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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 with explosion protection available
- 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	
Switching voltage (max.) ^b	AC 175 V	DC 175 V	AC 175 V	DC 175 V
Switching capacity (max.) ^b	10 VA	10 W	10 VA	10 W
Switching current (max.) ^b	0.5 A	0.5 A	0.5 A	0.5 A

Switching function (potential-free)	10 SPST-NO		11 SPST-NC	
Switching voltage (max.) ^b	AC 230 V	DC 230 V	AC 230 V	DC 230 V
Switching capacity (max.) ^b	100 VA	100 W	60 VA	60 W
Switching current (max.) ^b	1.0 A	1.0 A	1.0 A	1.0 A

Switching function (potential-free)	12 SPDT-CO		15 SPST-NO, bistable	
Switching voltage (max.) ^b	AC 230 V	DC 230 V	AC 230 V	DC 200 V
Switching capacity (max.) ^b	60 VA	60 W	50 VA	50 W
Switching current (max.) ^b	1.0 A	1.0 A	1.5 A	1.5 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
029	Spherical	AISI 316 series	29	900	-1 to +35	8
044	Cylinder	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
029			20.3	18.5	16.2	14.6
044		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 ^a e.g. process connection, float, guide tube	AISI 316 series, in the case of float 752 only floats made of titanium
Materials of parts not in contact with medium ^a Cable Terminal head Ex d Connection housing, cube-shaped, small Connection housing, cube-shaped, large	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 (electrical connection 130) and connection housing, cube-shaped, large (electrical connection 131) Diameter 6.5 to 11.9 mm for terminal head Ex d (electrical connection 115) 0.14 to 2.5 mm ² for connection housing, cube-shaped, small (electrical connection 130) 0.14 to 1.5 mm ² for terminal head Ex d (electrical connection 115) and connection housing, cube-shaped, large (electrical connection 131)
Weight	85 g for a guide tube length of 40+90 mm, process connection G 1/4 (process connection 104), and cable, silicone, measuring 500 mm (electrical connection 160)

^a The chemical resistance of the materials should be taken into account for the application.

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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 ^a	
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 ^b	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
Ambient temperature for electrical connection ^c	
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)

^a According to DIN EN 60529

^b According to IEC 60068-2-6

^c Observe dependency of extension tube length with process temperature, see following diagrams

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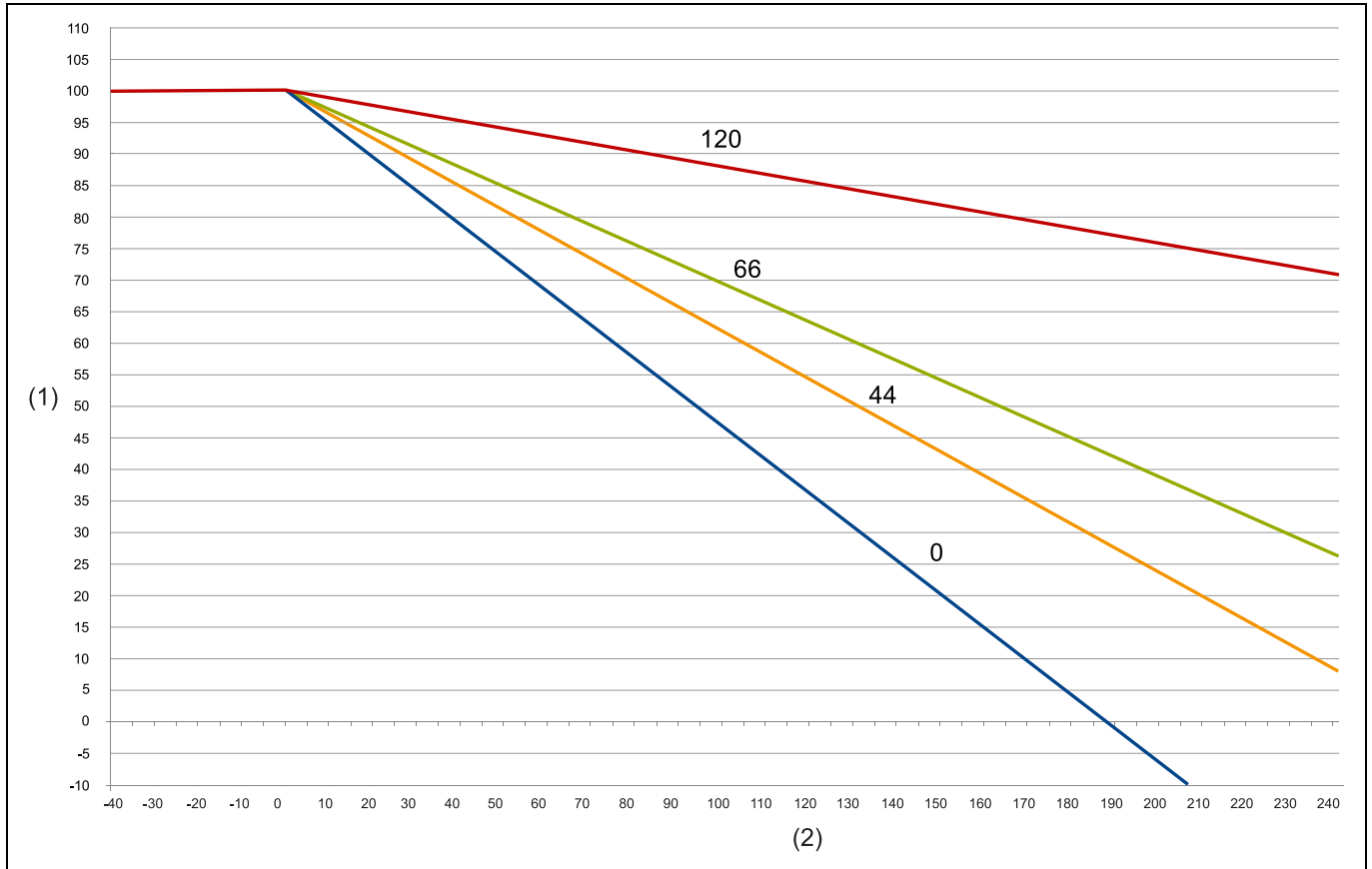
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Maximum ambient temperature depending on the extension tube length and process temperature

Small and large connection housing, extension tube lengths in mm



- (1) Maximum ambient temperature
- (2) Media temperature

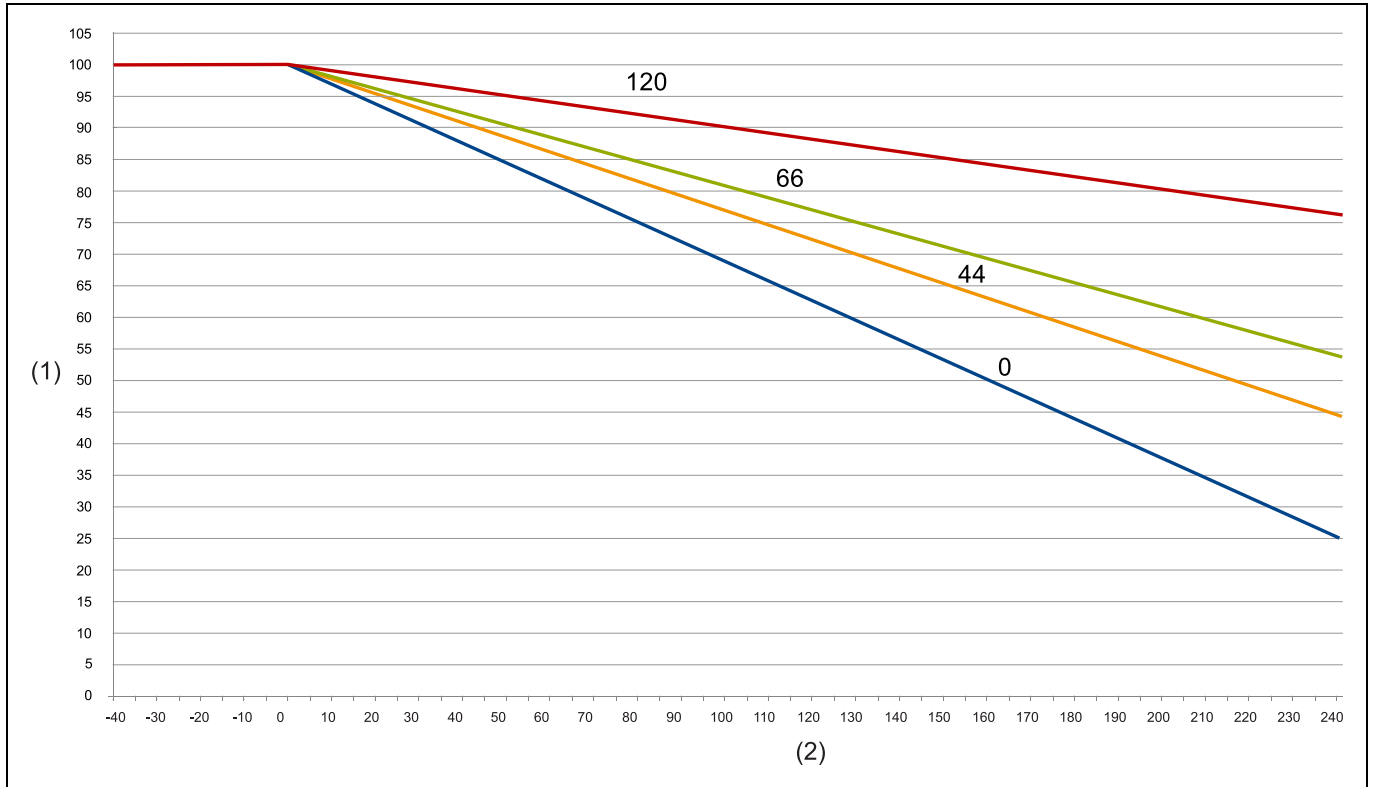
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Connection housing Ex d, extension tube lengths in mm



- (1) Maximum ambient temperature
- (2) Media temperature

Approvals and approval marks

Approval mark	Test facility	Certificate/certification number	Inspection basis	Valid for
ATEX, IEC EX intrinsically safe, Ex i	Eurofins Electrosuisse Product Testing	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 408302/362
ATEX, IEC EX flameproof enclosure, Ex d	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 408302/462

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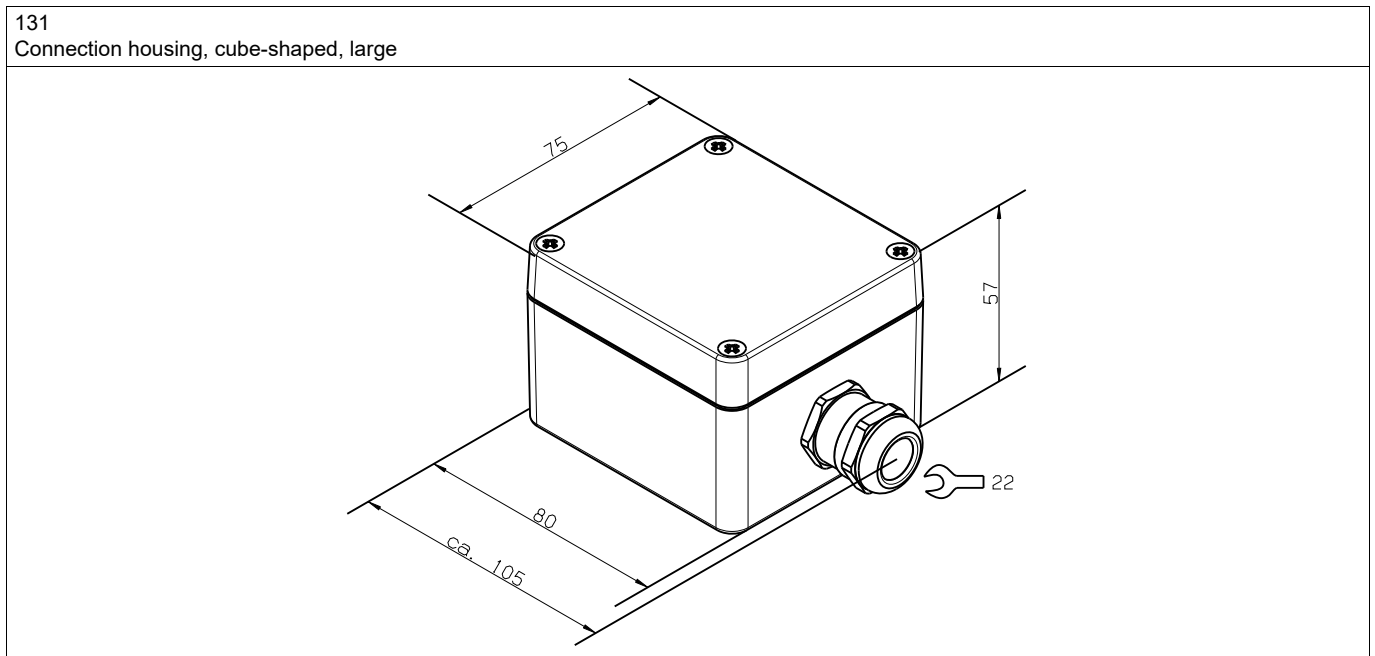
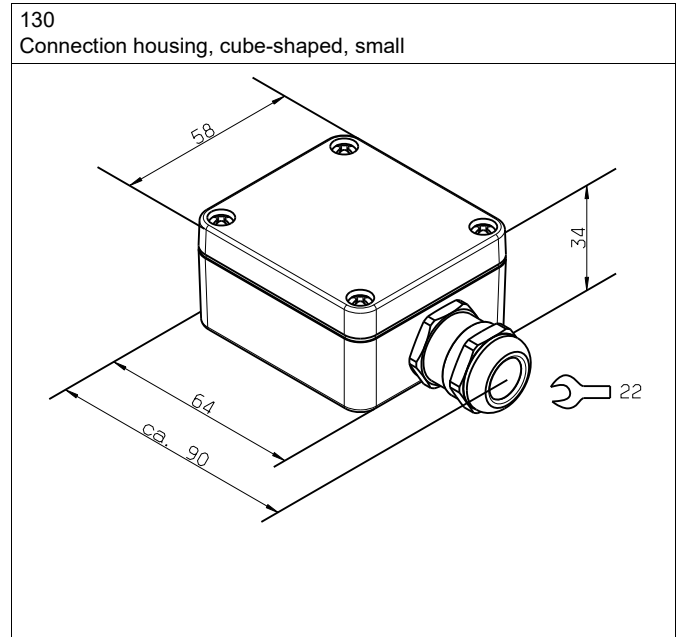
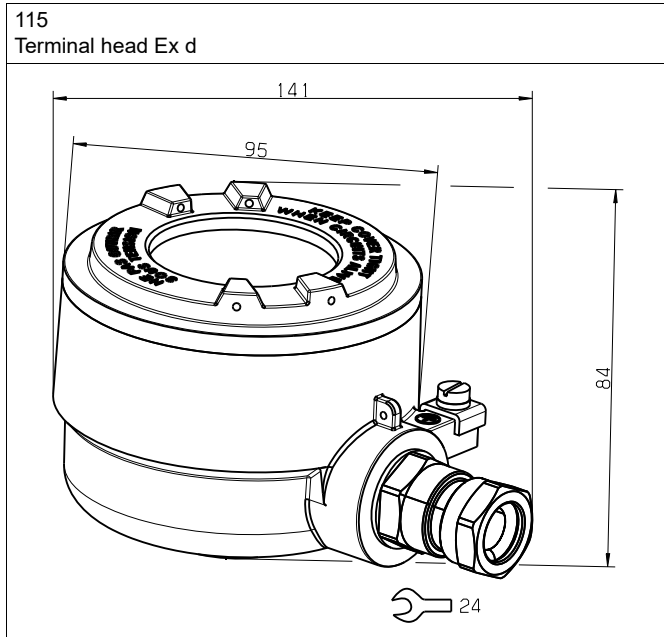
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Dimensions

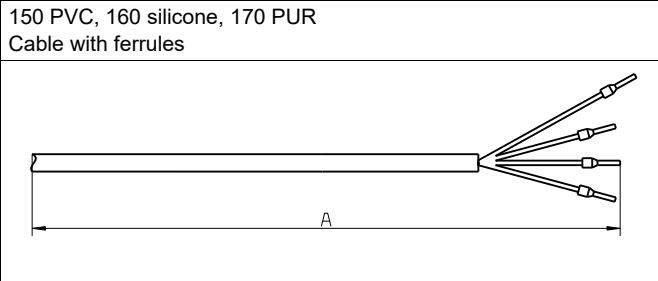
Electrical connection



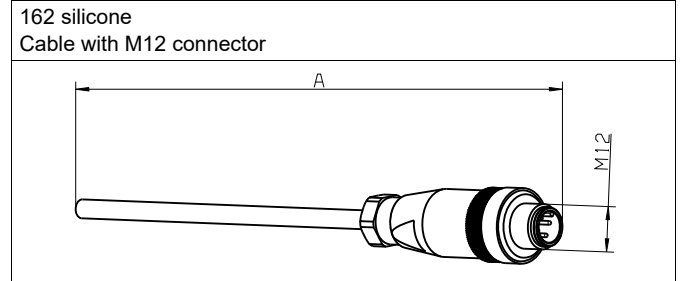
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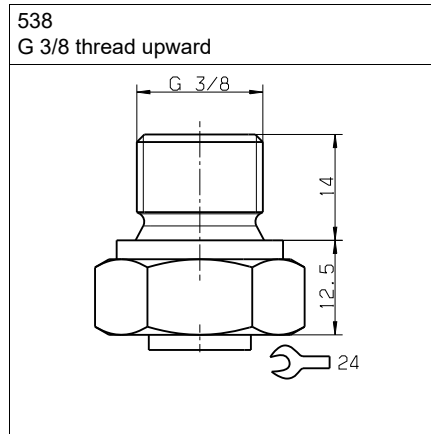
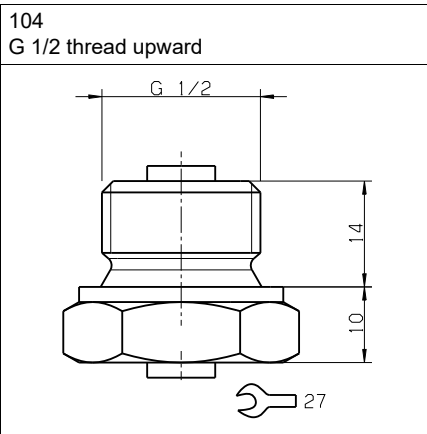
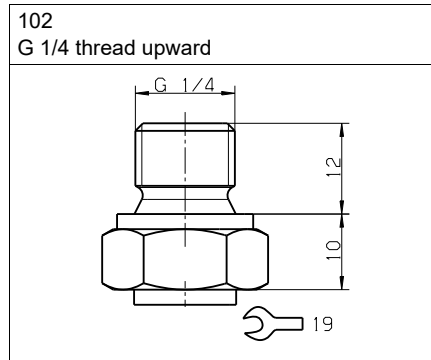
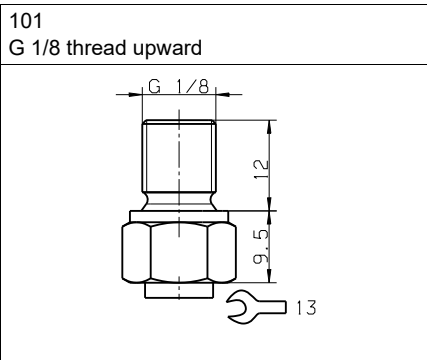


A Cable length, see order details



A Cable length, see order details

Process connections



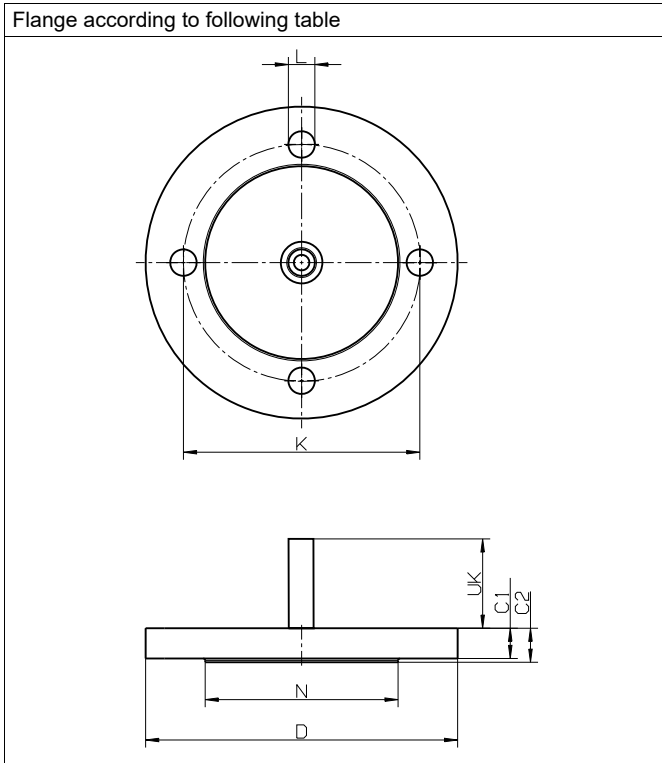
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Flange according to following table



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
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 with sealing strip	125	4	18	165	102	17	20
784	Flange DN 65, PN40 EN 1092-1, form B1 with sealing strip	145	8	18	185	122	19	22
785	Flange DN 80, PN40 EN 1092-1, form B1 with sealing strip	160	8	18	200	138	21	24

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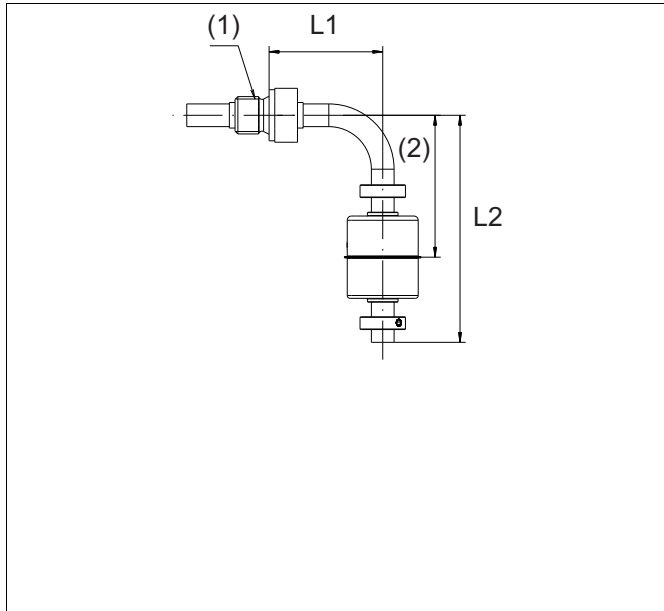
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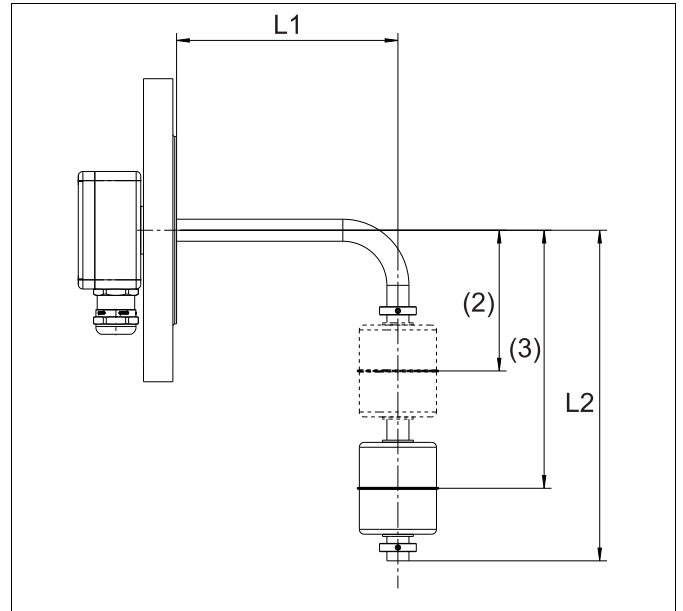


Important information about the order details

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	60 mm	60 mm	85 mm	85 mm
Min. L2	75 mm	75 mm	100 mm	100 mm

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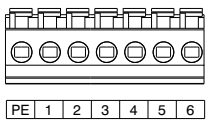
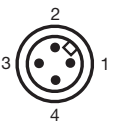
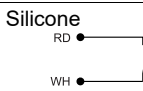


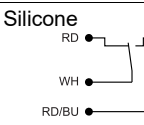
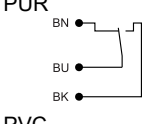
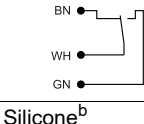
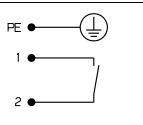
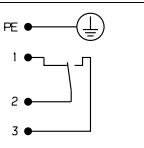
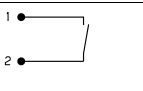
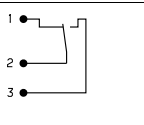
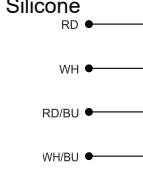
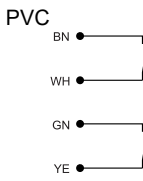
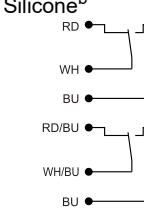
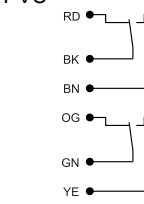
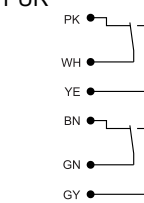
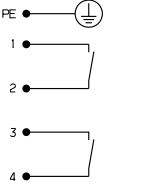
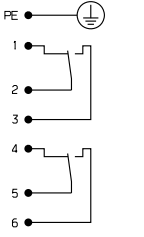
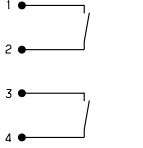
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Connection diagram

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.

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.


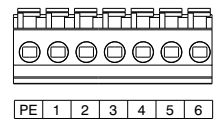
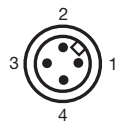
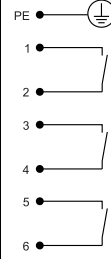
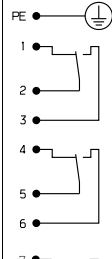
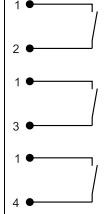
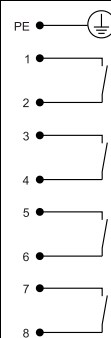
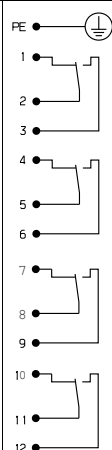
Number of contacts						
	Cable SPST-NO/NC	SPDT-CO	Connection housing SPST-NO/NC	SPDT-CO	Round plug M12 ^a SPST-NO/NC	SPDT-CO
1	<p>Silicone</p>  <p>PUR</p>  <p>PVC</p> 	<p>Silicone</p>  <p>PUR</p>  <p>PVC</p> 				
2	<p>Silicone</p>  <p>PVC</p> 	<p>Silicone^b</p>  <p>PVC^c</p>  <p>PUR^d</p> 				-

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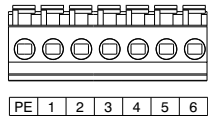
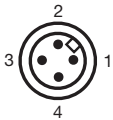
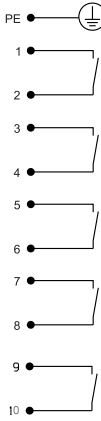
Number of contacts						
	Cable		Connection housing		Round plug M12^a	
	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO
3	Silicone^b RD WH RD/BU WH/BU BU BU PVC^c RD BK BN OG GN YE	-				-
4	-	-			-	-

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Number of contacts						
	Cable		Connection housing		Round plug M12 ^a	
	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO
5						
Protection rating ^e	prepared for 2 according to EN 61010-1		1	1	2	2

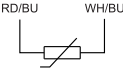
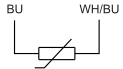


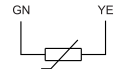




- ^a In the event of product configurations with more than one switching contact, mixing hazardous contact supply circuits and SELV circuits is not permitted.
- ^b According to VDE 0298-4 max. current 0.8 A at max. 175 °C or 1 A at max. 170 °C
- ^c According to VDE 0298-4 max. current 0.8 A at max. 75 °C or 1 A at max. 70 °C
- ^d Only available with protection class 3.
- ^e According to DIN EN 61140

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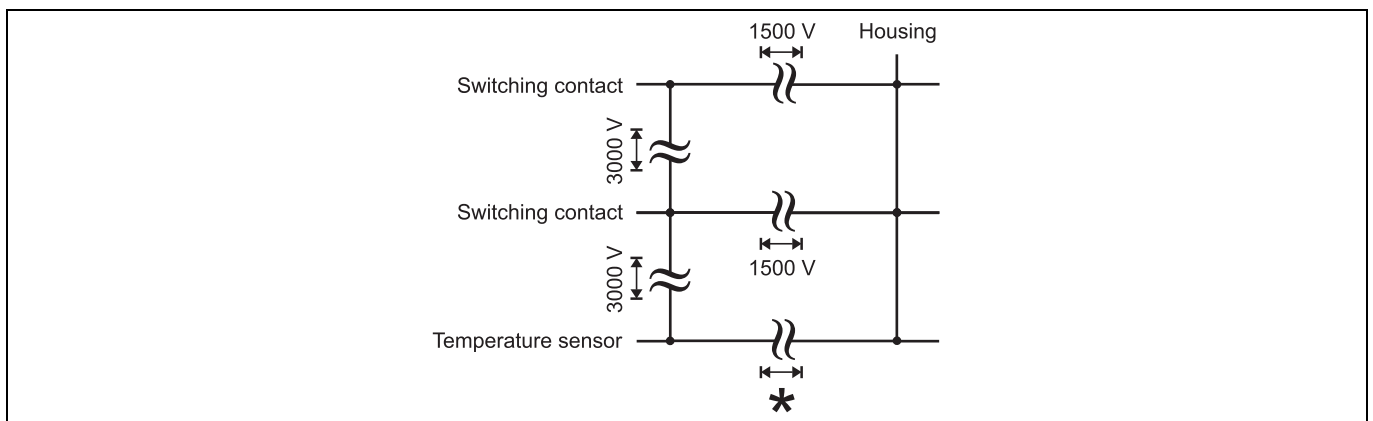
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	Cable	Connection housing	Round plug M12
Temperature sensor Pt100 ^{a, b}	Silicone ^c  Silicone 		
Temperature sensor Pt1000 ^{a, b}	PVC ^c 		
Temperature switch ^a	Silicone ^{d, e} 		
	PVC ^{d, f} 		

- ^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

The galvanic isolation is realized as follows:
 Protection rating 1 – guide tube diameter 12 mm



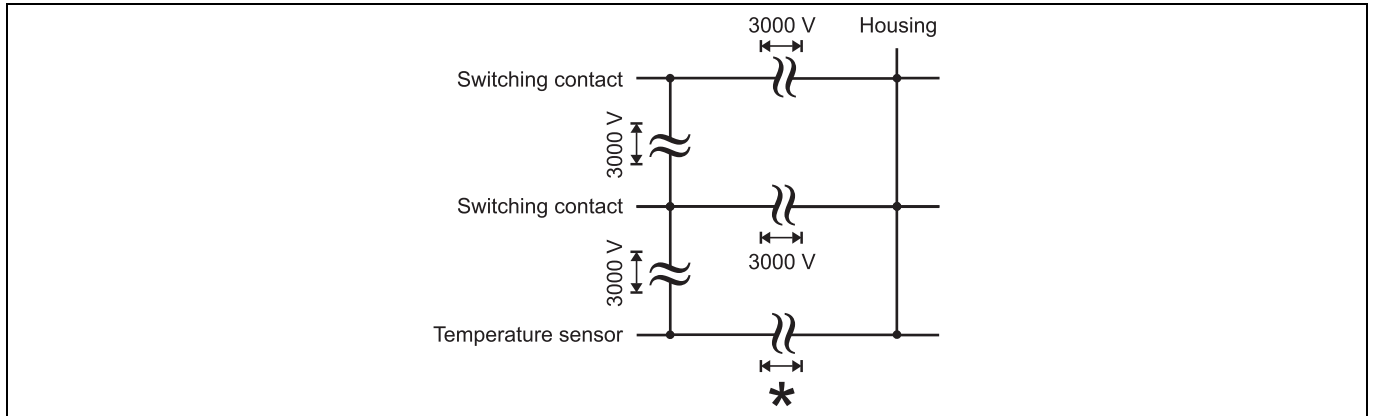
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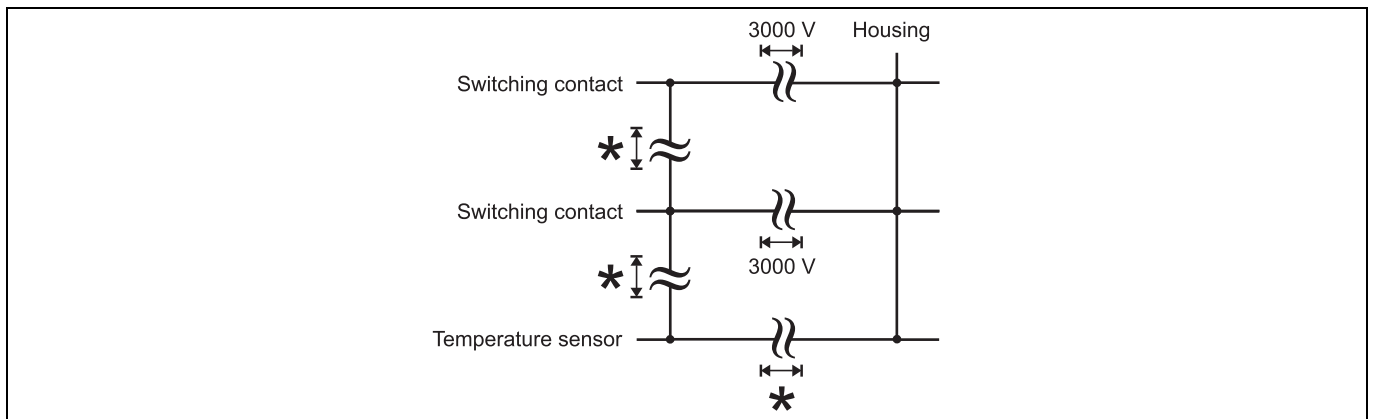
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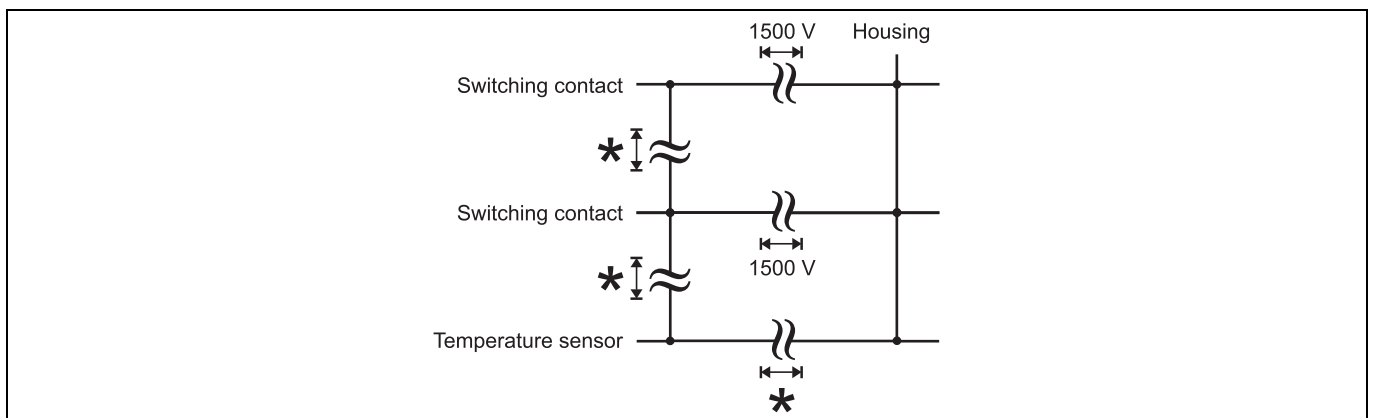
Protection rating 2 – guide tube diameter 12 mm



Protection rating 2 – guide tube diameter 12 mm – electrical connection, M12 connector



Protection rating 1 – guide tube diameter 8 mm



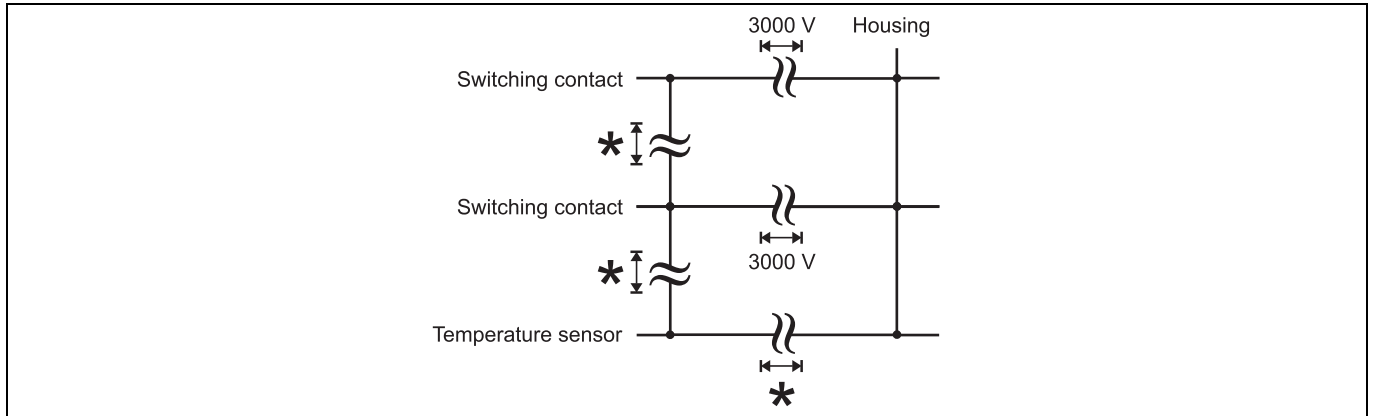
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Protection rating 2 – guide tube diameter 8 mm



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 U_i in mA	Max. power P_i in mW	Internal inductance in μ H	Internal capacitance in pF
SPST-NO	≤ 30	≤ 100	≤ 750	~0 for cable version 1 μ H/m connecting cable	~0 bei Kabelaus- führung 200 pF/m connecting cable
SPST-NC					
SPDT-CO					
Temperature switch					

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 capacitance in pF
Pt100	≤ 30	≤ 55	≤ 413	~0 for cable version 1 μ H/m connecting cable	~0 bei Kabelaus- führung 200 pF/m connecting cable
Pt1000					

Legend: cable	BN	Brown	GN	Green
	WH	White	RD	Red
	BU	Blue	YE	Yellow
	PK	Pink	GY	Grey

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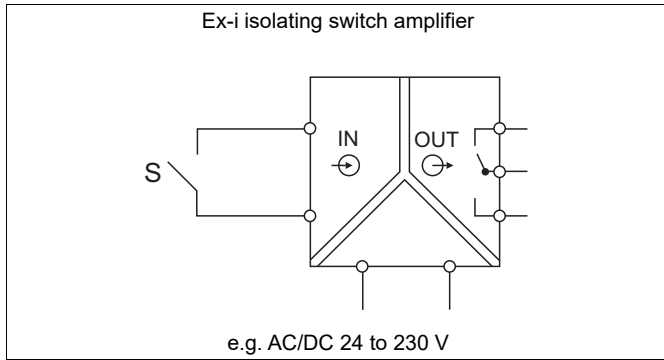
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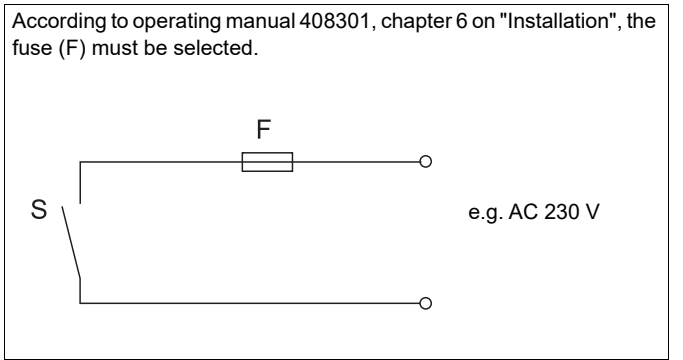
Connection examples of versions with explosion protection

Float switch (S)

Ex i



Ex d



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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
362	Explosion protection, intrinsically safe, Ex i
462	Explosion protection, pressure resistant, 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
714	Flange 2" 300 lbs ANSI B 16.5 RF
729	Flange DN 50, PN 40 DIN EN 1092-1, form B1
784	Flange DN 65, PN 40 DIN EN 1092-1, form B1
785	Flange DN 80, PN 40 DIN EN 1092-1, form B1
786	Flange DN 100, PN 40 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
	(8) Guide tube length L2, vertical^a
50 - 2000	Specifications in plain text
	(9) Float
027	Cylinder, CrNi (stainless steel), diameter 27, density 800 kg/m ³
028	Cylinder, CrNi (stainless steel), diameter 27, density 800 kg/m ³ , electropolished
029	Spherical, CrNi (stainless steel), diameter 29, density 900 kg/m ³
030	Spherical, CrNi (stainless steel), diameter 29, density 900 kg/m ³ , electropolished
044	Cylinder, CrNi (stainless steel), diameter 44, density 750 kg/m ³
045	Cylinder, CrNi (stainless steel), diameter 44, density 750 kg/m ³ , electropolished
052	Spherical, CrNi (stainless steel), diameter 52, density 680 kg/m ³
053	Spherical, CrNi (stainless steel), diameter 52, density 680 kg/m ³ , electropolished
729	Spherical, Ti (titanium), diameter 29, density 700 kg/m ³
744	Cylinder, Ti (titanium), diameter 44, density 750 kg/m ³

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752	Spherical, Ti (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, N/C 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, N/O contact (100 VA/AC 230 V/1 A)
11	SPST-NC, N/C contact (60 VA/AC 230 V/1 A)
12	SPDT, single-pole changeover contact (60 VA/AC 230 V/1 A)
15	SPST-NO, N/O 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	
20 - 1970	Specifications in plain text
(14) Position of contact 2^b	
0	None
20 - 1970	Specifications in plain text
(15) Position of contact 3^b	
0	None
40 - 1970	Specifications in plain text
(16) Position of contact 4^b	
0	None
40 - 1970	Specifications in plain text
(17) Extra codes	
000	None
005	Integrated temperature sensor Pt1000 ^c
007	Integrated temperature sensor Pt100 ^c
009	Temperature switch ^d
019	Temperature monitoring of reed contact, Pt1000

^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 (see "Important information about the order details").

^b The contact positions are viewed from the process connection toward the guide tube end (see "Important information about the order details").

^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.

Order code	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)								
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Order example	408304	/	000	-	160	-	2000	-	102	-	8	-	40	-	80	-	027
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)									
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	1	-	10	-	1	-	50	-	0	-	0	-	0	-	0	-	000