

JUMO dTRANS p20 Ex d

Process pressure transmitter
explosion-protected, explosion-proof enclosure



Operating Manual



40302600T90Z001K000

V9.00/EN/00556401/2022-10-31

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1 Safety information

General

This manual contains information that must be observed in the interest of your own safety and to avoid material damage. This information is supported by symbols which are used in this manual as indicated.

Please read this manual before starting up the device. Store this manual in a place that is accessible to all users at all times.

If difficulties occur during startup, please do not intervene in any way that could jeopardize your warranty rights!

Warning symbols



DANGER!

This symbol indicates that **personal injury from electrocution** may occur if the appropriate precautionary measures are not taken.



CAUTION!

This symbol in connection with the signal word indicates that **material damage or data loss** will occur if the respective precautionary measures are not taken.

Note symbols



NOTE!

This symbol refers to **important information** about the product, its handling, or additional benefits.

1.1 Hazardous materials

Using hazardous materials as a medium may result in abrasive and corrosive damage to components of the product that come into contact with the medium. The medium may leak and present a fire hazard and a risk to health.

Carry out a risk assessment taking into consideration the safety data sheet for the relevant hazardous substance for mounting, operation, maintenance, cleaning, and disposal:

- Comparison and systematic checking of the durability of the components of the product that come into contact with the medium and the admissible environmental influences.
- Assessment of the risk to people and the environment.
- Assessment of the fire hazard due to the product materials, the admissible environmental influences, and the voltage supply.

1 Safety information



DANGER!

The device is suitable for measuring pressure in gases and liquids without solids content. In the SIL version (functional safety), this device is used in safety-related systems for minimum, maximum and area monitoring that fulfil the requirements of the series of standards IEC 61508:2010.

A failure of the device or other devices connected to it, e.g. due to an operating error, can lead to dangerous malfunctions of the whole plant.

- ▶ Therefore please also observe the corresponding safety manual from the device series.
-



NOTE!

Read this operating manual before putting the device into service. Keep the operating manual in a place that is accessible to all users at all times.

All necessary settings are described in this operating manual. Nevertheless, should problems be encountered during startup please do not make any unauthorized manipulations. This could endanger your rights under the warranty!

Please contact the nearest branch office or the head office.

2.1 Areas of application

General information

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.

Use in „Ex-area“

The device is permitted for use in the „Ex-area“. The device is flameproof enclosed and can be mounted in Zone 1!

Functional safety use

In the SIL version, the device is permitted for use according to IEC 61508 if it has a corresponding identification marking on the nameplate.

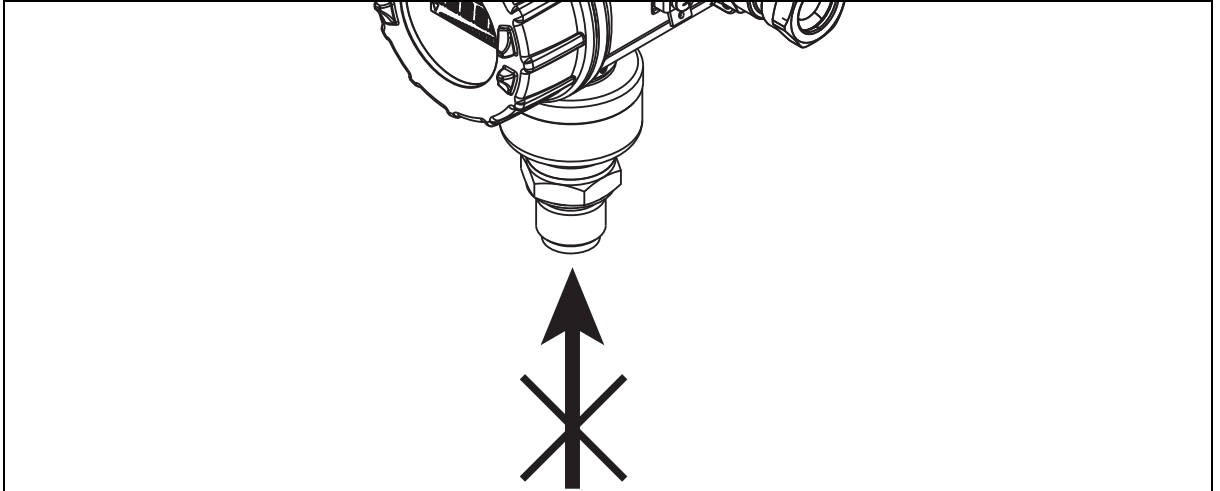
2 General information



CAUTION!

The device's membranes must not be damaged at the process connection!

- ▶ Do not insert any objects into the drilled holes of the pressure connections!
The device must be sent back if there is damage to the housing or membrane!



2.2 Scope of delivery

Operating Manual

The operating manual describe the mounting, the electrical connection, the startup and operation of the device.

Safety manual (option)

The safety manual describes the safe application with the installation according to IEC 61508.

Calibration certificate

The device is supplied with a calibration certificate and a setup print-out.

These documents contain information about the set parameters and/or the measured parameters for the respective device.

If the calibration certificate is lost or if you need another copy, the calibration certificate can be requested from the manufacturer by specifying the device's F number (see nameplate). You will find the supplier's address on the back cover of the manual.

Setup program (option)

The setup program is available as an option: part no. 00537577

All the device's parameters can be conveniently checked and adjusted using the setup program - there are also additional functions, e.g.:

- Recording the measured values
- Graphical view of temperature and pressure
- Detailed diagnostic messages
- Display of the complete order code and the device configuration (for follow-up orders)

The setup program accesses the device via

- the JUMO interface (standard) or
- the HART® interface (optional)

2 General information



DANGER!

**The JUMO interface must not be used in the Ex-area!
The device may only be operated using the rotary knob or the HART® interface!**

PC interface cable (option)

Available as an accessory: PC interface cable with USB/TTL converter and two adapters (USB transmitter cable), part no. 00456352.

The device can be connected to a PC's USB port via the JUMO interface with the PC interface cable.

HART® modem (option)

Available as an accessory: HART® modem for USB, part no. 00443447.

The device can be connected to a PC's USB® port via the HART® interface with the HART® modem.

Diaphragm seal (option)

Available as an accessory: see data sheets 409770 to 409786.

Diaphragm seals are used for adjusting to particular applications if conventional pressure connections cannot be used.



CAUTION!

Diaphragm seals are installed by default and must not be removed from the device!

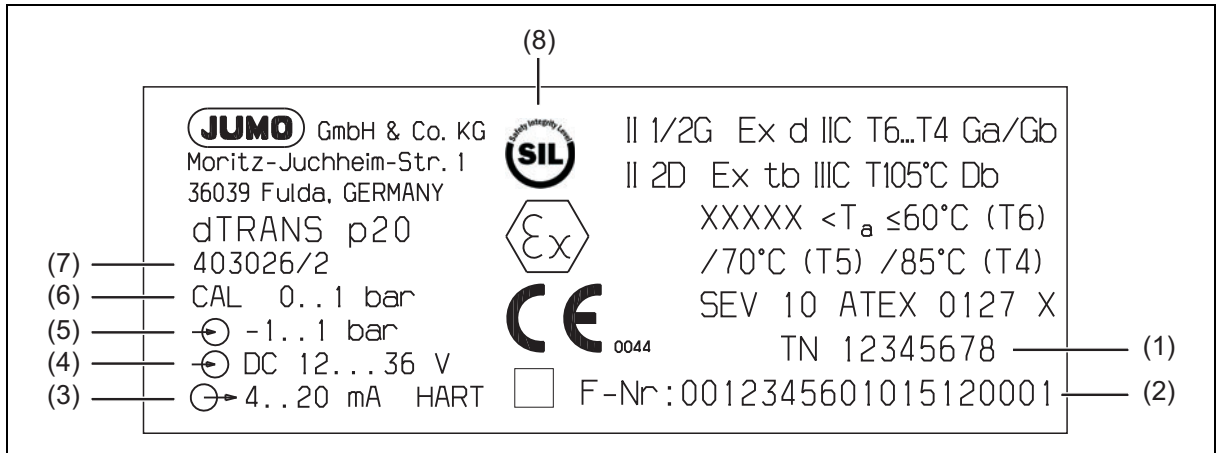
2 General information

3 Identifying the device version

3.1 Nameplate

Housing

Sample identification marking on the device housing.



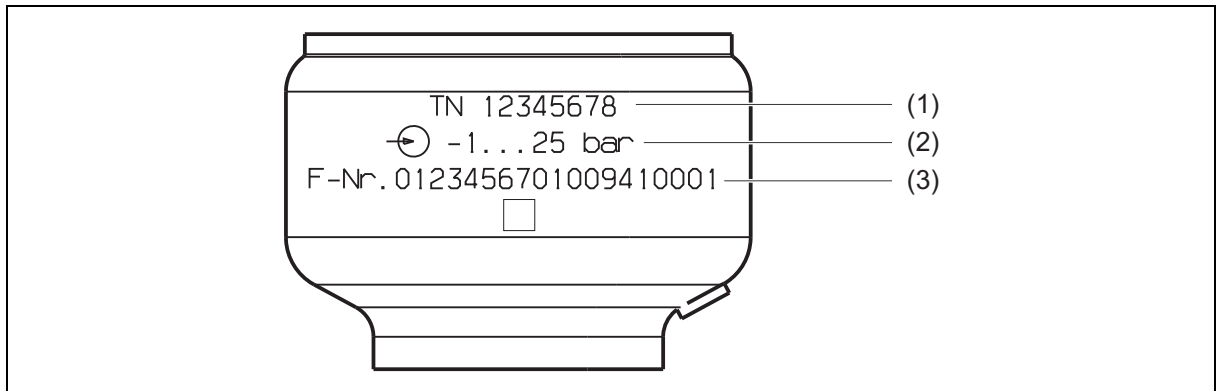
- | | |
|-----------------------------|--------------------------------------|
| (1) Part number | (2) Fabrication number |
| (3) Output signal | (4) Voltage supply |
| (5) Nominal measuring range | (6) Werkseinstellung Nennmessbereich |
| (7) Type | (8) SIL-Ausführung |

Date of manufacture

The date of manufacture (year and calendar week) of the device is encoded in the manufacturing number. The numbers 12 to 15 identify the year of manufacture and the calendar week.

Sensor unit

Identification marking on the device's sensor housing:



- | |
|-----------------------------|
| (1) Part number |
| (2) Nominal measuring range |
| (3) Fabrication number |

3 Identifying the device version

3.2 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)

3 Identifying the device version

82	NiMo ^d
(9) Measuring system, filling medium	
00	Without ^e
01	Silicon oil
(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"/>	/	<input type="text"/>
Order example	403026	/	0	-	1	-	1	-	514	-	410	-	504	-	20	-	01	/	000		

3 Identifying the device version

3.3 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.

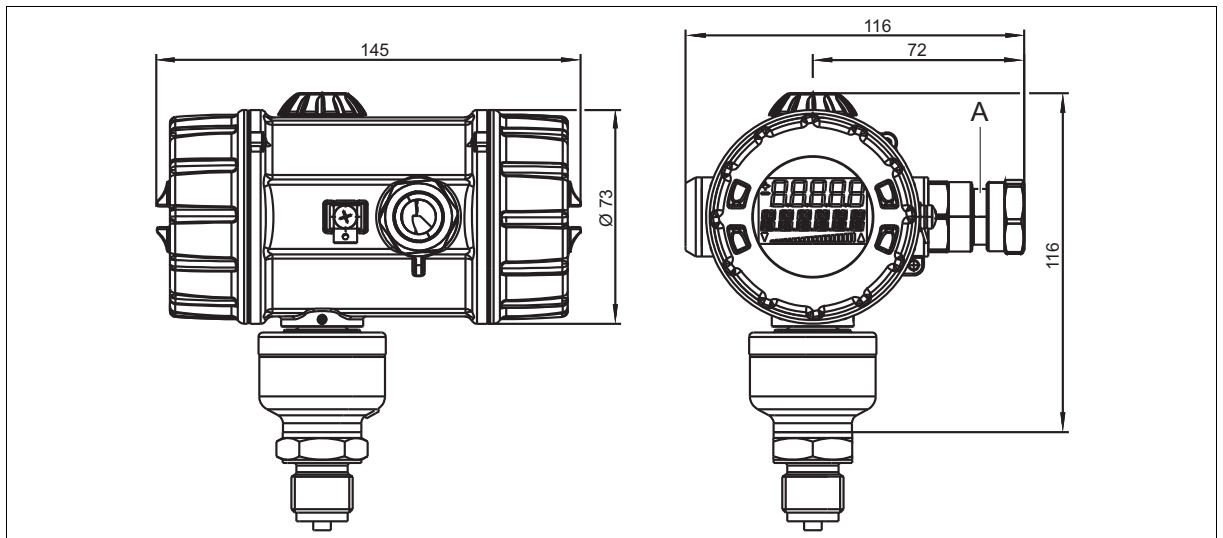
^b The HART® modem is the connection between the HART® interface of the differential pressure transmitter and the USB interface of a PC.

3.4 Software

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

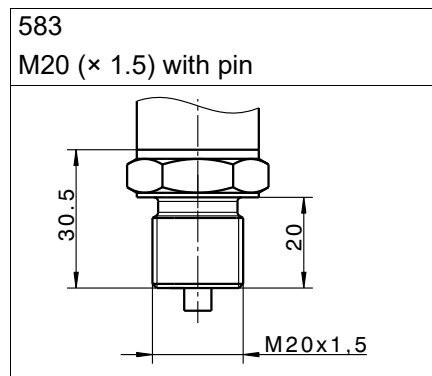
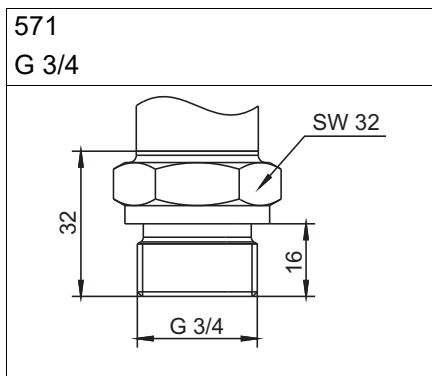
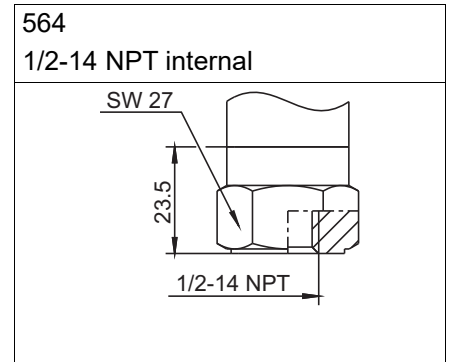
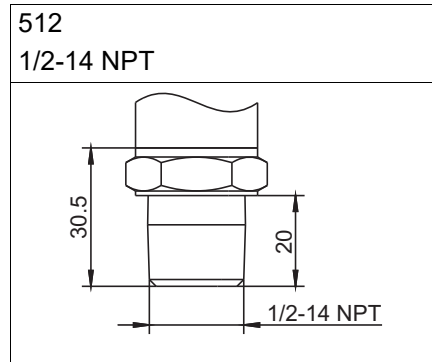
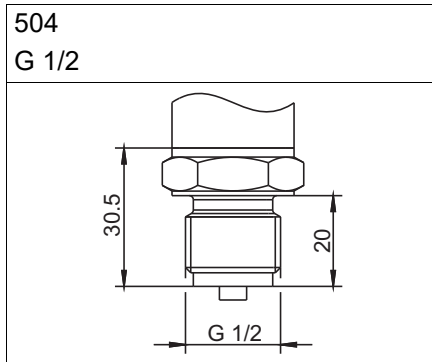
3 Identifying the device version

3.5 Dimensions



A Kabelverschraubung M20 × 1,5

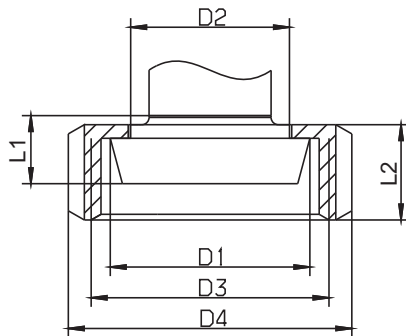
3.5.1 Process connections



3 Identifying the device version

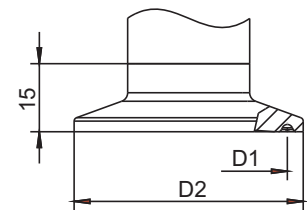
604 and 606

Taper socket with grooved union nut according to DIN 11851



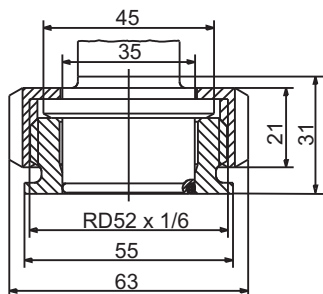
613 and 616

Clamp according to DIN 32676



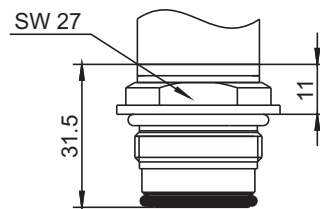
652

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				

4.1 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.

4 Technical data

4.2 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


4.3 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 ≤ (U _B -12 V) ÷ 0.022 A; additional: min. 250 Ω, max. 1100 Ω

4.4 Voltage supply

Voltage supply	DC 12 to 36 V
----------------	---------------

4.5 Mechanical features

<p>Process connection</p> <p>Materials</p> <p>For process connection 20 (stainless steel)</p> <p>For process connection 82 (HASTELLOY®)</p> <p>Surface</p>	<p>316 L for front-flush process connections</p> <p>Otherwise 316 Ti</p> <p>2.4819 NiMo</p> <p>Ra ≤ 0.8 μm</p>
<p>Process seal</p> <p>Process connection 571 G 3/4 front-flush) and process connection 652 (tank connection with grooved union nut)</p> <p>For process connection 997 (JUMO PEKA)</p> <p>For all other process connections</p>	<p>FPM</p> <p>FDA compliant: FPM, VMQ, EPDM as an option, see data sheet 409711</p> <p>No seal</p>
<p>Measuring membranes</p> <p>For material lid 20 (stainless steel)</p> <p>For material lid 82 (plastic)</p> <p>Surface</p>	<p>1.4542 for -1 to +250 bar relative pressure (measuring range 508) and -1 to +600 bar relative pressure (measuring range 516)</p> <p>Otherwise 316 L</p> <p>2.4819 NiMo</p> <p>Ra ≤ 0.8 μm</p>
<p>Housing</p> <p>Housing material</p> <p>Cover material</p> <p>Material of control knob</p> <p>For operation 0 (without control knob)</p> <p>For operation 1 (with control knob)</p>	<p>Precision casting 1.4408</p> <p>Precision casting 1.4408, seal FPM</p> <p>-</p> <p>PA</p>
<p>Explosion protection</p>	<p>EC type examination certificate SEV 10 ATEX 0127 X</p> <p> II 1/2G Ex d IIC T6 ... T4 Ga/Gb</p> <p>II 2D Ex tb IIIC T105 °C Db</p>
<p>Weight</p>	<p>Approximately 1.6 kg</p>

4 Technical data

4.6 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 Storage	100 % including condensation on the device outer case 90 % without condensation				
Admissible mechanical load Vibration strength Shock resistance	2 g, 10 to 2000 Hz according to DIN EN 60770-3 15 g for 6 ms according to IEC 60068-2-27				
Electromagnetic compatibility Interference emission Interference immunity	According to EN 61326 Class B ^d 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.

4.7 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			

4 Technical data

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	$r \leq 10$	$r \leq 20$	$r \leq 40$	$r \leq 20$
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	$r \times 0.24 \%$ for $1 \leq r \leq 10$	$r \times 0.08 \%$ for $1 \leq r \leq 20$	$r \times 0.08 \%$ for $1 \leq r \leq 40$	$r \times 0.08 \%$ for $1 \leq r \leq 20$
Accuracy in % of the set MSP Range: -40 to -20 °C or 60 to 85 °C	$r \times 0.36 \%$ for $1 \leq r \leq 10^d$	$r \times 0.16 \%$ for $1 \leq r \leq 20$	$r \times 0.16 \%$ for $1 \leq r \leq 40$	$r \times 0.16 \%$ for $1 \leq r \leq 20$
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	$r \leq 50$	$r \leq 20$		
Non-linearity for reference conditions ^c	0.04 %	0.04 %		
Accuracy in % of the set MSP Range: -20 to +60 °C	$r \times 0.08 \%$ for $1 \leq r \leq 50$	$r \times 0.08 \%$ for $1 \leq r \leq 20$		
Accuracy in % of the set MSP Range: -40 to -20 °C or 60 to 85 °C	$r \times 0.16 \%$ for $1 \leq r \leq 50$	$r \times 0.12 \%$ for $1 \leq r \leq 20$		
Long-term stability in % as of the nominal measuring range	0.1 %/year			

^a MSP = measuring span

^b $r = \text{span of the nominal measuring range} \div \text{adjusted measuring span}$

^c Reference conditions: ambient temperature 20 °C (± 3 K), air pressure 1000 hPa (± 25 hPa)

^d Only up to -30 °C

4.8 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

For the special conditions for use, the examination certificate must be observed.

⇒ chapter 12 "Examination certificate", Page 69

4 Technical data

5.1 Before mounting



DANGER!

Depressurize the plant before installing the device!

The device may only be opened in the potentially explosive area when disconnected from the power supply!



NOTE!

Select a freely accessible and low-vibration installation location, preferably near the measuring point. Ensure that the admissible ambient temperature is adhered to (take possible heat radiation into account).

The device can be installed above or below the pressure sensing point.

5.2 Unscrew the front ring or case lid

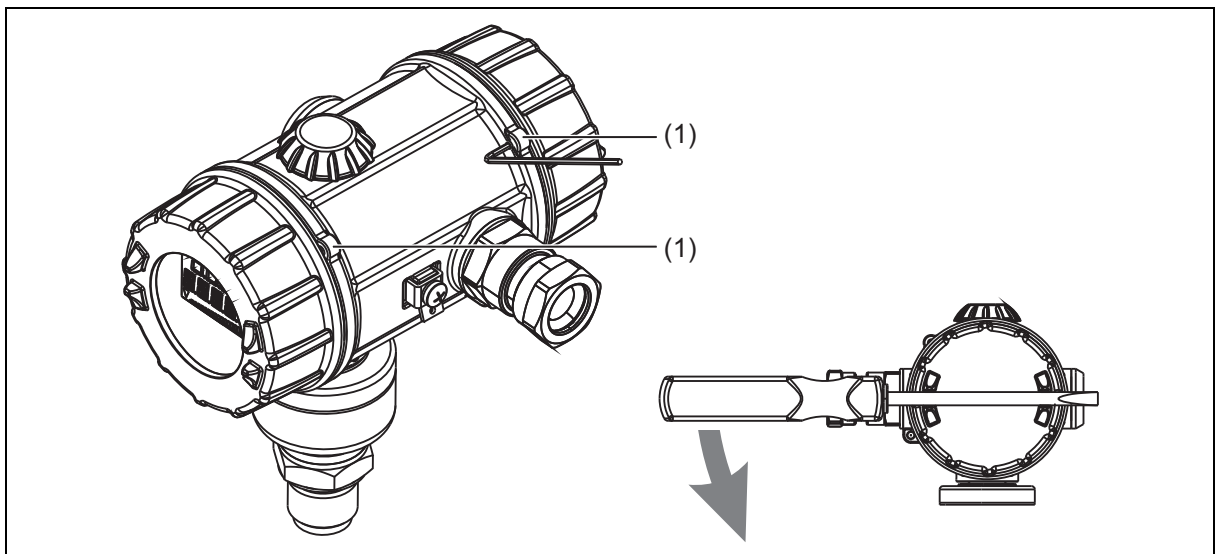
The bezel and the rear case lid can be removed once the locking screws (1) have been loosened. A size 1.5 hex wrench is required to loosen the locking screws.



NOTE!

Unscrew with a screwdriver, or similar.

Only tighten by hand!



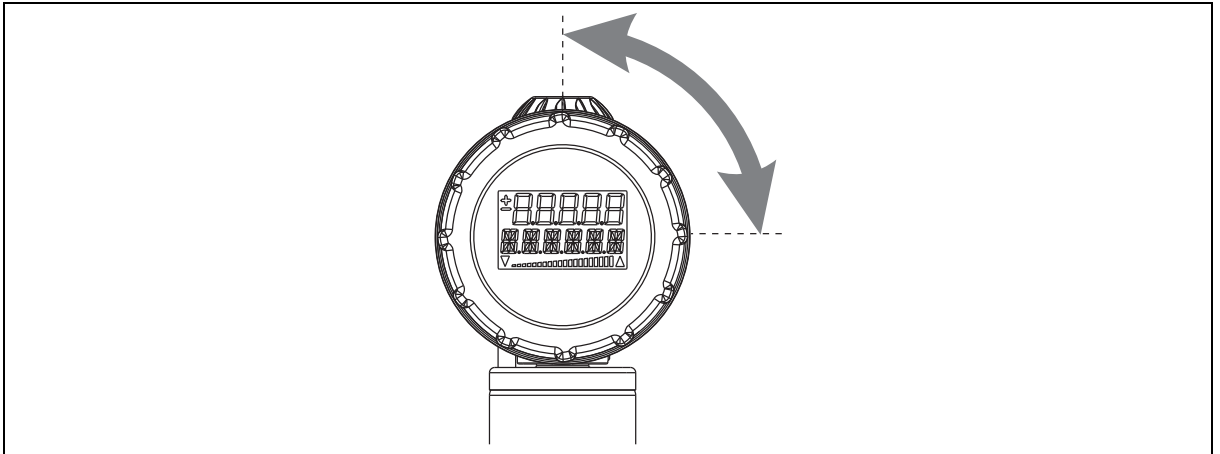
(1) Locking screws

5 Mounting

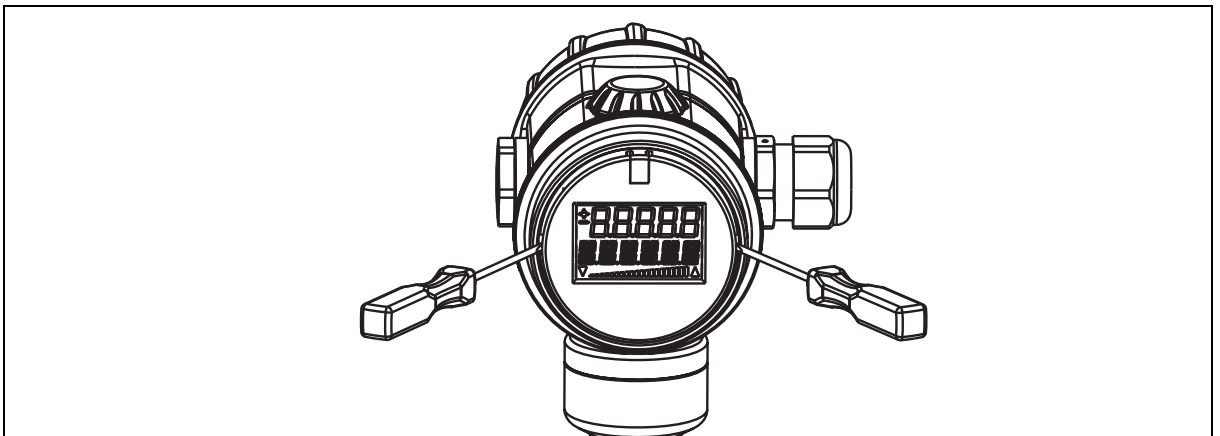
5.3 Rotating the LCD (display)

Installation position

The rated position of the device is vertically upright.



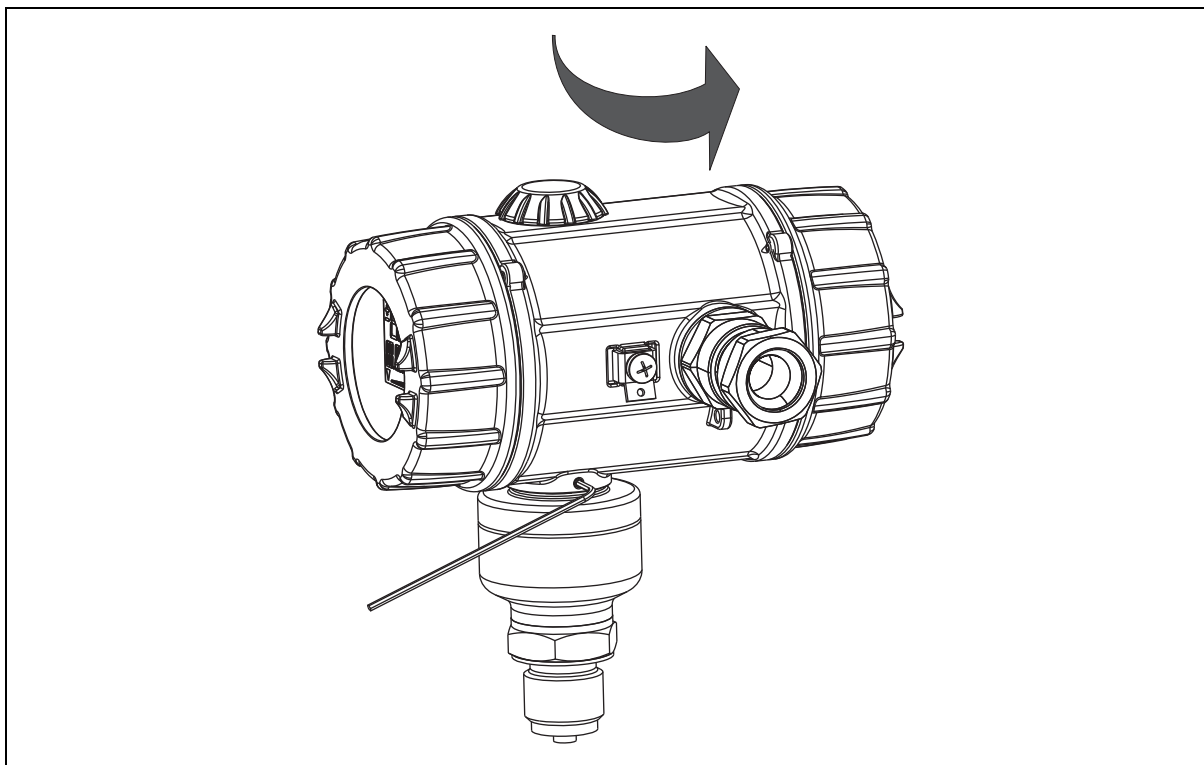
Depending on the conditions of the measuring point, the device can be installed in any other position. The LCD display can be rotated in 90° steps depending on the desired installation position.



1. To unscrew the bezel, see chapter 5.2 "Unscrew the front ring or case lid", Page 25.
2. Lift out the electronics module using a narrow (small) screwdriver.
3. Rotate the electronics module into the desired position (90° steps) and insert again.
4. Screw on the bezel so that it is hand-tight.

5.4 Rotating the housing

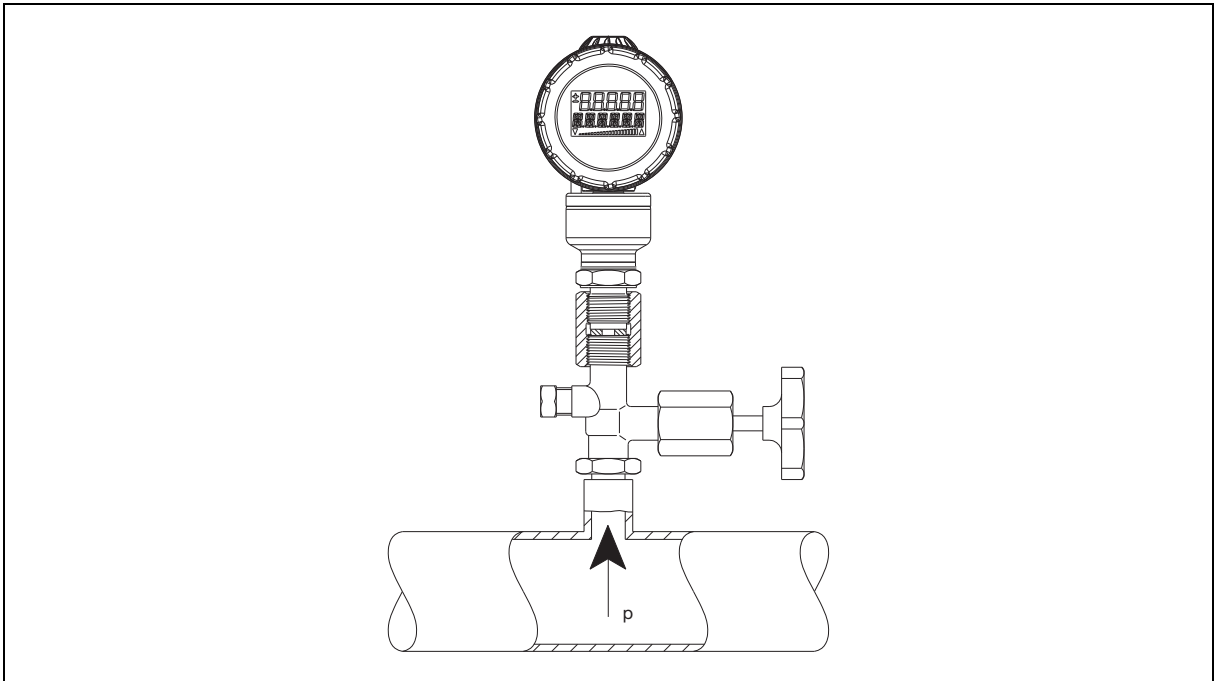
The housing can be rotated $\pm 160^\circ$.



1. Loosen the threaded pin using a 1.5 mm hex wrench (1/2 turn is sufficient).
2. Rotate the housing to the desired position.
3. Screw on the threaded pin again until it is **tight**.

5 Mounting

5.5 Pressure connection



Seals

Operating conditions (for example material compatibility) must be considered when selecting the seal.

Tightening torques

Maximum 200 Nm

The correct tightening torque depends on the size, material and shape of the seal that is used and the pressure connection of the device.

Checking for seal tightness

The pressure connection must be checked for seal tightness once established.



CAUTION!

If shut-off valves are used incorrectly, this can lead to personal injury or significant material damage!

Observe the correct order when opening or closing the valves!

- ▶ The device must not be vented when **used in toxic media!**



NOTE!

Depending on the system configuration, the following examples must be adapted to meet requirements!

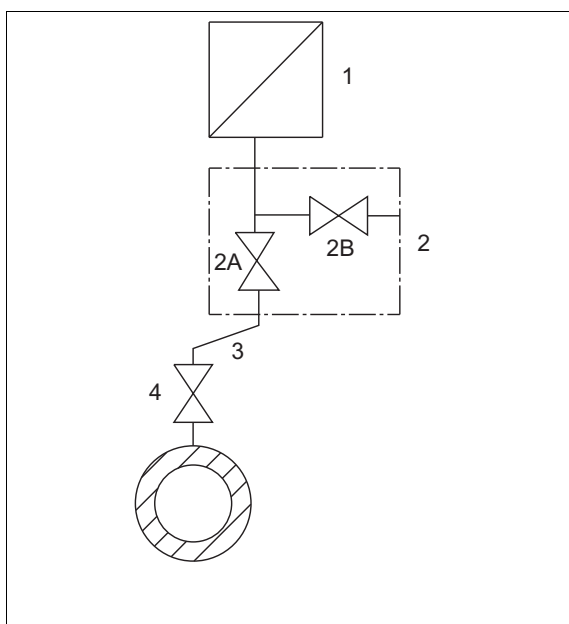


NOTE!

Mount the device so that abrasion at the process connection is avoided.

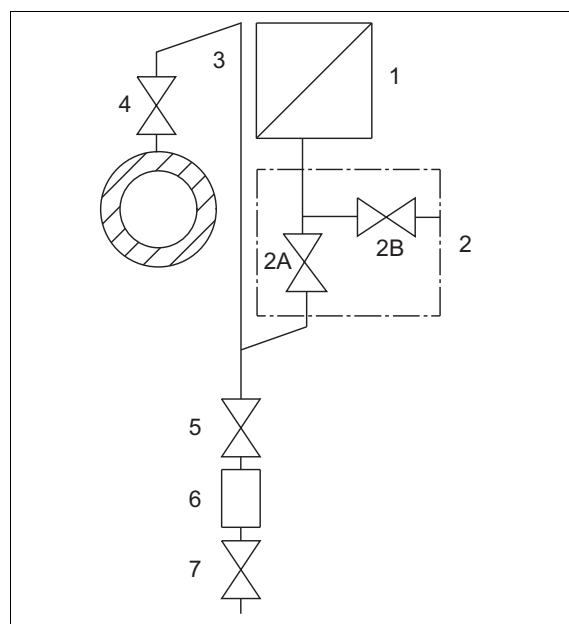
5.6 Measuring the relative or absolute pressure

Gases



Transmitter **above** the pressure sensing point (normal arrangement)

- (1) Transmitter
- (3) Pressure pipe
- (5) Shut-off valve (optional)
- (7) Drain valve



Transmitter **below** the pressure sensing point (exception)

- (2) Shut-off valve
- 2 A shut-off valve for processing
- 2 B shut-off valve for test connection
- (4) Shut-off valve
- (6) Condenser vessel (optional)

Pressurization

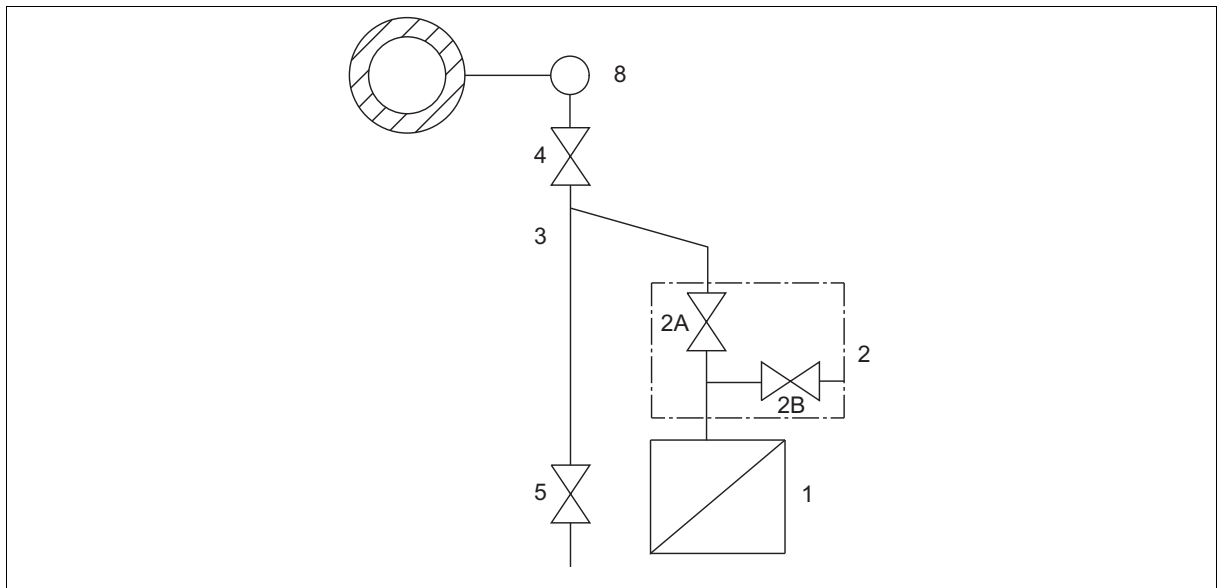
Start position: all valves closed

Operate shut-off valves in the following order:

1. Open shut-off valve (4) on the pressure relief support.
2. Open shut-off valve (2 A).
3. Note down the pressure value and mA value displayed on the device.
4. Close shut-off valve (2 A).
5. Open shut-off valve (2 B).
6. Enter the same pressure value via the shut-off valve (2) test connection on the device.
7. Compare the pressure value and mA value displayed on the device with the values noted under 3. Correct the device as required, see chapter 7.3.2 "The parameter level", Page 45.
8. Close shut-off valve (2 B).
9. Open shut-off valve (2 A).

5 Mounting

Steam



- | | |
|--------------------|---|
| (1) Transmitter | (2) Shut-off valve
2 A shut-off valve for processing
2 B shut-off valve for test connection |
| (3) Pressure pipe | (4) Shut-off valve |
| (5) Blow-off valve | (8) Compensating vessel |

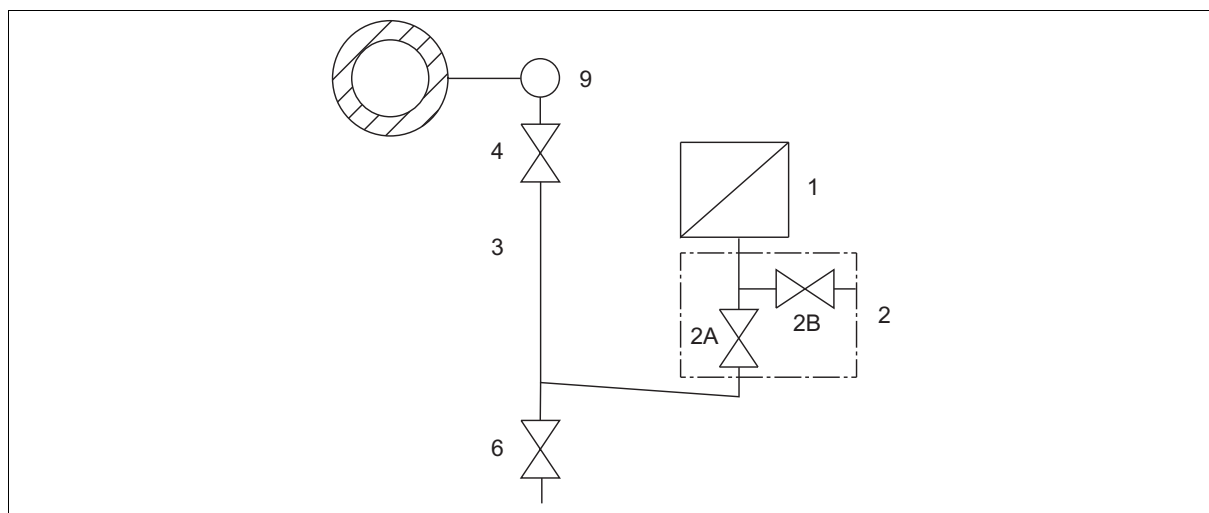
Pressurization

Start position: all valves closed

Operate shut-off valves in the following order:

1. Open shut-off valve (4) on the pressure relief support, and wait until the steam in the pressure pipe has condensed.
2. Open shut-off valve (2 A).
3. Note down the pressure value and mA value displayed on the device.
4. Close shut-off valve (2 A).
5. Open shut-off valve (2 B).
6. Open the drain/vent valve on the device (1) and drain the liquid.
7. Close the drain/vent valve on the device (1).
8. Enter the same pressure value via the shut-off valve (2) test connection on the device.
9. Compare the pressure value and mA value displayed on the device with the values noted under 3. Correct the device as required, see chapter 7.3.2 "The parameter level", Page 45.
10. Close shut-off valve (2 B).
11. Open shut-off valve (2 A).

Liquids



- | | |
|--------------------|---|
| (1) Transmitter | (2) Shut-off valve
2 A shut-off valve for processing
2 B shut-off valve for test connection |
| (3) Pressure pipe | (4) Shut-off valve |
| (5) Blow-off valve | (9) Compensating vessel |

Pressurization

Start position: all valves closed

Operate shut-off valves in the following order:

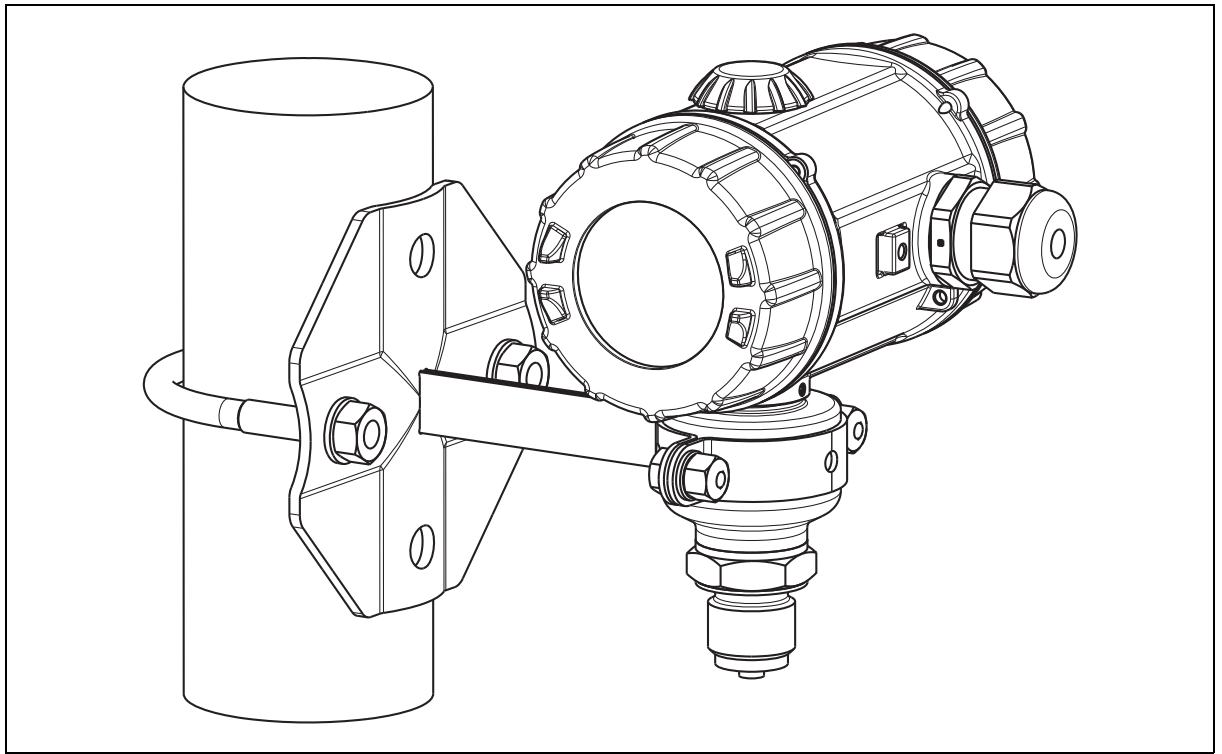
1. Open shut-off valve (4) on the pressure relief support.
2. Open shut-off valve (2 A).
3. Note down the pressure value and mA value displayed on the device.
4. Close shut-off valve (2 A).
5. Open shut-off valve (2 B).
6. Open the drain/vent valve on the device (1) and drain the liquid.
7. Close the drain/vent valve on the device (1).
8. Enter the same pressure value via the shut-off valve (2) test connection on the device.
9. Compare the pressure value and mA value displayed on the device with the values noted under 3. Correct the device as required, see chapter 7.3.2 "The parameter level", Page 45.
10. Close shut-off valve (2 B).
11. Open shut-off valve (2 A).

5 Mounting

5.7 Bracket for wall and pipe mounting

Mounting example

(Part no. 00597711)

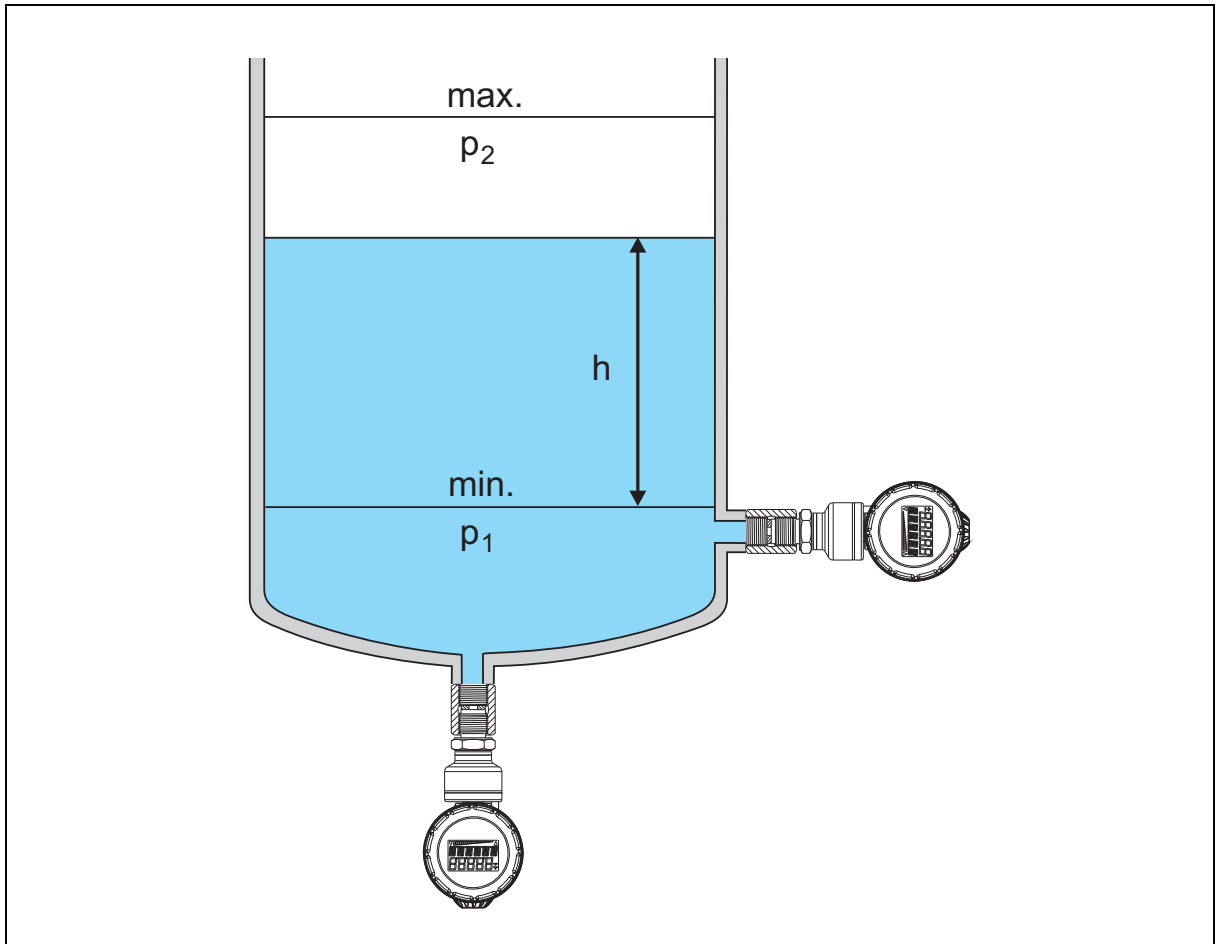


5.8 Level measurement with or without a pressure separator

The device is ideally suited for level measurements in open containers.

Mounting without a pressure separator

It is a good idea to mount cutters and drain valves in order to catch and remove deposits and pollutants. This makes it possible to remove the device even when the tank is full.



h (filling level) 4 to 20 mA

5.8.1 General information for a system with a diaphragm seal

A device with a capillary and diaphragm seals is a closed system that is filled with oil under vacuum.

- Remove membrane protection before installation
- Do not open closed system
- Do not touch or clean the diaphragm seal membranes with hard or sharp tools
- Bending radius of the capillaries: ≥ 100 mm



NOTE!

The filling oil influences the temperature application range and the response time of a pressure separator system. The medium and ambient temperature, as well as the process pressure are therefore decisive when selecting the filling oil.

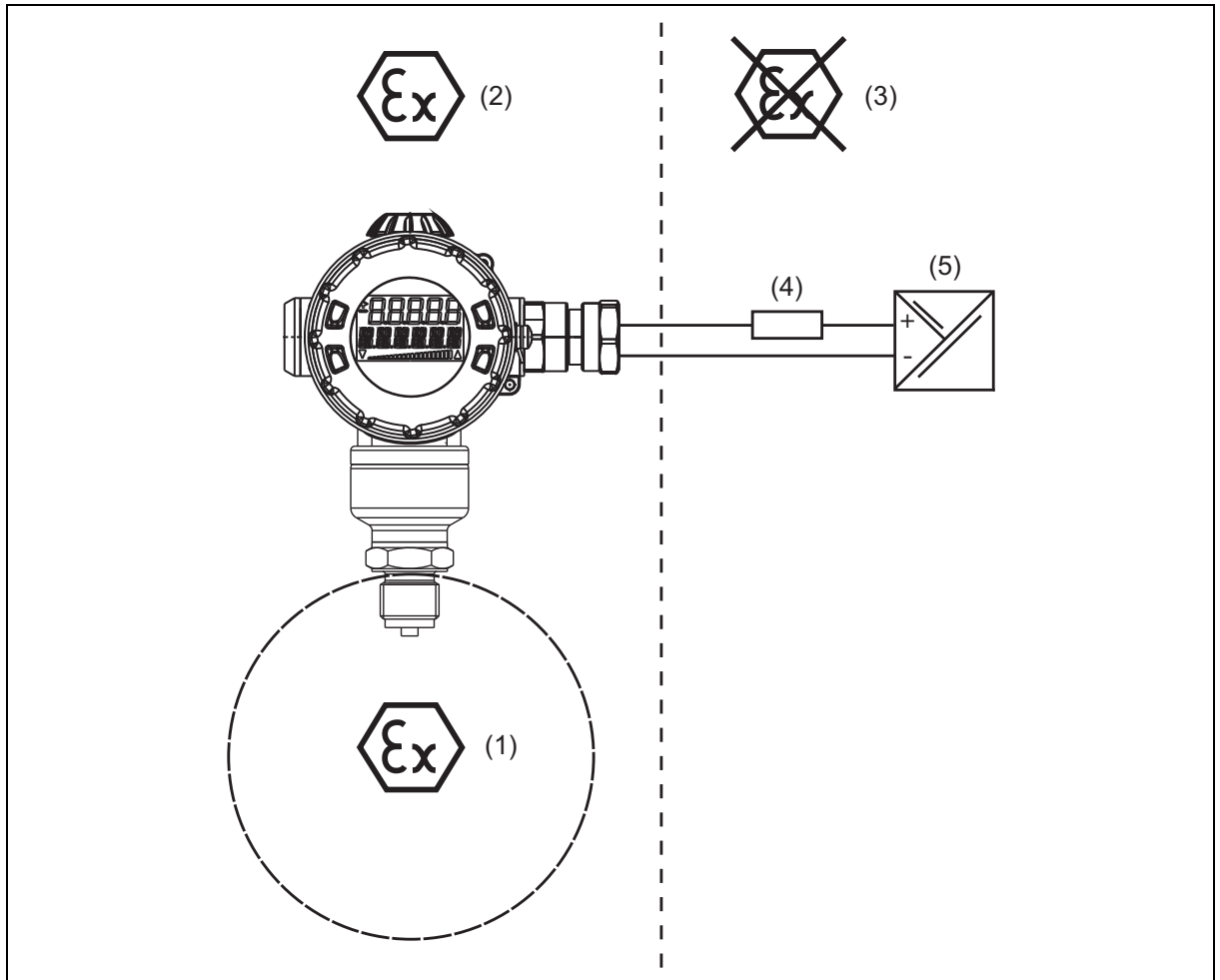
Take note of the maximum possible temperature and pressures during commissioning/cleaning of the

5 Mounting

tank.

Pay attention to the tolerability of the filling oil with the requirements of the medium. For example, only filling oils that do not pose a health risk may be used in the food industry.

5.9 Assembly in the explosion area



- (1) Hazardous area Zone 0/20
- (2) Hazardous area Zone 1/21
- (3) Non-hazardous area
- (4) Burden (optional for HART® interface)
- (5) Voltage supply

6.1 Installation notes



DANGER!

**In potentially explosive atmospheres, only open the device once it has been de-energized!
The electrical connection must only be implemented by suitably qualified personnel!
Ground the device!**

- ▶ Only use cable entries or glands, blanking plugs, etc., that are suitable for the "explosion-proof enclosure d" protection type!
The cables or leads must be suitable for the ambient conditions!
Connection openings on the device that are open must be closed with suitable blanking plugs!

General

Applicable requirements must be followed for the electrical connection, especially in a potentially explosive atmosphere:

Regulation concerning electrical systems in areas with an explosion hazard (Elex V)

Requirement for project planning, selecting and setting up electrical systems in areas with an explosion hazard (IEC 60079-14)

EC-type examination certificate

Electromagnetic compatibility meets the requirements of EN 61326

The pressure transmitter is suitable for use in SELV or PELV current circuits according to protection rating 3.

Apart from faulty installation, incorrect settings on the device may also affect the proper functioning of the subsequent process or lead to damage. You should therefore always provide safety equipment that is independent of the device and it should only be possible for qualified personnel to make settings.

Conductor cross-sections and ferrules

	Permissible cross-section
Without ferrule (for rigid cable only)	0.2 to 1.5 mm ² AWG 24 to 16
With ferrule (for rigid or flexible cable)	0.25 to 0.75 mm ²

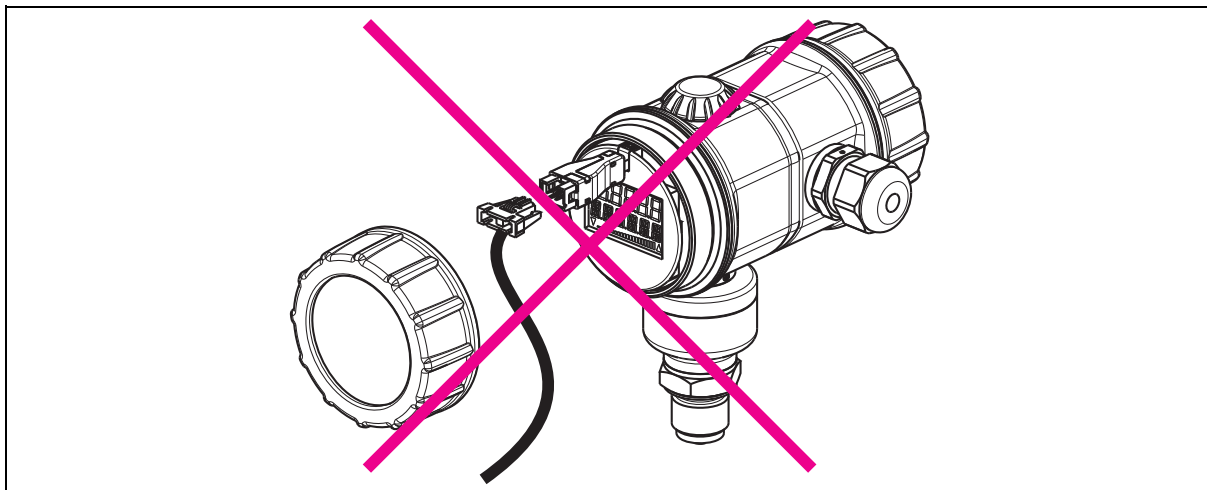


DANGER!

The JUMO interface must not be used in the explosion-proofed area!

- ▶ The device's voltage supply must be intrinsically safe and must not exceed the following maximum values:
DC 12 to 36 V

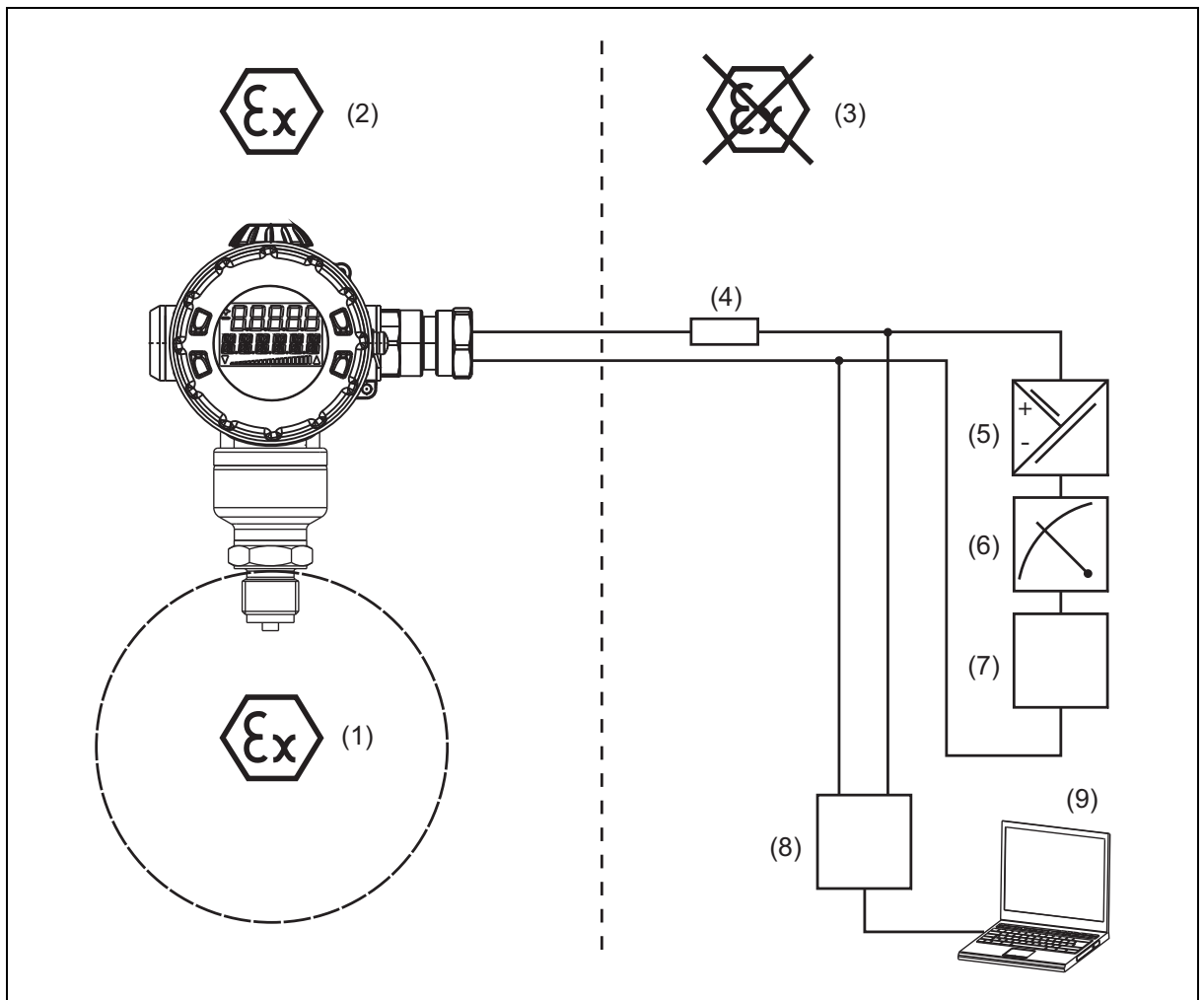
6 Installation



NOTE!

Connecting the HART® communicator or the HART® modem is optional. A minimum burden must be present on the signal circuit in order to facilitate error-free communication, see the previous pages.

6.1.1 Connection diagram "Ex"



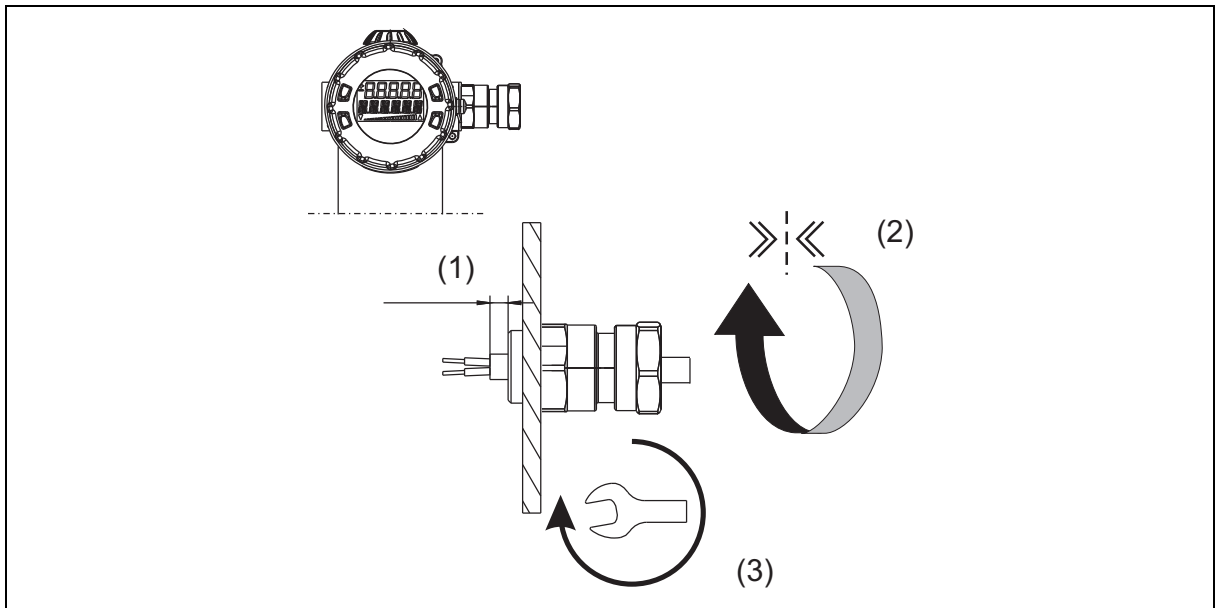
- (1) Hazardous area Zone 0/21
- (2) Hazardous area Zone 1/21
- (3) Non-hazardous area
- (4) Burden for HART® $\leq (U_B - 12 \text{ V}) \div 0.022 \text{ A}$;
additional: min. 250 Ω , max. 1100 Ω
- (5) Voltage supply
- (6) Indicating device or recorder, controller, PLC, etc.
- (7) Additional devices
- (8) HART® modem
- (9) PC or notebook

6 Installation

6.2 Device with cable gland

General information

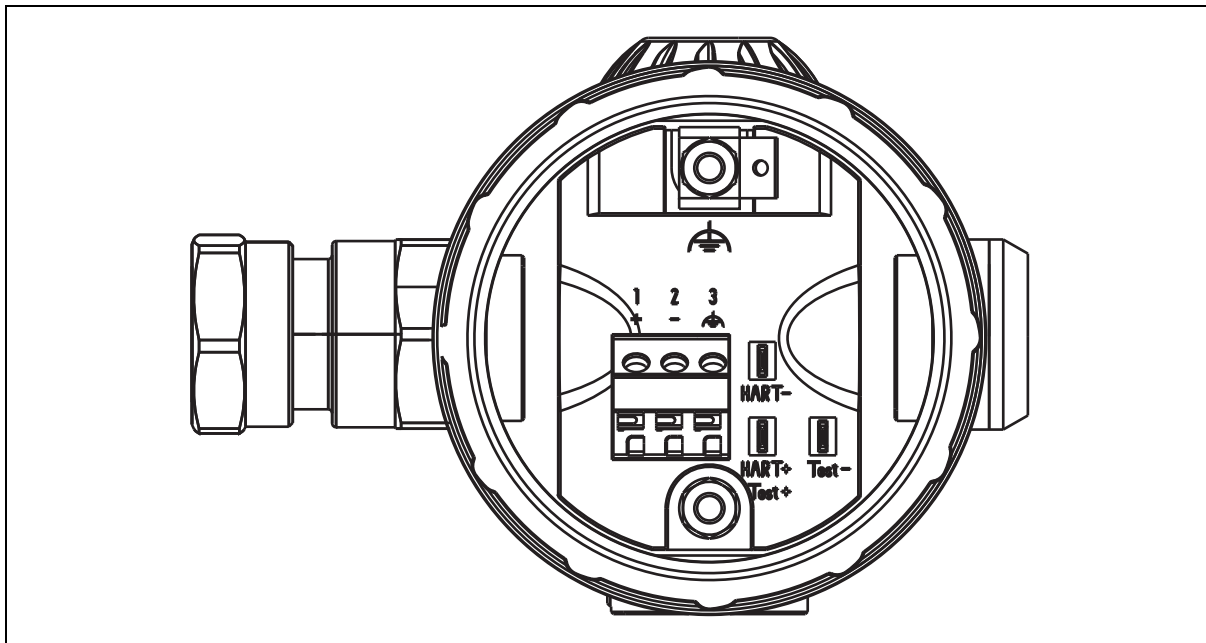
- Cables or lines must be suitable for the environmental influences
- Cable diameters of 7.5 to 11.9 mm are admissible
- Max. conductor cross section of 1.5 mm²
- Lay the signal lines isolated from cables with a voltage of > 60 V
- Use protected cables with twisted cores
- Keep away from large, electrical plants
- The full specification according to HART® can only be reached with a shielded cable.



- (1) The connecting cable must reach at least 5 mm into the housing
- (2) Tighten the screw connection by hand until resistance is felt
- (3) Tighten the screw connection using a wrench (approx. 3/4 to 1 rotation)

Connection

1. To unscrew the rear housing lid, see chapter 5.2 "Unscrew the front ring or case lid", Page 25
2. Ground the device.
3. For connecting the connecting cables, see the following figure:



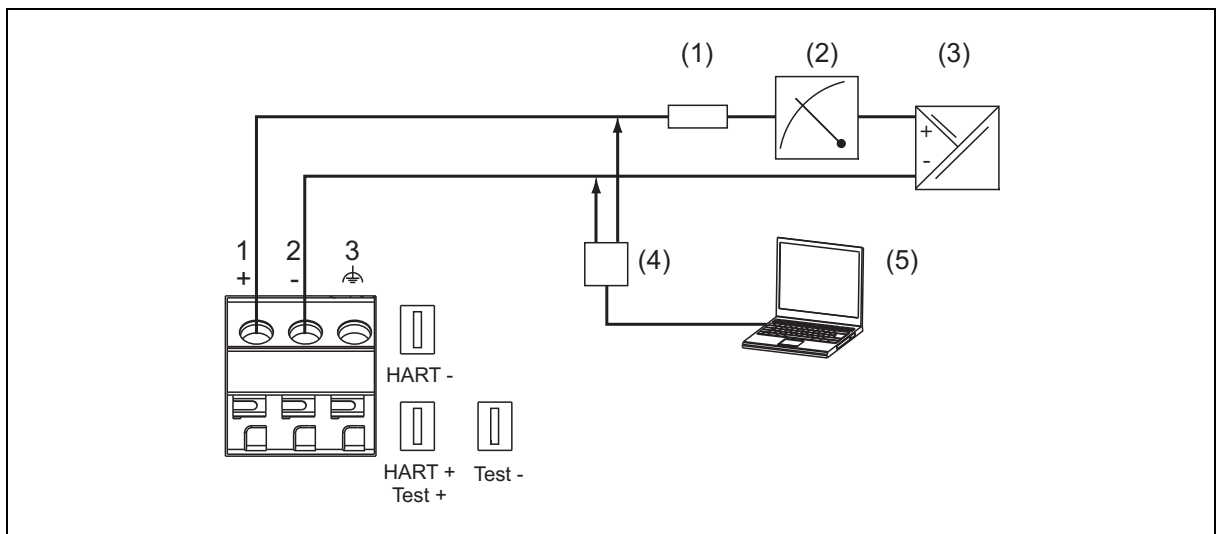
CAUTION!

Once electrical connection is complete, re-tighten the locking screw of the housing cover!

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

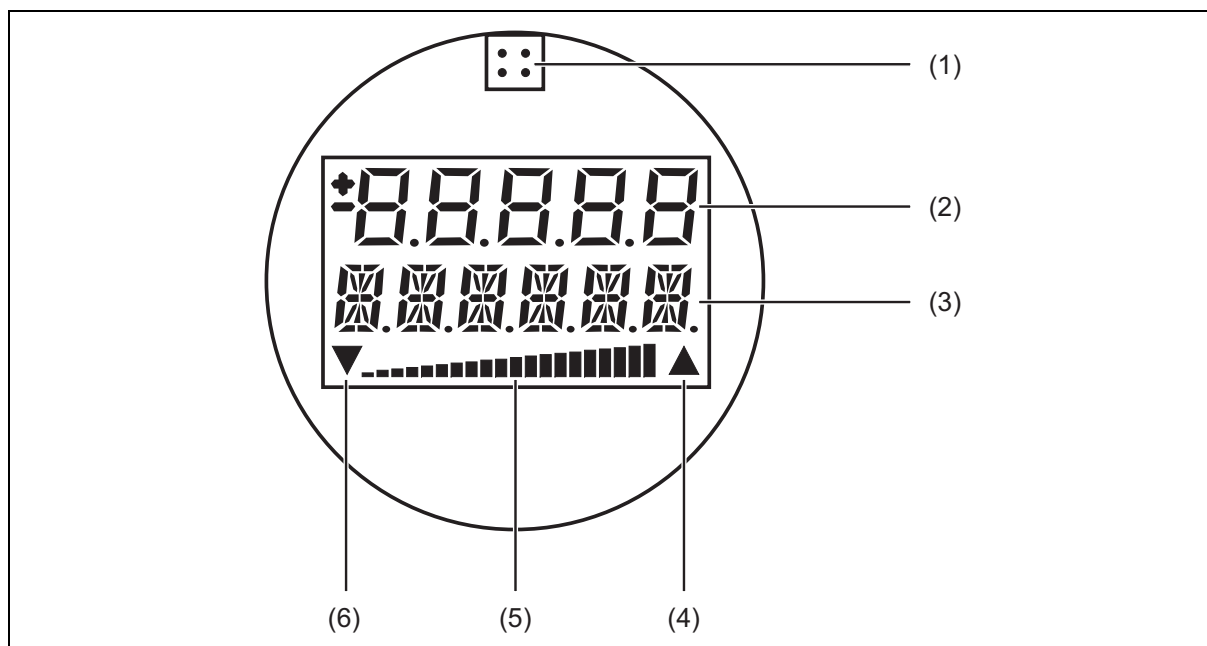
6 Installation

Operation and testing



- (1) Total burden: $Burden \leq (U_B - 12 \text{ V}) \div 0.022 \text{ A}$;
for HART® additional: min. 250 Ω , max. 1100 Ω
- (2) Indicating device or recorder, controller, PLC, etc.
- (3) Voltage supply DC 12 to 36 V
- (4) HART® modem
- (5) PC or notebook

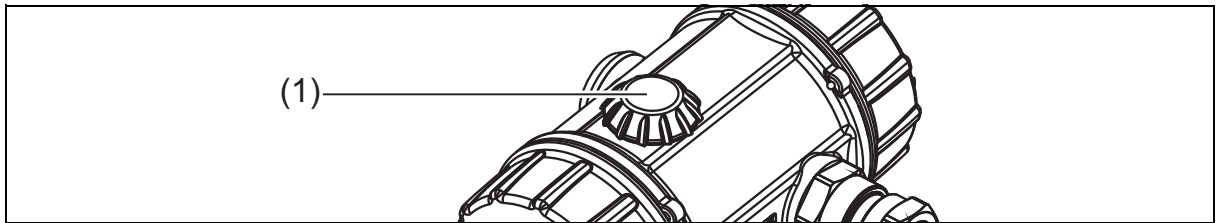
7.1 Display



- (1) Socket for JUMO setup interface (behind a cover)
- (2) Measured value
- (3) Measuring unit
- (4) Overage
- (5) Percentage control of the measuring range
- (6) Underrange

7 Operation

7.2 Operation with rotary knob or with setup programm



(1) Rotary knob

The device is operated either

- with the rotary knob (1) or
- via the optional setup program or
- via the HART® interface, e.g. with a handheld or PC program.



NOTE!

Alternatively, for operation via a rotary knob, all actual values and parameters can very easily be displayed or adjusted by means of the setup program.

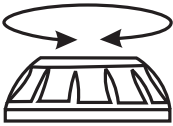
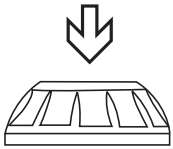
Furthermore, the setup program offers an array of useful additional functions, e.g.:

- Recording the measured values
- Graphical view of temperature and pressure
- Detailed diagnostic messages
- Display of the complete order code and the device configuration (can be printed out, e.g. for project documents or follow-up orders)

The setup program can address the device via the following interfaces:

- JUMO setup interface
The PC interface cable with USB/TTL converter (USB transmitter cable) is required to connect the PC to the device, part no. 00456352
- HART® interface
A HART® modem is required to connect the PC to the device, part no. 00443447

Rotating and pressing

	Rotate Select parameter or set values
	Press Confirm parameter or values

7.3 The level concept

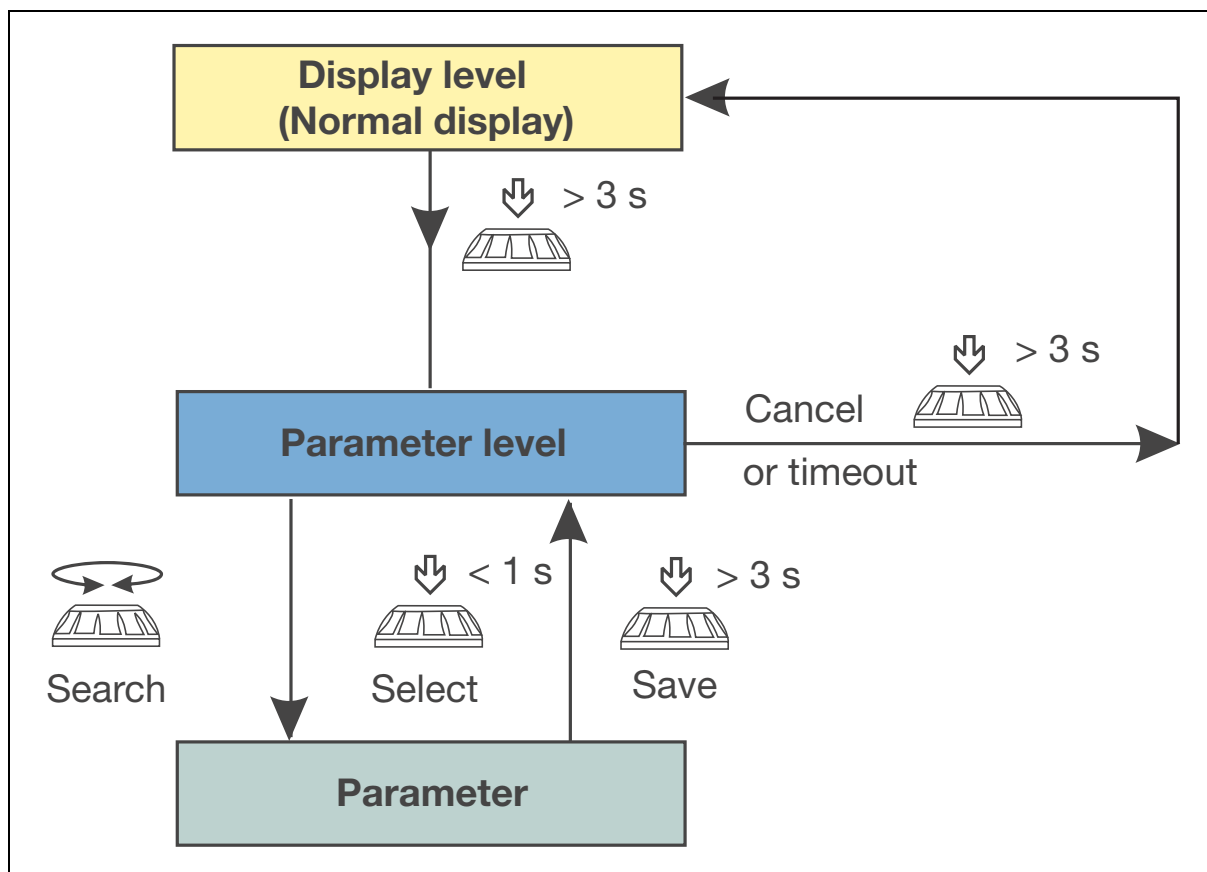
Two levels

Operation is on two levels:



NOTE!

After the device is turned on, it is on the display level. You can go to the parameter level through the following operation.


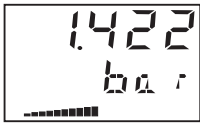
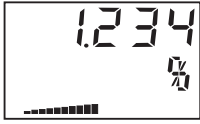
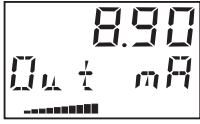






7 Operation

7.3.1 The display level









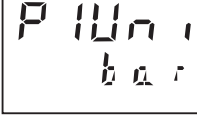




The measured pressure and other values are displayed at the display level. The output current is shown in % as a bar chart in the third line of the display.

It is not possible to change parameters at the display level!



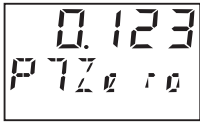



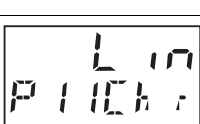
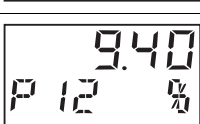

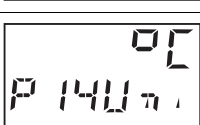
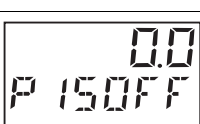
Action	Display (example)	Explanation
		Displays the pressure with measuring unit
		Displays the measured value in % or measured value scaled with a choice of measuring unit
		Displays the calculated output current in mA.
		Displays the sensor temperature in °C or °F.
		Displays the stored minimum pressure in the selected measuring unit
		Displays the stored maximum pressure
		Displays the pressure value and the sensor temperature in the selected measuring units

7.3.2 The parameter level

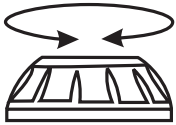





The device parameters can be displayed and changed at the parameter level.

Action	Display (example)	Explanation	Selection ^a
		P min Stored minimum pressure	Reset by  > 3 seconds 
		P max Stored maximum pressure	Reset by  > 3 seconds 
		P0 Den "Density" Density correction	0.01 to 1.00 to 99.99
		P1 Uni "Unit" Pressure measuring unit	inH2O inHG ftH2O mmH2O mmHG PSI bar mbar kg/cm2 kPa TORR MPa mH2O
		P2 mA Measuring range Lower range value	4.00 to 20.00 mA
		P3 mA Measuring range Upper range value	4.00 to 20.00 mA
		P4 sec Attenuation	0.00 to 100.0 s
		P5 RS "Range start" Measuring range Lower range value	Nominal measuring range

7 Operation

Action	Display (example)	Explanation	Selection ^a
		P6 RE "Range end" Measuring range Upper range value	Nominal measuring range
		P7 Zero Zero point adjustment	Current pressure
		P8 mA Current generator	3.60 to 4.00 to 21.60 mA
		P9 Err Current in case of malfunction	ErLo = 3.6 mA ErHi = 21.6 mA LAsT = last value
		P10 Key Key lock	0 = no lock LA = all, interface released L0 = all, without measurement start LS = alle, ohne Messanfang und -ende LALL = alle, inkl. Schnittstelle
		P11 Chr Characteristic line "Characteristic"	Lin = linear SLin = linear bis Beginn Radizierung SoFF = off until start of square root extraction
		P12 % Insertion point of Radizierung	5.0 to 9.4 to 15.0 % vom Ausgangsstrom
		P13 SWV Software version	Editing not possible
		P14 Uni Temperature measuring unit	°C/°F
		P15 OFF Pressure value offset (zero offset)	Nominal measuring range

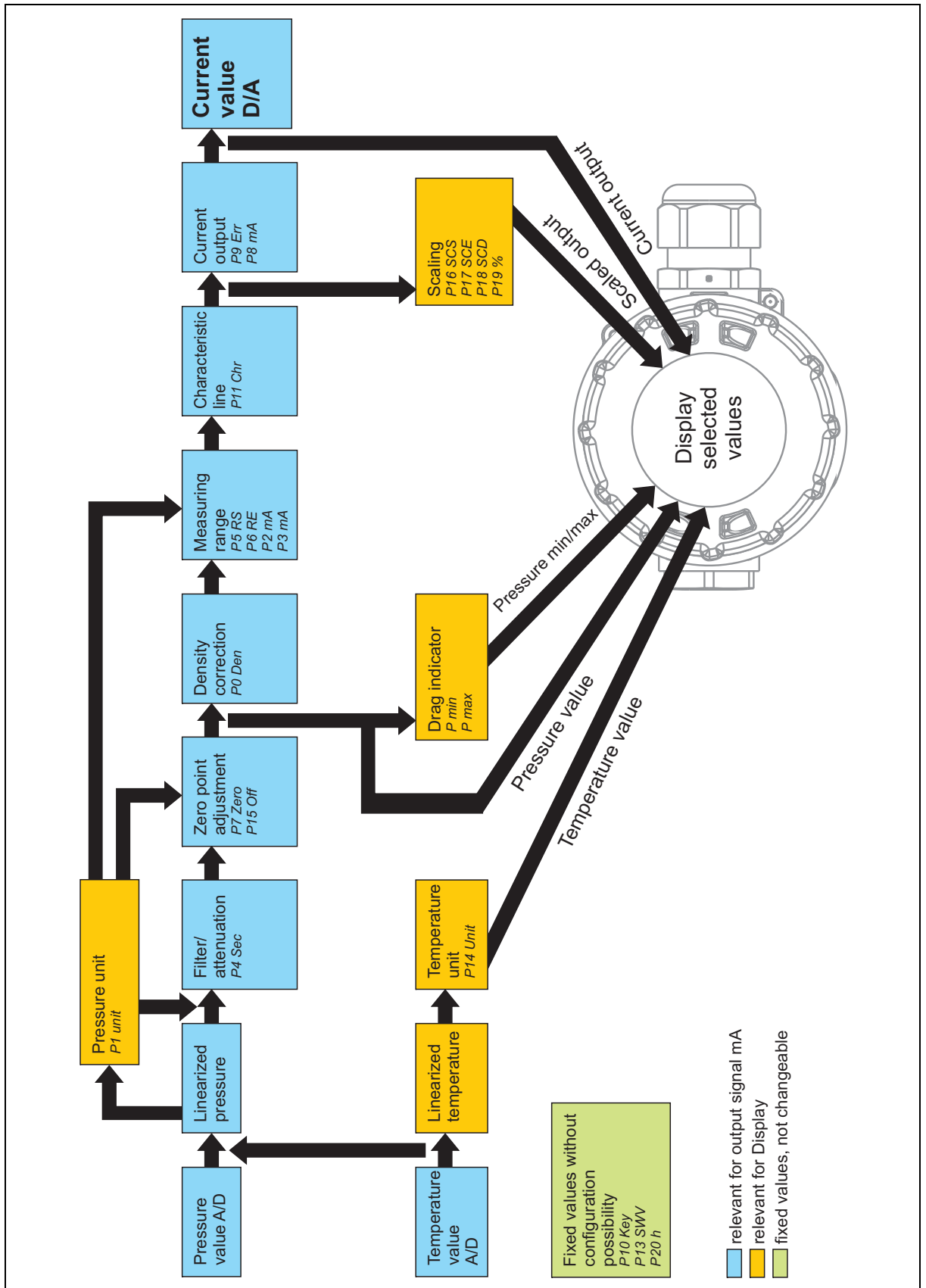
7 Operation

Action	Display (example)	Explanation	Selection ^a
		P16 SCS Scaling start „Scaling start“	-9999 to 0 to +9999
		P17 SCE Scaling end „Scaling end“	-9999 to 100 to +9999
		P18 SCD Decimal place scaling „Scaling decimal point“	Auto = automatic 0 = no decimal place 1 = 1 decimal place 2 = 2 decimal places 3 = 3 decimal places
		P19 % Scaling unit	% (default setting) kg/sec kg/min kg/h t/min t/h l/sec l/min l/h m ³ /sec m ³ /min m ³ /h L m ³ UsrTEXT
		P20 h Operating hours	Editing not possible

^a Default settings are shown in **bold**.

7 Operation

8.1 Data flow diagram



8 Configuration

8.2 Description of the possible configurations

P0 Den Density correction

Configuration of the density of the medium to be measured

This may, for example, be relevant for the level measurement in order to display the correct filling height from the measured pressure.



CAUTION!

The set value should remain at the value 1 and should be changed in exceptional cases.

P1 Uni Pressure measuring unit

The pressure value unit can be configured here. The pressure value unit is shown on the display and can be taken from the HART® protocol.

P2 mA Measuring range lower range value

Configuration of the device (measuring range) with pressure specification

If the tank is empty, the start point (zero point) of the pressure/level measurement can be set here. The advantage of this procedure: The device is immediately configured for the application (e.g. tank).



CAUTION!

No further density corrections may be configured. No other values may be entered under P5 RS.

P3 mA Measuring range upper range value

Configuration of the device (measuring range) with pressure specification

If the tank is full, the end point (full) of the pressure/level measurement can be set here. The advantage of this procedure: The device is immediately configured for the application (e.g. tank).



CAUTION!

No further density corrections may be configured. No other values may be entered under P6 RE.

P4 Sec Attenuation

Time constant defined in seconds

Depending on the default setting, it is ensured that the measured value responds with a delay to short, fast pressure changes.

P5 RS Measuring range lower range value

Configuration of the device (measuring range) without pressure specification

Any values can be entered here as the lower range value. It is important when, for example, a differential pressure measurement with a diaphragm seal is attached to an application (e.g. filling level) and no configuration with a pressure specification can be performed.

There is a calculation example available under chapter 8.4 "Level measurement configuration without a pressure specification with or without a diaphragm seal", Page 55.



CAUTION!

No further density corrections may be configured. No other values may be entered under P2 mA.

P6 RE Measuring range upper range value

Configuration of the device (measuring range) without pressure specification

Any values can be entered here as the upper range value. It is important when, for example, a differential pressure measurement with a diaphragm seal is attached to an application (e.g. filling level) and no configuration with a pressure specification can be performed.

There is a calculation example available under chapter 8.4 "Level measurement configuration without a pressure specification with or without a diaphragm seal", Page 55.



CAUTION!

No further density corrections may be configured. No other values may be entered under P3 mA.

P7 Zero Zero point adjustment (only for relative pressure)

The applied pressure is stored as a zero point.



CAUTION!

Only perform this configuration if it is certain that the zero point is actually present on the device (e.g. after installing or correcting the position of the device). Otherwise a zero offset can also be configured with this. The zero offset is stored as an offset (P15).

Zero point adjustment is not possible with absolute pressure sensors.

P8 mA Current generator

The device outputs a freely adjustable current value. The analog output has no reference to the pressure measurement. The actual pressure measurement continues to be performed in the background and can be queried via the interfaces. If the current generator was manually started via P8, this is represented by an icon next to P8 and can also be stopped again by exiting P8.

P9 Err Current in case of malfunction

Option for setting which fault current the device should output in case of a malfunction. The default value is set to 21.6 mA according to NAMUR NE 43.

P10 Key Key lock

This makes it possible to set a keypad lock in different stages. This is a safety feature to prevent accidental, but also intentional configuration changes to the device.



NOTE!

To cancel a set lock (LA, L0, LS), the user must press the P-key for longer than 5 s in the "Current in case of malfunction" (P9 Err) display screen.

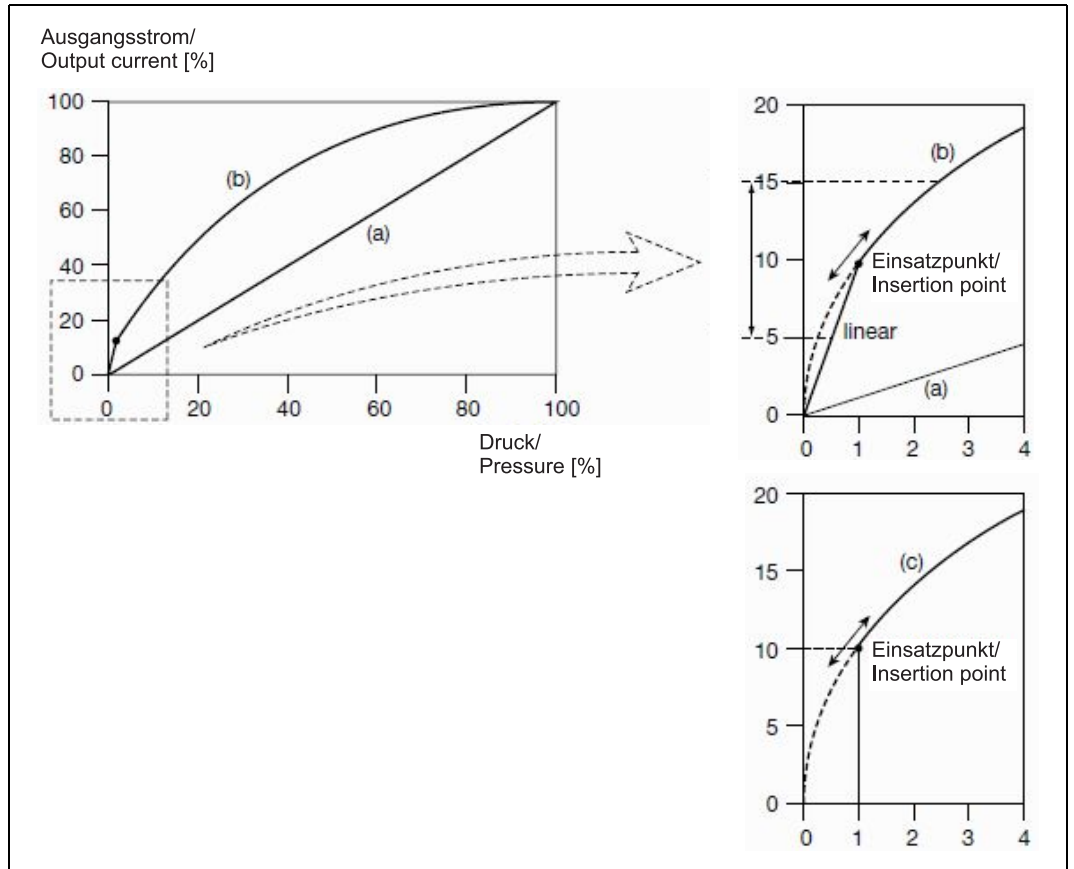
The "LALL" lock can only be set or canceled in the setup program.

8 Configuration

P11 Chr Characteristic line

This point is not relevant for relative/absolute pressure measurement and should therefore not be configured. It can be used with the differential pressure measurement to implement a flow measurement.

With P11, the characteristic line of the preset value $Lin = \text{pressure proportional}$ can be re-configured to a square root extraction characteristic line $SLin$ or $SOff = \text{flow proportional}$. For the flow measurement, parameter P12 = insertion point relevant, below the characteristic line for low flow suppression either linearly connected ($SLin$) or completely disabled ($SOff$).



- (a) = Lin = linear
- (b) = SLin = square-root, linear up to insertion point
- (c) = SOFF = square-root, disconnected up to insertion point

P12 % Insertion point of the square root extraction

This point is not relevant for relative/absolute pressure measurement and should therefore not be configured. It can be used with the differential pressure measurement to implement a flow measurement. The insertion point of the square root extraction sets the start point for the flow measurement.

P13 SWV Software version

For information only
No configuration option

P14 Uni Temperature measuring unit

The temperature value can be read on the display or via the HART® signal. There is no option to transmit the temperature value via a 4 to 20 mA signal. The temperature unit can be configured here.

- P15 Off** **Pressure value offset**
The offset value of the pressure value (relative or absolute pressure) is shown in figures here (e.g. after the zero point adjustment). The values listed there should only be corrected in exceptional cases as it is possible to manually readjust an offset there. Please contact the manufacturer for this.
- P16 SCS** **Scaling start**
Configuration option to show the pressure value assignment on other physical values/units. For example, the pressure value applied on the device can be scaled to liters and other units (see P19). The scaling start is set here (e.g. 0).
- P17 SCE** **Scaling end**
Configuration option to show the pressure value assignment on other physical values/units. For example, the pressure value applied on the device can be scaled to liters and other units (see P19). The scaling end is set here (e.g. 100).
- P18 SCD** **Decimal place scaling**
Configuration option to show the pressure value assignment on other physical values/units. For example, the pressure value applied on the device can be scaled to liters and other units (see P19). The scaling decimal place is set here.
- P19 %** **Scaling unit**
Configuration option to show the pressure value assignment on other physical values/units. The scaling unit is set here.
- P20 h** **Operating hours**
For information only
No configuration option

8 Configuration

8.3 Level measurement configuration with a pressure specification - recommended (tank empty, tank full)

The following description applies to level measurements of all measuring ranges with or without a diaphragm seal.

With rotary knob operation (parameter level)

Swap from display level to parameter level, see chapter 7.3 "The level concept", Page 43

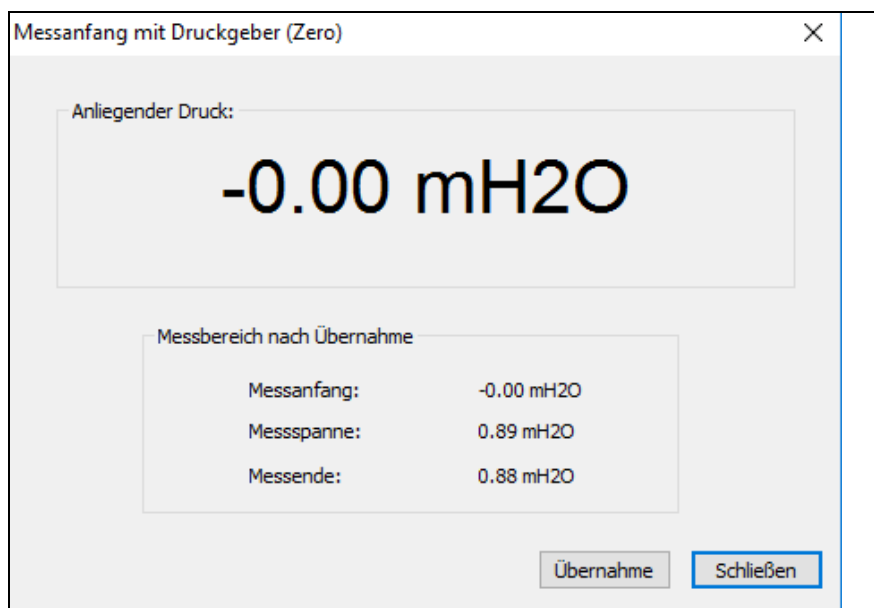
The following configuration steps should be taken:

- P1 Measuring unit, e.g. mbar
- P2 Measuring range lower range value: 4 mA (configuration with empty tank)
- P3 Measuring range upper range value: 20 mA (configuration with full tank)
- P4 Attenuation: 0
- P14 Temperature measuring unit (only for displaying or as HART® signal): °C
- P16 Scaling start: scaling on the tank, e.g. in liters: 0
- P17 Scaling end: scaling on the tank, e.g. in liters: 200
- P19 Scaling unit: L (liters)

Swap from parameter level to display level

With JUMO setup program

Extras **Extras: Online operation_measuring start with pressure transmitter (zero)** – with empty tank
Confirm transfer.



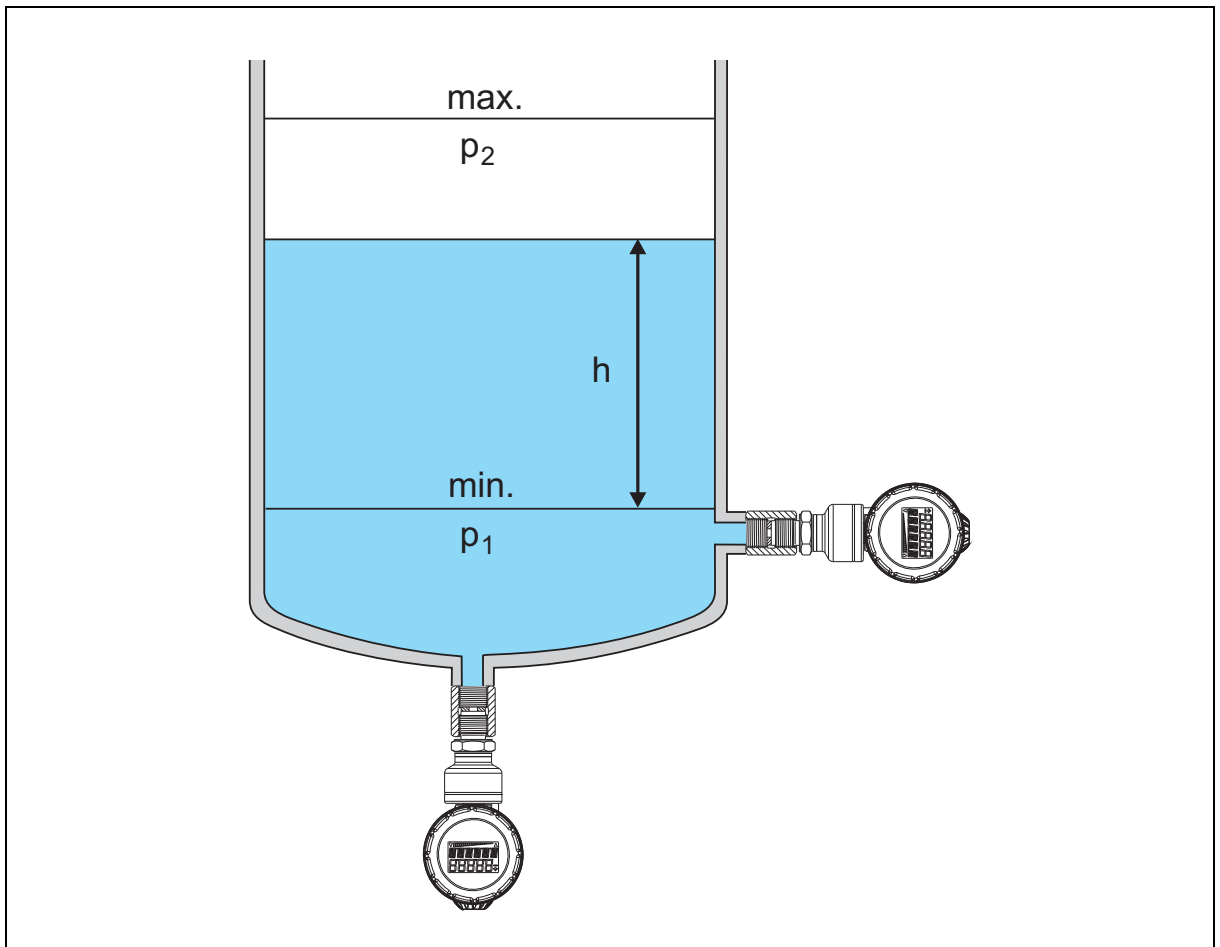
Extras **Extras: Online operation_measuring end with pressure transmitter (span)** – with full tank
Confirm transfer.



NOTE!

No zero point adjustment should be performed when configuring the level measurement with a pressure specification.

8.4 Level measurement configuration without a pressure specification with or without a diaphragm seal



h (filling level) 4 to 20 mA

With rotary knob operation (parameter level)

Swap from display level to parameter level, see chapter 7.3 "The level concept", Page 43

The following configuration steps should be taken:

- P1 Unit, e. g. mbar
- P4 Attenuation: 0
- P5 Measuring range lower range value: 0
- P6 Measuring range upper range value: 2.00 (2 m water column in this example)
- P7 Zero point adjustment, set device to zero, e.g. if tank is empty
- P14 Temperature measuring unit (only for displaying or as HART® signal): °C
- P16 Scaling start: scaling on the tank, e.g. in liters: 0
- P17 Scaling end: scaling on the tank, e.g. in liters: 200
- P19 Scaling unit: L (liters)

Swap from parameter level to display level

8 Configuration

With JUMO setup program

Data transfer from the device

Editing Maintenance

The following dialog window opens:

The screenshot shows the 'Instandhaltung' dialog box with the following settings:

- Messbereich:**
 - Maßeinheit (P01): mH2O
 - Messanfang (P05): 0.000 mH2O
 - Messende (P06): 1.500 mH2O
 - Offset (P15): -0.210 mH2O
- Kennlinie:**
 - Dämpfung (P04): 2.5 sec
 - Kennlinie (P11): Linear
 - Einsatzpunkt (P12): 9.4 %
- Skalierung:**
 - Anfang (P16): 0.00
 - Ende (P17): 20.00
 - Maximale Nachkommastelle (P18): Automatik
 - Einheit (P19): l
 - Kundenspezifisch: (empty)
- Datum:**
 - Messstellendatum: 01.01.2008 (with 'Heute' button)

Buttons at the bottom: OK, Abbrechen

- P01 Measuring unit, e.g. mbar
- P04 Attenuation: 0
- P05 Measuring range lower range value: 0
- P06 Measuring range upper range value: 2.00 (2 m water column in this example)
- P11 Characteristic line: linear
- P14 Temperature measuring unit (only for displaying or as HART® signal): °C
- P16 Scaling start: scaling on the tank, e.g. in liters: 0
- P17 Scaling end: scaling on the tank, e.g. in liters: 200
- P18 Maximum decimal place: automatic
- P19 Scaling unit: L (liters)

After entering the desired values: Data transfer to device

Zero point adjustment, set device to zero, e.g. if tank is empty



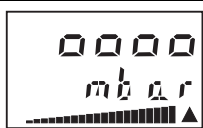

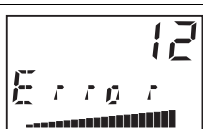
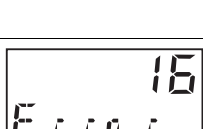


Extras Extras: Online operation_sensor zero point calibration



NOTE!

If you notice an external fault (including a mechanical one), the device must be sent to the manufacturer to be repaired.

9.1 Overcoming errors and malfunctions

Error/fault		Possible cause	Remedy
Display:	None	No voltage supply	Turn on the voltage supply
		Device faulty	Send the device to the supplier for repairs.
Display:		Overrange, overpressure	Bring the pressure back into the measuring range or adjust the measuring range.
Display:		Underrange, underpressure	
Display:		Pressure can no longer be displayed, overpressure	Adjust scaling or unit of measure
Display:		Pressure can no longer be displayed, underpressure	
Display:		The connection between sensor and electronic is broken.	a) Proof the plug connection at the back of the electronic module b) Send the device to the supplier for repairs.
Display:		An error was discovered in the electronics during the self test.	Send the device to the supplier for repairs.
Display:		Temperature sensor or pressure sensor faulty	Send the device to the supplier for repairs.
The rotary knob is not responding		Keyboard lock	Override keyboard lock
		Device faulty	Send the device to the supplier for repairs.

9 Maintenance

10 HART® 7 specification

The device is in the version with HART® protocol if it has a corresponding identification marking on the nameplate: 4 to 20 mA HART®

10.1 Device identification

Manufacturer	JUMO GmbH & Co. KG
Manufacturer ID	24716 (0x608C)
Device type	JUMO dTRANS p20
Device ID	58062 (0xE2CE)
HART® Protocol Version	7
Device version	1
Number of device variables	3
Physical layers supported	FSK
Device category	Transmitter, without galvanic isolation

10.2 Variable codes

The process pressure transmitter supports three device variables and two dynamic device variables as well as the fixed measurands percentage value and milliampere value.

The following table describes the variable numbering that is required for commands 9, 54, and 107.

Variable code	Designation	Class	Unit
0	Customer scaled value	Depending on the current P19 unit: 0 = not classified 66 = flow 68 = level	Depending on the current P19 unit: 57, 73, 74, 75, 77, 78, 24, 17, 138, 28, 131, 19, 41, 43, 253 = diverse flow and level units
1	Drag indicator minimum	65 = pressure	Depending on the current P1 unit: 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 237, 240 = diverse pressure units
2	Drag indicator maximum	65 = pressure	Depending on the current P1 unit: 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 237, 240 = diverse pressure units
244	Percent	0 = not classified	57 = percent
245	Current	84 = current	39 = mA
246	Primary variable	65 = pressure	Depending on the current P1 unit: 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 237, 240 = diverse pressure units
247	Secondary variable	64 = temperature	Depending on the current P14 unit: 32 = level C 33 = level F

10 HART® 7 specification

10.3 HART® commands

Command	Designation	Request data	Response data (plus 2 status bytes)
Universal commands (0 to 30 as well as 38 and 48)			
0	Read unique identifier	None	22 bytes includes the long address
1	Read Primary Variable	None	1 byte unit code P 4 bytes pressure P as float
2	Read current and percent	None	4 bytes current as float 4 bytes percent as float
3	Read current and dynamic variables	None	4 bytes current as float 1 byte unit code P 4 bytes pressure P as float 1 byte unit code T 4 bytes temp T as float
6	Write polling address	1 byte short address 1 byte LoopCurr_active	As request
7	Read loop configuration	None	1 byte short address 1 byte LoopCurr_active
8	Read dynamic variable classifications	None	1 Byte Class PrimV 1 Byte Class SecV 1 Byte Class ThirdV 1 Byte Class QuadV
9	Read device variables with status	1 byte DevVarCode [1 byte DevVarCode] [1 byte DevVarCode] [1 byte DevVarCode]	1 byte ExtendedDevStatus 8 bytes info about DevVar [8 bytes info about DevVar] [8 bytes info about DevVar] [8 bytes info about DevVar] 4 bytes TimeStamp
11	Read unique identifier by TAG	6 bytes TAG no.	Same as command 0
12	Read message	None	24 bytes message
13	Read TAG + descriptor + date	None	6 bytes TAG no. 12 bytes description 3 bytes date
14	Read PV sensor info	None	3 bytes sensor man.no. 1 byte unit code sensor 4 bytes SensorMax as float 4 bytes SensorMin as float 4 bytes SensorSpan as float

10 HART® 7 specification

Command	Designation	Request data	Response data (plus 2 status bytes7)
15	Read device info	None	1 byte alarm code 1 byte "P11 Chr" 1 byte unit code sensor 4 bytes "P6 RE" (range end) 4 bytes "P5 RS" (range start) 4 bytes "P4 sec" 1 byte code write lock 1 byte manufacturer code 1 byte AnalogChannelFlag
16	Read final assembly number	None	3 bytes assembly number
17	Write message	24 bytes message	As request
18	Write TAG + descriptor + date	6 bytes TAG no. 12 bytes description 3 bytes calibration date	As request
19	Write final assembly number	3 bytes assembly number	As request
20	Read long TAG	None	32 bytes long TAG
21	Read unique identifier by Long TAG	32 bytes long TAG	Same as command 0
22	Write long TAG	32 bytes long TAG	As request
Common Practice Commands (32 to 121, except 38 and 48)			
34	Write damping value	4 bytes "P4 sec"	As request
35	Write range values	1 byte unit code 4 bytes "P6 RE" 4 bytes "P5 RS"	As request
36	Set upper range value	None	None
37	Set lower range value	None	None
38	Reset configuration changed flag	2 bytes ConfigChCnt	2 bytes ConfigChCnt
40	Fixed current mode	4 bytes "P8 mA" (0 = Current generator mode off)	As request
41	Perform self test	None	None
42	Perform device reset	None	None
43	Set PV zero ("P7 Zero") Absent with absolute pressure sensors!	None	None
44	Write PV units	1 byte "P1 Uni"	As request
45	Trim loop current zero	4 bytes measured mA as float	As request
46	Trim loop current gain	4 bytes measured mA as float	As request

10 HART® 7 specification

Command	Designation	Request data	Response data (plus 2 status bytes7)
48	Read additional device status	None	6 bytes dev specific status 1 byte extended dev status 1 byte dev operating mode 1 byte standardized status
54	Read device variable info	1 byte DevVarCode	27 bytes info about DevVar
59	Write number of response preambles	1 byte number of preambles	As request
103	Write burst period	1 byte BurstMsgNr 4 bytes BurstMinUpdTime 4 bytes BurstMaxUpdTime	As approved request; invalid values are automatically set to the nearest valid value
104	Write burst trigger	1 byte BurstMsgNr 1 byte BurstTrigMode 1 byte BurstTrigClass 1 byte BurstTrigUnits 4 bytes BurstTrigValue	As request
105	Read burst mode configuration	[1 byte BurstMsgNo]	1 byte BurstAktiv 1 byte BurstCmd 8 bytes BurstDevVarCode 1 byte BurstMsgNr 1 byte number BurstCfg 2 bytes BurstCmd16Bit 4 bytes BurstMinUpdTime 4 bytes BurstMaxUpdTime 1 byte BurstTrigMode 1 byte BurstTrigClass 1 byte BurstTrigUnits 4 bytes BurstTrigValue
107	Write burst device variables	1 byte DevVarCode [1 byte DevVarCode] [1 byte DevVarCode] [1 byte DevVarCode] [1 byte DevVarCode] [1 byte DevVarCode] [1 byte DevVarCode] [1 byte DevVarCode] [1 byte BurstMsgNo]	8 bytes BurstDevVarCode 1 byte BurstMsgNr
108	Write burst mode command number	2 bytes BurstCmd16Bit 1 byte BurstMsgNr	As request
109	Burst Mode Control	1 byte Burst_Active [1 byte BurstMsgNo]	As request

Command	Designation	Request data	Response data (plus 2 status bytes7)
Device-specific commands (128 to 253)			
128	Write offset	1 byte unit code 4 bytes "P15 OFF"	As request
129	Read offset	None	1 byte "P1 Uni" 4 bytes "P15 OFF"
130	Reset min/max value	1 byte both/min/max	As request
131	Read min/max value	None	4 bytes DragIndicatorMax 4 bytes DragIndicatorMin In "P1 Uni"
132	Write output mode	1 byte "P11 Chr"	As request
133	Read output mode	None	1 byte "P11 Chr"
134	Write error mode	1 byte "P9 Err"	As request
135	Read error mode	None	1 byte "P9 Err"
136	Write keyboard mode	1 byte "P10 Key"	As request
137	Read keyboard mode	None	1 byte "P10 Key"
138	Write temperature unit	1 byte "P14 Uni"	As request
141	Read square root start	None	4 bytes "P12 %"
142	Write square root start	4 bytes "P12 %"	As request
147	Write Scale_Beg + Scale_End	4 bytes "P17 SCE" 4 bytes "P16 SCS"	As request
148	Read Scale_Beg + Scale_End	None	4 bytes "P17 SCE" 4 bytes "P16 SCS"
149	Write Scale_Unit	1 byte unit code for "P19 %"	As request
151	Write Scale_Comma	1 byte "P18 SCD" [Auto/0/1/2/3]	As request
152	Read Scale_Comma	None	1 byte "P18 SCD" [Auto/0/1/2/3]

10.4 Burst mode commands

The burst mode is an operating mode in which the device sends telegrams independently without an inquiry. It is configured with the setup program or with the commands 103 to 109.

The following commands are available:

Command	Designation
1	Primary variable
2	Current and percent
3	Current and dynamic variables
9	Device variables
48	Additional device status

10 HART® 7 specification

10.5 Performance data

The parameters that are listed below determine the performance of the process pressure transmitter.

Telegram length

The maximum telegraph length of up to 68 bytes occurs with this HART® 7 device with command 9 (39 bytes payload including 2 status bytes).

Operating modes

The process pressure transmitter has three output operating modes:

- Standard mode (single mode): current proportional to measurand
- Current generator mode: current is adjusted through HART® command 40 or through adjustment parameter "P8 mA"
- Constant current mode (multidrop mode): current is set to constant 4 mA in bus operation (HART® command 6)

Write protection

The device can be protected against unintentional overwriting of a parameter through a keyboard lock.

- At the device through parameter "P10 key"
- In the setup program under "Further maintenance data - Inhibit (P10)"
- Via HART® command 136 and 137

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More than **sensors + automation**

EU-Konformitätserklärung

EU declaration of conformity / Déclaration UE de conformité

Dokument-Nr.

CE 604

Document No. / Document n°.

Hersteller

JUMO GmbH & Co. KG

Manufacturer / Etabli par

Anschrift

Moritz-Juchheim-Straße 1, 36039 Fulda, Germany

Address / Adresse

Produkt

Product / Produit

Name

Name / Nom

Typ

Type / Type

Typenblatt-Nr.

Data sheet no. / N°

Document

d'identification

dTRANS p20 Ex d

403026

403026

Wir erklären in alleiniger Verantwortung, dass das bezeichnete Produkt die Anforderungen der Europäischen Richtlinien erfüllt.

We hereby declare in sole responsibility that the designated product fulfills the requirements of the European Directives.

Nous déclarons sous notre seule responsabilité que le produit remplit les Directives Européennes.

Richtlinie 1

Directive / Directive

Name

EMC

Name / Nom

Fundstelle

2014/30/EU

Reference / Référence

Bemerkung

Comment / Remarque

Datum der Erstanbringung des CE-Zeichens 2011

auf dem Produkt

Date of first application of the CE mark to the product / Date

de 1ère application du sigle sur le produit

Dokument-Nr.

CE 604

Document No. / Document n°.

EU-Konformitätserklärung

Seite: 1 von 4

11 Declaration of conformity

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Angewendete Normen/Spezifikationen

Standards/Specifications applied / Normes/Spécifications appliquées

Fundstelle

Reference / Référence

Ausgabe

Edition / Édition

Bemerkung

Comment / Remarque

EN 61326-1

2013

EN 61326-2-3

2013

Gültig für Typ

Valid for Type / Valable pour le type

403026/...

Richtlinie 2

Directive / Directive

Name

Name / Nom

ATEX

Fundstelle

Reference / Référence

2014/34/EU

Bemerkung

Comment / Remarque

Mod. B+D

Datum der Erstanbringung des CE-Zeichens auf dem Produkt

*Date of first application of the CE mark to the product / Date
de 1ère application du sigle sur le produit*

2011

Angewendete Normen/Spezifikationen

Standards/Specifications applied / Normes/Spécifications appliquées

Fundstelle

Reference / Référence

Ausgabe

Edition / Édition

Bemerkung

Comment / Remarque

EN 60079-0

2012+A11:2013

EN 60079-1

2014

EN 60079-26

2015

EN 60079-31

2014

Gültig für Typ

Valid for Type / Valable pour le type

403026/...

Dokument-Nr.
Document No. / Document n°.

CE 604

EU-Konformitätserklärung

Seite: 2 von 4

11 Declaration of conformity

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More than **sensors + automation**

EU-Baumusterprüfbescheinigung 2.1

EU type examination certificate / Certificat d'examen de type UE

Fundstelle

Reference / Référence

SEV 10 ATEX 0127 X

Benannte Stelle

Notified Body / Organisme notifié

Eurofins Electrosuisse Product Testing AG

Kennnummer

Identification no. / N° d'identification

1258

Gültig für Typ

Valid for Type / Valable pour le type

403026/...

Anerkannte Qualitätssicherungssysteme der Produktion

Recognized quality assurance systems of production / Systèmes de qualité reconnus de production

Benannte Stelle

Notified Body / Organisme notifié

TÜV NORD CERT GmbH

Kennnummer

Identification no. / N° d'identification

0044

Richtlinie 3

Directive / Directive

Name

Name / Nom

RoHS

Fundstelle

Reference / Référence

2011/65/EU

Bemerkung

Comment / Remarque

Datum der Erstanbringung des CE-Zeichens 2017

auf dem Produkt

Date of first application of the CE mark to the product / Date

de 1ère application du sigle sur le produit

Dokument-Nr.
Document No. / Document n°.

CE 604

EU-Konformitätserklärung

Seite: 3 von 4

11 Declaration of conformity

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More than **sensors + automation**

Angewendete Normen/Spezifikationen

Standards/Specifications applied / Normes/Spécifications appliquées

Fundstelle

Reference / Référence

Ausgabe

Edition / Édition

Bemerkung

Comment / Remarque

VDK Umweltrelevante Aspekte V1
bei der Produktentwicklung und
-gestaltung

Gültig für Typ

Valid for Type / Valable pour le type

403026/...

Aussteller

Issued by / Etabli par

JUMO GmbH & Co. KG

Ort, Datum

Place, date / Lieu, date

Fulda, 2018-01-03

Rechtsverbindliche Unterschrift

Legally binding signature / Signature juridiquement valable

Bereichsleiter Verkauf
ppa. Wolfgang Vogl

Dokument-Nr.
Document No. / Document n°.

CE 604

EU-Konformitätserklärung

Seite: 4 von 4



(1) EU-Type Examination Certificate

- (2) Equipment or protective system intended for use in potentially explosive atmospheres - **Directive 2014/34/EU**
- (3) Certificate number: **SEV 10 ATEX 0127 X**
- (4) Product: Process pressure transmitter
JUMO dTRANS p20 type 403026
JUMO dTRANS p20 DELTA type 403023
- (5) Manufacturer: JUMO GmbH & Co. KG
- (6) Address: Moritz-Juchheim-Strasse 1, 36039 Fulda, GERMANY
- (7) The equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
- (8) Eurofins Electrosuisse Product Testing AG, notified body No. 1258, in accordance with article 17 of Directive 2014/34/EU of the European parliament and of the council, dated 26 February 2014, certifies that this product has been found to comply with the essential health and safety requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in confidential report no 09-IK-0103.02 incl. extension 1 to 3
- (9) Compliance with the essential health and safety requirements has been assured by compliance with:
EN 60079-0:12 + A11:13 EN 60079-1:14 EN 60079-26:15
EN 60079-31:14
Except in respect of those requirements listed at item 18 of the schedule.
- (10) If the sign «X» is placed after the certificate number, it indicates that the product is subjected to special conditions for safe use specified in the schedule to this certificate
- (11) This EU type examination certificate relates only to design and construction of the specified product. Further requirements of this directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.
- (12) The marking of the product shall include the following:

See Appendix page 3: (20) Marking

Eurofins Electrosuisse Product Testing AG
ATEX Notified Body 1258

Martin Plüss
Product Certification



12 Examination certificate

(13)

Appendix

(14)

EU-Type Examination Certificate no. SEV 10 ATEX 0127 X

(15) **Description of product**

The process pressure transmitter JUMO dTRANS p20 type 403026 or JUMO dTRANS p20 DELTA type 403023 serves for converting a physical measured quantity (pressure) into a standard electrical signal (current signal 4...20 mA). They are intended for use in potentially explosive atmospheres. The precision cast stainless steel enclosure of the pressure trans-mitter is dust-tight with the minimum type of protection IP 66 according to IEC 60529.

Ratings

Supply circuit

U = 12.0 VDC up to 36.0 VDC
I = 22mA

Classification of installation and use:

stationary

Ingress protection:

IP66

Rated ambient temperature range:

Assignment between the maximum permissible ambient temperature in the electronic enclosure, measuring temperature and the maximum surface temperature for the process pressure transmitter is shown in the following values:

JUMO dTRANS p20 Typ 403026:

Ambient temperature:

T6: -50 °C ... +60 °C

T5: -50 °C ... +70 °C

T4: -50 °C ... +85 °C

T105: -50 °C ... +85 °C

Maximum permissible measuring substance temperature:

T6: +70 °C

T5: +85 °C

T4: +115 °C

T105: +100 °C

JUMO dTRANS p20 Typ 403023:

Ambient temperature:

T6: -50 °C ... +60 °C

T5: -50 °C ... +70 °C

T4: -50 °C ... +85 °C

T105: -50 °C ... +85 °C

Maximum permissible measuring substance temperature:

T6: +70 °C

T5: +85 °C

T4: +110 °C

T105: +100 °C





Electrosuisse
Product Testing

(16) **Report number** 09-IK-0103.02 incl. extension 1 to 3

(17) **Specific conditions of use**

- In the temperature range of -40 °C ... -50 °C the lid with inspection glass of the appliance has to be additionally protected against mechanical impact- respectively collision effect.
- Where temperatures higher than +70 °C occur at the cable entry or +80 °C at the junction of the conductors, only a tested and heat-resistant cable must be connected.
- Only separately certified cable glands and blanking elements according to Directive 2014/34/EU may be used.
Unused openings shall be closed with the aforementioned blanking elements.

(18) **Essential health and safety requirements**

In addition to the essential health and safety requirements (EHSRs) covered by the standards listed at item 9, the following are considered relevant to this product, and conformity is demonstrated in the report:

Clause	Subject
None	

(19) **Drawings and Documents**


See test report "Manufacturer's Documents"

(20) **Marking**

JUMO dTRANS p20 type 403026		II 1/2G II 2D	Ex d IIC Ex tb IIIC	T6 ... T4 Ga/Gb T105 °C Db
JUMO dTRANS p20 DELTA Typ 403023		II 1/2G II 2D	Ex d IIC Ex tb IIIC	T6 ... T4 Ga/Gb T105 °C Db



12 Examination certificate

		有毒有害物质或元素 Hazardous substances						
		铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)	
部件名称	Product group: 403026							
外壳 Housing (Gehäuse)		○	○	○	○	○	○	○
过程连接 Process connection (Prozessanschluss)		○	○	○	○	○	○	○
螺母 Nut (Mutter)		○	○	○	○	○	○	○
螺钉 Screw (Schraube)		○	○	○	○	○	○	○

本表格依据 SJ/T 11364-2014 的规定编制。
 (This table is prepared in accordance with the provisions of SJ/T 11364-2014.)
 O : 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
 (O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.)
 X : 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。
 (X: Indicates that said hazardous substance contained in one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.)

13 China RoHS



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