

**JUMO GmbH & Co. KG**

Delivery address: Mackenrodtstraße 14  
36039 Fulda, Germany  
Postal address: 36035 Fulda, Germany  
Phone: +49 661 6003-0  
Fax: +49 661 6003-607  
Email: mail@jumo.net  
Internet: www.jumo.net

**JUMO Instrument Co. Ltd.**

JUMO House  
Temple Bank, Riverway  
Harlow, Essex, CM20 2DY, UK  
Phone: +44 1279 63 55 33  
Fax: +44 1279 62 50 29  
Email: sales@jumo.co.uk  
Internet: www.jumo.co.uk

**JUMO Process Control, Inc.**

6733 Myers Road  
East Syracuse, NY 13057, USA  
Phone: +1 315 437 5866  
Fax: +1 315 437 5860  
Email: info.us@jumo.net  
Internet: www.jumousa.com



# 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

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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 bar	Linearity <sup>a</sup> % MSP <sup>f</sup>	Accuracy at		Long-term stability <sup>b</sup> % MSP per year	Overload capacity <sup>c</sup> bar	Burst pressure bar
		20 °C <sup>d</sup> % MSP	-20 °C to +100 °C <sup>e</sup> % MSP			
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	

<sup>a</sup> Linearity according to limit point setting

<sup>b</sup> Reference conditions DIN EN 61298-1

<sup>c</sup> All pressure transmitters are vacuum-proof.

<sup>d</sup> Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

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

<sup>f</sup> MSP = measuring span

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## Output

Analog output Output 405	4 mA to 20 mA, 2-wire
Step response $T_{90}$	$\leq 3$ 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 (electrical connection 36)	Diecast zinc, nickel-plated, PA, stainless steel 303
Bayonet connector (electrical connection 54)	Stainless steel 304
Plug connector (electrical connection 60)	PBT-GF30
Cable socket (electrical connection 61)	PBT-GF30, PA, silicone
Process seal	The measuring system is welded and therefore entirely free of seals. <sup>a</sup>
Weight	135 g with G 1/4 (process connection 502)

<sup>a</sup> 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	
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 <sup>a</sup> 20 g, 15 Hz to 2,000 Hz <sup>b</sup>
Shock resistance	3 g for 30 ms <sup>c</sup> 100 g for 1 ms <sup>d</sup>
Electromagnetic compatibility	
Interference emission <sup>e</sup>	Class B <sup>f</sup>
Interference immunity <sup>c</sup>	Evaluation criterion A
Protection type for electrical connection	According to DIN EN 60529
Round plug M12 × 1 <sup>g</sup>	IP66/IP67
Bayonet connector <sup>g</sup>	IP66/IP67
Plug connector	IP50
Cable socket <sup>h</sup>	IP65

<sup>a</sup> DIN EN 61373, chapter 8, category 1, class B

<sup>b</sup> DIN EN 60068-2-6

<sup>c</sup> DIN EN 61373, chapter 10, category 1, class A + B

<sup>d</sup> DIN EN 60068-2-27

<sup>e</sup> DIN EN 50121-3-2

<sup>f</sup> The product is suitable for industrial use as well as for households and small businesses.

<sup>g</sup> The protection type is only achieved with a suitable mounted counter piece.

<sup>h</sup> Connecting cable diameter, minimum 6 mm, maximum 8 mm

## Auxiliary power

Voltage supply U <sub>B</sub> <sup>a</sup>	
4 mA to 20 mA, 2-wire (output 405)	DC 10 V to 30 V, rated voltage supply DC 24 V
Current consumption	
4 mA to 20 mA, 2-wire (output 405)	≤ 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".

<sup>a</sup> Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

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**Certificate**

**JUMO GmbH & Co KG**

Moritz-Juchheim-Straße 1  
 36039 Fulda, Germany  
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 Email: mail@jumo.net  
 Internet: www.jumo.net



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**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
<b>6</b> Vibration and shock test		
Half sine puls Acceleration 30 m/s <sup>2</sup> , 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 <sup>2</sup> , 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 <sup>2</sup> , frequency range 5 Hz ≤ f ≤ 150 Hz, approx. 10 minutes per orientation	EN 61373:1999 Cat. 1B	Passed
<b>7</b> 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
<b>8</b> Accelerated lifetime test (lifetime: 190,000 h)	Lifetime [h] / 2 <sup>Δ</sup> (temperature increase /10)= test time [h]	Passed
<b>9</b> Accelerated ageing 150,000 pressure cycles, 0 to 60 bar, 3 Hz		Passed

**JUMO GmbH & Co. KG**  
 Moritz-Juchheim-Straße 1, Fulda, Germany

July 11, 2016

Joachim Vollmer  
 Product Management Sensors

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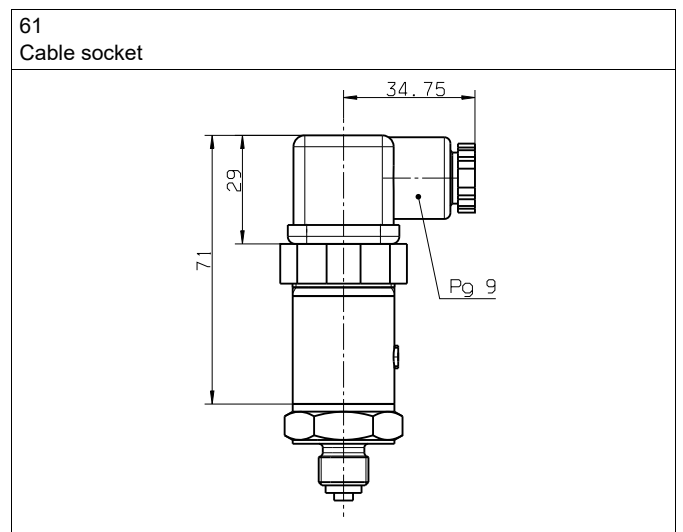
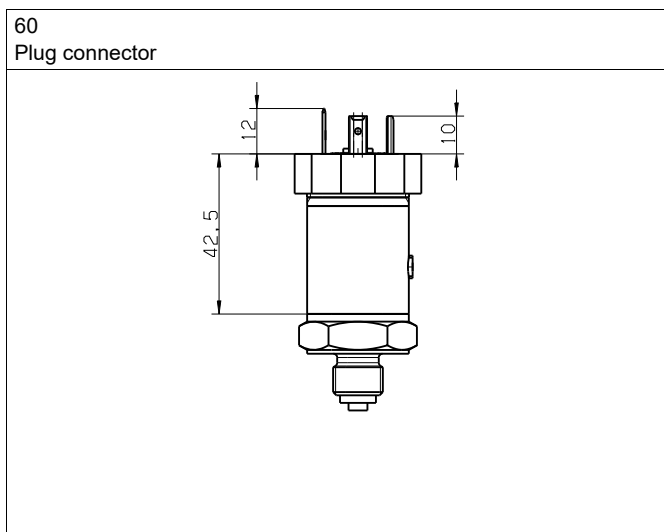
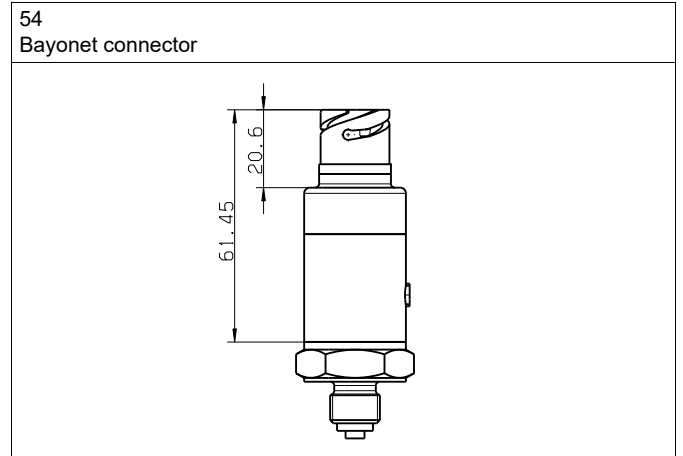
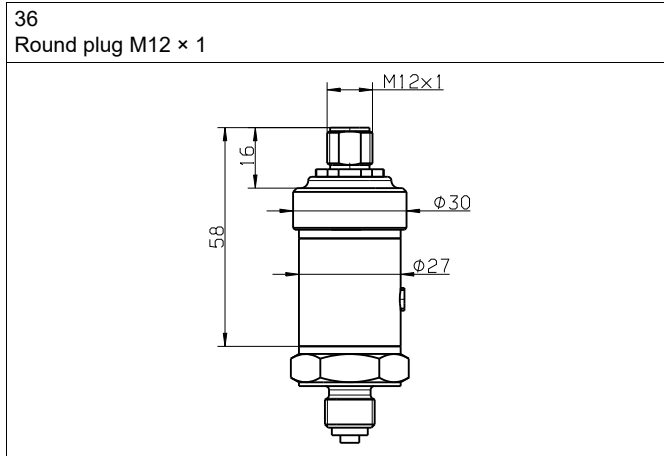
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# Dimensions

## Electrical connection



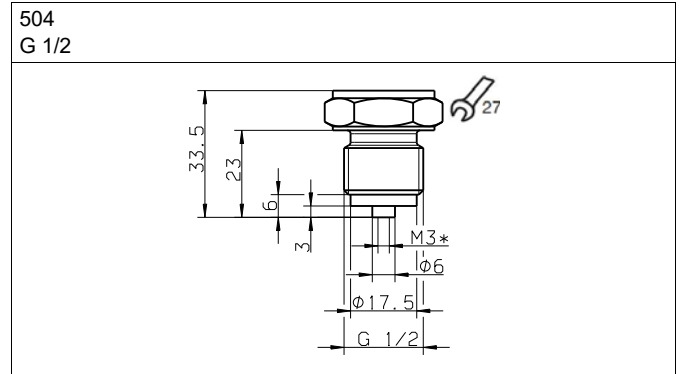
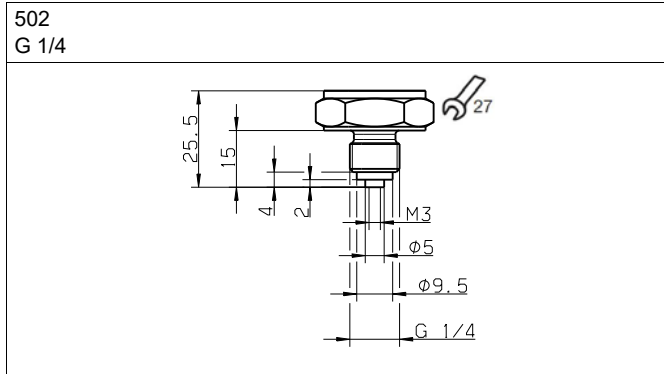
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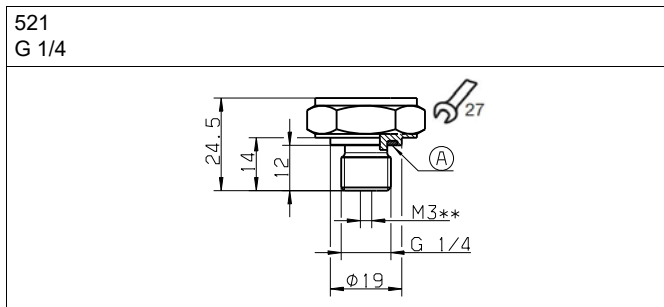
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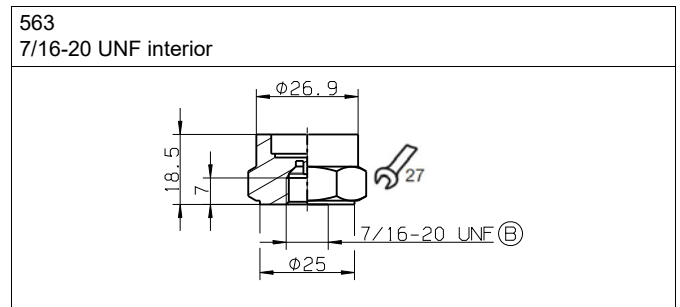
**Process connection**



\* Extra code 630 pressure channel Ø 12 mm



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



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 <sup>a</sup>		
		36 Round plug M12 × 1	54 Bayonet connector	60 Plug connector 61 Cable socket
<b>4 mA to 20 mA, 2-wire (output 405)</b>				
Voltage supply DC 10 V to 30 V	U <sub>B</sub> /S+	1	1	1
	0 V/S-	3	2	2
Functional bonding conductor FB <sup>b</sup>		2	3	

<sup>a</sup> Figure: Connection to the pressure transmitter

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

<b>Color coding: connecting cable round plug M12 × 1</b>	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

	<b>(1) Basic type</b>
401008/000	JUMO MIDAS S19 R – OEM pressure transmitter – Railway
401008/999	JUMO MIDAS S19 R – OEM pressure transmitter – Railway, special version
	<b>(2) Input</b>
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
	<b>(3) Output</b>
405	4 mA to 20 mA, 2-wire
	<b>(4) Process connection</b>
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
	<b>(5) Process connection material</b>
20	CrNi (stainless steel)
	<b>(6) Electrical connection</b>
36	Round plug M12 × 1
54	Bayonet VG 95234A - 10SL
60	Plug connector DIN EN 174301-803, Form A (without cable socket)
61	Cable 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 <sup>a</sup>
950	For railway applications <sup>b</sup>

<sup>a</sup> Diameter 8 mm for process connection 521, diameter 12 mm for process connection 504

<sup>b</sup> Railway application is standard and must always be indicated.

**Order code**                                    **(1)**                                    **(2)**                                    **(3)**                                    **(4)**                                    **(5)**                                    **(6)**                                    **(7)**  
 Order example                                    401008/000                                    -                                    455                                    -                                    405                                    -                                    504                                    -                                    20                                    -                                    61                                    /                                    950 , ...<sup>a</sup>

<sup>a</sup> List extra codes in sequence, separated by commas.