector	-40 to +85 °C
RADOX® cable	-50 to +120 °C
Round plug M12 × 1	-30 to +90 °C
Cable socket	-40 to +125 °C
Terminal head BUZ	-40 to +74 °C
Terminal head BUZ-H	-40 to +79 °C
Terminal head Ex d	-40 to +80 °C
Terminal head Form BEGF with M12 connector	-40 to +74 °C
Connection housing, cube-shaped, large	-40 to +81 °C
Process temperature	
Parts in contact with medium (e.g. guide tube with float)	-40 to +150 °C (standard) -52 to +180 °C (upon request)

^a The product is suitable for industrial use as well as for households and small businesses.

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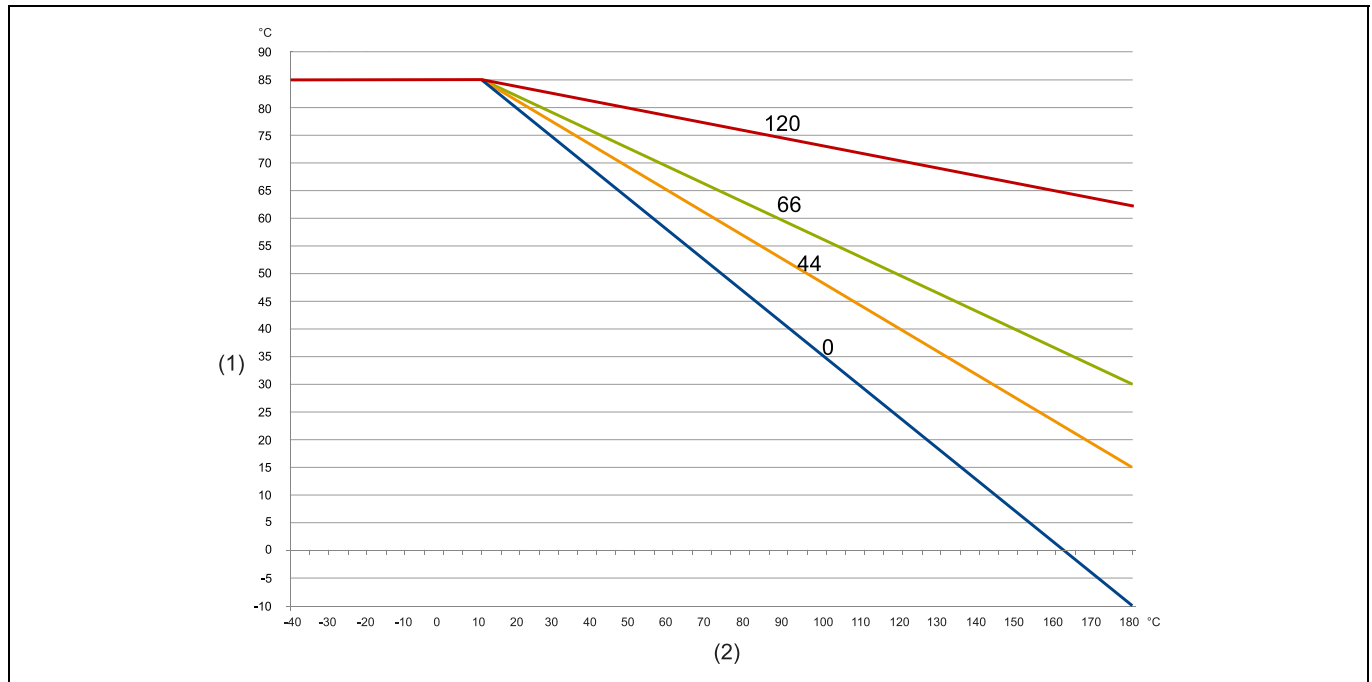
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Maximum ambient temperature depending on the extension tube length and process temperature

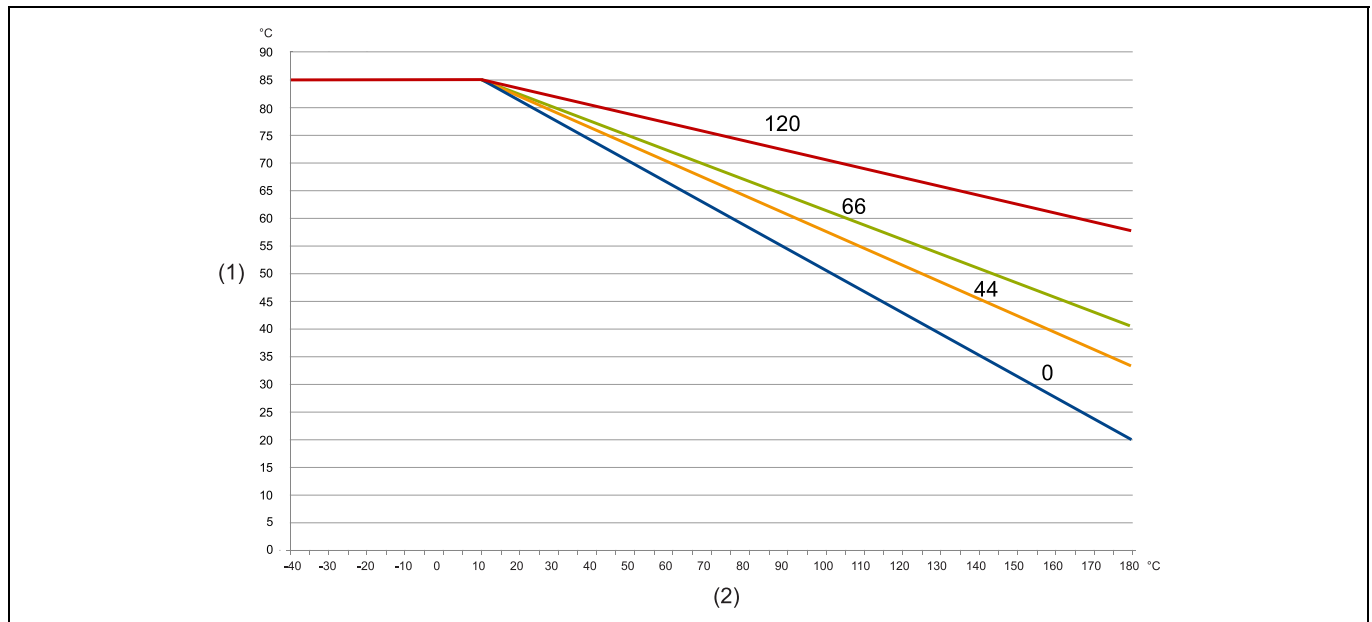
Terminal head BUZ and terminal head Form BEGF with M12 connector, extension tube lengths in mm



(1) Maximum ambient temperature

(2) Media temperature

Terminal head BUZ-H and connection housing Ex d, extension tube lengths in mm



(1) Maximum ambient temperature

(2) Media temperature

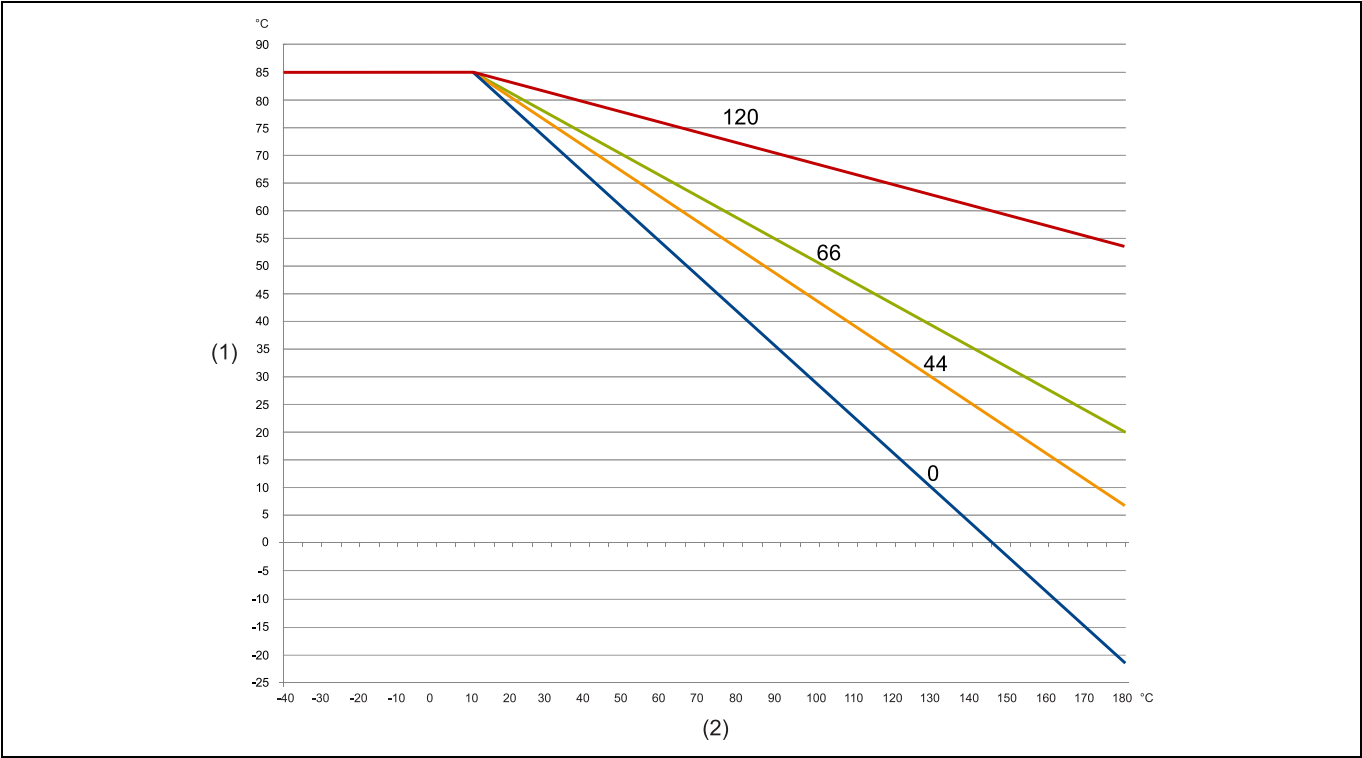
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Large connection housing, extension tube lengths in mm



(1) Maximum ambient temperature

(2) Media temperature

Display

Function principle	Current loops fed, only in connection with terminal head BUZ-H
Display	Seven-segment, four-digit "9999", default setting 0 to 100 [%]
Ambient temperature	-20 to +80 °C 0 to 60 °C for Ex i version

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Approvals and approval marks

ATEX, IEC Ex, intrinsically safe, Ex i Testing agency Certificate/certification numbers Inspection basis Valid for	Eurofins Electrosuisse Product Testing AG SEV 18 ATEX 0134 X, IECEx SEV 18.0011X IEC/EN 60079-0, IEC/EN 60079-11, IEC/EN 60079-26, DIN EN ISO 80079-36, DIN EN ISO 80079-37 Type 408320/362, Type 408320/662
ATEX, IEC Ex, flameproof enclosure, Ex d Testing agency Certificate/certification numbers Inspection basis Valid for	Eurofins Electrosuisse Product Testing SEV 18 ATEX 0133 X, IECEx SEV 18.0010X IEC/EN 60079-0, IEC/EN 60079-1, IEC/EN 60079-26, IEC/EN 60079-31, DIN EN ISO 80079-36, DIN EN ISO 80079-37 Type 408320/462, Type 408320/962
DNV GL Testing agency Certificate/certification numbers Inspection basis Valid for	DNV GL TAA00001VR Class Guidelines CG 0339, November 2016 Type 408320/062, Type 408320/662, Type 408320/962
EAC ^a Testing agency Certificate/certification numbers Inspection basis Valid for	Оценка продукции и систем менеджмента C-DE.HP15.B.00960/20 TR TS 020/2011 Type 408320/...
EAC-Ex ^a Testing agency Certificate/certification numbers Inspection basis Valid for	ПрофиТест ЕАЭС RU C-DE.HB07.B.00316/20 TR TS 012/2011 Type 408320/362, Type 408320/462, Type 408320/662, Type 408320/962 – each with extra code 240
Railroad application Testing agency Certificate/certification numbers Inspection basis Valid for	RST Rail System Testing, JUMO NESOS Certificate Railroad application DIN EN 50155, DIN EN 50121-3-2, EN 45545-1, EN 45545-2 Extra code 950

^a Russian documentation upon request

NOTE!

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

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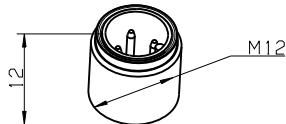
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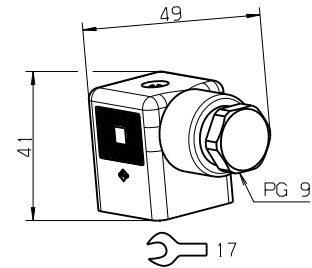
Dimensions

Electrical connection

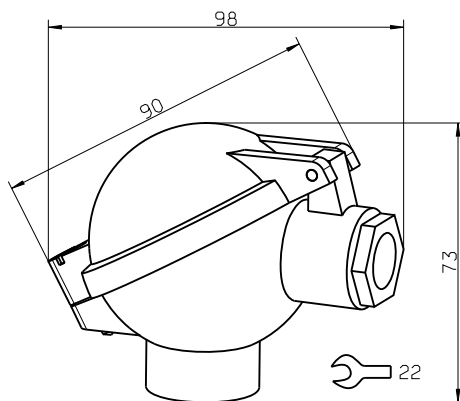
036
Round plug M12 × 1



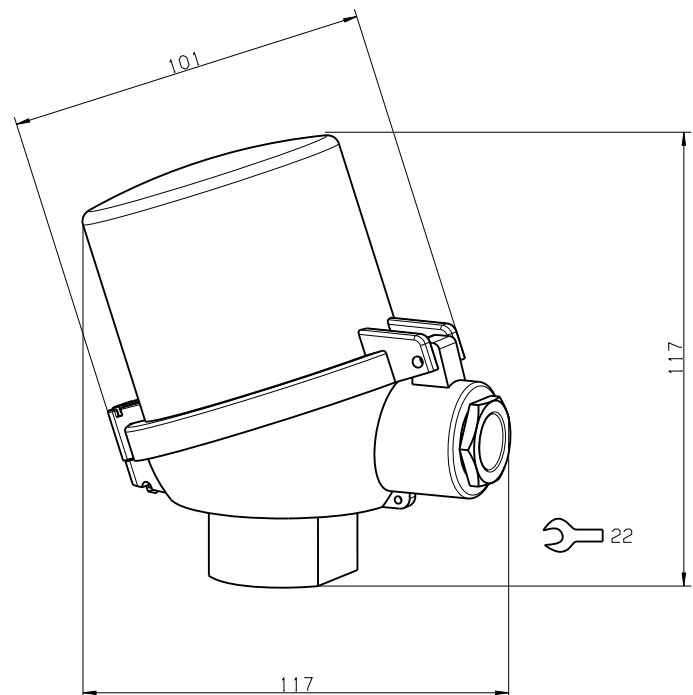
061
Cable socket DIN EN 175301-803



110
Terminal head BUZ



111
Terminal head BUZ-H



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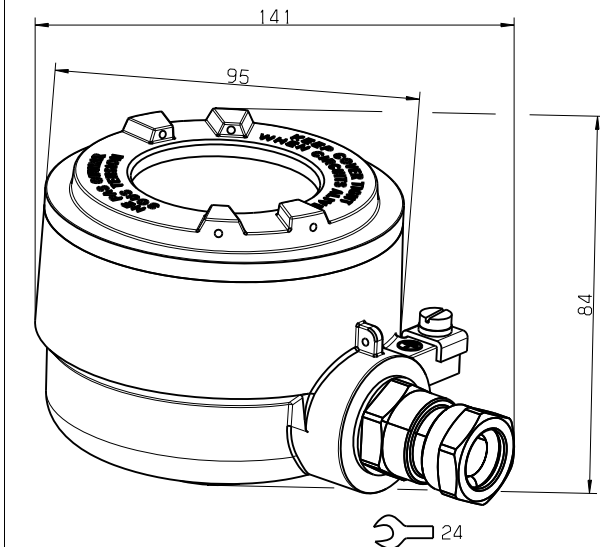
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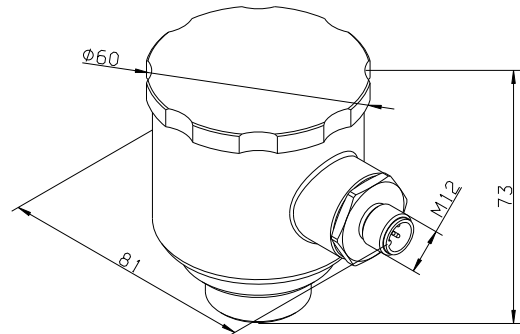
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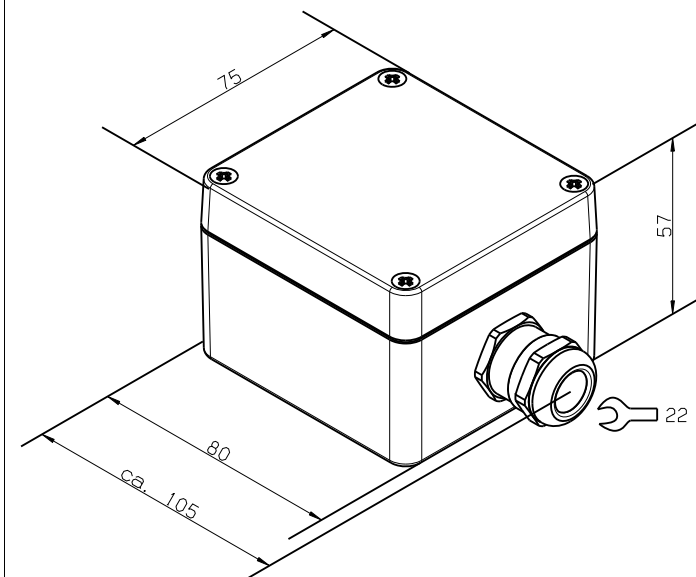
115
Terminal head Ex d



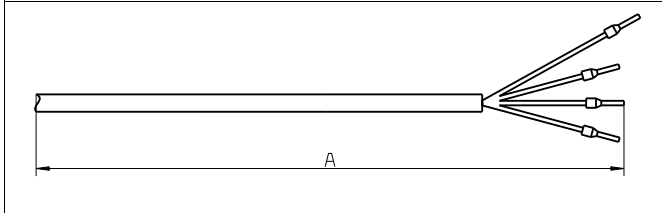
116
Terminal head Form BEGF with M12 connector



131
Connection housing, cube-shaped, large

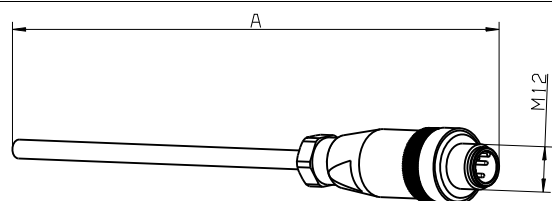


150 PVC, 160 silicone, 170 PUR, 180 RADOX®
Cable with ferrules



A Cable length, see order details

152 PVC, 162 silicone, 172 PUR
Cable with M12 connector



A Cable length, see order details

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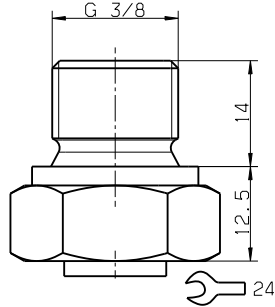
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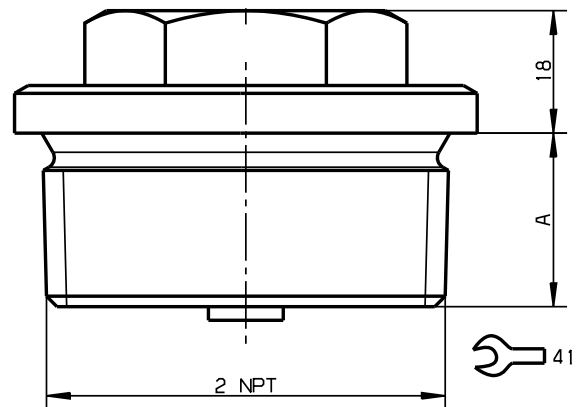
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**Process connections**

538
G 3/8 thread upward

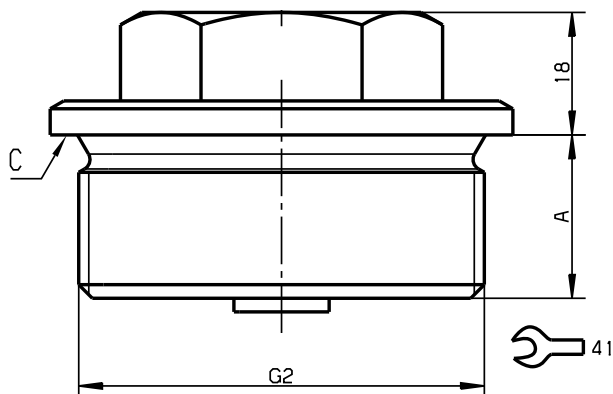


516
2 NPT



A 25.5

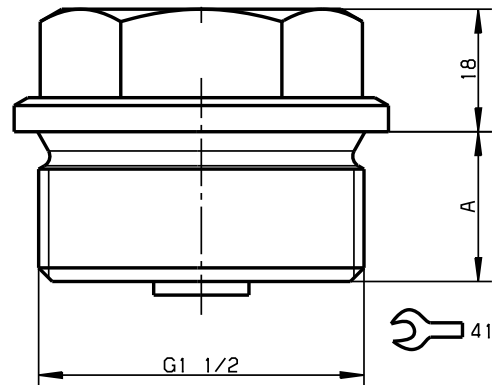
569
G 2



A 24 (25.5 for Ex d)

C A seal/O-ring with a thickness of at least 2 mm is recommended.

570
G 1 1/2



A 22 (25.5 for Ex d)

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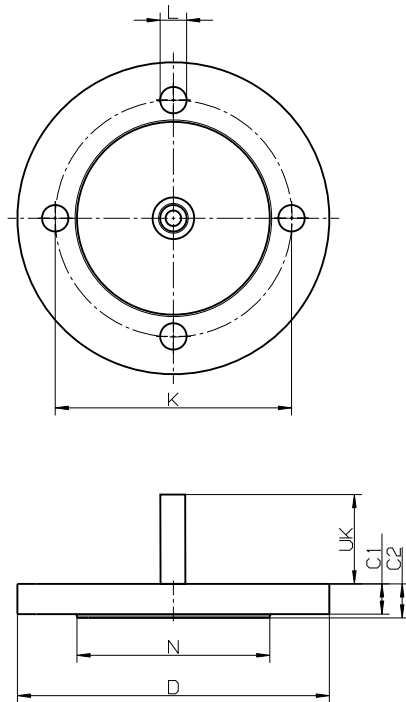
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Flange according to following table



Example of extension tube; also available for other process connections;

UK = extension tube length + 9 mm

Order code	Flange designation	Hole circle K	Number of holes	Diameter of holes L	Exterior diameter D	Diameter of sealing strip N	Strength of flange C1	Strength of flange including sealing strip C2
703	Flange 2.5" 150 lbs ANSI B 16.5 RF	139.7	4	19.1	177.8	104.6	26.8	28.4
713	Flange 2" 150 lbs ANSI B 16.5 RF	120.7	4	19.1	152.4	91.9	23.8	25.4
714	Flange 2" 300 lbs ANSI B 16.5 RF	127	8	19	165.1	92.1	20.6	22.2
729	Flange DN 50, PN40, EN 1092-1, form B1	125	4	18	165	102	17	20
784	Flange DN 65, PN40, EN 1092-1, form B1	145	8	18	185	122	19	22
785	Flange DN 80, PN40, EN 1092-1, form B1	160	8	18	200	138	21	24
786	Flange DN 100, PN40, EN 1092-1, form B1	190	8	22	235	162	21	24

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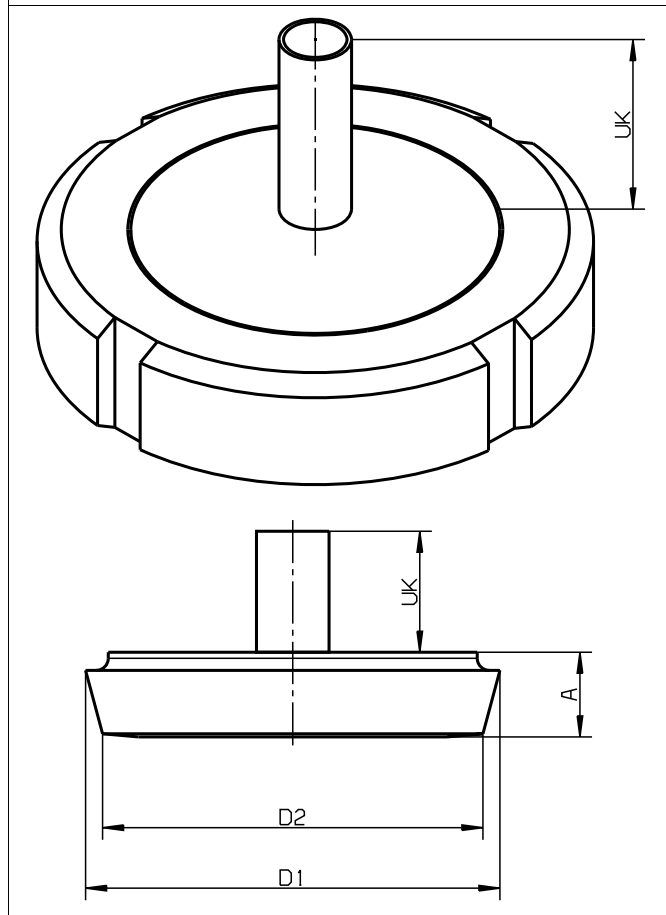
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Taper socket according to following table



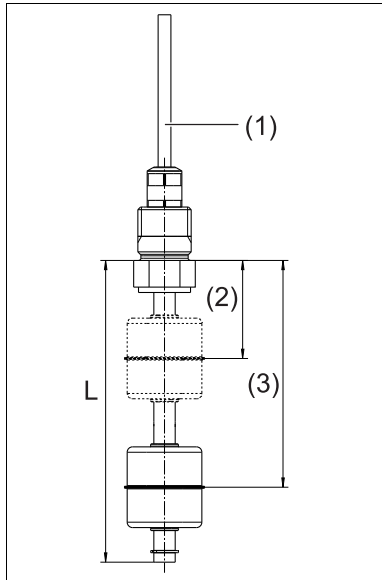
Example of extension tube; also available for other process connections;
UK = extension tube length + 9 mm

Order code	Designation	A	D1	D2
607	Taper socket with union nut DN 50, DIN 11851 (dairy pipe fitting)	14 mm	68.5 mm	62.9 mm
608	Taper socket with union nut DN 65, DIN 11851 (dairy pipe fitting)	16 mm	86 mm	79.6 mm



Important information about the order details

Below are examples for the dimensioning of the guide tube length L, of the measuring range start (3), and the measuring range end (2) depending on the respective process connection.

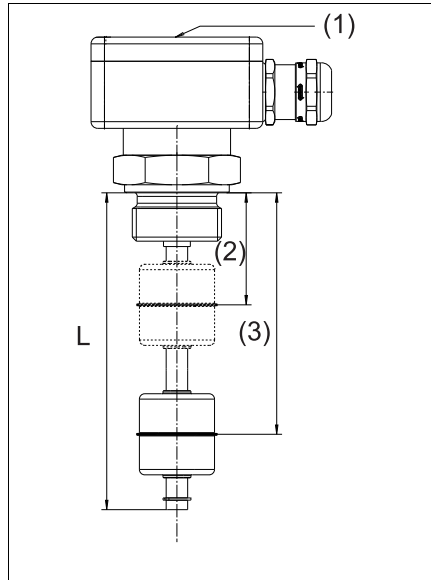


(1) Process connection
"thread upward"

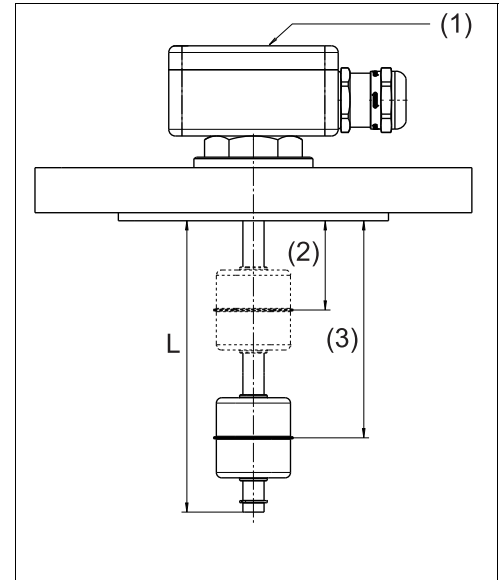
(2) Measuring range end in mm

(3) Measuring range start in mm

L Guide tube length in mm



(1) Process connection
"thread"



(1) Process connection
"flange"

The table below shows the dependencies of the maximum measuring range, the minimum measuring range end (MRE), and guide tube length (L), as well as the overall resistance values, assigned to the resolution. The order code can be specified using the formula below:

Measuring range end (MRE) = measuring range start (MRS) - measuring range

max. MRS = L - 53 mm for resolution 5.5 and 11 mm

max. MRS = L - 56 mm for resolution 8.8 and 17.6 mm

Resolution 8.8 and 17.6 mm

Max. measuring range in mm	Min. MRE in mm	Min. L in mm	Resistance value	
			in Ω Resolution 8.8 mm	Resolution 17.6 mm
179	55	290	1397	
302	55	423	2095	1047
425	55	536	2794	1397
443	55	554	2894	1447
548	55	659	3493	1746
566	55	677	3592	1796
689	55	800	4291	2145
812	55	923	4990	2495
935	55	1046	5688	2844
953	55	1064	5788	2894
1059	55	1170	6387	3193
1076	55	1187	6487	3243
1199	55	1310	7185	3592
1323	55	1434	7884	3942
1446	55	1557	8582	4291

Resolution 5.5 and 11 mm

Max. measuring range in mm	Min. MRE in mm	Min. L in mm	Resistance value	
			in Ω Resolution 5.5 mm	Resolution 11 mm
157	52	262	1996	
267	52	372	2994	1497
377	52	482	3992	1996
443	52	548	4590	2295
487	52	592	4990	2495
553	52	658	5588	2794
663	52	768	6586	3293
773	52	878	7584	3792
883	52	988	8582	4291
949	52	1054	9181	4590
993	52	1098	9580	4790
1059	52	1164	10179	5089
1169	52	1274	11177	5588
1279	52	1384	12175	6087
1389	52	1494	13173	6586

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Resolution 8.8 and 17.6 mm

Max. measuring range in mm	Min. MRE in mm	Min. L in mm	Resistance value	
			in Ω Resolution 8.8 mm	Resolution 17.6 mm
1463	55	1574	8682	4341
1569	55	1680	9281	4640
1587	55	1698	9381	4690
1710	55	1821	10079	5039
1833	55	1944	10778	5389
1956	55	2067	11477	5738
1974	55	2085	11576	5788
2079	55	2190	12175	6087
2097	55	2208	12275	6137
2220	55	2331	12974	6487
2343	55	2454	13672	6836
2467	55	2578	14371	7185
2484	55	2595	14471	7235
2590	55	2701	15069	7534
2607	55	2718	15169	7584
2731	55	2842	15868	7934
2854	55	2965	16566	8283
2977	55	3088	17265	8632
2995	55	3106	17365	8682
3118	55	3229	18063	9031
3241	55	3352	18762	9381
3364	55	3475	19461	9730
3487	55	3598	20159	10079
3505	55	3616	20259	10129
3611	55	3722	20858	10429
3628	55	3739	20958	10479
3751	55	3862	21656	10828
3875	55	3986	22355	11177
3998	55	4109	23053	11526
4015	55	4126	23153	11576

Resolution 5.5 and 11 mm

Max. measuring range in mm	Min. MRE in mm	Min. L in mm	Resistance value	
			in Ω Resolution 5.5 mm	Resolution 11 mm
1455	52	1560	13772	6886
1499	52	1604	14171	7085
1565	52	1670	14770	7385
1675	52	1780	15768	7884
1785	52	1890	16766	8383
1895	52	2000	17764	882
1961	52	2066	18363	9181
2005	52	2110	18762	9381
2071	52	2176	19361	9680
2181	52	2286	20359	10179
2291	52	2396	21357	10678
2401	52	2506	22355	11177
2467	52	2572	22954	11477
2511	52	2616	23353	11676
2577	52	2682	23952	11976
2687	52	2792	24950	12475
2797	52	2902	25948	12974
2907	52	3012	26946	13473
2973	52	3078	27544	13772
3017	52	3122	27944	13972
3083	52	3188	28542	14271
3193	52	3298	29540	14770
3303	52	3408	30538	15269
3413	52	3518	31536	15768
3479	52	3584	32135	16067
3523	52	3628	32534	16267
3589	52	3694	33133	16566
3699	52	3804	34131	17065
3809	52	3914	35129	17564
3919	52	4024	36127	18063
3985	52	4090	36726	18363
4029	52	4134	37125	18562

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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Connection		Terminal assignment				
		Cable	Cable socket	Connection housing/ Terminal head		Round plug M12
4 to 20 mA, two-wire (output 405)						
Voltage supply DC 8 to 30 V	U _B /S+ 0 V/S-	-	-	1 2	-	1 3
Resistance value (ohm) (output 501)						
Potentiometric	<p>Silicone</p> <p>RD/BU RD WH</p> <p>PUR</p> <p>BU BN BK</p> <p>PVC</p> <p>GN BN WH</p> <p>RADOX®</p> <p>WH 2 WH 1 WH 3</p>		-			
Shielding						
Caution: ground the device! Ground all connected devices (such as pumps and valves) to the same potential! Functional bonding conductor	BK ^a					Metallic connector casing
Protection rating according to DIN EN 61140	3	3	3	3	3	3

^a Around 1 cm longer than other stranded wires

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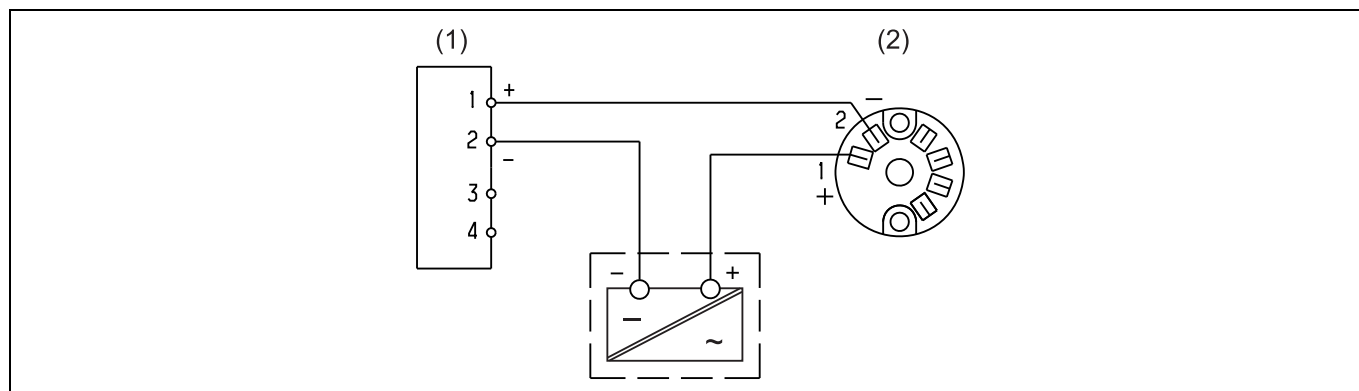


		Cable	Cable socket	Connection housing/ Terminal head	Round plug M12
Temperature sensor Pt100 ^a			-		-
Temperature sensor Pt1000 ^a					
Temperature switch ^a		-	-		-
Temperature transmitter voltage supply DC 8 to 30 V	U _B /S+ 0 V/S-	-	-	+ -	-

^a Assignment is always to terminals with the highest numbers

Legend: cable	BN	Brown	RD	Red
	WH	White	YE	Yellow
	BU	Blue	OG	Orange
	GN	Green	BK	Black

Connection diagram



(1) Current loop display

(2) Transmitter connection diagram

(1) and (2) already installed in BUZ-H head; electrical connection supplied by the customer to terminal (+) transmitter and terminal (-) current loop display

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If connected to a certified intrinsically safe electrical circuit Ex i, the following values are given.

Output	Max. voltage U_i in V	Max. current I_i in mA	Max. power P_i in mW	Internal inductance in μH	Internal capacitance in pF
4 to 20 mA	≤ 30	≤ 100	≤ 750	~ 10 for cable version 1 $\mu\text{H}/\text{m}$ connecting cable	~ 1000 for cable version 200 pF/m connecting cable
Temperature switch				~ 0 for cable version 1 $\mu\text{H}/\text{m}$ connecting cable	~ 0 for cable version 200 pF/m connecting cable
Temperature transmitter					
Potentiometric output					

When using explosion-proof versions (intrinsically safe, Ex i, and flameproof enclosure, Ex d) the following values are given.

Temperature sensor	Max. voltage U_i in V	Max. current I_i in mA	Max. power P_i in mW	Internal inductance in μH	Internal capacitance in pF
Pt100	≤ 30	≤ 55	≤ 413	~ 0 for cable version 1 $\mu\text{H}/\text{m}$ connecting cable	~ 0 for cable version 200 pF/m connecting cable
Pt1000					

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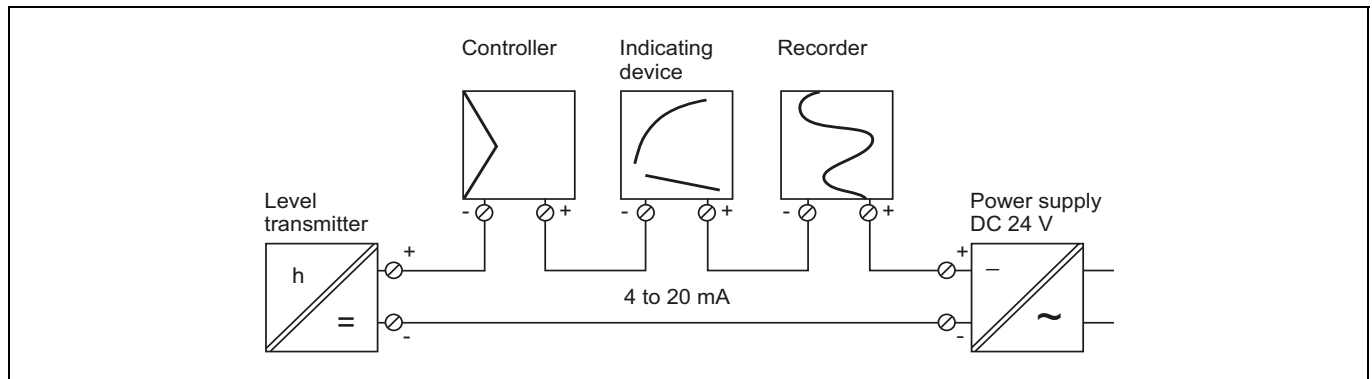
JUMO Instrument Co. Ltd.
 JUMO House
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 Harlow, Essex, CM20 2DY, UK
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 Fax: +44 1279 62 50 29
 Email: sales@jumo.co.uk
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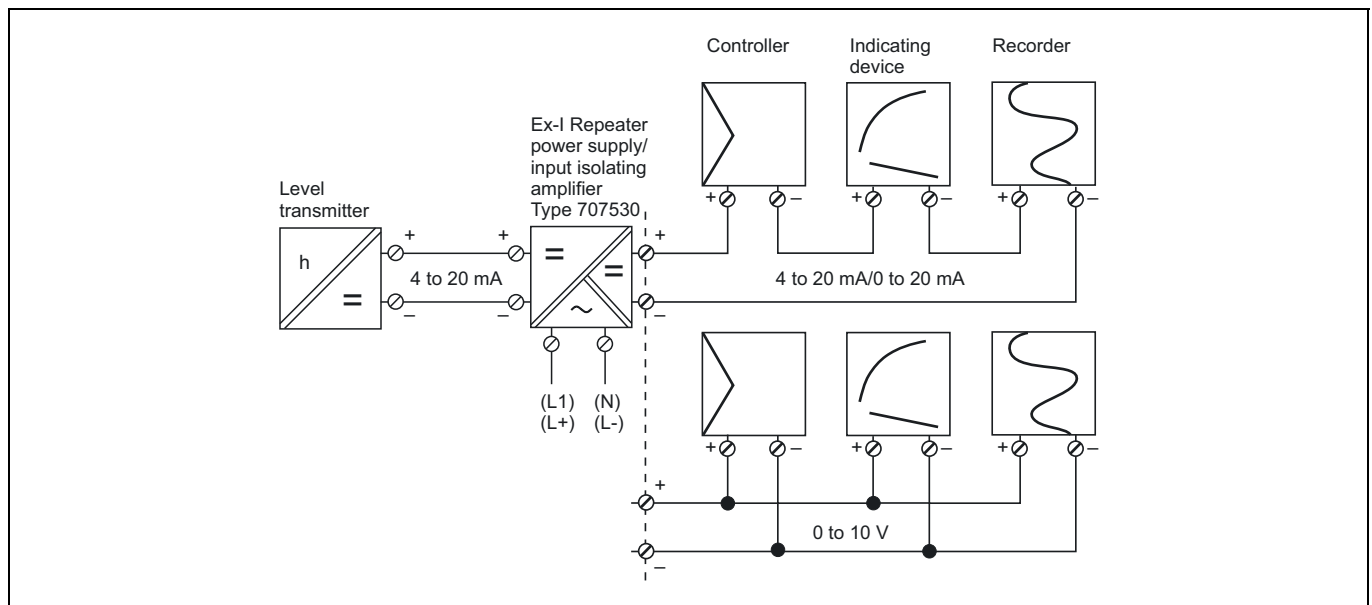


Connection examples

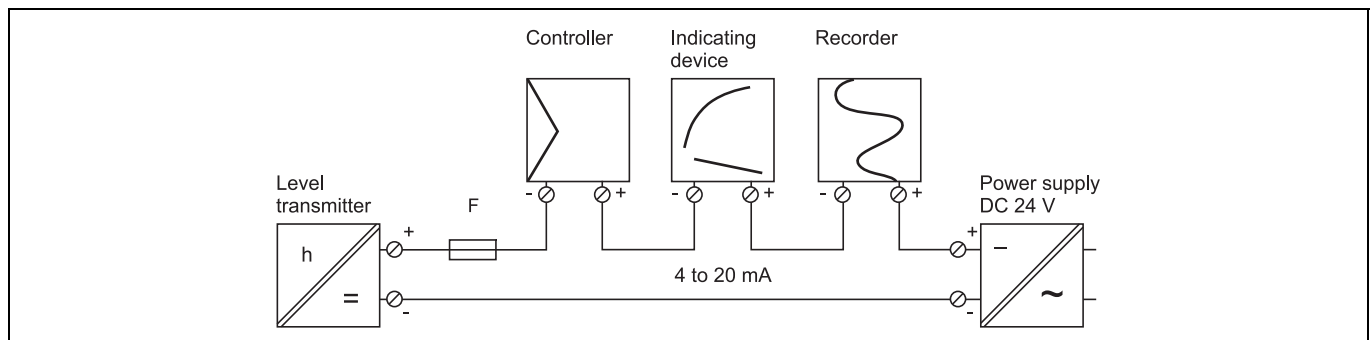
Standard



Ignition protection type Ex i



Ignition protection type Ex d



According to operating manual 408301, chapter 6 on "Installation", the fuse (F) must be selected.

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Order details

	(1) Basic type
408320	JUMO NESOS R20 LT – Level transmitter via float
	(2) Basic type extension
000	None
062	Shipbuilding approval
362	Explosion protection, intrinsically safe, Ex i
462	Explosion protection, flameproof enclosure, Ex d
662	Shipbuilding approval and explosion protection, intrinsically safe, Ex i
962	Shipbuilding approval and explosion protection, flameproof enclosure, Ex d
999	Special version
	(3) Electrical connection
036	Round plug M12 × 1
061	Cable socket DIN EN 175301-803, form A
110	Terminal head BUZ
111	Terminal head BUZ-H
115	Terminal head Ex d
116	Terminal head Form BEGF with M12 connector
131	Connection housing, cube-shaped, large
150	Cable, PVC
152	Cable, PVC with M12 connector
160	Cable, silicone
162	Cable, silicone with M12 connector
170	Cable, PUR
172	Cable, PUR with M12 connector
180	Cable, RADOX®
999	Special version
	(4) Cable length
0	None
2000	2000 mm
5000	5000 mm
100 - 5000	Specifications in plain text
	(5) Process connection
516	2 NPT
538	G 3/8 thread upward
569	G 2
570	G 1 1/2
607	Taper socket with union nut DN 50, DIN 11851 (dairy pipe fitting)
608	Taper socket with union nut DN 65, DIN 11851 (dairy pipe fitting)
703	Flange 2.5" 150 lbs ANSI B 16.5 RF
713	Flange 2" 150 lbs ANSI B 16.5 RF
714	Flange 2" 300 lbs ANSI B 16.5 RF
729	Flange DN 50, PN40, EN 1092-1, form B1
784	Flange DN 65, PN40, EN 1092-1, form B1
785	Flange DN 80, PN40, EN 1092-1, form B1
786	Flange DN 100, PN40, EN 1092-1, form B1
999	According to customer specification
	(6) Guide tube diameter
12	12 mm
14	14 mm

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(7)	Guide tube length L^a
262 - 4200	Specifications in plain text
(8)	Float
044	Cylinder, stainless steel, diameter 44, density 750 kg/m ³
045	Cylinder, stainless steel, diameter 44, density 750 kg/m ³ , e-polished
052	Spherical, stainless steel, diameter 52, density 680 kg/m ³
053	Spherical, stainless steel, diameter 52, density 680 kg/m ³ , e-polished
752	Spherical, titanium, diameter 52, density 650 kg/m ³
(9)	Number of floats
1	1 piece
2	2 pieces
3	3 pieces
4	4 pieces
(10)	Output
405	4 to 20 mA, two-wire
501	Resistance value (ohm)
(11)	Accuracy
5.5	5.5 mm
8.8	8.8 mm
11.0	11.0 mm
17.6	17.6 mm
(12)	Measuring range start 4 mA
209 - 4156	Specifications in plain text
(13)	Measuring range end 20 mA
52 - 3800	Specifications in plain text
(14)	Display (LCD)
0	Without
1	With
(15)	Extra codes
000	None
005	Integrated temperature sensor Pt1000
007	Integrated temperature sensor Pt100
009	Temperature switch, NC contact ^b
140	Temperature transmitter, analog, output 4 to 20 mA
240	EAC-Ex approval
307	Extension tube ^c
950	Railroad application ^d
954	Technical passport

^a The dimensioning is in mm in relation to the contact/reference surface (threaded bushing of the container/tank wall) of the selected process connection.

^b Specify switching temperature in plain text. The temperature switch is positioned at the end of the guide tube.

^c Specify the extension tube length as a function of the process and ambient temperature in plain text.

^d The extra code railroad application is only available in connection with electrical connection M12 plug or RADOX® cable.

⇒ For details on the dimensioning of the guide tube length L depending on the respective process connection, see Operating manual B 408301, chapter 3.2.

Order code	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Order example	408320	/	000	-	131	-	0	-	570
						-	12	-	044
								-	1
	(9)	(10)	(11)	(12)	(13)	(14)	(15)		
	1	-	405	-	8.8	-	1170	-	40
						-	0	/	000

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Minimum order quantity: 1 piece

Accessories

Designation	Description	Part no.
Ex-i repeater power supply and input isolating amplifier 	<p>The Ex-i repeater power supply and input isolating amplifier is designed for operating intrinsically safe (Ex-i) transmitters and mA current sources installed in Ex areas.</p> <p>Two-wire transmitters are supplied with energy and analog 0/4 to 20 mA measured values are transmitted from the Ex-area to the non-Ex-area. The output of the module can be operated actively or passively. Further technical data and the relevant safety requirements are available in the operating manual 707530.</p>	00577948
Cable box, straight 	<p>The PVC connecting cable is 2 m in length and has a 4-pole, straight M12 × 1 connector with gold-plated contacts on the device side.</p> <p>Not for Ex applications.</p>	00404585
Cable box, angled 	<p>The PVC connecting cable is 2 m in length and has a 4-pole, angled M12 × 1 connector with gold-plated contacts on the device side.</p> <p>Not for Ex applications.</p>	00409334
Mounting element 	<p>Mounting element, head transmitter for installation into a control cabinet (hole spacing 33 mm, C-rail, UL94 V0 material)</p>	00352463
Head transmitter 	<p>Suitable as spare part or for mounting in the control cabinet together with the mounting element (TN 00352463). The head transmitter is not configured for end product. If required, a factory configuration can be made.</p>	00731477

Trademark information

- RADOX® is a registered trademark of Huber+Suhner AG, DE.

JUMO NESOS R40 LSH

Horizontal float switch

Applications

- Point level measurement of liquids in storage tanks, containers, oil sumps, and tanks
- Water and wastewater treatment
- Mechanical and plant engineering
- Apparatus and container engineering
- Oil and gas
- Chemical and petrochemical industries

Brief description

The point level measurement is carried out according to Archimedes' principle for liquids. The float is guided by a joint and moves as the level rises or falls. The magnet in the float actuates the reed contact(s) installed in the guide tube. The switching status of the reed contact can be evaluated and processed through downstream electronic components, relays, or contactors. Alarms, pumps, signal lamps, valves, and horns are typically switched via a contact protection relay.

The float switch is mounted at the side (horizontally) on a tank or container, for example. This means that the same product can be used for applications involving both a minimum (MIN) and a maximum (MAX) point level. On versions with threaded process connections, the float is aligned using a cutting ring fitting.

Float switches with highly configurable guide tube lengths of up to 1 m are available for applications involving container insulation or flange fittings. Variants with a connecting plug help to minimize mounting work.

Depending on the variant ordered, various electrical connections, process connections, guide tube lengths, floats, number of contacts, and functions (SPST-NO [normally open contact] and SPDT-CO [changeover contact]) are available.

With the optional temperature sensor or temperature switch, both the point level measurement and the temperature can be acquired via just one measuring point. Variants for monitoring the reed contact temperature are also available.

Variants in an intrinsically safe [Ex i] version and with a flameproof enclosure [Ex d] are available for applications involving explosion protection. No isolating switch amplifier is required for installations with a flameproof enclosure.

Customer benefits

- Cost-effective installation and mounting due to spring-cage terminals (Push-In®), for example
- Reduced operating costs due to maintenance-free device design
- Price-performance ratio optimized through the use of standard components
- No isolating switch amplifier required for [Ex d] (flameproof enclosure) applications
- Lower storage costs as the same component can be reused



Type 408340

Special features

- Approvals and certificates available for explosion protection, shipbuilding, and German Water Resources Act (WHG)
- High switching voltages and switching currents
- Wide operating temperature range for media from -52 to +240 °C
- Wide pressure range from -1 to +47 bar
- Up to 2 switching outputs can be freely defined as normally open contact and changeover contact
- Temperature sensor/temperature switch are available

Approvals and approval marks



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Technical data

General Information

Function principle	Magnetic float switch with reed contact			
Installation position	±30°			
Switching function (potential-free)	10 SPST-NO		12 SPDT-CO	
Switching voltage (max.) ^a	AC 230 V	DC 230 V	AC 230 V	DC 230 V
Switching capacity (max.) ^a	100 VA	100 W	60 VA	60 W
Switching current (max.) ^a	1 A	1 A	1 A	1 A

^a The values must also be adhered to in combination.

	Pt100	Pt1000	Temperature switch, N/C contact, max. 2.5 A, AC 230 V, cos φ 0.95 [0.6], 2.5 A [1.6 A]
Measuring range	-40 to +150 °C	-40 to +150 °C	Specify switching point in plain text
Accuracy	DIN class B according to DIN EN 60751 the limit deviation in °C is as follows: ±(0.3 + 0.005 t) t = temperature in °C regardless of prefix sign		Tolerance ±5 K Hysteresis 30 K ±15 K

Special features for products with protection rating 3 (see "Connection diagram") ^a	Switching voltage (max.)	AC ≤ 33 V (AC 46 V peak value)	DC 70 V
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^a Limit values according to EN 61010-1

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Mechanical features

Float	Form	Material	Outer diameter	Min. density kg/m ³	Pressure range (nominal pressure) bar
042	Cylinder	AISI 316 series	42	390	-1 to +15
052	Spherical	AISI 316 series	52	420	-1 to +47

Float	Density of medium kg/m ³							
	500	600	700	800	900	1000	1200	1400
	Immersion depth mm							
042	37.8	31.5	27.0	23.6	21.0	18.9	15.7	13.5
052	45	37.5	32.1	28.1	25.0	22.5	18.7	16.0

Materials of parts in contact with the medium e.g. process connection, float, guide tube	The chemical resistance of the materials should be taken into account for the application. AISI 316 series
Materials of parts not in contact with the medium Cable Cable socket Round plug M12 × 1 Terminal head Ex d Stainless steel terminal head Terminal head Ex d, stainless steel Connection housing, cube-shaped, small Connection housing, cube-shaped, large	The chemical resistance of the materials should be taken into account for the application. PVC or silicone or PUR PBT-GF30 PBT-GF30 Aluminum, painted AISI 321 316 Aluminum, painted Aluminum, painted
Clamping range Cable fitting Terminal block	Diameter 6 to 12 mm for connection housing, cube-shaped, small, and connection housing, cube-shaped, large Diameter 6.5 to 11.9 mm for terminal head Ex d Diameter 6 to 8 mm for cable socket Diameter 5 to 12 mm for stainless steel terminal head 0.14 to 2.5 mm ² for connection housing, cube-shaped, small 0.14 to 1.5 mm ² for terminal head Ex d, stainless steel terminal head, and connection housing, cube-shaped, large
Weight	3840 g for guide tube length of 100 mm, process connection flange DN 50, and connection housing Ex d

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Environmental influences

Moisture	
Operation	100 % rel. humidity including condensation on the product outer shell
Storage	90 % rel. humidity without condensation
Protection type for electrical connection	According to DIN EN 60529
Cable	IP68
Cable with M12 connector	IP66
Round plug M12 × 1	IP66
Cable socket	IP65
Terminal head Ex d	IP68
Terminal head, stainless steel	IP68
Terminal head Ex d, stainless steel	IP66
Connection housing, cube-shaped, small	IP66
Connection housing, cube-shaped, large	IP66
Vibration	0.7 g at 13.2 to 100 Hz, according to IEC 60068-2-6
Ambient temperature for electrical connection	Please note: dependent on extension tube length and process temperature, see following diagrams
PVC cable	-5 to +80 °C
Silicone cable	-50 to +180 °C
PUR cable	-40 to +90 °C
PVC cable, with M12 connector	-5 to +80 °C
Silicone cable, with M12 connector	-40 to +85 °C
PUR cable, with M12 connector	-40 to +85 °C
Round plug M12 × 1	-30 to +90 °C
Cable socket	-40 to +125 °C
Terminal head Ex d	-40 to +100 °C
Terminal head, stainless steel	-40 to +100 °C
Terminal head Ex d, stainless steel	-40 to +100 °C
Connection housing, cube-shaped, small	-40 to +100 °C
Connection housing, cube-shaped, large	-40 to +100 °C
Process temperature of parts in contact with the medium (e.g. guide tube with float)	-40 to +150 °C (standard) -52 to +240 °C (upon request)

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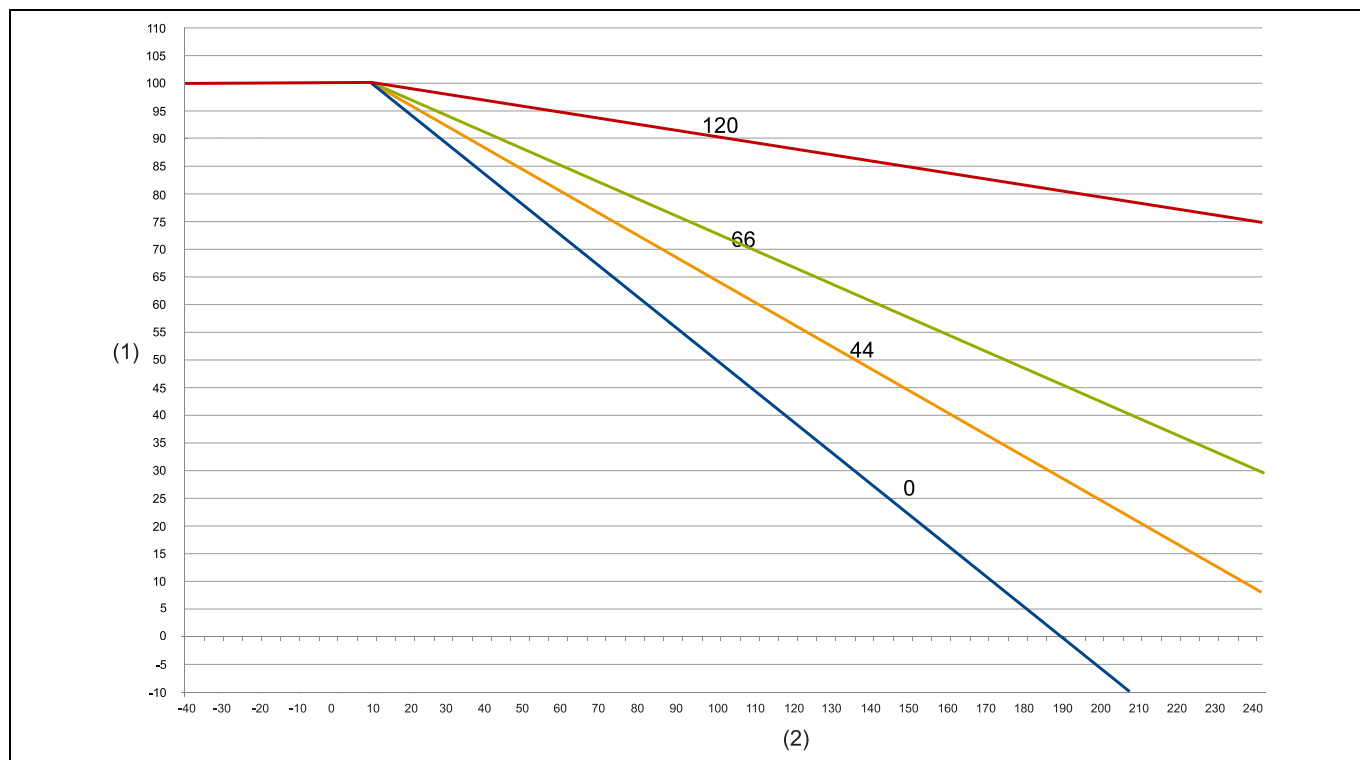
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Maximum ambient temperature depending on the extension tube length and process temperature

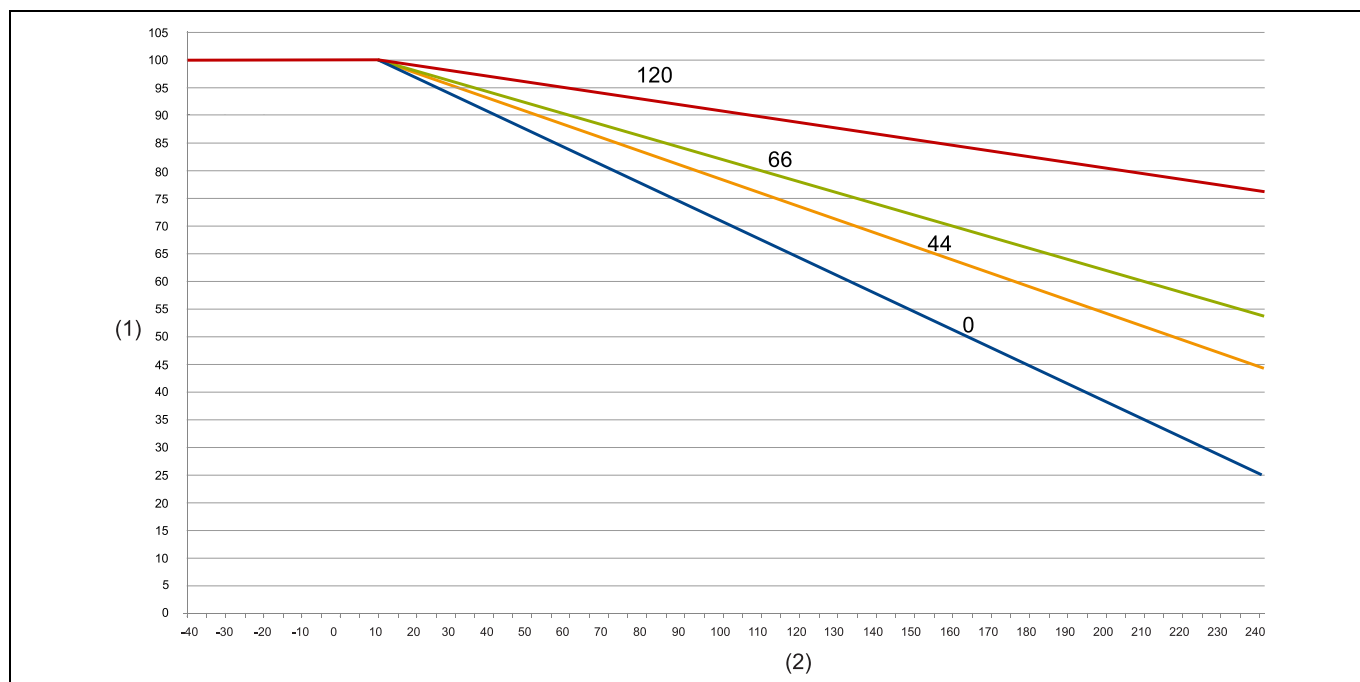
Connection housing small, large, and stainless steel; extension tube lengths in mm



(1) Maximum ambient temperature

(2) Media temperature

Connection housing Ex d and Ex d, stainless steel; extension tube lengths in mm



(1) Maximum ambient temperature

(2) Media temperature

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Approvals and approval marks

ATEX, IEC EX, intrinsically safe, Ex i Test facility Certificate/certification number Inspection basis Valid for	Eurofins Electrosuisse Product Testing AG SEV 18 ATEX 0134 X, IECEx SEV 18.0011X (2020-07-14) IEC/EN 60079-0, IEC/EN 60079-11, IEC/EN 60079-26, DIN EN ISO 80079-36, DIN EN ISO 80079-37 Type 408340/263, Type 408340/362, Type 408340/662
ATEX, IEC EX, flameproof enclosure, Ex d Test facility Certificate/certification number Inspection basis Valid for	Eurofins Electrosuisse Product Testing AG SEV 18 ATEX 0133 X, IECEx SEV 18.0010X (2020-08-31) IEC/EN 60079-0, IEC/EN 60079-1, IEC/EN 60079-26, IEC/EN 60079-31, DIN EN ISO 80079-36, DIN EN ISO 80079-37 Type 408340/264, Type 408340/462, Type 408340/962
DNV GL Test facility Certificate/certification number Inspection basis Valid for	DNV GL TAA00001VR Class Guidelines CG 0339, November 2016 Type 408340/062, Type 408340/662, Type 408340/962
German Water Resources Act (WHG) Test facility Certificate/certification number Inspection basis Valid for	DIBT Z-65.11-608 Approval principles for safety devices for tanks and pipelines, overfill protection (ZG-ÜS) Type 408340/262, Type 408340/263, Type 408340/264
EAC ^a Test facility Certificate/certification number Inspection basis Valid for	СИСТЕМА КАЧЕСТВА Д-DE.HP15.B.06254/20 Standard TR TS 020/2011 Type 408340/...
EAC-Ex ^a Test facility Certificate/certification number Inspection basis Valid for	ПрофиТест ЕАЭС RU C-DE.HB07.B.00316/20 TR TS 012/2011 Type 408340/263, Type 408340/264, Type 408340/362, Type 408340/462, Type 408340/662, Type 408340/962 – each with extra code 240

^a Russian documentation upon request

NOTE!

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

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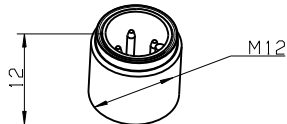
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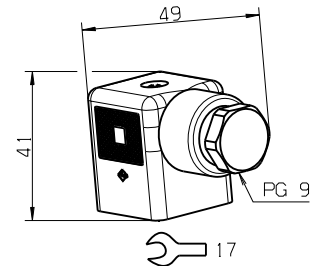
Dimensions

Electrical connection

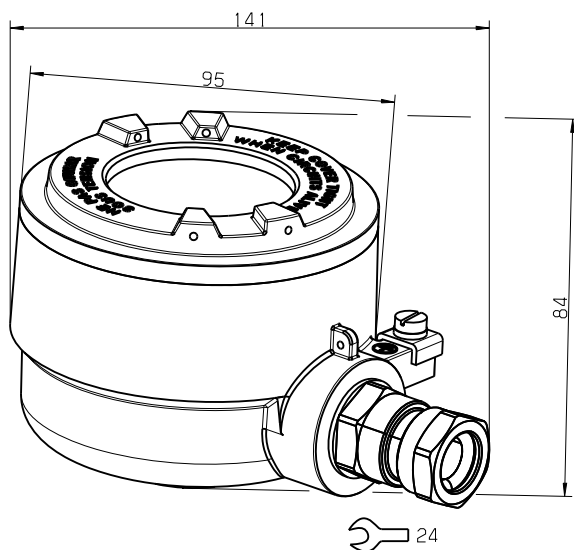
036
Rundstecker M12 × 1



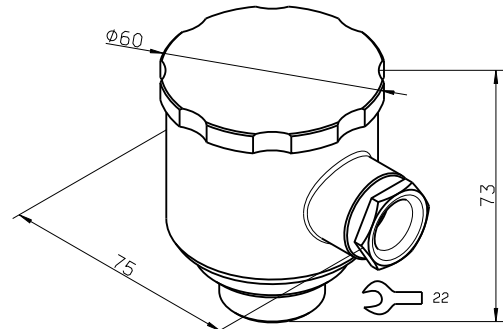
061
Cable socket DIN EN 175301-803



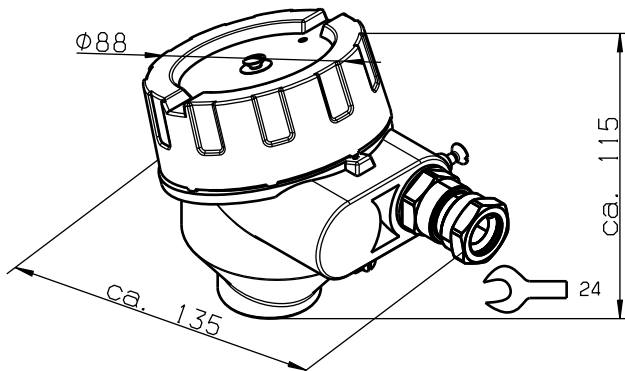
115
Terminal head Ex d



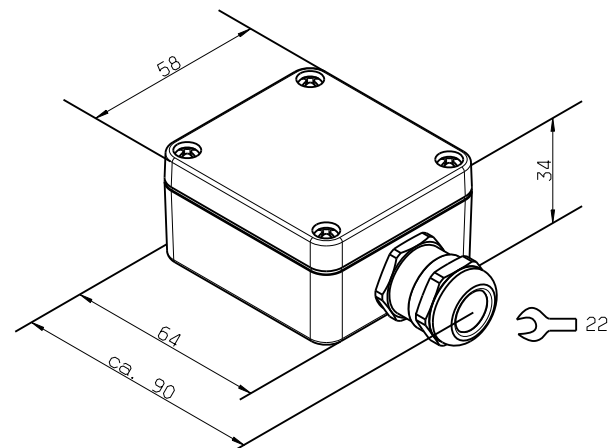
117
Stainless steel terminal head



118
Terminal head Ex d, stainless steel



130
Connection housing, cube-shaped, small



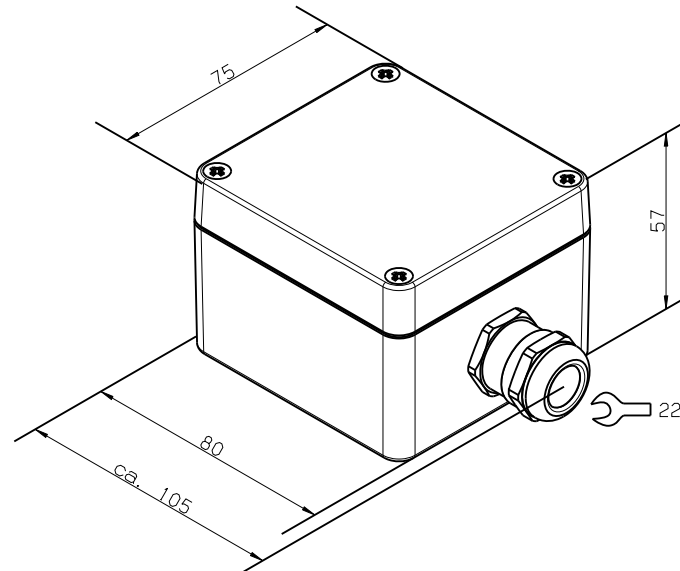
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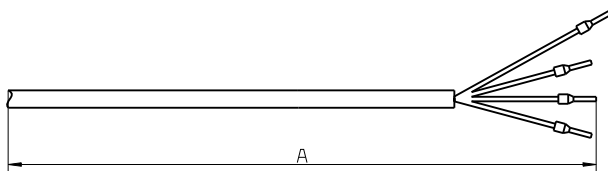
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131
 Connection housing, cube-shaped, large

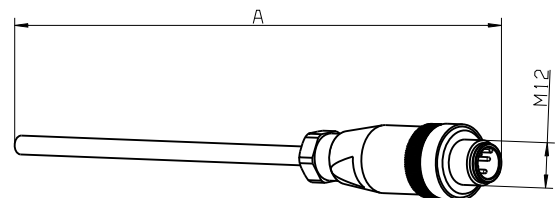


150 PVC, 160 silicone, 170 PUR
 Cable with ferrules



A Cable length, see order details

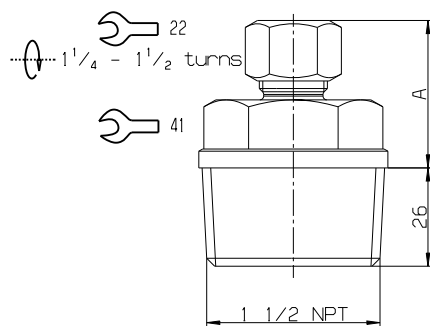
152 PVC, 162 silicone, 172 PUR
 Cable with M12 connector



A Cable length, see order details

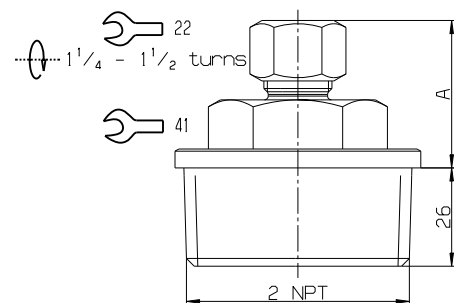
Process connections

515
 1 1/2 NPT



A 39

516
 2 NPT



A 39

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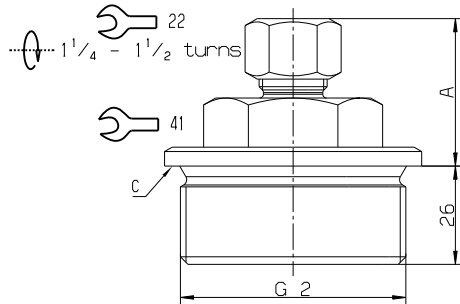
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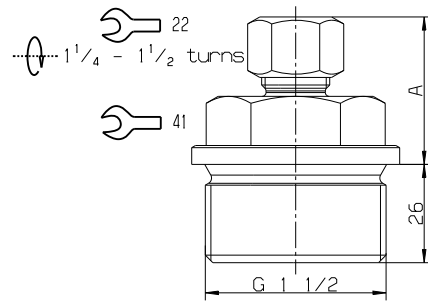
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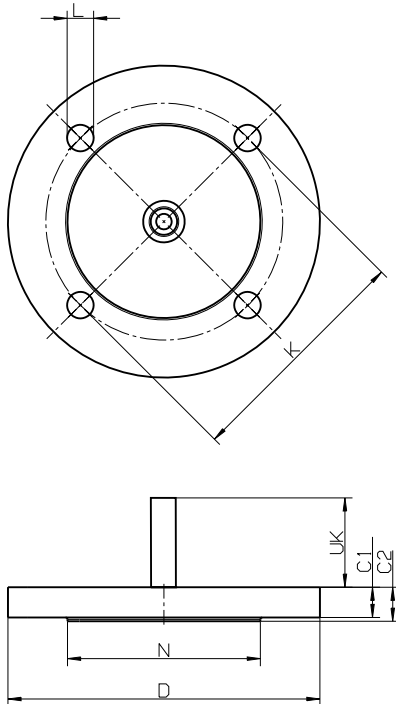
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**Data Sheet 408340****Page 9/16****569****G 2****A 39**

c A seal/O-ring with a thickness of at least 2 mm is recommended.

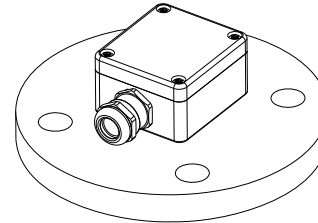
570**G 1 1/2****A 39**

Flange according to following table



Example of extension tube; also available for other process connections; UK = extension tube length + 9 mm

Alignment of cable fitting between flange holes



Order code	Flange designation	Hole circle K	Number of holes	Diameter of holes L	Exterior diameter D	Diameter of sealing strip N	Strength of flange C1	Strength of flange including sealing strip C2
703	Flange 2.5" 150 lbs ANSI B 16.5 RF	139.7	4	19.1	177.8	104.6	26.8	28.4
713	Flange 2" 150 lbs ANSI B 16.5 RF	120.7	4	19.1	152.4	91.9	23.8	25.4
714	Flange 2" 300 lbs ANSI B 16.5 RF	127	8	19	165.1	92.1	20.6	22.2
729	Flange DN 50, PN40, EN 1092-1, form B1	125	4	18	165	102	17	20
784	Flange DN 65, PN40, EN 1092-1, form B1	145	8	18	185	122	19	22
785	Flange DN 80, PN40, EN 1092-1, form B1	160	8	18	200	138	21	24
786	Flange DN 100, PN40, EN 1092-1, form B1	190	8	22	235	162	21	24

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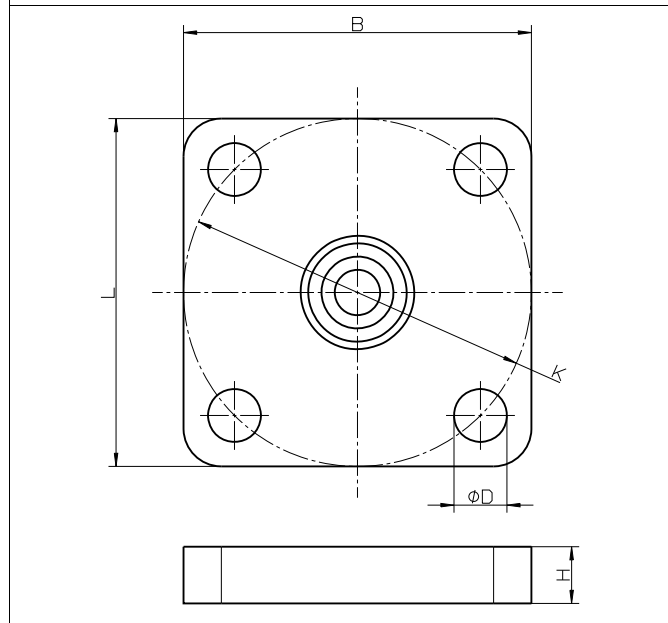
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Square flange according to following table^a

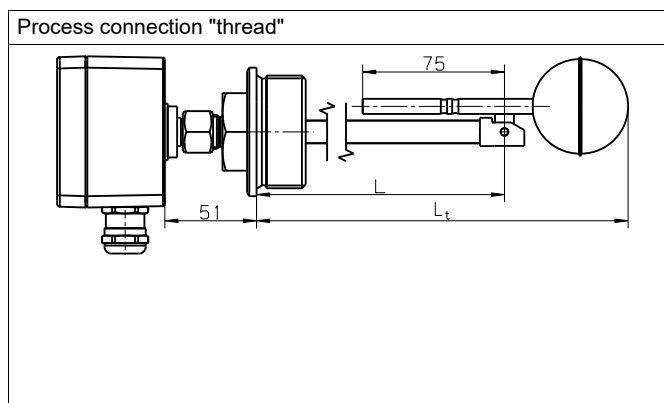
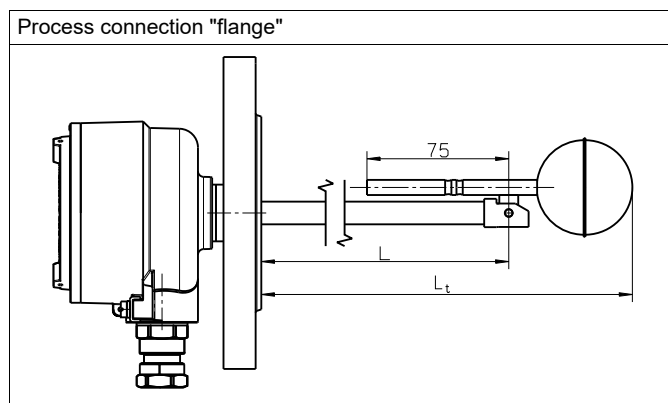


^a For the alignment of the cable fitting please see page 10

Order code	Length L	Width B	Height H	Number of holes	Hole circle K	Diameter of holes D
975	80	80	12	4	83	9
976	92	92	15	4	92	14

Important information about the order details

An example for the dimensions of guide tube length L is shown below.



L Guide tube length in mm
for flange version L = 85 mm min.
for thread version L = 110 mm min.

042 L_t overall insertion length = Guide tube length L + 100 mm

052 L_t overall insertion length = Guide tube length L + 70 mm

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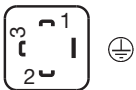
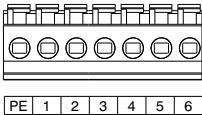
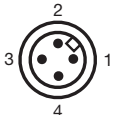
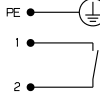
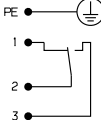
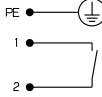
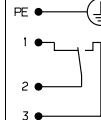
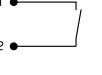
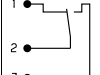
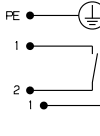
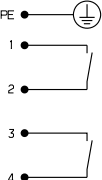
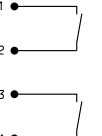
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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

Number of contacts								
	Cable SPST-NO	SPDT-CO	Cable socket SPST-NO	SPDT-CO	Connection housing SPST-NO	SPDT-CO	Round plug M12 SPST-NO	SPDT-CO
1	Silicone RD WH PUR BN WH PVC BN WH	Silicone RD WH RD/BU PUR BN BU BK PVC BN WH GN						
2	Silicone RD WH RD/BU WH/BU PVC BN WH GN YE	-		-		-		-
Protection rating ^a	prepared for 2 according to EN 61010-1		1	1	1	1	3	3

^a According to DIN EN 61140

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	Cable	Cable socket	Connection housing	Round plug M12
Temperature sensor Pt100 ^a	Silicone ^b Silicone ^b 	-		
Temperature sensor Pt1000 ^a	PVC ^b 			
Temperature switch ^a	Silicone ^{c, d} 			
	PVC ^{c, e} 			

^a Assignment is always to terminals with the highest numbers

^b For 1× SPST-NO switching contacts

^c For 2× SPST-NO or 1×SPDT-CO switching contacts

^d According to VDE 0298-4 max. current 0.8 A at max. 175 °C or 2 A to max. 150 °C

^e According to VDE 0298-4 max. current 0.8 A at max. 75 °C or 2 A to max. 50 °C

NAMUR circuit, switching signal according to DIN EN 60947-5-6

Versions with NAMUR circuitry may only be operated with switching voltages DC ≤ 15 V. A NAMUR circuit is assigned to each switching contact. Depending on the selected electrical connection, the wiring diagram is identical to the above. The NAMUR circuit can be used to detect line faults (line break, short-circuit) in a suitable evaluation unit (e.g. see Ex-i isolating amplifier accessories).

	SPST-NO/NC	SPDT-CO
Scheme		
Example: 1 switching contact with silicone cable		

Legend: cable	BN	Brown	GN	Green
	WH	White	RD	Red
	BU	Blue	YE	Yellow
	PK	Pink	GY	Gray

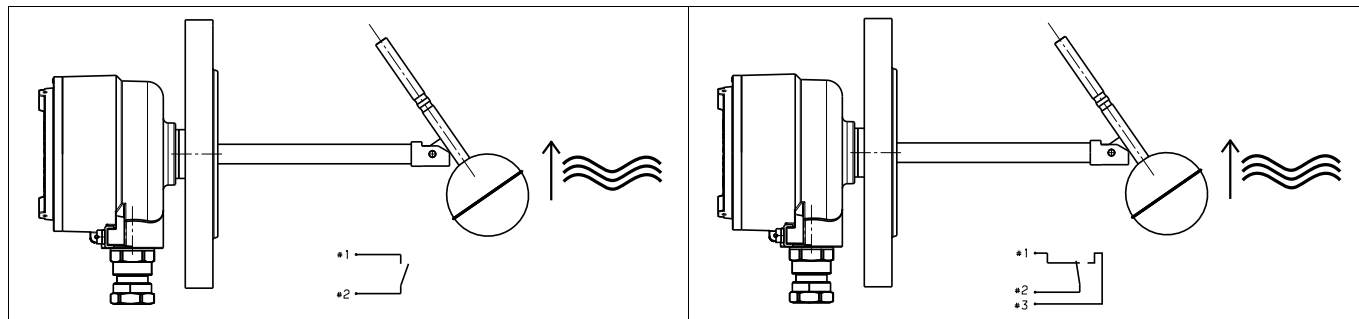
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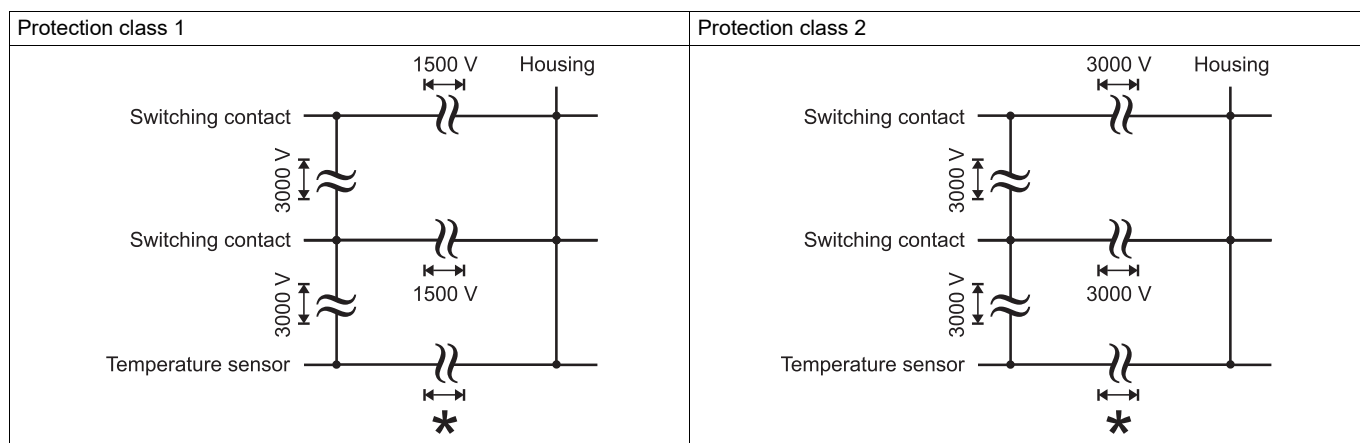
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The switching function is taken into account as follows, depending on how the device is installed in an empty container.



The galvanic isolation is realized as follows:



Caution:

* Functional galvanic isolation

If connected to a certified intrinsically safe electrical circuit Ex i, the following values are given.

Contact function	Max. voltage U_i in V	Max. current I_i in mA	Max. power P_i in mW	Internal inductance in μH	Internal capacitance in pF
SPST-NO	≤ 30	≤ 100	≤ 750	~ 0	~ 0
SPDT-CO				for cable version 1 $\mu H/m$	for cable version 200 pF/m
Temperature switch				connecting cable	connecting cable

When using explosion-proof versions (intrinsically safe, Ex i, and flameproof enclosure, Ex d), the following values are given.

Contact function	Max. voltage U_i in V	Max. current I_i in mA	Max. power P_i in mW	Internal inductance in μH	Internal capacitance in pF
Pt100	≤ 30	≤ 55	≤ 413	~ 0	~ 0
Pt1000				for cable version 1 $\mu H/m$	for cable version 200 pF/m
NAMUR circuit	≤ 15	≤ 60	≤ 225	connecting cable	connecting cable

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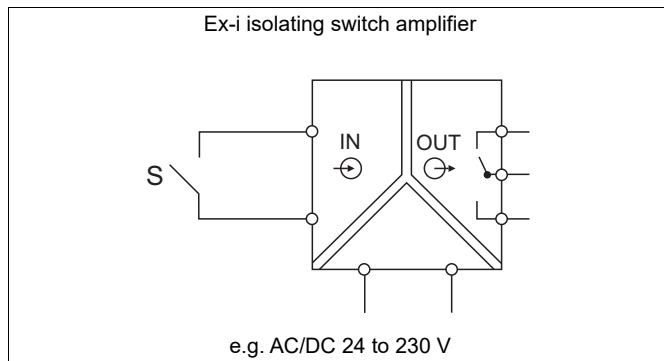
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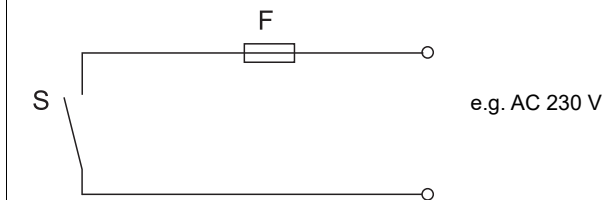


Connection examples of versions with explosion protection

Float switch (S)

Ex i**Ex d**

According to operating manual 408301, chapter 6 on "Installation", the fuse (F) must be selected.



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Order details

	(1) Basic type
408340	JUMO NESOS R40 LSH – Horizontal float switch
	(2) Basic type extension
000	None
062	Shipbuilding approval
262	WHG approval (German Water Resources Act)
263	WHG approval (German Water Resources Act), explosion protection, intrinsically safe, Ex i
264	WHG approval (German Water Resources Act), explosion protection, flameproof enclosure, Ex d
362	Explosion protection, intrinsically safe, Ex i
462	Explosion protection, flameproof enclosure, Ex d
662	Shipbuilding approval and explosion protection, intrinsically safe, Ex i
962	Shipbuilding approval and explosion protection, flameproof enclosure, Ex d
	(3) Electrical connection
036	Round plug M12 × 1
061	Cable socket DIN EN 175301-803, form A
115	Terminal head Ex d
117	Stainless steel terminal head
118	Terminal head Ex d, stainless steel
130	Connection housing, cube-shaped, small
131	Connection housing, cube-shaped, large
150	Cable, PVC
152	Cable, PVC with M12 connector
160	Cable, silicone
162	Cable, silicone with M12 connector
170	Cable, PUR
172	Cable, PUR with M12 connector
	(4) Cable length
0000	None
2000	2000 mm
5000	5000 mm
100 - 5000	Specifications in plain text (increments of 100 mm)
	(5) Process connection
515	1 1/2 NPT
516	2 NPT
569	G 2
570	G 1 1/2
703	Flange 2.5" 150 lbs ANSI B 16.5 RF
713	Flange 2" 150 lbs ANSI B 16.5 RF
714	Flange 2" 300 lbs ANSI B 16.5 RF
729	Flange DN 50, PN40, EN 1092-1, form B1
784	Flange DN 65, PN40, EN 1092-1, form B1
785	Flange DN 80, PN40, EN 1092-1, form B1
786	Flange DN 100, PN40, EN 1092-1, form B1
975	Square flange, 80 × 80 × 12
976	Square flange, 92 × 92 × 15
	(6) Guide tube length L^a
100 - 1000	Specifications in plain text (increments of 50 mm)

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(7)	Float
042	Cylinder, stainless steel, diameter 42, density 390 kg/m ³
052	Spherical, stainless steel, diameter 52, density 420 kg/m ³
(8)	Switching function
10	SPST-NO, NO contact (100 VA/AC 230 V/1 A)
12	SPDT-CO, single-pole changeover contact (60 VA/AC 230 V/1 A)
(9)	Number of contacts
1	1 contact
2	2 contacts
(10)	Extra codes
000	None
005	Integrated temperature sensor Pt1000 ^b
007	Integrated temperature sensor Pt100 ^b
009	Temperature switch, NC contact ^c
240	EAC-Ex approval
307	Extension tube ^d
663	NAMUR circuit ^a
954	Technical passport

^a Not available for shipbuilding approval, shipbuilding approval and explosion protection, intrinsically safe, Ex i, and shipbuilding approval and explosion protection, flameproof enclosure, Ex d.

^b The temperature sensor is positioned at the end of the guide tube.

^c Specify switching temperature in plain text. The temperature switch is positioned at the end of the guide tube.


^d Specify the extension tube length depending on the process temperature and ambient temperature in plain text.

⇒ For details on the dimensioning of the guide tube length L depending on the respective process connection, see Operating manual B 408301, chapter 3.2.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)									
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Minimum order quantity: 1 piece

Accessories

Designation	Description	Part no.
Ex-i repeater power supply and input isolating amplifier 	The intrinsically safe isolation switching amplifier ensures reliable, galvanic isolation and safe transmission of switching signals in Ex applications. It can be mounted in Ex zone 2. When using the NAMUR circuitry, line break and short circuit can be detected. Further technical data and the relevant safety regulations can be found in the operating instructions B 707540.0	00734357

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JUMO flowTRANS DP P

Pitot tube P01 to P04

Applications

- for flow measurement of liquids, gases and steam (saturated steam, overheated steam) in closed pipelines

Brief description

Flow measurements on the basis of the differential pressure method can be carried out with the JUMO flowTRANS DP P pitot tube in liquids, gases and steam in closed pipe systems. The different type series P01 to P04 can be used in a wide range of nominal widths, temperatures, and pressures.

The pitot tube can be mounted into the pipe either using a welding screw connection or a mounting pipe with flange connection, depending on the requirements.

The JUMO dTRANS p02/p20 DELTA differential pressure transmitter is connected to the probe head via a flange plate in the compact design. In the remote mount design type, the differential pressure transmitter is connected to the pitot tube via differential pressure pipes.

Pitot tube P01 and P02

- Flow measurement of liquids and gases
- Temperatures up to 1175 °C
- Nominal width up to DN 2000 (others on request)

Pitot tube P03 and P04

- Flow measurement of saturated steam and overheated steam
- Temperatures up to 450 °C at 100 bar
- Nominal width up to DN 1000

Customer benefits

- Cost advantages compared to flanged devices with large nominal widths
- Bidirectional flow measurement thanks to symmetrical pitot tube profiles
- Short inlet and outlet sections
due to measurement and averaging of the static and dynamic pressure at four measuring locations along the probe profile
- Low pressure losses
due to probe profiles with optimized hydraulic design



JUMO flowTRANS DP P01

Special features

- Probe profile with optimized hydraulic design
- Excellent reliability under difficult operating conditions

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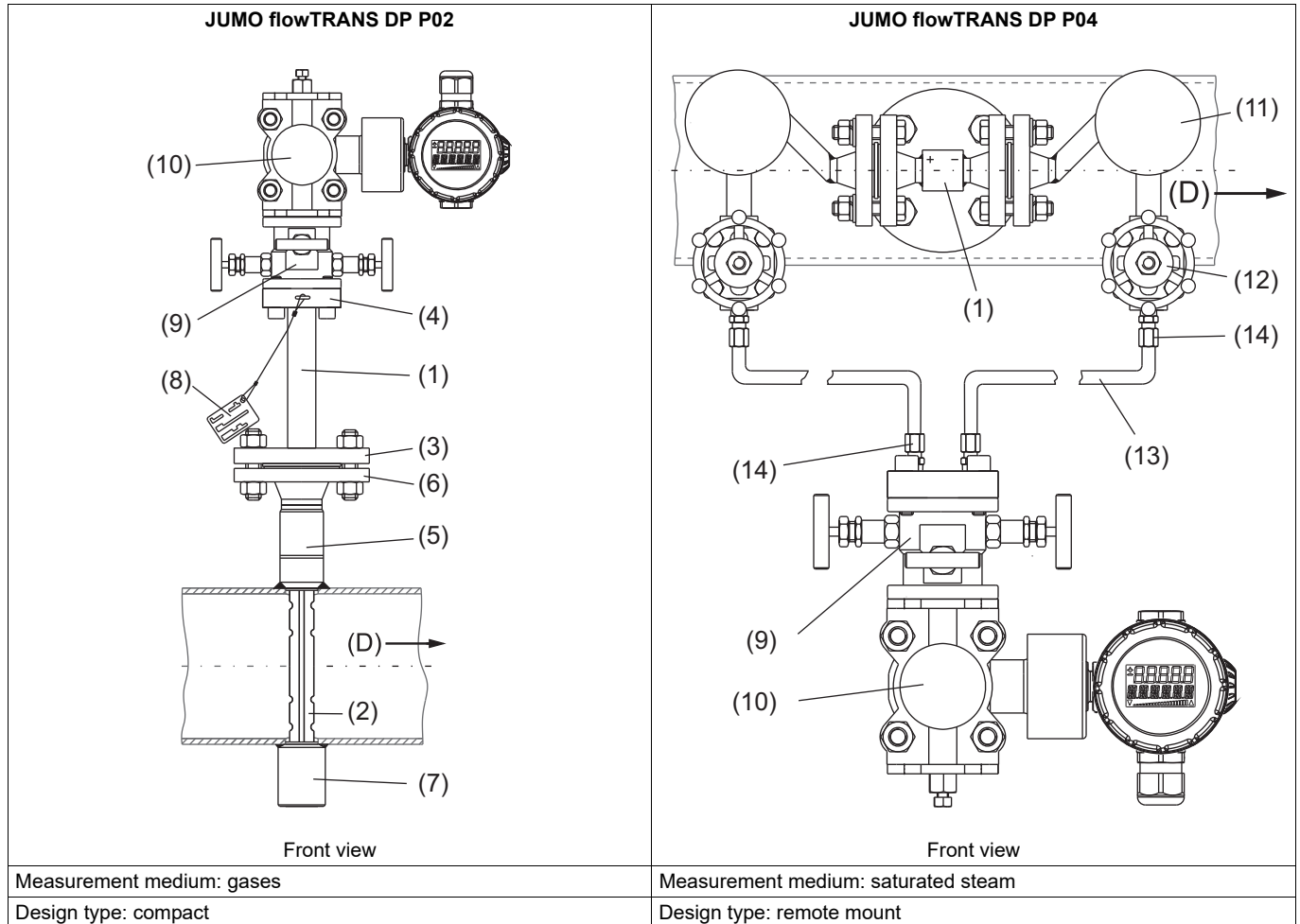
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Assembly of a flow measuring system

Examples:



- | | | |
|--|------------------------------|-------------------------------------|
| (1) Pitot tube | (2) Probe profile | (3) Probe flange |
| (4) Probe head | (5) Mounting pipe | (6) Mounting flange |
| (7) Counter-bearing (if required) | (8) Nameplate | (9) Valve block (3- or 5-way valve) |
| (10) Differential pressure transmitter | (11) Condensate trap | (12) Shut-off device |
| (13) 12 × 1 mm Ermeto pipe | (14) Ermeto screw connection | (D) Flow direction (medium) |

The differential pressure transmitter JUMO dTRANS p02 DELTA or JUMO dTRANS p20 DELTA supplements the pitot tube JUMO flowTRANS DP P01, P02, P03 or P04 to create a flow measuring system.

Measuring principle

Differential pressure method

The measuring principle of the pitot tube uses the pressure difference between the dynamic pressure building up upstream of an obstacle blocking the flow and the static pressure immediately at the rear of the probe.

In accordance with the Continuity Law derived from Bernoulli and the energy equation of a stationary, friction-free pipe flow, the total of the pressure energy, the potential energy, and the kinetic energy must have the same value at every point in the pipe and at any time. **Equation 1:**

$$p_{\text{stat}} + p_{\text{dyn}} = \text{const}$$

The measurand p_{stat} is the static pressure applied evenly in all directions. The measurand p_{dyn} stands for the dynamic pressure applied in the direction of flow.

For fluids flowing in horizontal pipelines, where the speeds of flow are low in relation to the Mach number $Ma < 1$, p_{dyn} can be calculated with the flow speed v , the density ρ and the resistance coefficient ζ in accordance with **Equation 2:**

$$p_{\text{dyn}} = \zeta \frac{\rho}{2} v^2$$

If a fixed body is inserted into a steady flow, the flow will back up immediately upstream from this body and will come to a complete standstill at the so-called stagnation point (see S2 in Figure 1). At this point, the total pressure p_{s2} is expressed with **Equation 3:**

$$p_{s2} = p_{\text{stat}} + p_{\text{dyn}}$$

At the openings on the side of a pitot tube facing away from the flow, only the direction-independent pressure p_{stat} can be applied. The difference between the two pressures, the differential pressure (effective pressure) Δp , is a measure of the speed of the flow against the body (see Figure 2) **Equation 4:**

$$\Delta p = p_{s2} - p_{s1}$$

Applying **Equation 2** and **Equation 3** to **Equation 4** leads to **Equation 5:**

$$\Delta p = \zeta \frac{\rho}{2} v^2$$

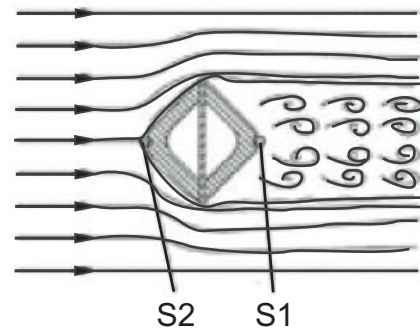


Figure 1: Diagram of the flow field at the profile of the pitot tube

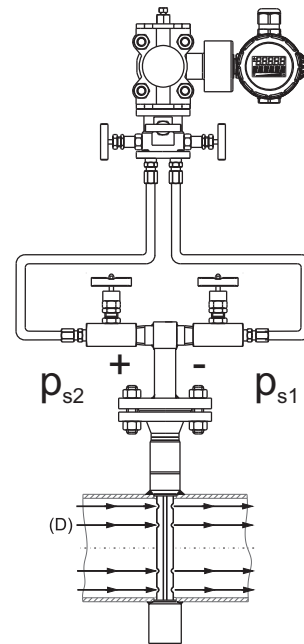


Figure 2: Diagram showing the generation of the differential pressure

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Selection criteria

Preselection of the type series

First, the type series is pre-selected on the basis of the medium to be measured:

Measurement medium	Type series
Liquids and gases	JUMO flowTRANS DP P01
	JUMO flowTRANS DP P02
Steam (saturated steam, overheated steam)	JUMO flowTRANS DP P03
	JUMO flowTRANS DP P04

Specification of the type series

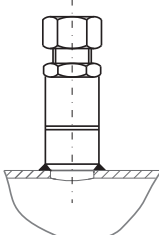
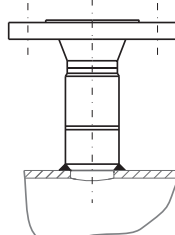
The area of application (operating pressure and temperature of the plant) influences the selection of the probe material and the type of installation into the pipeline. The type series is specified using the following criteria:

Pitot tube for liquids and gases:

Area of application	Probe material	Installation type	Type series
Up to 200 °C (at 25 bar)	1.4571	Welding screw connection	JUMO flowTRANS DP P01
Up to 1175 °C	e.g. 1.4462 (Duplex), etc.	Mounting pipe	JUMO flowTRANS DP P02

Pitot tube for steam:

Area of application	Probe material	Installation type	Type series
Up to 200 °C (at 16 bar)	1.4571	Welding screw connection	JUMO flowTRANS DP P03
Up to 450 °C (at 100 bar)	e.g. 1.4462 (Duplex), etc.	Mounting pipe	JUMO flowTRANS DP P04

Welding screw connection (JUMO flowTRANS DP P01/P03)	Mounting pipe with flange (JUMO flowTRANS DP P02/P04)
	

Material of the mounting parts

The material of the mounting parts depends on the material of the pipeline where the pitot tube is to be fitted (weldability).

Selection of the design type

The medium temperature, the installation location, and the local environment will influence the selection of the design type. The JUMO flowTRANS DP P pitot tubes are available in compact and remote mount design types.

Environmental influences	Design type
Medium temperature, ambient temperature, space conditions, read-out options, etc.	compact
	remote mount

The compact design type is the more cost-effective variant due to additional installation and material costs incurred when selecting the remote mount design type.

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Type series

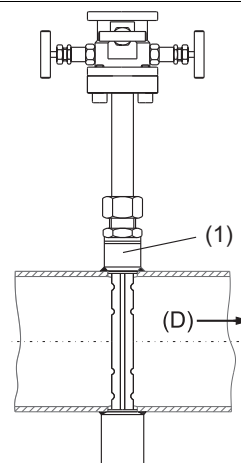
Pitot tubes for liquids and gases

JUMO flowTRANS DP P01

The installation between the pipeline and the pitot tube modules is carried out with a welding screw connection (1) and offers an excellent price/performance ratio for applications without any particularly high requirements for the operating pressure or the operating temperature.

1.4571 is available as a probe material.

The probe's enables a 3- or 5-way valve block to be installed for the direct attachment of the differential pressure transmitter.



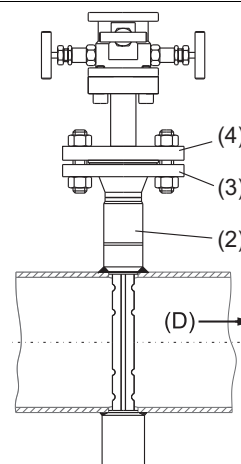
JUMO flowTRANS DP P02

The probe flange (4) is screwed to the mounting flange (3) of the mounting pipe (2). As a result, this version can be used up to PN 400.

The maximum pressure stage is dependent only on the flange pressure stage.

The probe is produced as standard in material 1.4571.

The following materials are also still available: 1.4462 (Duplex), 1.4539, Hastelloy C4, Incoloy 800, Inconel, Monel.



Probe heads

The JUMO flowTRANS DP P01/P02 pitot tubes are available with the following probe heads:



Probe head with 1/4" and 1/2" NPT external thread



Probe head with flange plate for the fitting of 3- and 5-way valve blocks

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Pitot tubes for steam

JUMO flowTRANS DP P03

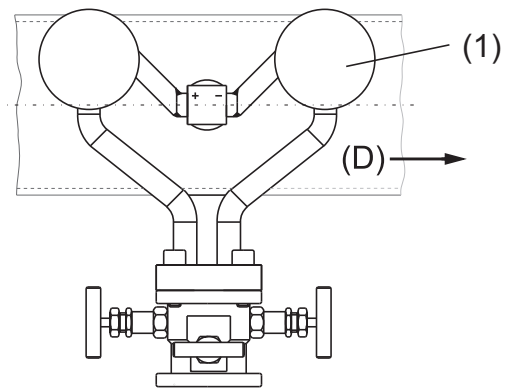
The installation between the pipeline and the pitot tube modules is carried out with a welding screw connection.

For technical safety reasons, it is necessary to ensure the tightness of the screw connection, so the pressure nut must be tightened.

1.4571 is available as a probe material.

The condensate traps are indispensable for measuring the flow of steam:

- The water seal in the condensate traps acts as temperature protection for the connected transmitter
- The water columns in the condensate traps must be positioned at exactly identical, hydrostatic heights above the differential pressure transmitter



Front view

JUMO flowTRANS DP P04

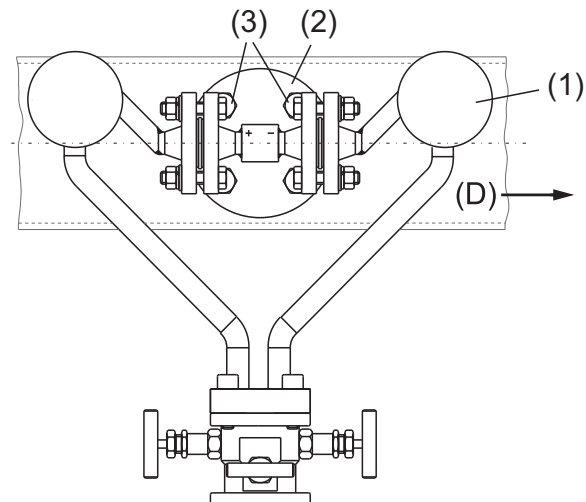
The probe flange (2) is screwed to the mounting flange of the mounting pipe (3).

As a result, this version can be used at operating pressures up to 100 bar at 450 °C.

The probe is produced as standard in material 1.4571.

The condensate traps are indispensable for measuring the flow of steam:

- The water seal in the condensate traps acts as temperature protection for the connected transmitter
- The water columns in the condensate traps must be positioned at exactly identical, hydrostatic heights above the differential pressure transmitter



Front view

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Technical data

Mechanical features

	Liquids, gases		Steam	
	JUMO flowTRANS DP P01	JUMO flowTRANS DP P02	JUMO flowTRANS DP P03	JUMO flowTRANS DP P04
Application area				
Up to 200 °C (16 bar)	x	x	x	x
Up to 200 °C (25 bar)	x	x		x
Up to 450 °C (100 bar) with 1.4571		x		x ^a
Up to 1175 °C		x ^a		
Nominal width				
DN 25 to DN 2000 (1" to 80")	x			
DN 40 to DN 800 (1 1/2" to 32")			x	
DN 40 to DN 1000 (1 1/2" to 40")				x
DN 40 to DN 2000 (1 1/2" to 80")		x		
Probe material				
1.4571	x	x	x	x
1.4462 (Duplex), Inconel, Monel, 1.4539, Hastelloy C4, Incoloy 800, PVDF		x		
Assembly parts material				
C-steel, 1.4571	x	x	x	x
1.4462 (Duplex), Inconel, Monel, 1.4539, Hastelloy C4, Incoloy 800, PVDF		x		
A335 Grade P1, A335 Grade P11, A335 Grade P22, A335 Grade P91				x
Pipeline connection				
Welding screw connection (screw connection with welding socket and pressure nut)	x		x	
Assembly pipe (flange connection for mounting the probe)		x		x
Installation and removal				
An interruption to operations is necessary	x	x		
Emptying of the pipeline is necessary			x	x

^a Depending on the use of the materials

Environmental influences

Measurement uncertainty

The measurement uncertainty for the JUMO flowTRANS DP P pitot tubes is ± 1 %

Pressure loss

Low pressure losses due to probe profiles with optimized flow properties.

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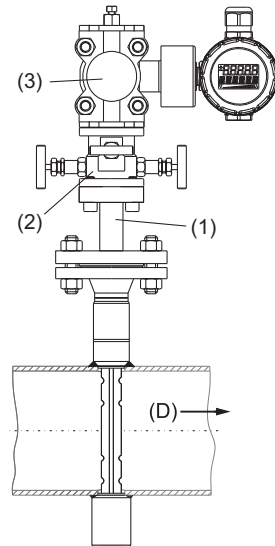


Design

All type series of the pitot tubes for liquids, gases, and steam are available in compact and remote mount design types. The compact and/or remote mount design type refer to the manner in which the components (pitot tube, valve block, and transmitter) are installed.

JUMO flowTRANS DP P – compact design type

In the compact design type, the pitot tube (1), a separate 3- or 5-way valve block (2), and the transmitter (3) are bolted to a compact unit.



Front view

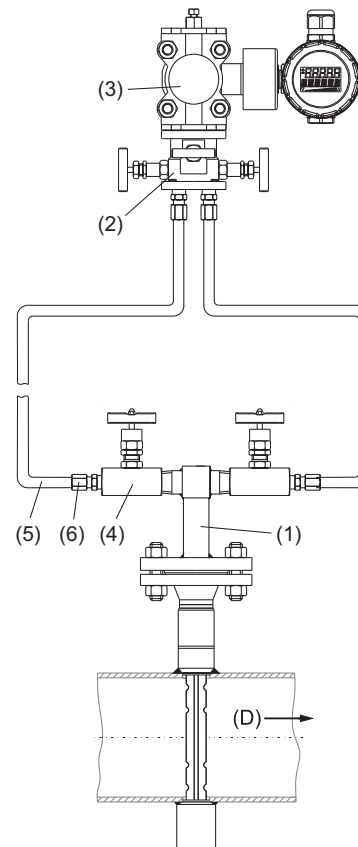
JUMO flowTRANS DP P – remote mount design type

In the remote mount design type, the pitot tube (1) and the transmitter (3) are separated from each other.

In addition to the separate 3- or 5-way valve block (2), two shut-off devices (4), two 12 × 1 mm Ermeto pipes (5), and the corresponding Ermeto screw connections (6) are needed on the shut-off device and the valve block.

If necessary, additional mounting brackets may be needed for the transmitter.

The assembly effort is greater than with the compact design type.



Front view

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Mounting

Installation position (liquids)

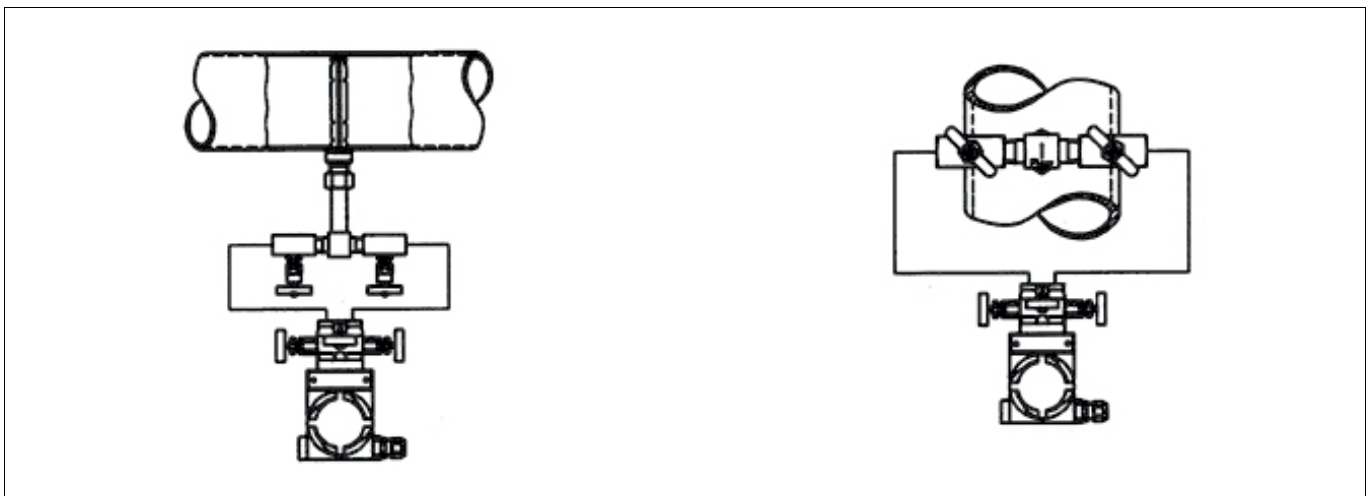


NOTE!

Never fit the pitot tube from above into the pipeline! Rising air bubbles may distort the measuring result!

Recommended installation position:

- Fit the pitot tube from the side or from below into the pipeline
- Install the differential pressure transmitter under the effective pressure outlet



Installation position (gases)

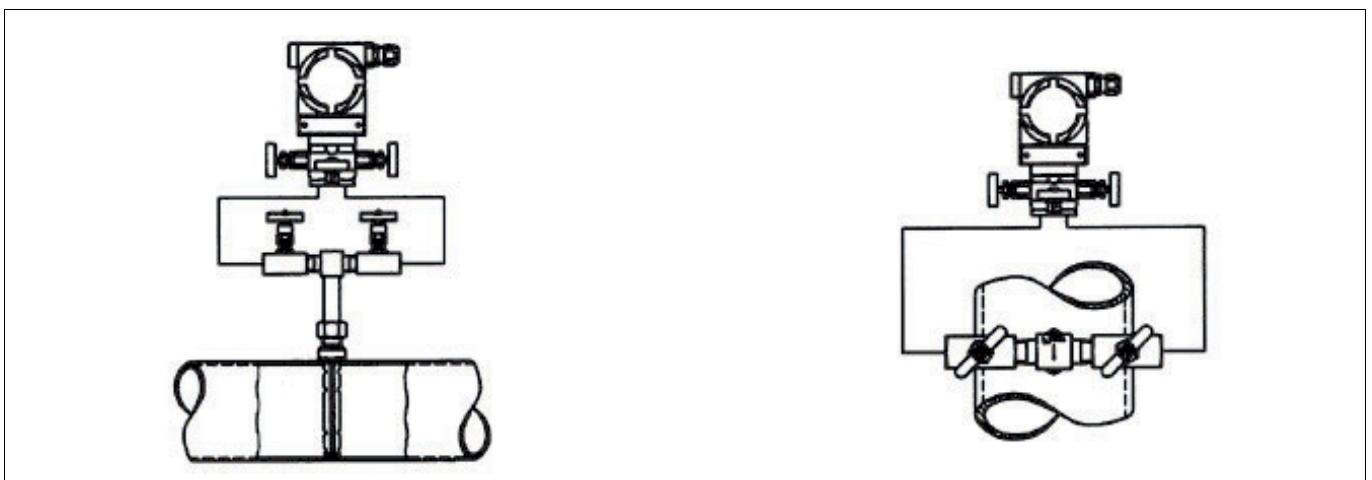


NOTE!

Never fit the pitot tube from below into the pipeline! Liquid transported in gases can cause the liquid level to rise and may distort the measuring result!

Recommended installation position:

- Fit the pitot tube from the side or from above into the pipeline
- Install the differential pressure transmitter above the effective pressure outlet



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Installation position (steam)



NOTE!

Never fit the pitot tube from above into the pipeline! The exchange between the steam-water aggregate states must be able to run smoothly!

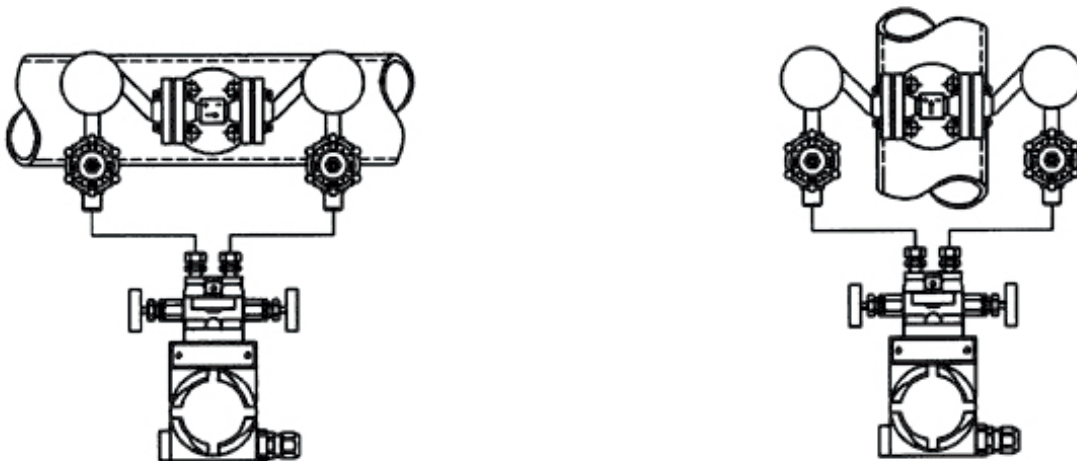


NOTE!

Do not insulate the condensate traps!

Recommended installation position:

- Fit the pitot tube from the side into the pipeline
- Install the differential pressure transmitter below the effective pressure outlet
The water columns in the condensate traps must be positioned at exactly identical, hydrostatic heights above the differential pressure transmitter.



Inlet and outlet section

As the precision of the measuring result of the pitot tube depends on the formation of a flow profile that is as undisturbed as possible, the importance of selecting a suitable installation position must not be underestimated.

In general, control valves, throttle valves, and shut-off valves should be installed downstream of the pitot tube. If it is not possible to comply with the specified values, the pitot tube may also be installed downstream of an elbow or in short inlet and outlet sections. Naturally, this will impair the precision. In unfavorable flow conditions, the loss of precision may be approx. 3 %.



NOTE!

If the recommended straight sections for the inlet and outlet are not available, the measuring precision can be adjusted to the conditions of the meter run with a comparative measurement (e.g. Pitot tube, individual point measurement).

An individual point measurement guarantees that the differential pressure corresponds to the genuine speed, so achieving the specified degree of precision.

Details are available on request from the manufacturer.

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The following inlet and outlet sections have confirmed and proven their value in practice, and are helpful in selecting a suitable installation location:

(A)	(B)	
7 × DN	3 × DN	
9 × DN	3 × DN	
17 × DN	4 × DN	
18 × DN	4 × DN	
7 × DN	3 × DN	Constriction of the pipeline
7 × DN	3 × DN	Expansion of the pipeline
24 × DN	4 × DN	Regulation unit

(A) Inlet section

(B) Outlet section

DN Nominal width (pipe diameter)

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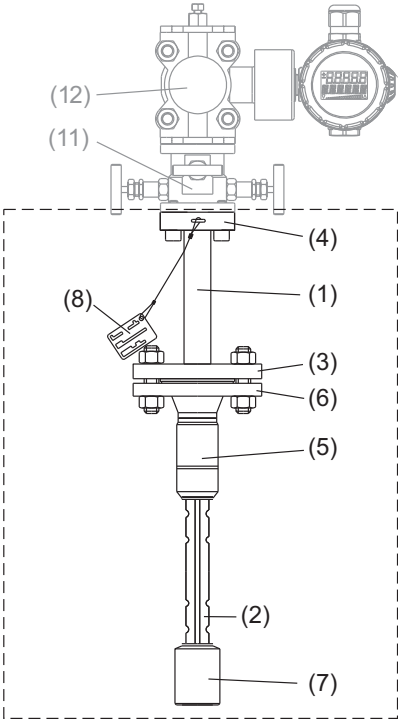
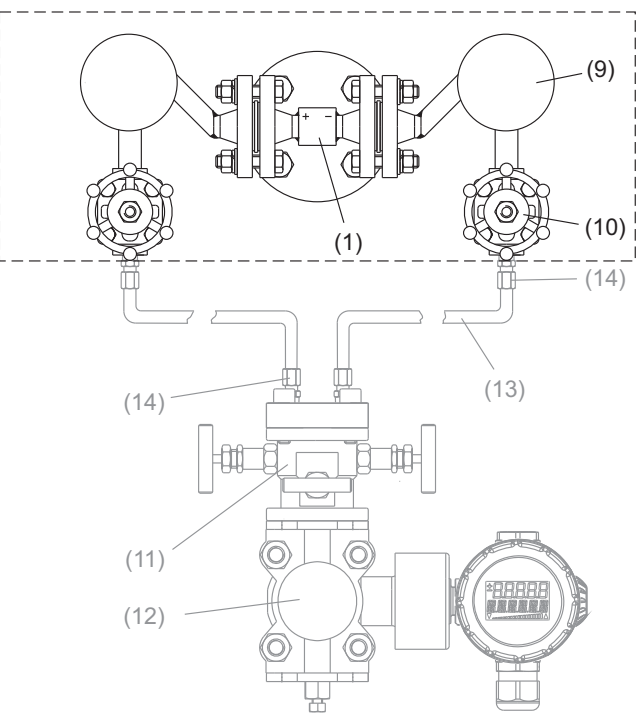
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Scope of delivery

Examples

JUMO flowTRANS DP P02	JUMO flowTRANS DP P04
 <p>Front view</p>	 <p>Front view</p>
Measurement medium: gases	Measurement medium: saturated steam
Design type: compact	Design type: remote mount

- | | | |
|-----------------------------------|-------------------|---------------------|
| (1) Pitot tube | (2) Probe profile | (3) Probe flange |
| (4) Probe head | (5) Mounting pipe | (6) Mounting flange |
| (7) Counter-bearing (if required) | (8) Nameplate | (9) Condensate trap |
| (10) Shut-off device | | |

Accessories

- | | | |
|--------------------------------------|--|----------------------------|
| (11) Valve block (3- or 5-way valve) | (12) Differential pressure transmitter | (13) 12 × 1 mm Ermeto pipe |
| (14) Ermeto screw connection | | |

The differential pressure transmitter JUMO dTRANS p02 DELTA or JUMO dTRANS p20 DELTA supplements the pitot tube JUMO flowTRANS DP P01, P02, P03 or P04 to create a flow measuring system.

Other accessories available on request.



JUMO flowTRANS DP R

Meter run R01 and orifice plate R02

Applications

- For the flow measurement of single-phase aggressive and non-aggressive gases, steam, and liquids
- In nominal widths up to DN 40 designed as a meter run R01
- In nominal widths as of DN 50 designed as a single-part orifice plate R02

Brief description

The flow measurement based on the differential pressure is universal and can be used in liquids, gases, and steams. The primary element JUMO flowTRANS DP R can be used in a wide range of nominal widths, temperatures, and pressures.

The differential pressure generated via the primary element (orifice plate) is measured using the differential pressure transmitter JUMO dTRANS p02 DELTA or JUMO dTRANS p20 DELTA and converted into a proportional flow signal.

The dimensioning of the primary element depends on the application that is acquired through a checklist. The measuring insert is designed as a standardized orifice plate.

Meter run R01

- Orifice plate with ring chamber tapping (carrier rings with replaceable measuring insert)
- Inlet and outlet sections correspond to default standards
- Other design types are possible based on the operating conditions

Orifice plate R02

- Orifice plate with single pressure tapping (carrier rings with integrated measuring insert)
- Compact design allows for the direct installation of the valve manifold and differential pressure transmitter on the orifice plate

Customer benefits

- Globally standardized measurement method according to ISO 5167 is defined, among other factors, by the dimensioning, the design type, and the installation conditions
- Sturdy design, no moving parts
The service lives are long due to the solid design and the lack of moving parts
The requirements of the standard on the orifice plate can be checked at any time
- Adaptable to the applications
Material selection of the system can be adjusted to the application



JUMO flowTRANS DP R01



JUMO flowTRANS DP R02

Special features

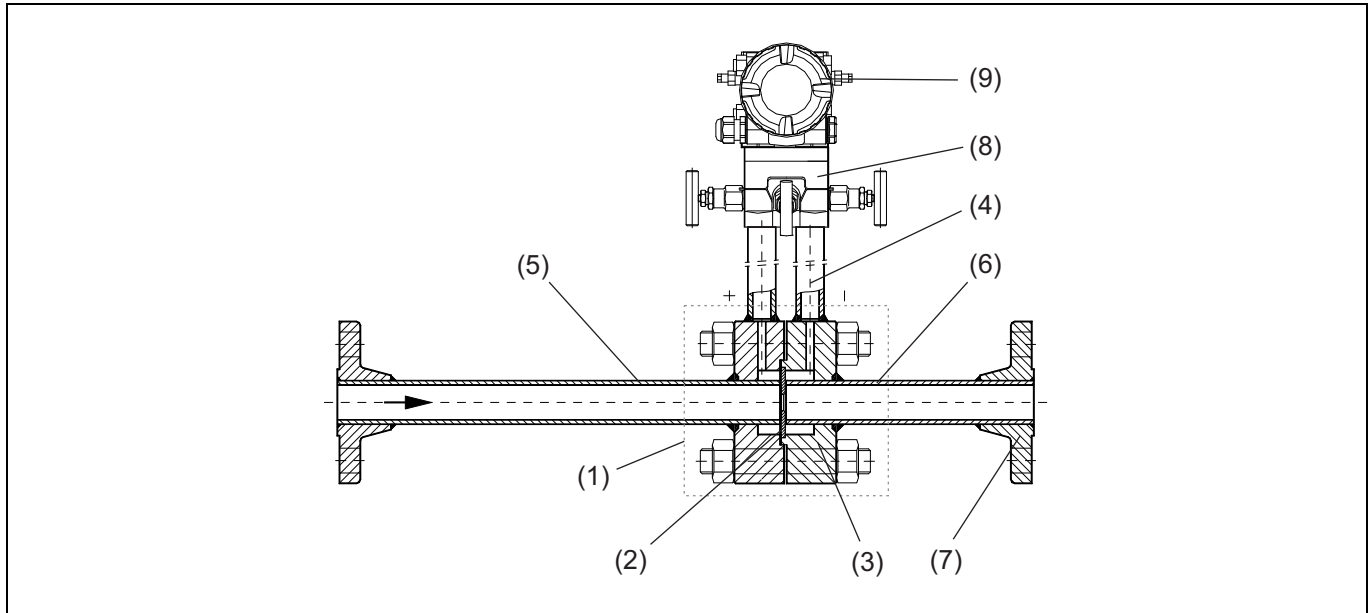
Meter run R01

- Nominal pressure up to PN 40 (ASME CL300)
- Nominal width up to DN 40 (1.5")
- Minor influence of installation faults on the measuring accuracy of meter runs

Orifice plate R02

- Nominal pressure up to PN 400 (ASME CL2500)
- Nominal width up to DN 1000 (40")
- Single-part and low-cost design of the orifice plate
- Reduced installation costs due to the omission of differential pressure pipes

Assembly of a flow measuring system



- | | | |
|-------------------------------------|----------------------|---------------------------------------|
| (1) Orifice plate (primary element) | (2) Measuring insert | (3) Carrier ring |
| (4) Pressure tapping | (5) Inlet section | (6) Outlet section |
| (7) Pipe flange | (8) Valve manifold | (9) Differential pressure transmitter |

Measuring principle

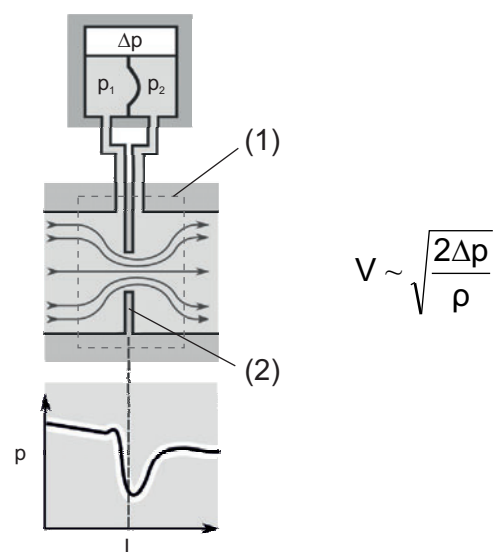
Differential pressure method with orifice plate

The differential pressure method involves the installation of an orifice plate into the pipe as a measuring insert. The orifice plate reduces the cross section of the pipe and causes a pipe flow constriction.

As a result of the reduction of the cross-section, the flow speed of the medium increases in line with the continuity equation and the static pressure decreases in line with the Bernoulli equation. These two relations can be linked with the volume flow.

To determine the volume flow, the static pressure is measured immediately before (p_1) and after (p_2) the orifice plate. The differential pressure $\Delta p = p_1 - p_2$ is calculated from this.

The generated differential pressure is measured with the JUMO dTRANS p02 DELTA or JUMO dTRANS p20 DELTA differential pressure transmitter and converted into a proportional flow signal.



- | | | |
|-------------------------------------|---|--|
| (1) Orifice plate (primary element) | (2) Measuring insert | L Pipe length |
| p Static pressure | p_1 Pressure before the orifice plate | p_2 Pressure after the orifice plate |
| Δp Differential pressure | | |

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Technical data

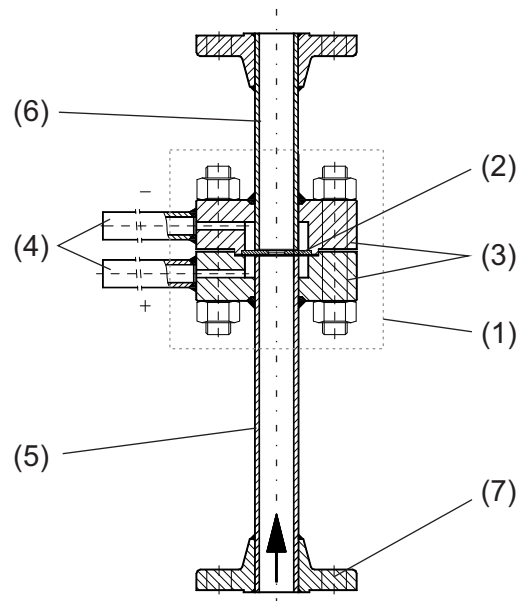
Design

Meter run R01 (to DN 40)

The meter run R01 with the orifice plate (carrier rings with replaceable measuring insert) is a primary element with ring chamber tapping.

The measuring insert is designed as a standardized orifice plate according to DIN EN ISO 5167-2 and in line with the respective operating conditions. Other forms of orifice plate are available upon request.

The meter runs are completely assembled and delivered ready-to-install.



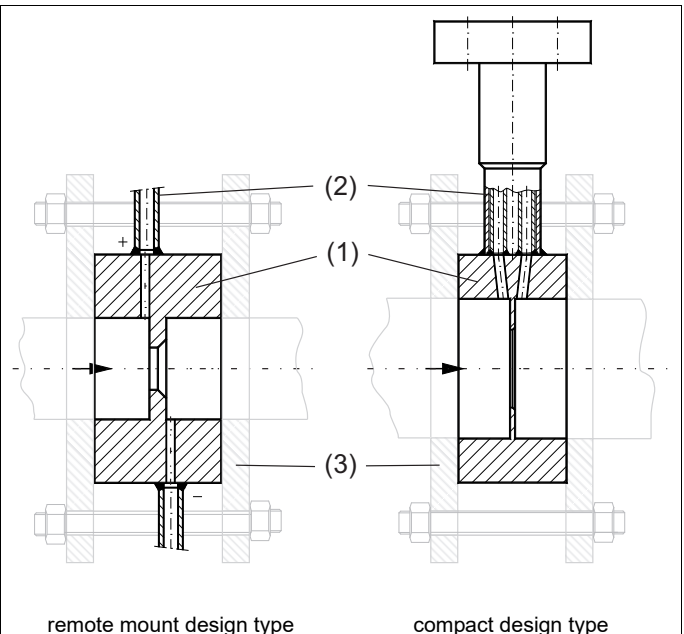
- | | | |
|-------------------------------------|----------------------|--------------------|
| (1) Orifice plate (primary element) | (2) Measuring insert | (3) Carrier ring |
| (4) Pressure tapping | (5) Inlet section | (6) Outlet section |
| (7) Pipe flange | | |

Orifice plate R02 (from DN 50)

The single-part orifice plate (carrier rings with integrated measuring insert) is a primary element with single pressure tapplings in a compact or remote mount design type.

The measuring insert cannot be exchanged and is designed as a standardized orifice plate according to DIN EN ISO 5167-2 and in line with the respective operating conditions. Other forms of orifice plate are available upon request.

The orifice plate is installed between the standardized pipe flanges.



- | | | |
|-------------------------------------|----------------------|---------------------|
| (1) Orifice plate (primary element) | (2) Pressure tapping | (3) Standard flange |
|-------------------------------------|----------------------|---------------------|

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Measuring insert (standard orifice plate)

It has proven to be practical to only use certain forms of orifice plates that allow the volume flow to be measured very precisely under suitable conditions.

The essential benefit of using orifice plates standardized according to DIN EN ISO 5167-2 is that all devices can be used considering all manufacturing and installation regulations without them having to be calibrated beforehand.

Pressure tappings and standard flanges

Pressure tapping (typical design length approx. 100 mm)	Smooth sockets for screw connections	
	Welded socket	
	Threaded socket	
	Socket with flanges	
	According to DIN EN 61518 (compact)	
Standard flange, meter run R01, sealing surface of orifice plate R02	According to DIN EN 1092-1	Smooth (form B1 and B2)
		Groove (form D)
		Return (form E)
	According to DIN 2696	Lens
	According to ASME B16.5	Smooth (RF and SF)
		Groove (small/large)
		Return (small/large)
		RTJ groove
	Customer-specific flange standards (JIS, BS, etc.) also possible	

Mechanical features

Nominal width

Meter run R01	DN 10 to DN 40 (3/8 to 1.5")
Orifice plate R02	DN 50 to DN 1000 (2 to 40")

Nominal pressure

Meter run R01	PN 6 to PN 40 (ASME CL150 to CL300)
Orifice plate R02	To PN 400 (ASME CL2500)

Materials

The materials are categorically selected based on the medium, pressure, and temperature.

Component	Standard material
Meter run R01	
Measuring insert (standardized orifice plate)	Stainless steel AISI 316 L (1.4404)
Carrier ring	Structural steel or stainless steel AISI 316 L (1.4404)
Inlet and outlet section	Structural steel or stainless steel AISI 316 L (1.4404)
Orifice plate R02	
Measuring insert (standardized orifice plate)	Stainless steel AISI 316 L (1.4404)
Carrier ring	Structural steel or stainless steel AISI 316 L (1.4404)
Pressure tapping	Such as a carrier ring or a suitably adequate pipe material

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Environmental influences

Measurement uncertainty

Meter run R01	~0.5 to 1.5 % of the flow coefficient C, depending on the application
Orifice plate R02	~0.5 to 1.2 % of the flow coefficient C, depending on the application

Pressure loss

Depending on the flow ratio β (d/D), around 30 to 80 % of the differential pressure.

Calibration

Meter run R01 can be calibrated by empirically determining the flow coefficient "C" on the test bed for particularly stringent requirements.

Quality assurance

The manufacturing and testing is conducted according to the pertinent directives such as AD data sheets, EN 13480, ASME regulations (without a stamp) or customer specifications.

Acceptance test certificates according to EN 10204 3.1 and 3.2 special acceptance certificates are available upon request.

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Dimensions

Meter run R01

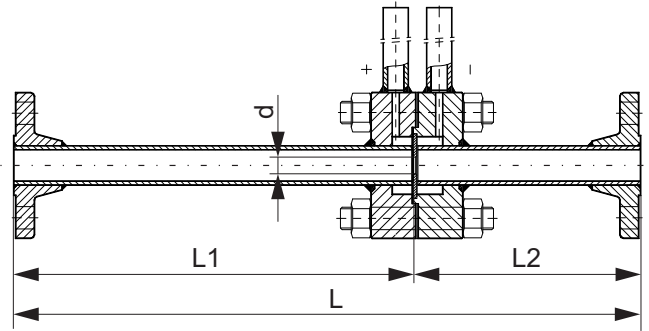
Inlet section L1, outlet section L2						
DN	10	15	20	25	32	40
	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"
L ^a	400	550	700	900	1100	1300
L1	230	380	500	650	800	1000
L2	170	170	200	250	300	300

Other insertion lengths are possible.

Orifice plate diameter d

It is carefully dimensioned from the specified data while considering the corresponding latest standards as well as regulations and then documented in the calculation sheet.

The calculation sheet is part of the scope of delivery.



^a According to DIN 19205

Orifice plate R02

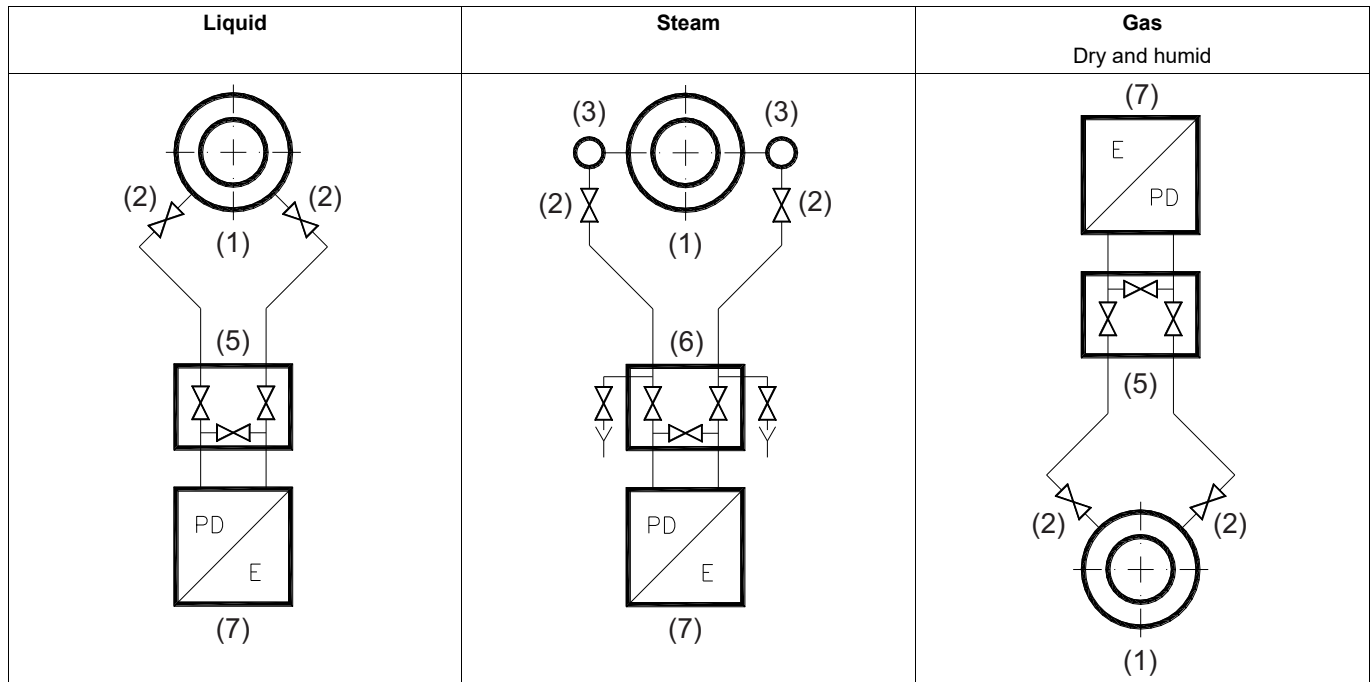
Insertion length L	
65 mm, 40 mm, 25 mm (special lengths possible)	
Orifice plate diameter d	
It is carefully dimensioned from the specified data while considering the corresponding latest standards as well as regulations and then documented in the calculation sheet.	
The calculation sheet is part of the scope of delivery.	
Inner diameter of the carrier ring d1	
The inner diameter d1 is manufactured larger than the measured pipe inner diameter D according to the specifications of ISO 5167-2 point 5.2.3.6. This ensures that the carrier rings do not protrude into the pipe.	
Outer diameter d4	
The outer diameter d4 is adjusted to the utilized standard flanges.	



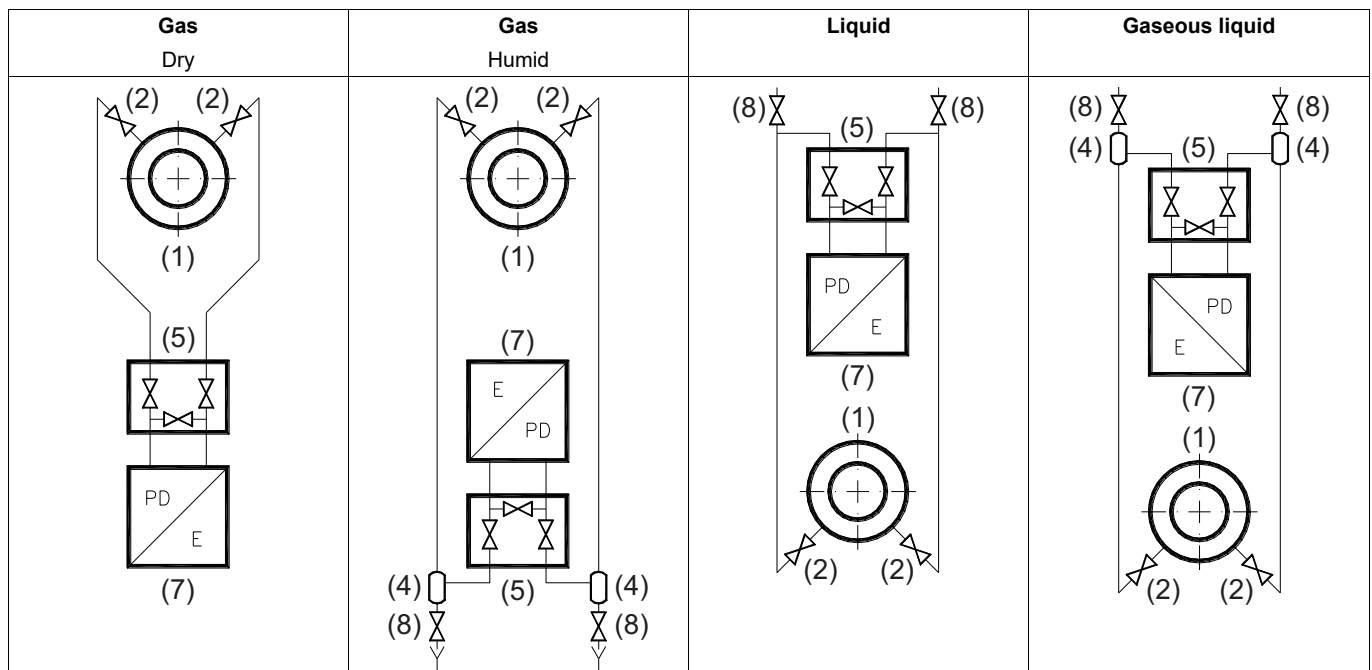
Mounting

Principal arrangement of primary elements according to DIN 19216

Recommended arrangement



Other possible arrangements



- (1) Primary element
- (4) Drainage/ventilation traps
- (7) Transmitter/measuring device

- (2) Orifice plate shut-off valves
- (5) 3-valve manifold
- (8) Vent valve

- (3) Condensate traps
- (6) 5-valve manifold

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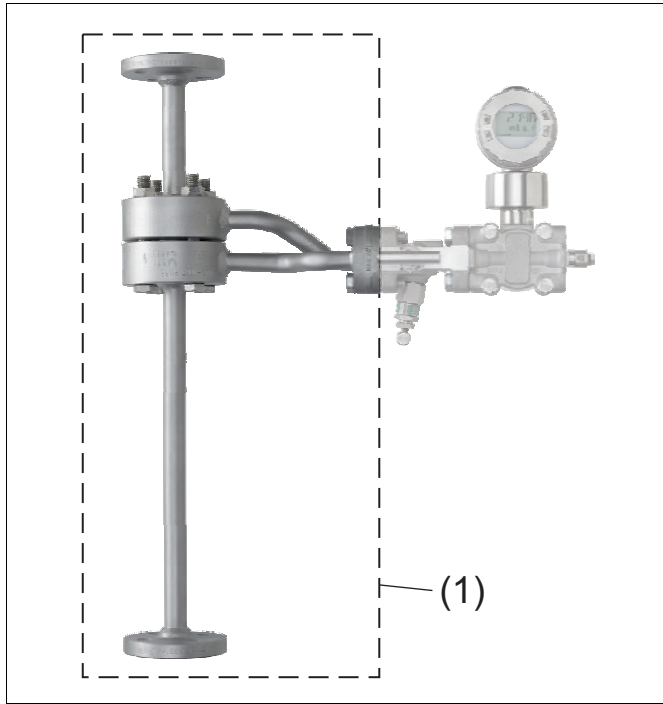
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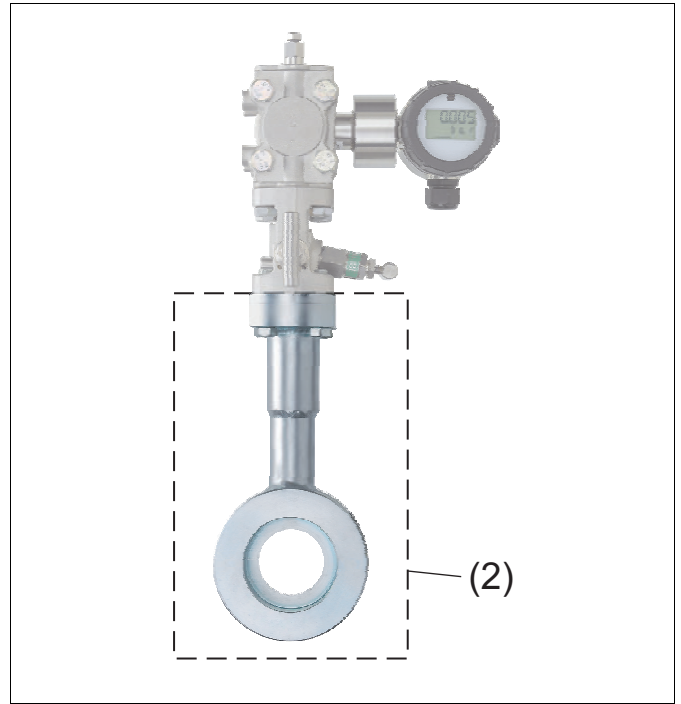
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Scope of delivery



(1) JUMO flowTRANS DP R01 (meter run)



(2) JUMO flowTRANS DP R02 (orifice plate)

Accessories

The differential pressure transmitter JUMO dTRANS p02 DELTA or JUMO dTRANS p20 DELTA supplements the meter run JUMO flowTRANS DP R01 or the orifice plate JUMO flowTRANS DP R02 to create a flow measuring system.

Also deliverable:

- Pipe flanges
- Screws and seals for the installation
- Shut-off valves
- Condensate traps
- Drainage or ventilation traps
- Valve manifolds
- Installation accessories

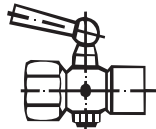
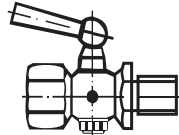
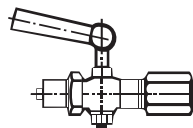
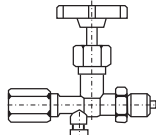
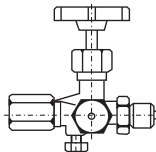
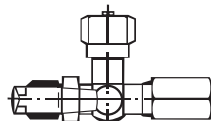
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Accessories for Pressure gauges

Part no.	Figure	ND	Connection	Material
Stopcock DIN 16261, socket × socket				
48040600		25	1/2" pipe	Brass
00310344		6	1/4" pipe	Brass
Stopcock DIN 16261, nipple × socket				
48040601		25	1/2" pipe	Brass
00310029		6	1/4" pipe	
Stopcock DIN 16262, nipple × tension socket				
48040604		25	1/2" pipe	Brass
00309860		25	1/2" pipe	Stainless Steel Ref. 1.4571
Stop valve DIN 16270, nipple × tension socket				
00309858		250	1/2" pipe	Brass
00323311		250	1/4" pipe	
00310346		400	1/2" pipe	Steel
00310347		400	1/2" pipe	Stainless steel Ref. 1.4571
Stop valve DIN 16271, nipple × tension socket				
00310348	Test nipple M20 × 1,5 	250	1/2" pipe	Brass
00310349		400	1/2" pipe	Steel
00309888		400	1/2" pipe	Stainless steel Ref. 1.4571
00310350	Test flange 60 × 25	250	1/2" pipe	Brass
00310351		400	1/2" pipe	Steel
00310352		400	1/2" pipe	Stainless steel Ref. 1.4571
Test cock DIN 16263, nipple × tension socket				
00310353	Test nipple M20 × 1,5 	25	1/2" pipe	Brass
00309934		25	1/2" pipe	Stainless steel Ref. 1.4571

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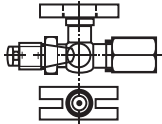

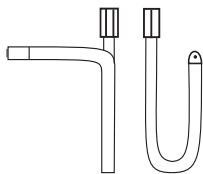
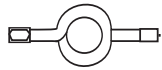
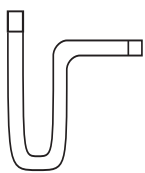

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Part no.	Figure	ND	Connection	Material
Test cock DIN 16263, nipple x tension socket				
00310355		25	1/2" pipe	Brass
00310356		25	1/2" pipe	Stainless steel Ref. 1.4571
Druck-Stoßdämpfer (adjustable) with restrictor screw in entry duct, locked at the side				
48040611		250	1/2" pipe	Brass
00310072		600	1/2" pipe	Steel
00310000		600	1/2" pipe	Stainless steel Ref. 1.4571
Part no.	Figure	Shape	Connection	Material
Water traps DIN 16282, Inlet: nipple, Outlet: tension socket				
48040605		A	1/2" pipe	Steel
00310339		A	1/2" pipe	Stainless steel Ref. 1.4571
48040606		C	1/2" pipe	Steel
00310357		C	1/2" pipe	Stainless steel Ref. 1.4571
Water traps similar DIN 16270, Inlet: nipple, Outlet: nipple				
00310359		U	1/2" pipe	Steel
00310360		U	1/2" pipe	Stainless steel Ref. 1.4571
00310080		T	1/2" pipe	Steel
00309855		T	1/2" pipe	Stainless steel Ref. 1.4571

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Part no.	Figure	Shape	Reach	Material
Instrument bracket DIN 16281				
00056166		H for mounting on wall	100 mm	Aluminium
00387946		A for mounting on wall or 2" pipe	100 mm	Cast iron
Instrument bracket DN 43, for pressure transmitter type 403025, 403026, 405052, 405054				
00597711		for mounting on wall or 2" pipe	100 mm	Stainless steel

Part no.	Figure	Connection	Material
Connectors for instrument bracket DIN 16281			
00056164		1/2" pipe	Brass
00056165		1/2" pipe	Stainless steel Ref. 1.4571

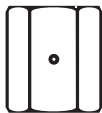
Part no.	Figure	Length	Connection	Material
Cooler internal dia. 2 mm				
00082371		129 mm	1/2" pipe	Stainless steel Ref. 1.4571
Capillary (extension) internal dia. 2 mm				
00063601		1 m	1/2" pipe	Stainless steel Ref. 1.4571
00053784		2 m	1/2" pipe	
00063602		3 m	1/2" pipe	
00405415		4 m	1/2" pipe	
00372354		5 m	1/2" pipe	


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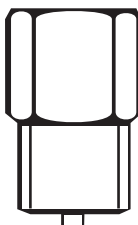
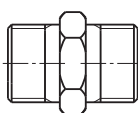
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Part no.	Figure	Thread	Material
tension sockets DIN 16283 (flat)			
48040608		1/2" pipe	Steel
48040609		1/2" pipe	Stainless steel Ref. 1.4571

Part no.	Figure	Connection	Material
Seals DIN 16258 (flat)			
00083564		1/4" pipe	Uni „N“ blue
00055240		1/4" pipe	Copper
00054765		1/2" pipe	
00083563		1/4" pipe	Stainless steel
00083565		1/2" pipe	Ref. 1.4571
Union nut with nipple similar to DIN 16284			
00313785		1/4" pipe	Stainless steel
00313921		1/2" pipe	Ref. 1.4571

Part no.	Figure	Thread		Material
Adapters		socket	nipple	
00068963		1/4" pipe	3/8" pipe	Brass
00026268		1/4" pipe	1/2" pipe	
00052964		1/2" pipe	1/4" pipe	
00319792		1/2" pipe	3/4" pipe	
00056916		1/2" pipe	M20 × 1,5	
00053675		1/2" pipe	1/4" pipe	Stainless steel Ref. 1.4571
00053674		1/2" pipe	3/8" pipe	
00319980		1/2" pipe	3/4" pipe	
00319708		1/2" pipe	M20 × 1,5	
00053676		1/2" pipe	1/2-14 NPT	
00060609		1/4" pipe	1/2" pipe	
00053671		1/2" pipe	1/2" pipe	
00361827		3/4" pipe	1/2" pipe	
Double nipple		nipple	nipple	
00060594		1/4" pipe	1/4" pipe	Stainless steel Ref. 1.4571
00434164		1/2" pipe	1/4-18 NPT	
00512584		1/2" pipe	1/2-14 NPT	
00512585		1/2-14 NPT	1/2-14 NPT	

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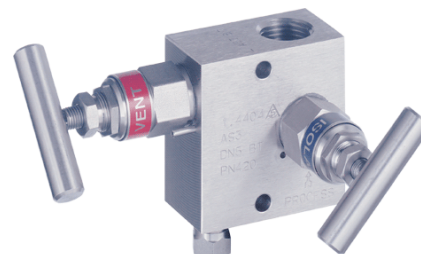
Manifolds

Brief description

Manifolds are used in conjunction with pressure measuring instruments. They are used as a shut-off valve and for adjusting the zero point of the pressure measuring device.

Overview

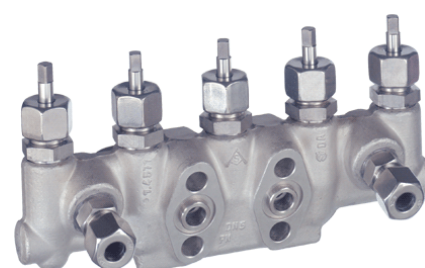
Type	Application	Page
2-valve manifold	Relative and absolute pressure measuring instruments	2 - 3
3-valve manifold	Differential pressure measuring instruments	4 - 9
5-valve manifold	Differential pressure measuring instruments	10 - 13



2-valve manifold



3-valve manifold



5-valve manifold

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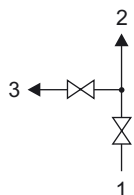


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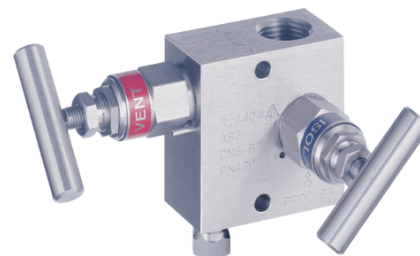
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2-valve manifold PN 420 DN 5 for pressure measuring instruments with 1/2" NPT and G1/2 connection

Connection diagram



- 1 Process input
- 2 Measuring instrument output
- 3 Test / vent

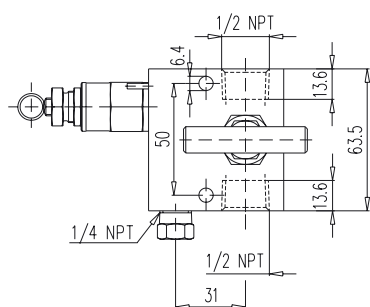
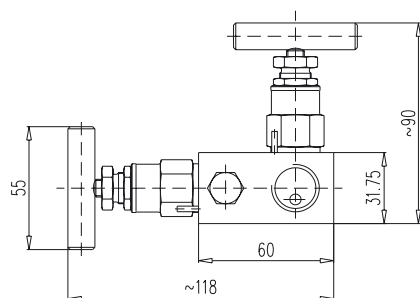


2-valve manifold

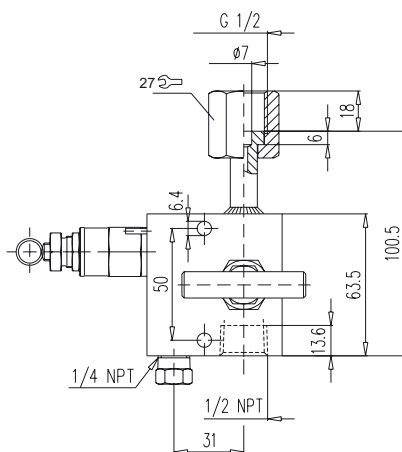
Key features

- Surface: phosphatized steel
- External stem thread
- Stem with cold-rolled surface, with back seat and crimped valve tip
- Special designs are available on request
- Manifolds can be supplied in accordance with the NACE specification

Dimensions



Sales number
40/00561605



Sales number
40/00550362

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Technical data

Nominal pressure	PN 420 1 PTFE packing 2 Pure graphite packing 1.0460 3 Pure graphite packing 1.4404	
Materials¹ Housing ² Bonnet Valve stem Valve tip ³ Packing up to 200°C up to 450°C up to 550°C Gland nut T-handle Screw plug	Stainless steel 1.4404 / 316L Stainless steel 1.4401 / 316 Stainless steel 1.4404 Stainless steel 1.4571 PTFE Pure graphite 1.0460 Pure graphite 1.4404 Stainless steel 1.4301 Stainless steel Stainless steel 1.4404	
Process connections Sales number: 40/00xxxxxx Input Output Sales number: 40/00550362 Input Output	1/2" NPT female 1/2" NPT female 1/2" NPT female G1/2 female, swivel nut	
Test and vent	1/4" NPT with screw plug	

¹ Also available in an oil and grease-free version for oxygen use (note ordering instruction B3).

² Available with inspection certificate as defined by EN 10204/3.1.

³ PTCFE or POM valve tips available on request.

Stock instruments

Delivery in 3 working days after receipt of order

Version	Sales number
2-valve manifold, input: 1/2 NPT, output: 1/2 NPT	40/00561605
2-valve manifold, input: 1/2 NPT, output: G1/2, rotating	40/00550362

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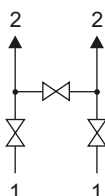
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3-valve manifold PN 400 DN 5 for direct mounting according to DIN 19213

Connection diagram



- 1 Process input
- 2 Measuring instrument output

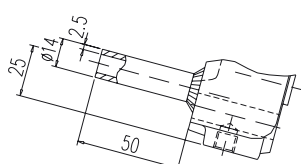
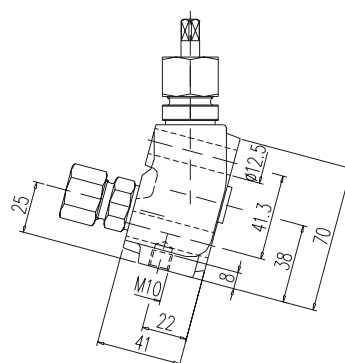
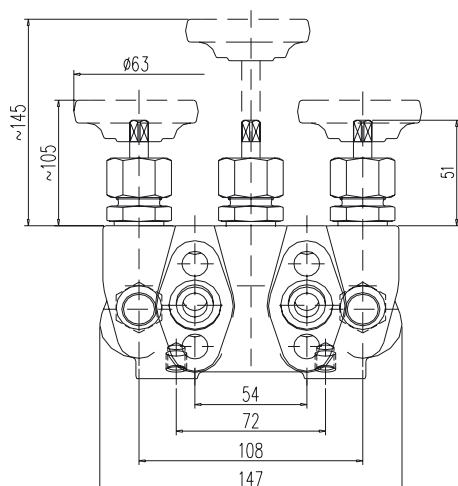
Key features

- Housing: die-pressed part
- Surface: phosphatized steel
- Internal stem threads
- Replaceable valve seat
- Stem with cold-rolled surface, with back seat and crimped valve tip
- Plastic handwheels
- Special designs are available on request



3-valve manifold

Dimensions



Input 14 x 2.5
weld ends

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Technical data

Nominal pressure	PN 400 1 PTFE packing 2 Pure graphite packing	<table border="1"> <caption>Pressure-temperature data from graph</caption> <thead> <tr> <th>T [°C]</th> <th>P [bar] (PTFE)</th> <th>P [bar] (Pure graphite)</th> </tr> </thead> <tbody> <tr> <td>100</td> <td>400</td> <td>400</td> </tr> <tr> <td>200</td> <td>100</td> <td>350</td> </tr> <tr> <td>300</td> <td>-</td> <td>280</td> </tr> </tbody> </table>	T [°C]	P [bar] (PTFE)	P [bar] (Pure graphite)	100	400	400	200	100	350	300	-	280
T [°C]	P [bar] (PTFE)	P [bar] (Pure graphite)												
100	400	400												
200	100	350												
300	-	280												
Materials¹ Housing ² Bonnet Valve Valve stem Valve tip Packing up to 200°C up to 300°C Union nut Weld ends	Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4571 PTFE Pure graphite Stainless steel 1.4571 Stainless steel 1.4571													
Process connections Input 12 S Input 14 x 2.5 Output IEC A	Tube fitting ø 12 mm, series S, G 3/8 Weld ends for tube ø 14 x 2.5 mm DIN 19213 Type B3													
Mounting set M10 7/16-20 UNF	4 M10 screws, 4 washers, 2 FPM sealing rings 4 7/16-20 UNF screws, 4 washers, 2 FPM sealing rings													

¹ Also available in an oil and grease-free version for oxygen use.

² Available with inspection certificate as defined by EN 10204/3.1.

Stock instruments

Delivery in 3 working days after receipt of order

Version	Sales number
3-valve manifold 12 S / IEC A, incl. M10 mounting set	40/00308191
3-valve manifold 12 S / IEC A, incl. 7/16-20 UNF mounting set	40/00552040
3-valve manifold 14 x 2.5 / IEC A, incl. M10 mounting set	40/00558635
3-valve manifold 14 x 2.5 / IEC A, incl. 7/16-20 UNF mounting set	40/00558636

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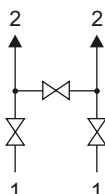
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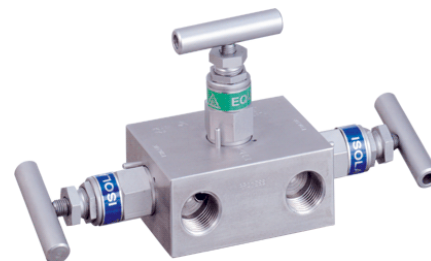


3-valve manifold PN 420 DN 5 for remote mounting

Connection diagram



- 1 Process input
- 2 Measuring instrument output

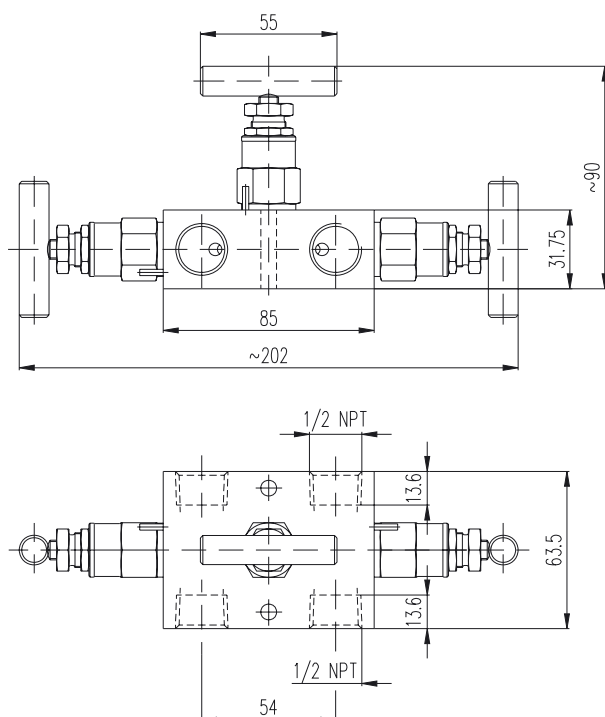


3-valve manifold

Key features

- Surface: phosphatized steel
- External stem thread
- Stem with cold-rolled surface, with back seat and crimped valve tip
- Special designs are available on request
- Manifolds can be supplied in accordance with the NACE specification

Dimensions



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Technical data

Nominal pressure	PN 420 1 PTFE packing 2 Pure graphite packing 1.0460 3 Pure graphite packing 1.4404	
Materials¹ Housing ² Bonnet Valve stem Valve tip ³ Packing up to 200°C up to 450°C up to 550°C Gland nut T-handle	Stainless steel 1.4404 / 316L Stainless steel 1.4401 / 316 Stainless steel 1.4404 Stainless steel 1.4571 PTFE Pure graphite 1.0460 Pure graphite 1.4404 Stainless steel 1.4301 Stainless steel	
Process connections Input Output	1/2" NPT female 1/2" NPT female	

¹ Also available in an oil and grease-free version for oxygen use (note ordering instruction B3).

² Available with inspection certificate as defined by EN 10204/3.1.

³ PTFE or POM valve tips available on request.

Stock instruments

Delivery in 3 working days after receipt of order

Version	Sales number
3-valve manifold 1/2 NPT / 1/2 NPT, without mounting set	40/00561608

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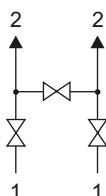


Data Sheet 409706

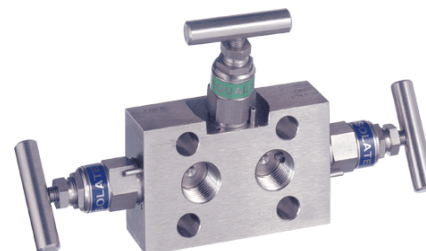
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3-valve manifold PN 420 DN 5 for direct connection according to EN IEC 61518

Connection diagram



- 1 Process input
- 2 Measuring instrument output

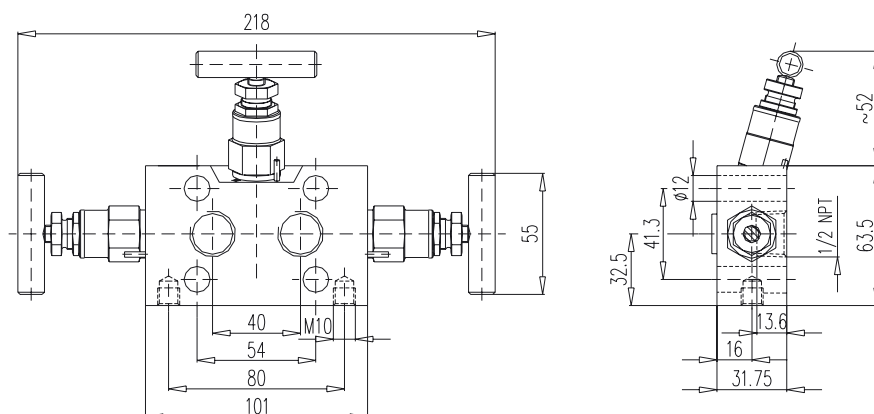


3-valve manifold

Key features

- Surface: phosphatized steel
- Internal stem thread
- Stem with cold-rolled surface, with back seat and crimped valve tip
- Special designs are available on request
- Manifolds can be supplied in accordance with the NACE specification

Dimensions



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Technical data

Nominal pressure	PN 420 1 PTFE packing 2 Pure graphite packing 1.0460 3 Pure graphite packing 1.4404	
Materials¹ Housing ² Bonnet Valve stem Valve tip ³ Packing up to 200°C up to 450°C up to 550°C Gland nut T-handle	Stainless steel 1.4404 / 316L Stainless steel 1.4401 / 316 Stainless steel 1.4404 Stainless steel 1.4571 PTFE Pure graphite 1.0460 Pure graphite 1.4404 Stainless steel 1.4301 Stainless steel	
Process connections Input Output	1/2" NPT female IEC, Type A	
Mounting set M10 7/16-20 UNF	4 M10 screws, 4 washers, 2 FPM sealing rings 4 7/16-20 UNF screws, 4 washers, 2 FPM sealing rings	

¹ Also available in an oil and grease-free version for oxygen use (note ordering instruction B3).

² Available with inspection certificate as defined by EN 10204/3.1.

³ PTFE or POM valve tips available on request.

Stock instruments

Delivery in 3 working days after receipt of order

Version	Sales number
3-valve manifold 1/2 NPT / IEC A, incl. M10 mounting set	40/00561619
3-valve manifold 1/2 NPT / IEC A, incl. 7/16-20 UNF mounting set	40/00561621

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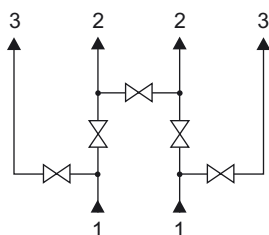
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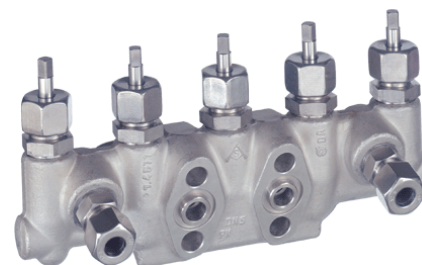


5-valve manifold PN 400 DN 5 for direct connection according to DIN 19213

Connection diagram



- 1 Process input
- 2 Measuring instrument output
- 3 Purge

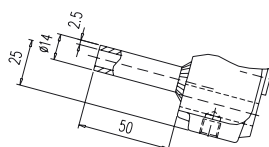
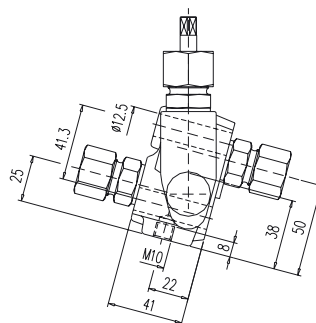
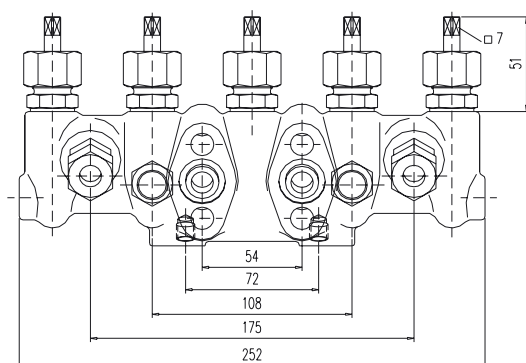


5-valve manifold

Key features

- Housing: die-pressed part
- Surface: phosphatized steel
- Internal stem thread
- Replaceable valve seat
- Stem with cold-rolled surface, with back seat and crimped valve tip
- Special designs are available on request
- Accessories: 1 socket wrench

Dimensions

Input 14 x 2.5
weld ends

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Technical data

Nominal pressure	PN 400 1 PTFE packing 2 Pure graphite packing 1.0460 3 Pure graphite packing 1.4404	
Materials¹ Housing ² Bonnet Valve stem Valve tip Valve seat Packing up to 200°C up to 300°C Union nut	Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4571 PTFE Pure graphite Stainless steel 1.4571	
Process connections Input / purge 12 S Output 14 x 2.5 Output IEC A	Tube fitting ø 12 mm, series S, G 3/8, DIN 19213 Type B3 Weld ends for tube ø 14x2.5 mm DIN 19213, Type B3	
Mounting set M10 7/16-20 UNF	4 M10 screws, 4 washers, 2 FPM sealing rings 4 7/16-20 UNF screws, 4 washers, 2 FPM sealing rings	

¹ Also available in an oil and grease-free version for oxygen use (note ordering instruction B3).

² Available with inspection certificate as defined by EN 10204/3.1.

³ PTFE or POM valve tips available on request.

Stock instruments

Delivery in 3 working days after receipt of order

Version	Sales number
5-valve manifold 12 S / IEC A, incl. M10 mounting set	40/00387943
5-valve manifold 12 S / IEC A, incl. 7/16-20 UNF mounting set	40/00387952
5-valve manifold 14 x 2.5 / IEC A, incl. M10 mounting set	40/00561611
5-valve manifold 14 x 2.5 / IEC A, incl. 7/16-20 UNF mounting set	40/00561613

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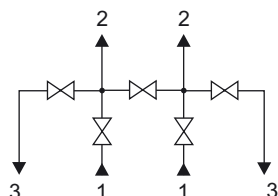
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5-valve manifold PN 420 DN 5

Connection diagram



- 1 Process input
- 2 Measuring instrument output
- 3 Test / vent



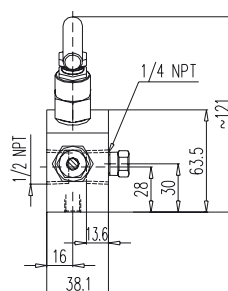
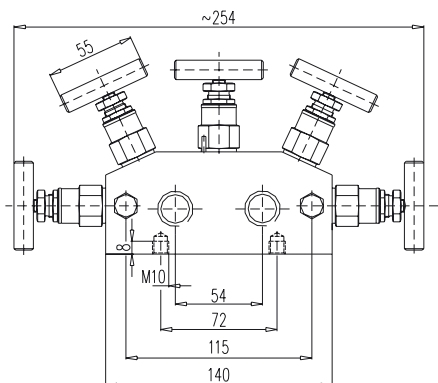
5-valve manifold

Key features

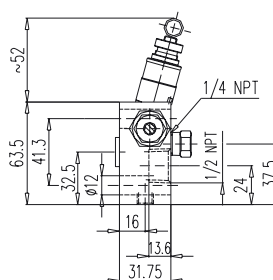
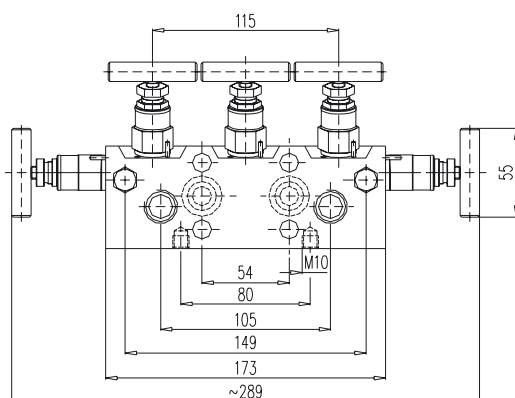
- Surface: phosphatized steel
- External stem thread
- Stem with cold-rolled surface, with back seat and crimped valve tip
- Special designs are available on request
- Manifolds can be supplied in accordance with the NACE specification

Dimensions

Version: for remote mounting



Version: for direct mounting



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Technical data

Nominal pressure	PN 420
Materials¹	
Housing ²	Stainless steel 1.4404 / 316L
Bonnet	Stainless steel 1.4401 / 316
Valve stem	Stainless steel 1.4404
Valve tip ³	Stainless steel 1.4571
Packing	
up to 200°C	PTFE
up to 450°C	Pure graphite 1.0460
up to 550°C	Pure graphite 1.4404
Gland nut	Stainless steel 1.4301
T-handle	Stainless steel
Screw plug	Stainless steel 1.4404
Process connections	
Input 1/2 NPT	1/2" NPT female
Output 1/2 NPT	1/2" NPT female
Output IEC, Type A	IEC Type A
Test and vent	1/4" NPT female with screw plug
Mounting set	
M10	4 M10 screws, 4 washers, 2 FPM sealing rings
7/16-20 UNF	4 7/16-20 UNF screws, 4 washers, 2 FPM sealing rings

¹ Also available in an oil and grease-free version for oxygen use.

² Available with inspection certificate as defined by EN 10204/3.1.

³ PTFE or POM valve tips available on request.

Stock instruments

Delivery in 3 working days after receipt of order

Version	Sales number
5-valve manifold 1/2 NPT / 1/2 NPT, without mounting set	40/00561614
5-valve manifold 1/2 NPT / IEC A, incl. M10 mounting set	40/00561616
5-valve manifold 1/2 NPT / IEC A, incl. 7/16-20 UNF mounting set	40/00561617

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Fax: +49 661 6003-607
Email: mail@jumo.net
Internet: www.jumo.net

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Fax: +44 1279 62 50 29
Email: sales@jumo.co.uk
Internet: www.jumo.co.uk

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Internet: www.jumousa.com



JUMO PEKA

Hygienic process connection

Brief description

The process connection combines the measuring instrument (different physical measurement variables or electrolytic conductivity) with a process connection adapter that is suitable for the application. Starting with a system that eliminates dead zones and a design that allows for good cleaning, the adapter system is specially constructed for the requirements of hygienic processes.

The rigid connecting piece with the adapter, which is designed to rotate, protects the O-ring that is located flush with the front from damage resulting from assembly and also makes it possible to align the measuring instrument.

The modular adapter system provides a fast, easy way to replace the measuring instrument, for example for calibration.

Possible applications include:

- Food and beverage industry
- Pharmaceutical industry
- Biotechnology
- Peripheral processes (water and wastewater treatment)



Customer benefits

- **Process safety**
Hygienic design, parts in contacts with medium made of stainless steel. This and a system design that eliminates dead zones prevents microbial contamination, thereby ensuring the highest level of process safety.
- **Uncomplicated and time-saving**
The modular adapter system can be used for numerous measuring instruments and is available with a wide range of process connection adapters. The measuring instrument can be mounted and removed any number of times. Reduced time for assembly, cleaning, and repair processes keeps system downtimes and the costs associated with them to a minimum.
- **Flexible**
With the 360° rotating connection adapter, the measuring instrument can be aligned individually in a user-friendly manner to ensure optimum legibility and electrical installation in any mounting position.

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Technical data

Mechanical features

Material	1.4435 (316 L)
Surface	Ra ≤ 0.8

System structure

Measuring instruments



Pressure



Temperature



Liquid analysis

Pressure transmitter

402050 JUMO dTRANS p31
 402060 JUMO Wtrans p
 403025 JUMO dTRANS p20
 404366 JUMO dTRANS p30
 404385 JUMO dTRANS p02
 405052 JUMO DELOS SI

Resistance thermometers

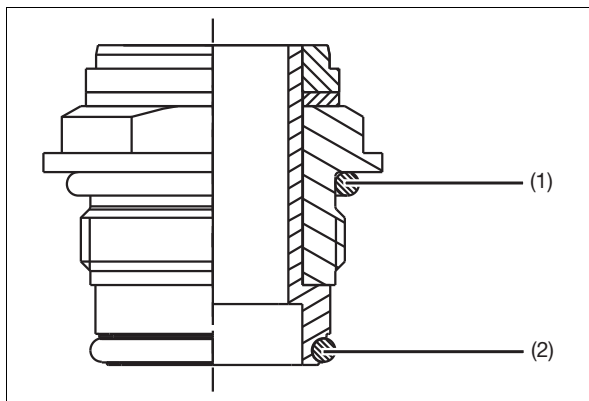
902810 Resistance thermometers
 902815 JUMO Dtrans T100
 902915 JUMO dTRANS T1000

Electrolytic conductivity

202924 JUMO tecLine CR
 202930 JUMO tecLine CR-4P

Process connection JUMO PEKA 997

(process connection in the data sheet of the relevant measuring instrument: 997)



(1) Rear seal^a

(2) Front flush seal^b

^a In conjunction with a measuring device the seal is included in delivery of process connection 997.

^b Please order seal matching to application. These is not included in the scope of delivery.

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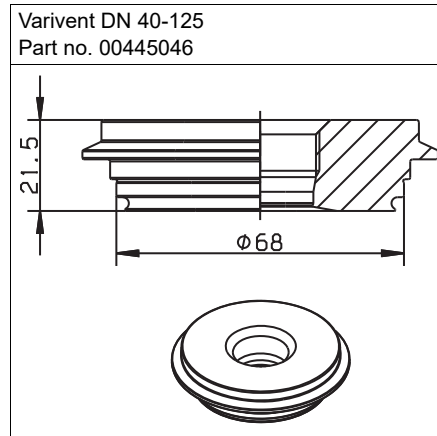
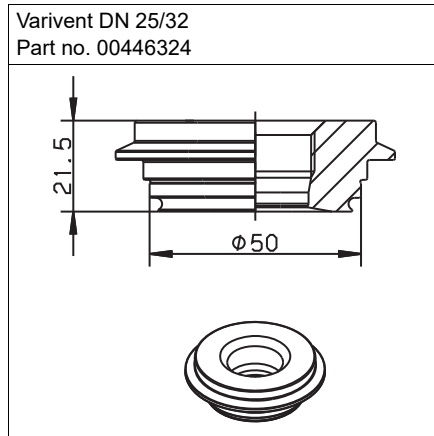
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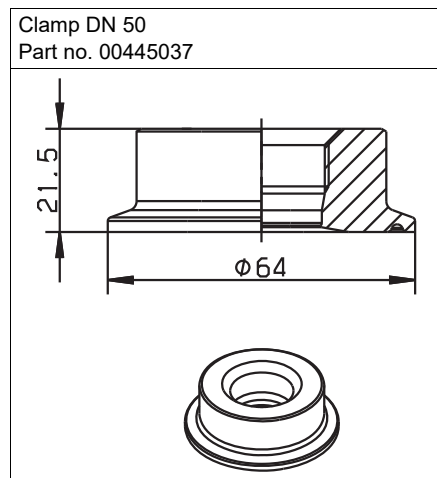
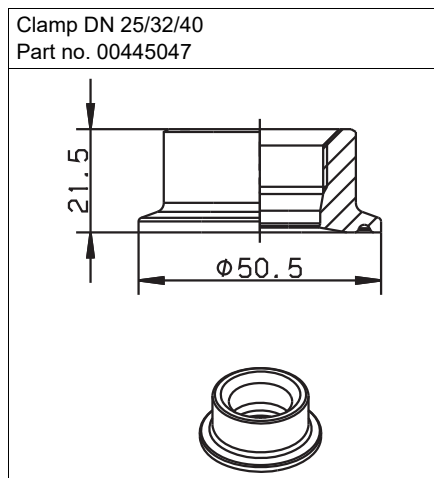


Process connection adapter (dimensions)

Varivent connection adapter



Clamp connection adapter



DN DIN 32676	DN (Zoll)	DN ISO 2852	Ø D ₁	Ø D ₂
25	1	20	43.5	50.5
32	1.5	25		
40		32		
50	2	40	56.5	64

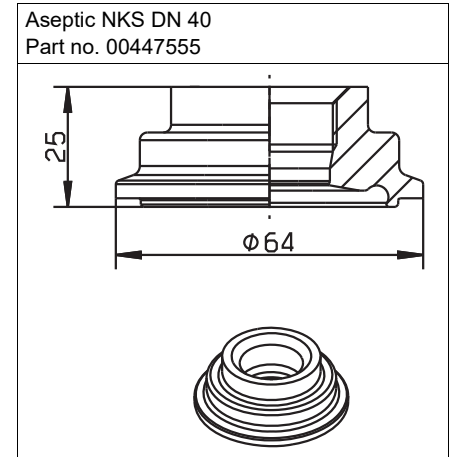
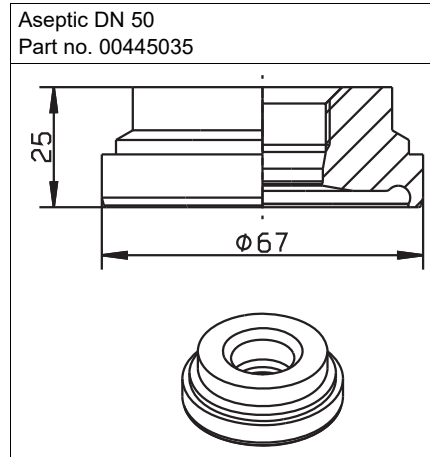
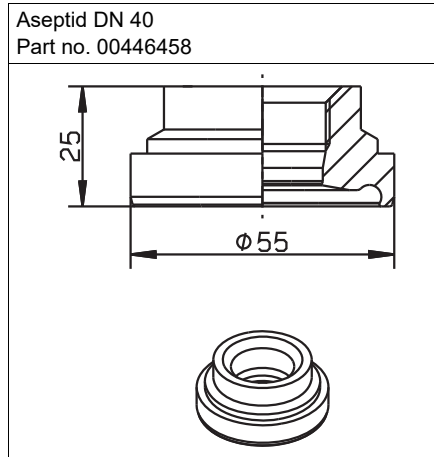
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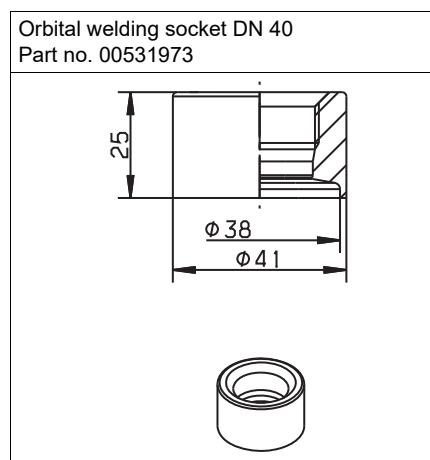
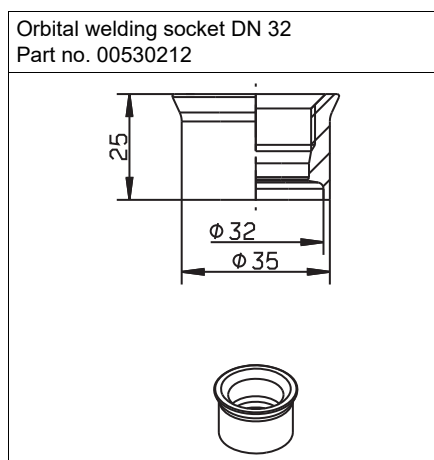
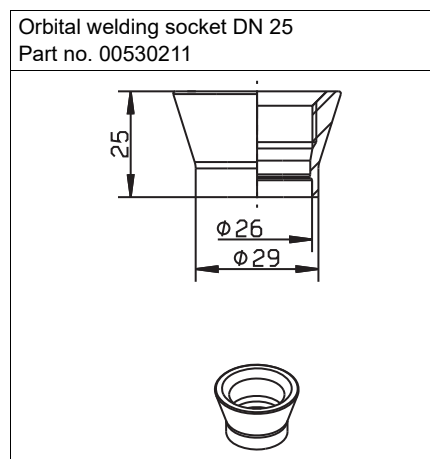
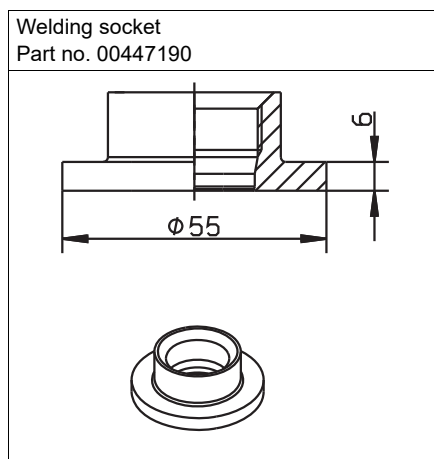
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Aseptic connection adapter



Welding sockets



JUMO GmbH & Co. KG

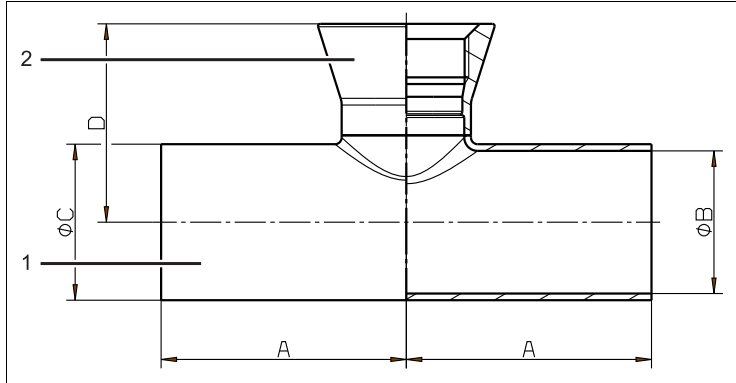
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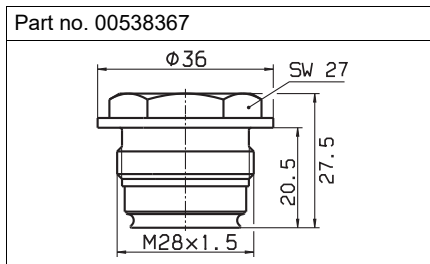
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**T-piece**

- (1) T-piece with PEKA connection
(2) Orbital welding socket DN 25

DN	A	B	C	D
25	50	26	29	41
32	55	32	35	44
40	60	38	41	47
50	70	50	53	53
65	80	66	70	62
80	90	81	85	70
100	100	100	104	80.5

Blind grommet**NOTE!**

Please select the seal adapted to the application. This is not included in the scope of delivery.

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Seal materials

Features	Seal materials		
	FKM Fluororubber	VMQ Vinyl-methyl-polysiloxane (silicone rubber)	EPDM Ethylen-propylene-diene rubber
Alkaline media	unsuitable	not advisable	very good
Peracetic acid < 1 %	good	not advisable	good
Peracetic acid 10 %	unsuitable	unsuitable	unsuitable
Caustic soda < 5 %	not advisable	satisfactory	very good
Nitric acid < 5 %	good	not advisable	good
Hydrochloric acid < 5 %	good	not advisable	good
Ozone < 200 pphm	very good	very good	very good
Citrus juice	good	unsuitable	unsuitable
Polyglucose/Fat	good	good	good
Mineral oil/Fat	good	satisfactory	unsuitable
Silicone oil/Fat	good	unsuitable	very good
Water	satisfactory	good	very good
Steam	not advisable	not advisable	up to 150 °C
Milk products	good	good	satisfactory

Other than a seal's technical suitability it also has to fulfill a variety of additional properties that result from the general purity specifications, legislative measures, and health policy aspects.

The areas of application / stable properties that are listed in the table are only rough guidelines. They do not release users from having to conduct their own tests for evaluating operational capability.

Soldering guidelines

The soldering guidelines apply to all welding sleeves listed in data sheet 409711.

Welding the PEKA welding sleeves in tanks (figure 1) and pipes (figure 2)

- 1) Drill a hole with the same external diameter as the sleeve, observing a max. tolerance of +0,2 mm.
- 2) Position the welding sleeve and fasten it provisionally at four points.
- 3) Screw the welding aid in place.
- 4) It is advisable to divide the weld into several segments, in accordance with conventional welding practice. Weld the sections between opposite points to avoid deformation and sealing problems.
- 5) After welding two segments, pause the welding process until the weld has cooled.
- 6) Allow the welding sleeve to cool after welding and remove the welding aid.

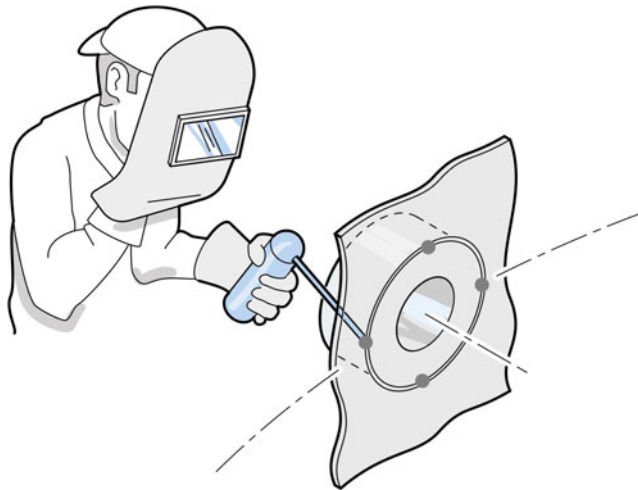


Figure 1: Welding in tanks

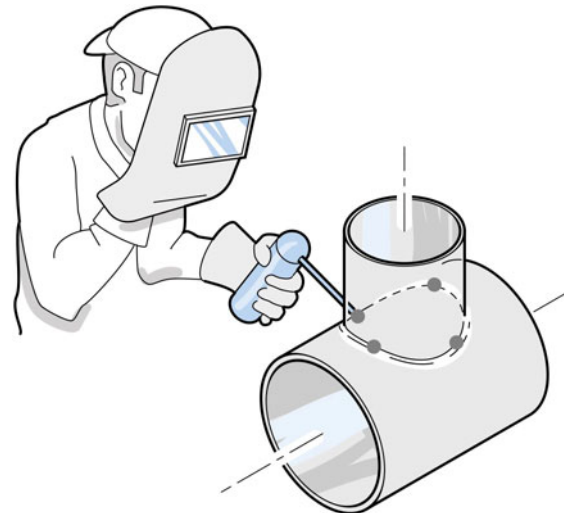
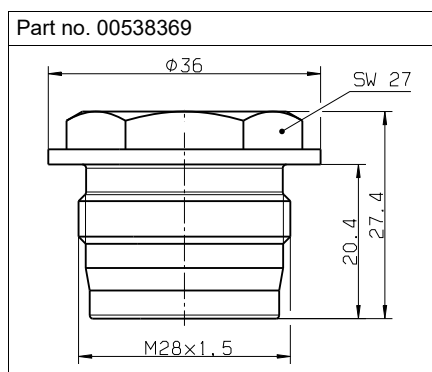


Figure 2: Welding in pipes

Import information!

To prevent the sleeve from melting or warping, the pauses between the individual sections should be timed to allow the sleeve to cool.

Welding dummy/welding aid



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Order details

	Varivent
00445046	Varivent DN 40-125, material-no. 1.4435, 316 L
00446324	Varivent DN 32/25, material-no. 1.4404, 316 L
	Clamp
00445037	Clamp DN 50 according to DIN 32676, 2" ISO 2852, material-no. 1.4404, 316 L
00445047	Clamp DN 25/32/40 according to DIN 32676, material-no. 1.4404, 316 L
	Aseptic
00445035	DN 50 Aseptic according to DIN 11864-1A, material-no. 1.4404, 316 L
00446458	DN 40 Aseptic according to DIN 11864-1A, material-no. 1.4404, 316 L
	Weld-in socket
00447190	Weld-in socket Ø 55 mm, material-no. 1.4435, 316 L
00530211	Orbital weld-in socket DN 25, material-no. 1.4435, 316 L
00530212	Orbital weld-in socket DN 32, material-no. 1.4435, 316 L
00531973	Orbital weld-in socket DN 40, material-no. 1.4435, 316 L
00538367	Blind plug M28 × 1.5, JUMO PEKA
00538369	Welding dummy M28 × 1.5, JUMO PEKA
	Flange
	None
00579359	DRD flange DN 50
	Front flush seal liegende Dichtung^a
00446160	O-ring 21 × 2.5 VMQ, FDA konform
00446162	O-ring 21 × 2.5 EPDM, FDA konform
00446738	O-ring 21 × 2.5 FPM, FDA konform
	Rear seal^b
	None
00451344	O-ring 26 × 2.5 VMQ, FDA conform
	T-piece
00643555	T-piece with PEKA connection DN 25

^a Please order seal matching to application. These is not included in the scope of delivery.

^b In conjunction with a measuring device the seal is included in delivery of process connection 997.

All part numbers are optional available with inspection certificate 3.1 material.

Accessories

Notice regarding orders

Hygienic process connection 997 JUMO PEKA

NOTE!

Process connection 997 must be selected in the data sheet of the relevant measuring instrument!

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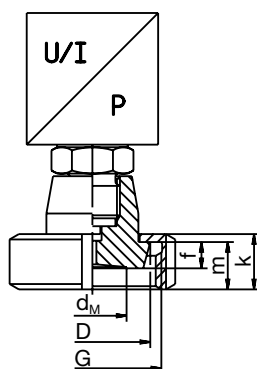
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Pressure separator with taper fitting or threaded adaptor DIN 11 851 (milk pipe fitting)

Type 409772

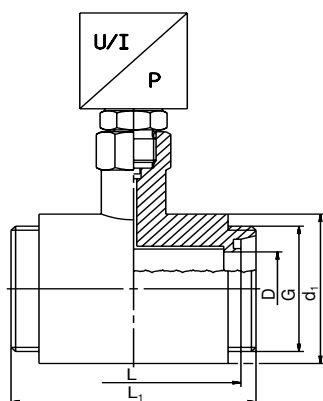
Diaphragm pressure separator Type 409772/17-...



Technical data

Process connection	Nominal pressure bar	Recommended min. pressure range bar	Temperature coefficient mbar/10°C	Weight (without meas. device) kg	Dimensions [mm]					
					d _M	D	thread G	f	m	k
DN25	PN40	above 6	+20	0.50	28	44	Rd 52 x 1/6	10	18	21
DN32		above 2	+12	0.65	34	50	Rd 58 x 1/6			
DN40		above 0.4	+6	0.73	38	56	Rd 65 x 1/6			
DN50	PN25	above 0.1	+3	1.10	46	68	Rd 78 x 1/6	11		22

Pipe pressure separator Type 409772/18-...



Technical data

Process connection	Nominal pressure bar	Recommended min. pressure range bar	Temperature coefficient mbar/10°C	Weight (without meas. device) kg	Dimensions [mm]				
					L	L ₁	D	thread G	d ₁
DN40	PN40	above 0.4	+6	3.20	126	140	38.0	Rd 65 x 1/6	78
DN50		above 0.1	+3	2.55	100	114	50.7	Rd 78 x 1/6	88

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**Order details****(1) Basic type**

409772 pressure separator with taper fitting DIN 11 851 or threaded adaptor DIN 11 851

(2) Basic type extension

17 diaphragm pressure separator with taper fitting and ring nut

18 pipe pressure separator with threaded adaptor

(3) Process connection

604 DN25¹

605 DN32¹

606 DN40

607 DN50

(4) Nominal pressure in bar

025 PN25¹

040 PN40

(5) Material

20 st. steel

99 special material²

(6) Filling liquid

1 silicone oil

2 halogenized silicone oil

3 vegetable oil

(7) Capillary

0000 no capillary

0001 with cooling device

1000 1.0 m capillary

1500 1.5 m capillary

2000 2.0 m capillary

3000 3.0 m capillary

5000 5.0 m capillary

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Order code	<input type="text"/>	/ <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>
Order example	409772	/ 18	- 606	- 040	- 20	- 3	- 1500

¹ only for pressure separators with taper fitting (basic type extension 17)

² please specify in plain text when ordering

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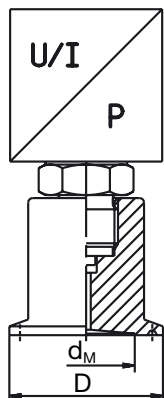
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Pressure separator with clamp connection

Type 409774

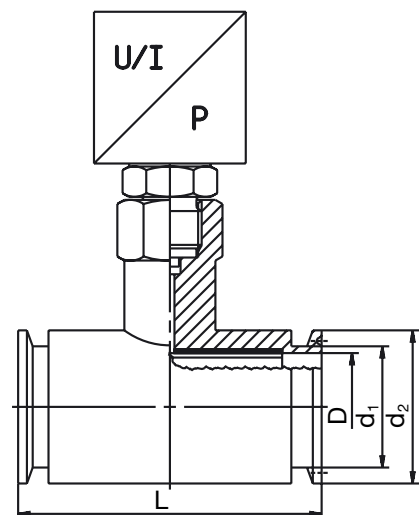
Diaphragm pressure separator Type 409774/17-...



Technical data

Process connection	Nominal pressure bar	Recommended min. pressure range bar	Temperature coefficient mbar/10°C	Weight (without meas. device) kg	Dimensions [mm]	
					d _M	D
DN 1½"	PN40	above 0.4	+12	0.32	34	50.5
DN 2"		above 0.1	+3	0.70	45	64

Pipe pressure separator Type 409774/18-...



Technical data

Process connection	Nominal pressure bar	Recommended min. pressure range bar	Temperature coefficient mbar/10°C	Weight (without meas. device) kg	Dimensions [mm]			
					L	D	d ₁	d ₂
DN 1½"	PN40	above 0.4	+12	0.99	126	35.5	40	50.5
DN 2"		above 0.1	+3	1.69	100	48.6	55	64

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**Order details**

- (1) Basic type**
409774 pressure separator with clamp connection
- (2) Basic type extension**
17 diaphragm pressure separator
18 pipe pressure separator
- (3) Process connection**
615 DN1½"
616 DN2"
- (4) Nominal pressure in bar**
040 PN40
- (5) Material**
20 st. steel
99 special material¹
- (6) Filling liquid**
1 silicone oil
2 halogenized filling oil
3 vegetable oil
- (7) Capillary**
0000 no capillary
0001 with cooling device
1000 1.0 m capillary
1500 1.5 m capillary
2000 2.0 m capillary
3000 3.0 m capillary
5000 5.0 m capillary

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Order code	<input type="text"/>	- <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Order example	409774	- 18	616	040	20	3	1500

¹ please specify in plain text when ordering

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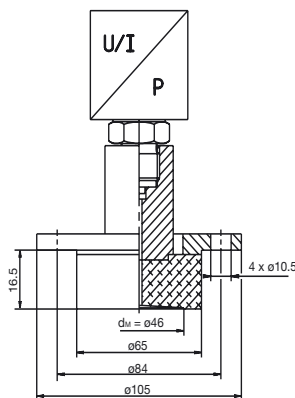
JUMO Process Control, Inc.

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Pressure separator with DRD flange or Varivent connection

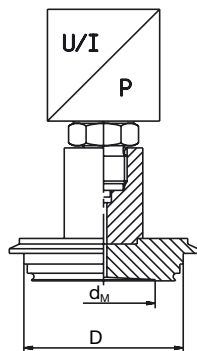
Diaphragm pressure separator with DRD flange



Technical data

Process connection	Nominal pressure	Recommended min. pressure range	Temperature coefficient	Weight (without meas. device)
	bar	bar	mbar/10°C	kg
D = 65	PN40	above 0.1	+3	0.8

Diaphragm pressure separator with Varivent connection



Technical data

Process connection	Nominal pressure	Recommended min. pressure range	Temperature coefficient	Weight (without meas. device)	Dimensions [mm]	
					d _M	D
D = 68 ¹	PN10	above 0.1	+3	0.82	46	68

¹ only for pipe diameters 40 to 125 mm

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**Order details**

- (1) Basic type**
409776 pressure separator with DRD flange or Varivent connection
- (2) Basic type extension**
00 none
- (3) Process connection**
661 DRD flange, D = 65 mm
686 Varivent connection, D = 68 mm¹
- (4) Nominal pressure in bar**
010 PN10²
040 PN40³
- (5) Material**
20 st. steel
99 special material⁴
- (6) Filling liquid**
1 silicone oil
2 inert liquid
3 vegetable oil
- (7) Capillary**
0000 no capillary
0001 with cooling device
1000 1.0 m capillary
1500 1.5 m capillary
2000 2.0 m capillary
3000 3.0 m capillary
5000 5.0 m capillary

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Order code	<input type="text"/>	/ <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>
Order example	409776	/ 00	- 661	- 040	- 20	- 3	- 1500

¹ only for pipe diameters 40 to 125 mm² only for pressure separators with Varivent connection (process connection 686)³ only for pressure separators with DRD flange (process connection 661)⁴ please specify in plain text when ordering

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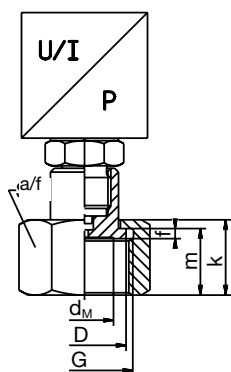
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Pressure separator with ISS connection or SMS connection or RJT connection and slotted ring nut Type 409778

Diaphragm pressure separator with ISS connection**Technical data**

Process connection	Nominal pressure bar	Recommended min. pressure range bar	Temperature coefficient mbar/10°C	Weight (without meas. device) kg	Dimensions [mm]						
					a/f	d _M	D	thread G	f	m	k
DN1"	PN40	above 6	+30	0.35	47	24	33	1½ x 1/8"	4	26.5	30
DN1½"		above 0.4	+12	0.59	62	34	47	2 x 1/8"			
DN2"		above 0.1	+3	1.00	77	45	60	2½ x 1/8"			

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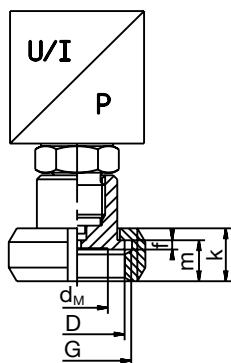
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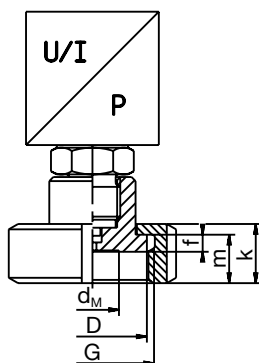
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**Diaphragm pressure separator with SMS connection****Technical data**

Process connection	Nominal pressure bar	Recommended min. pressure range bar	Temperature coefficient mbar/10°C	Weight (without meas. device) kg	Dimensions [mm]					
					d _M	D	thread G	f	m	k
DN1"	PN40	above 6	+30	0.22	24	35.5	Rd40 x 1/6"	3.5	15.5	20
DN1 1/2"		above 0.4	+12	0.60	34	55	Rd60 x 1/6"	4	21	25
DN2"		above 0.1	+3	1.00	46	65	Rd70 x 1/6"			26

Diaphragm pressure separator with RJT connection**Technical data**

Process connection	Nominal pressure bar	Recommended min. pressure range bar	Temperature coefficient mbar/10°C	Weight (without meas. device) kg	Dimensions [mm]					
					d _M	D	thread G	f	m	k
DN1"	PN40	above 6	+30	0.40	20	41	1 13/16 x 1/8"	6.4	18	22
DN1 1/2"		above 0.4	+12	0.75	28	54	2 5/16 x 1/8"		18	22
DN2"		above 0.1	+6	1.00	38	67	2 7/8 x 1/6"			

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**Order details**

- (1) Basic type**
409778 pressure separator with ISS connection or with SMS connection or with RJT connection and slotted ring nut
- (2) Basic type extension**
00 none
- (3) Process connection**
587 ISS DN1"
588 ISS DN1¹/₂"
589 ISS DN2"
584 SMS DN1"
585 SMS DN1¹/₂"
586 SMS DN2"
577 RJT DN1"
578 RJT DN1¹/₂"
579 RJT DN2"
- (4) Nominal pressure in bar**
040 PN40
- (5) Material**
20 st. steel
99 special material¹
- (6) Filling liquid**
1 silicone oil
2 halogenized oil
3 vegetable oil
- (7) Capillary**
0000 no capillary
0001 with cooling device
1000 1.0 m capillary
1500 1.5 m capillary
2000 2.0 m capillary
3000 3.0 m capillary
5000 5.0 m capillary

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Order code	<input type="text"/>	/ <input type="text"/>	- <input type="text"/>	<input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>
Order example	409778	/ 00	- 588	040	- 20	- 3	- 1500

¹ please specify in plain text when ordering

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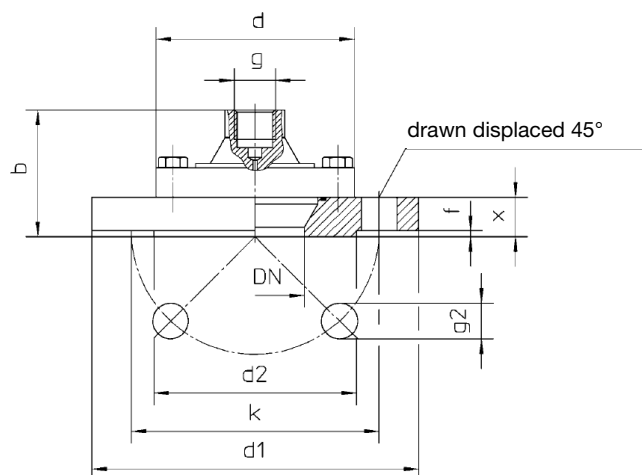
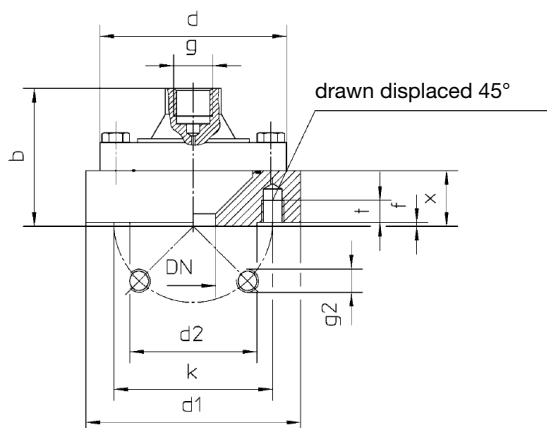
Diaphragm Chemical Seals 4MDV-10

Type 409780



Diaphragm chemical seal 4MDV-10 with flange connection to EN 1092-1 Form B1
with DN15, 20 and 25 connections

with DN50 connection



Technical data

Process connection	Nominal pressure	Recomm. minimum range bar	Weight (without meas. device) kg	Dimensions [mm]							
				DN	d ₂	k	d ₁	b	d	g	g ₂
DN15	PN 40 – 100	0 – 1	1.85	15	45	65	99	69	99	G1/2	4 x M 12
DN20		0 – 0.6	1.95	20	58	75	105	69			
DN25			2.00	25	68	85	115	66			
DN50			3.35	50	102	125	165	64			4 x ø 18

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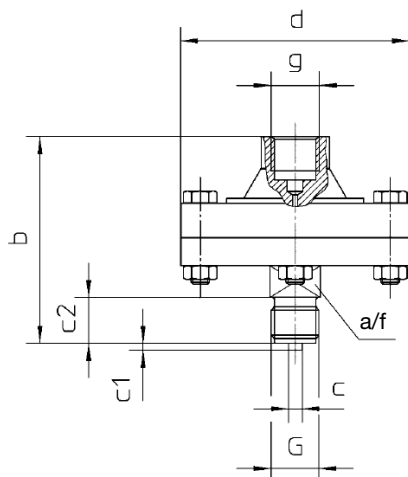
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**Diaphragm chemical seal 4MDV-10 with G1/2 screw connection****Technical data**

Process connection	Nominal pressure	Recomm. minimum range bar	Weight (without meas. device) kg	Dimensions [mm]							
				G	a/f	c	c ₁	c ₂	b	d	g
G1/2	PN 40 — 250	0 — 1	1.43	G1/2	22	6	3	20	90	99	G1/2

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Order details

(1) Basic type

409780 Diaphragm chemical seal 4MDV-10

(2) Process connection

504 G1/2 screw connection
726 DN15 flange connection
727 DN20 flange connection
728 DN25 flange connection
729 DN50 flange connection

(3) Nominal pressure in bar

040 PN40
100 PN100
250 PN250²

(4) Material

20 stainless steel
99 special material¹

(5) Filling medium

1 silicone oil
99 special filling medium¹

(6) Capillary

0000 without capillary
1000 1.0 m capillary
1500 1.5 m capillary
2000 2.0 m capillary
3000 3.0 m capillary
5000 5.0 m capillary

	(1)	(2)	(3)	(4)	(5)	(6)
Order code	<input type="text"/>	/ <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>
Order example	409780	/ 504	- 040	- 20	- 1	- 1000

¹ Please specify in plain text when ordering

² Only with process connection 504 "G1/2 screw connection"

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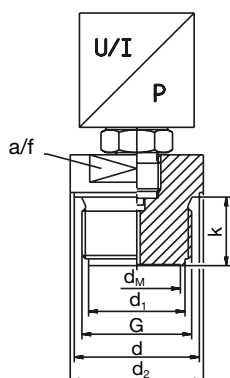
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Pressure separator with male thread ISO 228/1 or ANSI B 1.201 Type 409782

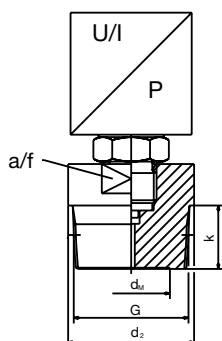
Diaphragm pressure separator ISO 228/1



Technical data

Process connection thread G	Nominal pressure bar	Recommended min. pressure range bar	Temperature coefficient mbar/10°C	Weight (without meas. device) kg	Dimensions [mm]					
					a/f	d _M	d ₁	d	d ₂	k
1" pipe B	PN600	above 10	+20	0.40	41	28	29	39	a/f 41	21
1½" pipe B		above 0.4	+12	1.08		38	44	55	58	30
2" pipe B		above 0.1	+3	1.95	65	46	56	68	78	

Diaphragm pressure separator ANSI B 1.201



Technical data

Process connection	Nominal pressure bar	Recommended min. pressure range bar	Temperature coefficient mbar/10°C	Weight (without meas. device) kg	Dimensions [mm]			
					a/f	d _M	d ₂	k
1" NPT	PN600	above 10	+20	0.55	41	24	(a/f 41)	28
1½" NPT		above 0.4	+12	1.00	46	32	52	30
2" NPT		above 0.1	+6	1.92	65	38	78	

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**Order details**

(1) Basic type	
409782	pressure separator with male thread ISO 228/1 or ANSI B 1.201
(2) Basic type extension	
00	none
(3) Process connection	
572	1" pipe B (ISO 228/1)
570	1½" pipe B (ISO 228/1)
569	2" pipe B (ISO 228/1)
514	1" NPT (ANSI B1.201)
515	1½" NPT (ANSI B1.201)
516	2" NPT (ANSI B1.201)
(4) Nominal pressure in bar	
600	PN600
(5) Material	
20	st. steel
99	special material ¹
(6) Filling liquid	
1	silicone oil
2	halogenized oil
3	vegetable oil
(7) Capillary	
0000	no capillary
0001	with cooling device
1000	1.0 m capillary
1500	1.5 m capillary
2000	2.0 m capillary
3000	3.0 m capillary
5000	5.0 m capillary

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Order code	<input type="text"/>	/ <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>
Order example	409782	/ 00	- 572	- 600	- 20	- 3	- 1500

¹ please specify in plain text when ordering

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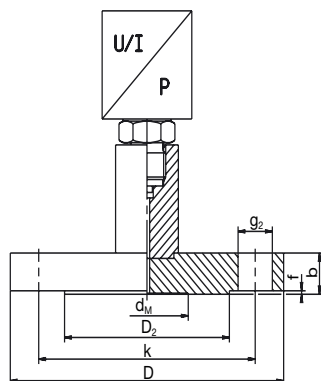


Chemical Seals with flange connection

EN 1092-1

with sealing lip Form B1

Type 409784

Diaphragm chemical seal without tube**Technical data**

Process connection	Nominal pressure bar	Recommended min. pressure range bar	Weight (without meas. device) kg	Dimensions [mm]						
				D	d ₂	d _M	f	g ₂	k	b
DN25	PN40	0 - 4	1.40	115	68	28	2	4 x Ø14	85	18
DN50	PN40	0 - 1	3.00	165	102	52	3	4 x Ø18	125	20
	PN64		4.60	180				4 x Ø22	135	26
	PN100		5.70	195				4 x Ø26	145	28
	PN160		6.15	195				4 x Ø26	145	30
	PN250		7.70	200				8 x Ø26	150	38
	PN320		9.50	210				8 x Ø26	160	42
	PN400		14.70	235				8 x Ø30	180	52
DN80	PN16	0 - 0.6	4.35	200	138	80	3	8 x Ø18	160	20
	PN40		5.25	200				8 x Ø18	160	24
	PN64		6.95	215				8 x Ø22	170	28
	PN100		8.85	230				8 x Ø26	180	32
	PN160		10.05	230				8 x Ø26	180	36
	PN250		15.70	255				8 x Ø30	200	46
	PN400		24.50	280				8 x Ø30	200	46
DN100	PN16	0 - 0.6	4.75	220	158	80	3	8 x Ø18	180	20
	PN40		6.65	235	162			8 x Ø22	190	24

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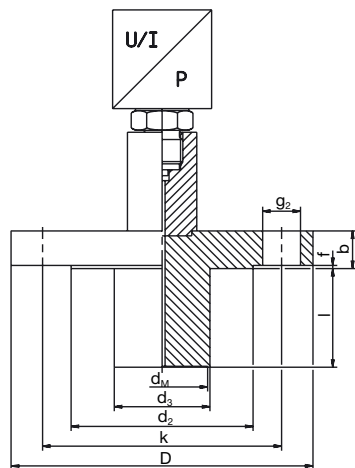
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**Diaphragm chemical seal with tube****Technical data**

Process connection	Nominal pressure bar	Recommended min. pressure range bar	Weight (without meas. device) kg	Dimensions [mm]								l
				D	d ₂	d ₃	d _M	f	g ₂	k	b	
DN50	PN40	0 - 1	3.44	165	102	48.3	45	3	4 x Ø18	125	20	50
			3.76									100
			4.07									150
			4.37									200
DN80	PN16	0 - 0.6	5.25	200	138	76	72	3	8 x Ø18	160	20	50
			5.81									100
			6.37									150
			6.92									200
	PN40		6.15								24	50
			6.71									100
			7.27									150
			7.82									200
DN100	PN16	0 - 0.6	6.25	220	158	94	80	3	8 x Ø18	180	20	50
			7.50									100
			8.75									150
			10.00									200
	PN40		8.15	235	162				8 x Ø22	190	24	50
			9.40									100
			10.70									150
			12.00									200

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Order details

- (1) Basic type**
 409784 Chemical seal with flange connection to EN 1092-1, with sealing lip Form B1
- (2) Basic type extension**
 00 no tube
 19 with tube
- (3) Process connection**
 632 DN25
 635 DN50
 637 DN80
 638 DN100
- (4) Nominal pressure in bar**
 016 PN16
 040 PN40
 064 PN64
 100 PN100
 160 PN160
 250 PN250
 320 PN320
 400 PN400
- (5) Tube length**
 000 no tube
 050 tube 50 mm long
 100 tube 100 mm long
 150 tube 150 mm long
 200 tube 200 mm long
- (6) Material**
 20 st. steel
 99 special material¹
- (7) Filling liquid**
 1 silicone oil
 2 halogenized oil
 3 vegetable oil
- (8) Capillary**
 0000 no capillary
 0001 with cooling device
 1000 1.0 m capillary
 1500 1.5 m capillary
 2000 2.0 m capillary
 3000 3.0 m capillary
 5000 5.0 m capillary

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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Order example	409784	/ 19	- 635	- 040	- 050	- 20	- 3	- 1500

¹ please specify in plain text when ordering

Accessory

Flushing device

Connections to EN 1092-1, sealing lip Form B1, and former DIN 2526, sealing lip Form D

Process connection	Nominal pressure bar	Dimensions [mm]				Weight [kg]	Sales No.
		d1	d2	g	h		
DN50	PN 16 - 400	102	62	1/2"NPT	30	1.1	40/00432697
DN80		138	92			1.9	40/00438998
DN100		162	92			3.15	40/00439001

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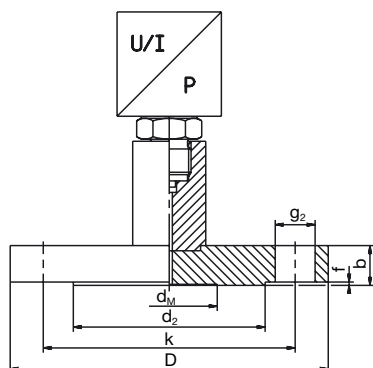
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Pressure separator with flange connection to ANSI B 16.5 with sealing lip Form RF Type 409786

Diaphragm pressure separator Type 409786/00-...**Technical data**

Process connection	Nominal pressure psi	Recommended min. pressure range bar	Weight (without meas. device) kg	Dimensions [mm]						
				D	d ₂	d _M	f	g ₂	k	b
DN2"	PN150	0 - 1	2.60	152	91.9	52	1.6	4 x Ø20	120.7	19.5
	PN300		3.40	165				8 x Ø20	127	22.5
	PN600		4.30	165			6.4	8 x Ø20	127	32
	PN1500		10.30	216				8 x Ø26	163.1	44.5
	PN2500		15.80	235				8 x Ø29	171.5	57.5
DN3"	PN150	0 - 0.6	5.10	191	127	80	1.6	4 x Ø20	152.4	24
	PN300		7.00	210				8 x Ø23	168.1	28.5
	PN600		8.60	210			6.4	8 x Ø23	168.1	38.5
	PN900		13.30	241				8 x Ø26	190.5	44.5
	PN1500		19.30	267				8 x Ø32	203.2	54.5
	PN2500		35.00	305				8 x Ø36	228.6	73
DN4"	PN150	0 - 0.6	7.20	229	157.2	80	1.6	8 x Ø20	190.5	24
	PN300		11.70	254				8 x Ø23	200.2	32
	PN400		13.90	254			6.4	8 x Ø26	200.2	41.5
	PN600		17.50	273				8 x Ø26	215.9	44.5
	PN900		27.10	292				8 x Ø32	234.9	51

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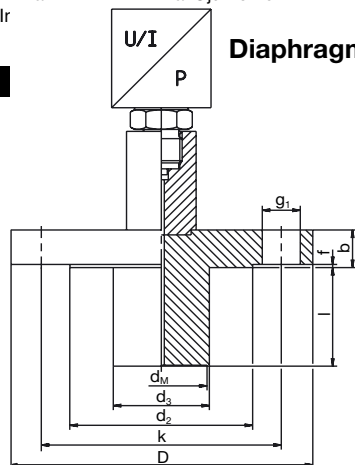
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**Diaphragm pressure separator Type 409786/19...****Data Sheet 40.9786****Page 2/3****Technical data**

Process connection	Nominal pressure psi	Recommended min. pressure range bar	Weight (without meas. device) kg	Dimensions [mm]								
				D	d ₂	d ₃	d _M	f	g ₂	k	b	l
DN2"	PN300	0 - 0.1	3.84	165	91.9	48.3	45	1.6	8 x Ø20	127	22.5	50
			4.16									100
			4.47									150
			4.77									200
DN3"	PN150	0 - 0.6	6.01	191	127	76	72	1.6	4 x Ø20	152.4	24	50
			6.56									100
			7.12									150
			7.67									200
	PN300		210	7.90					8 x Ø23	168.1	28.5	50
				8.46								100
				9.02								150
				9.57								200
DN4"	PN150	0 - 0.6	8.63	229	157.2	94	80	1.6	8 x Ø20	190.5	24	50
			9.90									100
			11.15									150
			12.40									200
	PN300		254	13.13					8 x Ø23	200.1	32	50
				14.40								100
				15.65								150
				16.91								200

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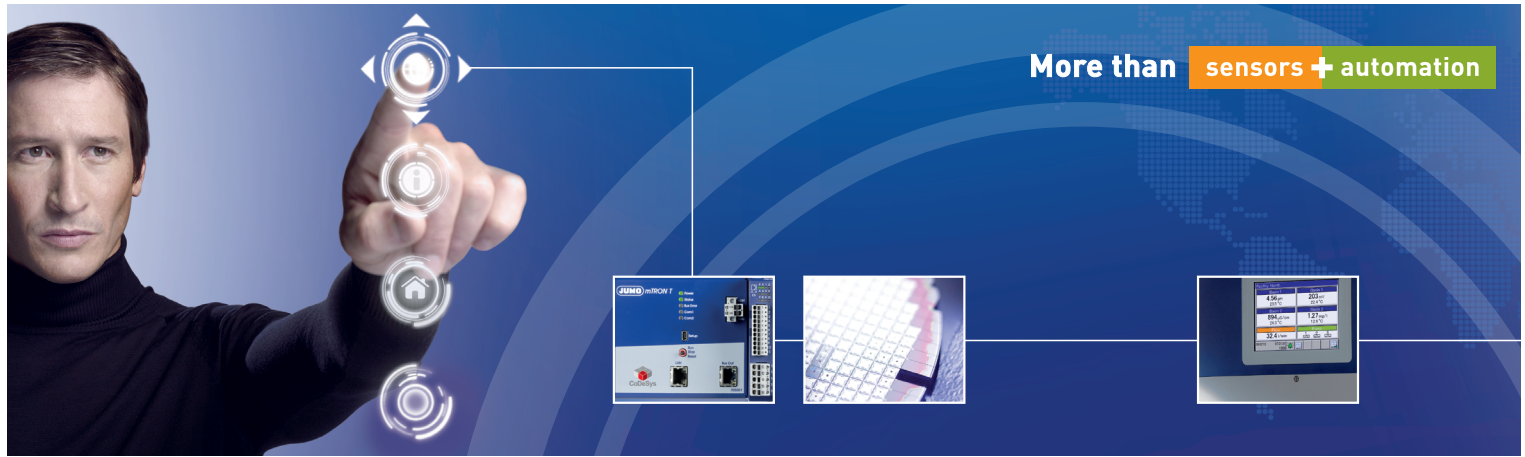


Order details

(1) Basic type	
409786	pressure separator with flange connection to ANSI B 16.5, with sealing lip Form RF
(2) Basic type extension	
00	no tube
19	with tube
(3) Process connection	
695	DN2"
696	DN3"
697	DN4"
(4) Nominal pressure in psi	
0150	PN150
0300	PN300
0400	PN400
0600	PN600
0900	PN900
1500	PN1500
2500	PN2500
(5) Tube length	
000	no tube
050	tube 50 mm long
100	tube 100 mm long
150	tube 150 mm long
200	tube 200 mm long
(6) Material	
20	st. steel
99	special material ¹
(7) Filling liquid	
1	silicone oil
2	halogenized oil
3	vegetable oil
(8) Capillary	
0000	no capillary
0001	with cooling device
1000	1.0 m capillary
1500	1.5 m capillary
2000	2.0 m capillary
3000	3.0 m capillary
5000	5.0 m capillary

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Order code	<input type="text"/>	/ <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>
Order example	409786	/ 00	- 695	- 0300	- 000	- 20	- 3	- 1500

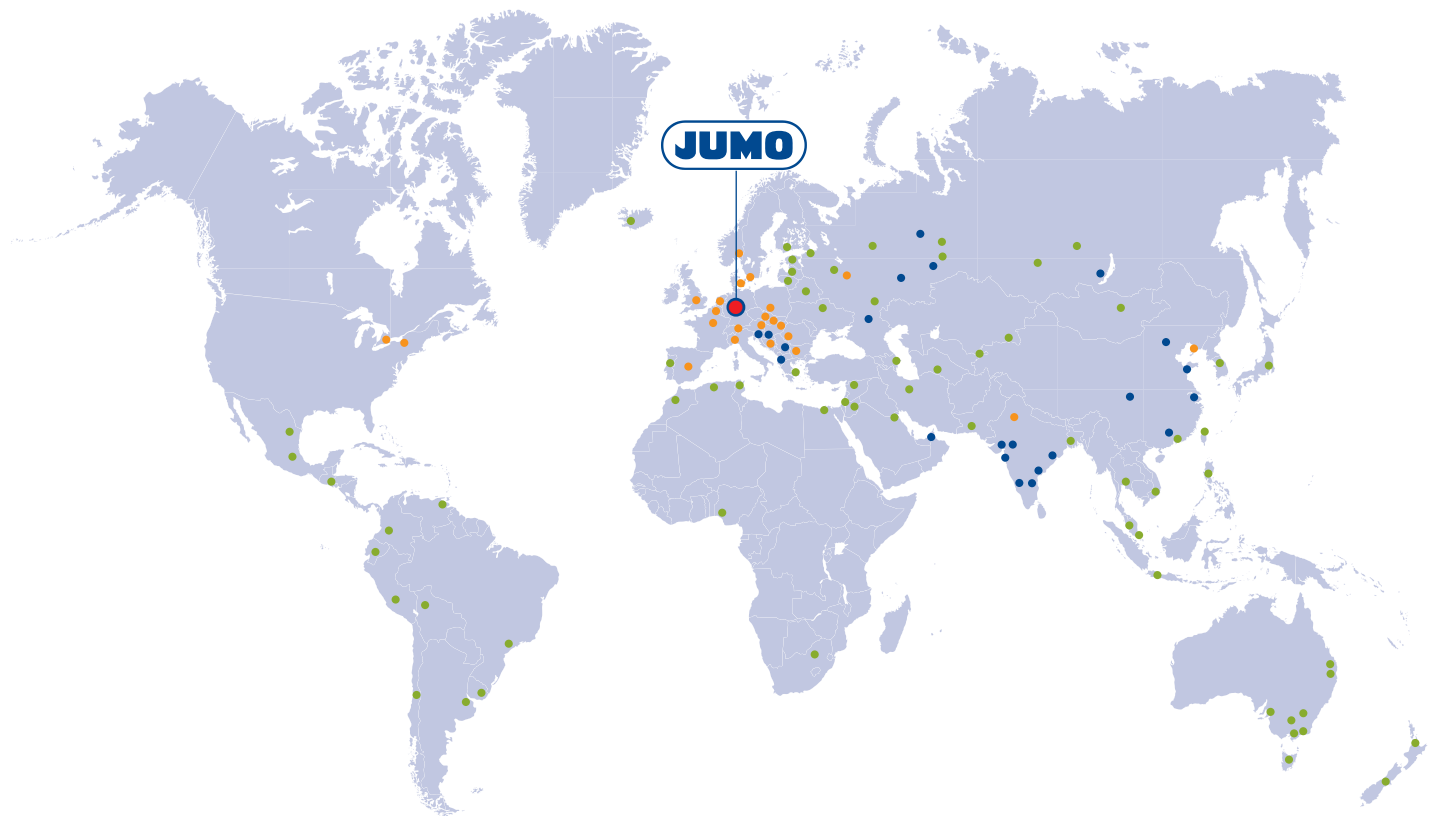
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● Subsidiary

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● Agency



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