JUMO dTRANS p20 DELTA

Differential pressure transmitter
Type 403022

B 403022.0

Operating Instructions

JUMO

2011-08-31/00519462

Danger:

Failure of the differential pressure transmitter or an instrument attached to it could possibly lead to dangerous malfunctions! Suitable preventive measures must be in place to prevent this from happening.

Note:

Please read these Operating Instructions before placing the instrument in operation. Keep the Operating Instructions in a place which is accessible to all users at all times.
All necessary settings are described in this manual. If any difficulties should nevertheless arise during start-up, please do not manipulate the unit in any way. You could endanger your rights under the instrument warranty!

Please contact the nearest subsidiary or the head office in such a case.

For technical questions
Service hotline:
Phone: +49-6 61-60 03-3 00 or +49-6 61-60 03-6 53
Fax: +49-6 61-60 03-88 13 00 or +49-6 61- 60 03-88 16 53
E-mail: service@jumo.net

Contents

1.1 Warning signs

Danger

Failure to follow these instructions or failure to follow them precisely may result in **injury**!

Caution

Failure to follow these instructions or failure to follow them precisely may result in **damage to instruments or data**!

1.2 Reference signs

Note

This sign is used to draw **special attention** to something.

abc[1]

Footnote

Footnotes are remarks that **refer to specific points** in the text. Footnotes consist of two parts:

Markers in the text and the footnote text.

The markers in the text are arranged as sequential superscript numbers.

✱

Action instruction

This sign indicates that an **action to be performed** is described.

The individual steps are marked by this asterisk.

Example:

✱ Loosen Phillips-head screws.

✱ Press key.

2 General information

2.1 Scope of application

General information

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

In the version with “Ex ia (intrinsically safe)“ explosion protection, the differential pressure transmitter can be fitted up to zone 0.

The enclosure and sensors are made from high-quality stainless steel. It is also possible to connect remote seals for special process engineering applications (see data sheets 409772 to 409784).

The transmitter is programmable, making it readily adaptable to a variety of different measurement tasks. A user-friendly setup program is available as an accessory, for operation via interfaces. A rotary knob ensures highly convenient and fast local, manual operation.

Use in "Ex areas"

The differential pressure transmitter in the **Ex ia** version is approved for use in "Ex areas" if the nameplate on the instrument so indicates.

2.2 Scope of delivery

Operating Instructions B 403022.0

The Operating Instructions describe the assembly and installation of the JUMO dTRANS p20 DELTA differential pressure transmitter.

Calibration certificate

The differential pressure transmitter comes with a calibration certificate and a SETUP printout. These documents contain information about the set parameters or measured parameters for the relevant pressure transmitter.

If the calibration certificate is lost, or if you need another copy, it can be ordered from JUMO. Please indicate the F number of the differential pressure transmitter (manufacturing number, see the nameplate).
Your **supplier's address** can be found on the back of the manual.

Setup program

The setup program is available as an accessory: Sales No. 40/00537577

The setup program provides a convenient way to check and adjust all parameters of the pressure transmitter. It also includes additional functions such as:

- Recording of measurements
- Graphical presentation of temperature and pressure
- Extensive diagnostic messages
- Display of complete order code and instrument configuration (for reordering).

The setup program accesses the pressure transmitter via the JUMO interface.

Danger

The JUMO interface must **not** be used for instruments with ATEX Ex ia explosion protection!
These instruments must **only** be operated with the rotary knob or via the HART® interface!

PC interface cable

Available as an accessory: PC interface cable including USB/TTL converters and two adapters (USB connecting cable), sales No. 40/00456352.

The PC interface cable can be used to connect the differential pressure transmitter to the USB interface of a PC via the JUMO interface.

HART® modem

Available as an accessory: HART® modem for USB,
Sales No.: 40/00443447.

The HART® modem can be used to connect the differential pressure transmitter with the USB® interface of a PC via the HART® interface.

Supply isolator

Available as an accessory: Supply isolator for Ex applications, HART®-enabled, sales No. 40/00389710.

Differential pressure transmitter with ATEX Ex ia explosion must be connected for use in Ex areas by means of a supply isolator!

Remote seals

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

Remote seals are used for adaptation to special applications, when conventional pressure connections cannot be used.

Caution

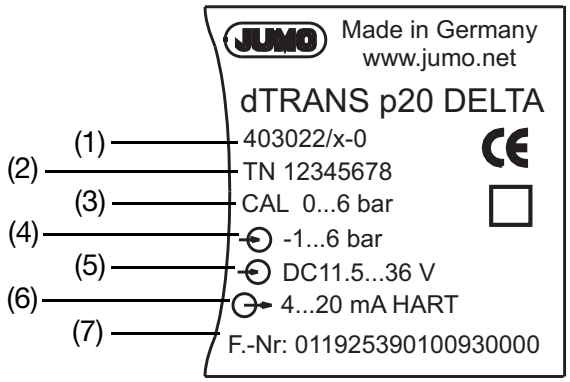
Remote seals are installed in the factory and must not be separated from the differential pressure transmitter!

3 Instrument identification

3.1 Nameplate

Non-Ex, Enclosure

Identification on the enclosure of a differential pressure transmitter that is **not** suitable for use in hazardous (Ex) areas.



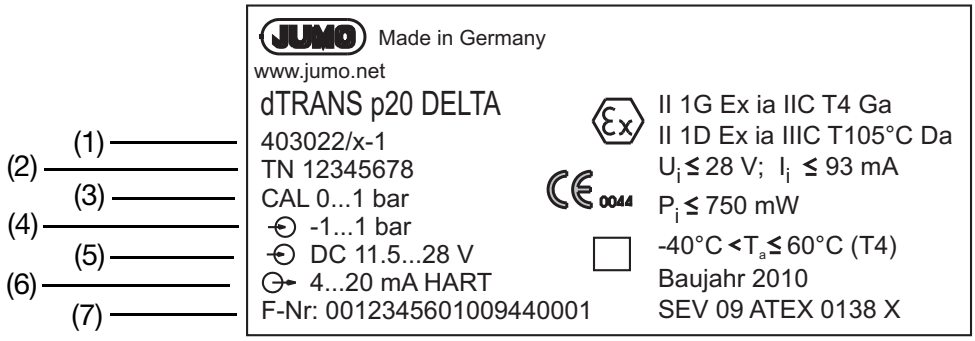
(1) Type
(2) Part number
(3) Factory setting for measurement range
(4) Nominal measuring range
(5) Power supply
(6) Output signal
(7) Manufacturing number

Date of manufacture

The date of manufacture (year and calendar week) of the instrument is encoded in the manufacturing number.
The numbers 12 to 15 identify the year of manufacture (here 09 for 2009) and the calendar week (here 30).

Ex, Enclosure

Second identification on the enclosure of a differential pressure transmitter that is suitable for use in hazardous (Ex) areas.



(1) Type
(2) Part number
(3) Measuring range
(4) Nominal measuring range
(5) Power supply
(6) Output signal
(7) Manufacturing number

Date of manufacture

The date of manufacture (year and calendar week) of the instrument is encoded in the manufacturing number.
The numbers 12 to 15 identify the year of manufacture (here 09 for 2009) and the calendar week (here 44).

3.2 Type description

(1) Basic type

403022 dTRANS p20 DELTA process differential pressure transmitter

(2) Basic type extension

0 None
9 Special design

(3) Explosion protection

0 None
1 ATEX Ex ia

(4) Enclosure

1 Short, stainless steel, with M12 connection
2 Long, stainless steel, with cable gland
3 Precision casting, with cable gland

(5) Electrical connection

36 Round plug, M12x1
82 Cable gland, plastic [1]
93 Cable gland, metal

(6) Cover material

20 Stainless steel
85 Plastic

(7) Display

0 Without display
1 With display

(8) Operation

0 Without control knob
1 With control knob

(9) Nominal measuring range of input

530 -10 to +10 mbar DP
531 -1 to +1 bar DP
532 0 to +1 bar DP
533 -1 to +6 bar DP
534 -1 to +100 bar DP

(10) Output

405 4 to 20 mA, two wires
410 4 to 20 mA, 2 wires with HART®

(11) Process connection

511 2 x pressure connection 1/4-18 NPT, to EN 837
998 Suitable for connecting to a diaphragm seal

(12) Process connection material

20 Stainless steel
80 Tantalum [2]
82 Hastelloy® C276, mat. no.: 2.4819[1]

(13) Measuring system filling medium

1 Silicon oil
2 Halogenized oil

(14) Extra codes

000 None
100 Customized setting [3]
624 Free of oil and grease
633 With holder for wall and pipe mounting
634 With TAG number (specify TAG no. when ordering)
681 Extended permissible ambient temperature
694 Increased nominal pressure PN 420 [4]

[1] Not for ATEX Ex ia.

[2] Not for nominal measuring range 530 (-10 to +10 mbar DP).

[3] Please specify required setting in plain text. For factory setting, see Accuracy section.

[4] Only in conjunction with input nominal measuring range 532 (0 to +1 bar) or 533 (-1 to +6 bar) or 534 (-1 to +100 bar).

	(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Order code		/									
Sample order	403022	/	0	- 0	- 2	- 82	- 85	- 1	- 1	- 514	- 405

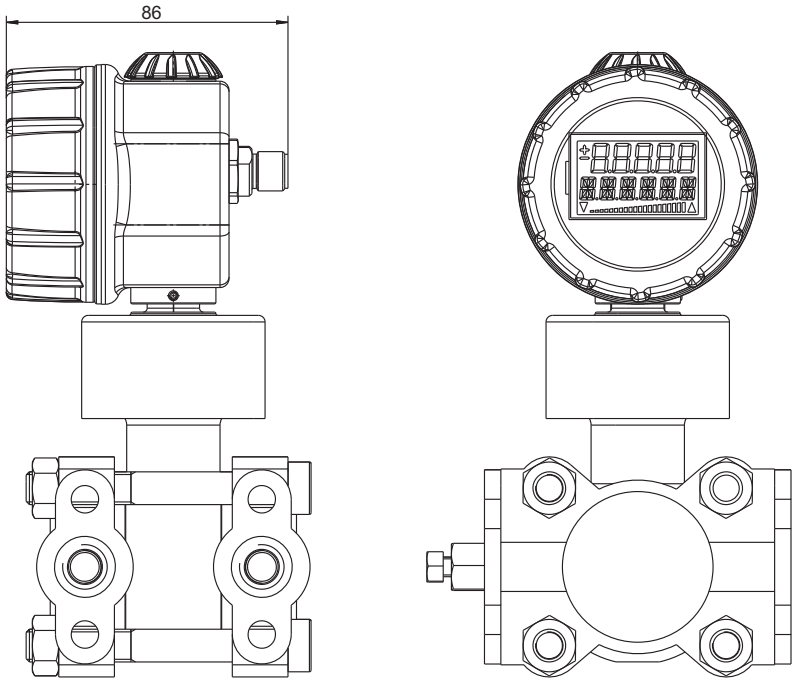
(11)	(12)	(13)	(14)
			/ ...
504 -	1 -	20 /	000

3.3 Accessories

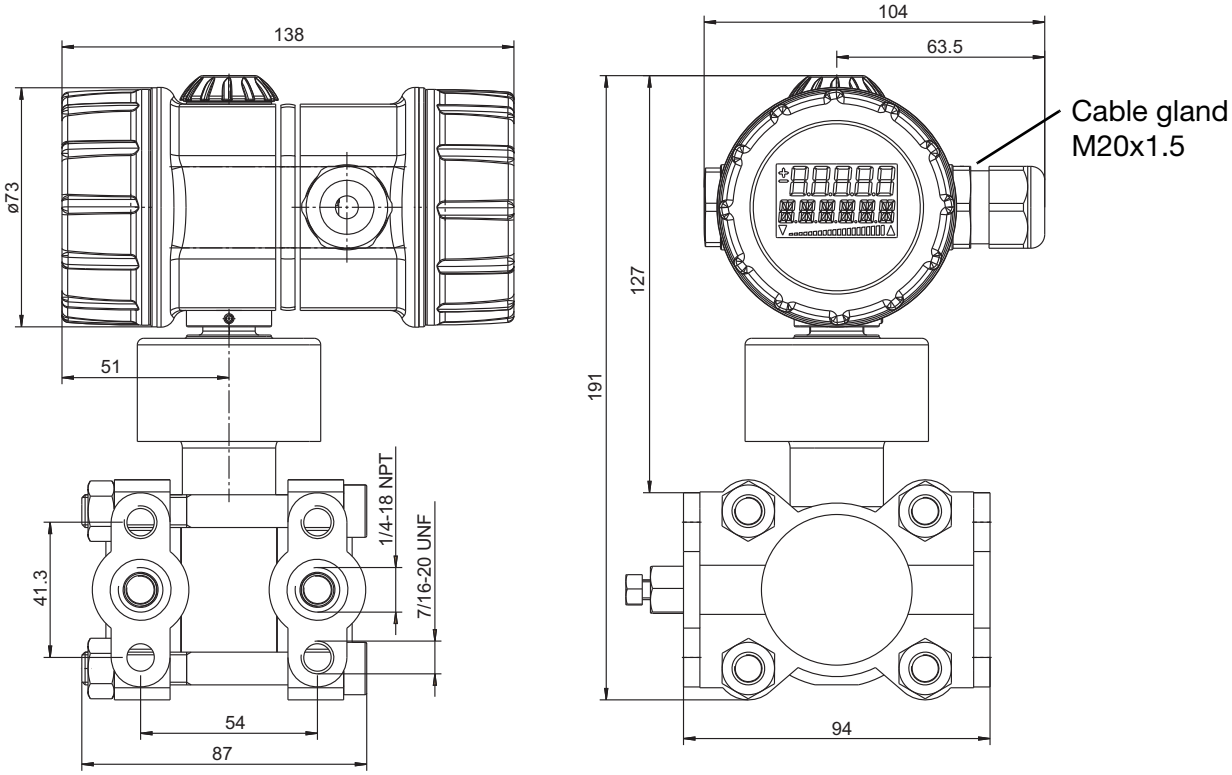
Designation	Explanation	**Sales No.**
Setup program for the JUMO dTRANS p20 series	The setup program helps to make operation and parameterization of all JUMO dTRANS p20 series instruments more user friendly	40/00537577
HART® modem	The HART® modem forms the onnection between the pressure transmitter's HART® interface and a PC's USB interface	40/00443447
PC interface cable including USB/TTL converters and two adapters (USB connecting cable)	The PC interface cable forms the connection between the differential pressure transmitter's JUMO interface and a PC's USB interface.	70/00456352
Supply isolator for Ex applications, HART®-enabled	See data sheet 404757	40/00389710
4-pin cable connector (straight) M12 x 1, with 2-m PVC cable		40/00404585
4-pin angle box M12 x 1, with 2-m PVC cable		40/00409334
5-pin cable connector M 12x1, straight, without cable	for self assembly	40/00419130
5-pin cable connector M 12x1, angled, without cable	for self assembly	40/00419133
Holder for wall and pipe mounting	Set includes 7/16-20 UNF screws and mounting bracket for a 2" pipe	40/00543777
3-way valve block	See data sheet 409706	
5-way valve block	See data sheet 409706	
Oval flange	to DIN 19 213, in stainless steel. Set 2 pieces incl. screws 7/16-20 UNF. Other types on request.	40/00543775
Remote seals	for adaptation to special applications, when conventional pressure connections cannot be used, see data sheets 409772 to 409786.	

3 Instrument identification

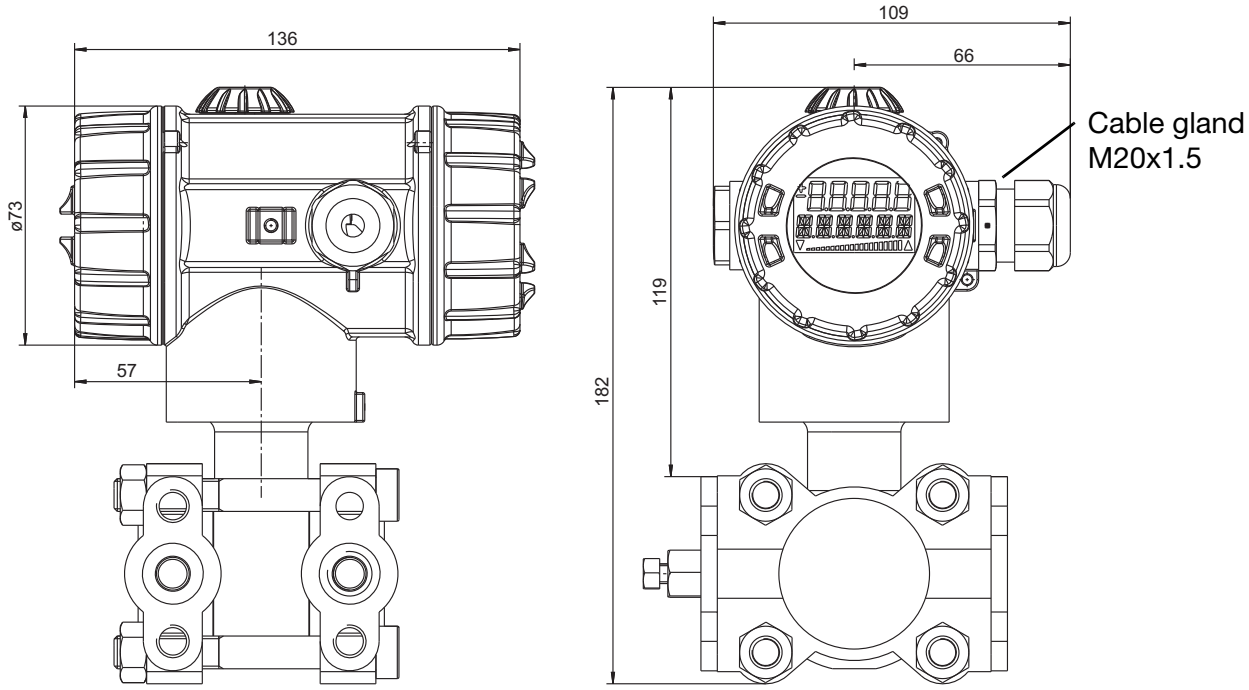
3.4 Dimensions



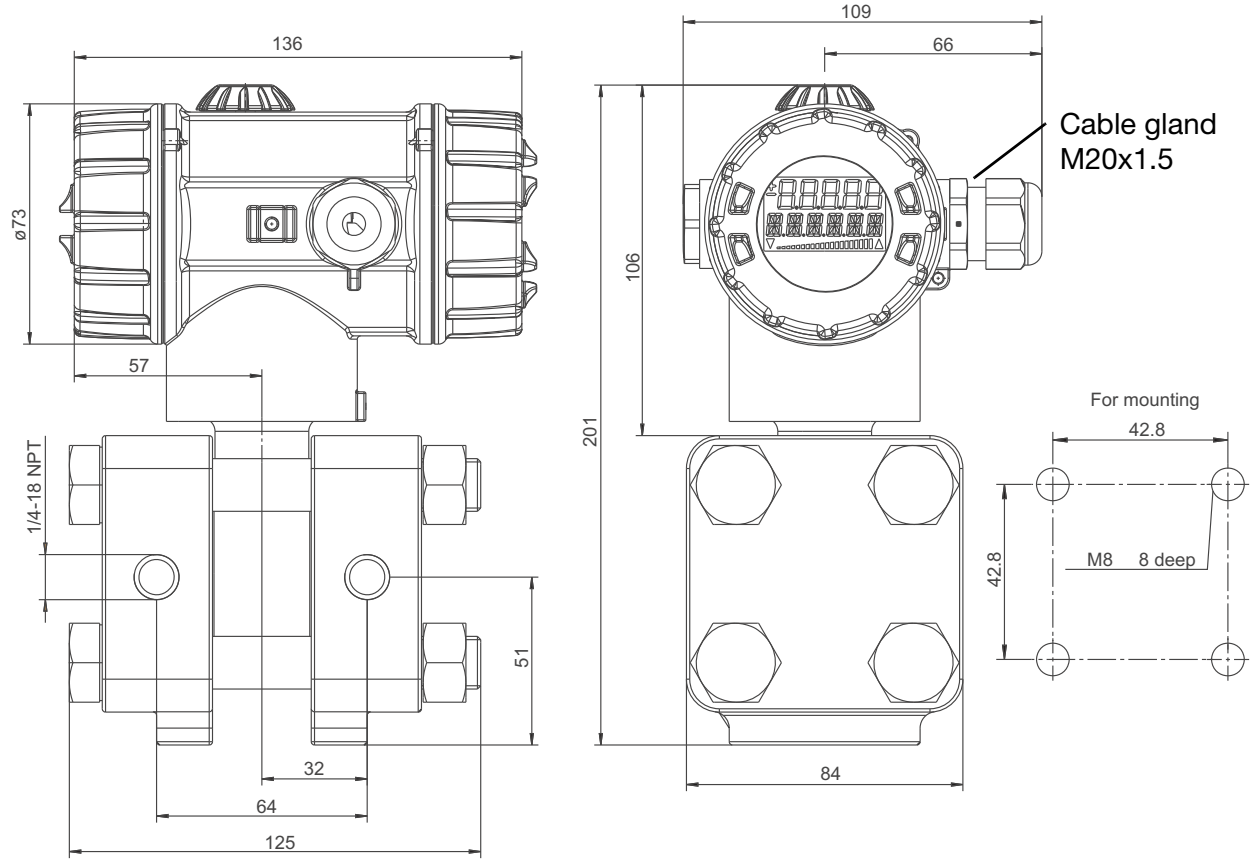
Type 403022/0-0-1 (short, stainless steel, with M12 connection)



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



Type 403022/0-0-3 (long, precision casting, with metal cable gland)



For extra code 694 (increased nominal pressure PN420)

4.1 General information

Reference conditions	DIN 16086, EN 60770 and DIN IEC 770/5.3
Sensor system Pressure transfer medium for measuring system 1 filling medium for measuring system 2 filling medium Permissible load changes	Silicon sensor with stainless steel separating diaphragm Silicon oil Halogenized filling oil > 10 million
Location Mounting location Calibration location Location-dependent zero point offset	 Any Device standing vertically, process connection on bottom ≤ 1 mbar Zero point correction possible locally or via setup
Display Alignment Size Color	LCD, two-line with bar graph Display unit can be rotated 90° at a time Enclosure can be rotated ±160° Display field 22 x 35 mm / font size 7 mm / 5 digits Black
Measurement unit display options Input pressure Measured value Output current Sensor temperature	 in H_2O, inHg, ftH_2O, mmH_2O, mmHg, psi, bar, mbar, kg/cm^2, kPa, Torr, MPa, mH_2O % or scaled with a freely adjustable measurement unit mA °C, °F
Additional display data	Minimum pressure, maximum pressure, error, overrange, underrange, operating hours
Operation Local Setup program	 With rotary knob and LCD Via interface
Interface Standard For output 410 (4 to 20 mA with HART®)	 JUMO interface[1], socket on front of instrument JUMO interface[1] and HART® interface
Explosion protection for explosion protection 0 (none) for explosion protection 1 (ATEX Ex ia)	 The instrument is **not** approved for use in hazardous (Ex) areas EC type examination certificate SEV 09ATEX (in progress) II 1 G Ex ia IIC T4 II 1 D Ex iaD 20 T105°C

[1] The JUMO interface must not be used for instruments with ATEX Ex ia explosion protection! These instruments can be operated by the rotary knob or via the HART® interface.

4.2 Input

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

4.3 Output

Analog output	
for output 405	4 to 20 mA, two wires
for output 410	4 to 20 mA, 2 wires with HART®
Step response time T_{60}	≤ 190 ms without damping
Damping	adjustable, 0 to 100 s
Burden	
for output 405 (4 to 20 mA)	Burden ≤ (U_B-11.5 V) / 0.022 A
for output 410 (4 to 20 mA with HART®)	Burden ≤ (U_B-11.5 V) / 0.022 A; also: min. 250 Ω, max. 1100 Ω

4.4 Power supply

For version	
Explosion protection 0 (none)	11.5 to 36 V DC
Explosion protection 1 (ATEX Ex ia)	11.5 to 28 V DC The power supply must be intrinsically safe and must not exceed the following maximum values: U_i ≤ 28 V DC I_i ≤ 93 mA P_i ≤ 750 mW

4.5 Mechanical properties

Process connection	
Materials	
Membrane	
for process connection 20 (stainless steel)	Stainless steel 316L
for process connection 82 (Hastelloy®)	Hastelloy® C276, mat. no.: 2.4819
for process connection 80 (tantalum)	Tantalum
Flange	Stainless steel 316
Seal	FEP

4 Technical data

Enclosure	
Material	
for enclosure 1 (short, stainless steel)	Stainless steel 1.4404
for enclosure 2 (long, stainless steel)	Stainless steel 1.4404, VMQ
for enclosure 3 (precision casting)	Precision casting 1.4408
for cover material 20 (stainless steel)	Precision casting 1.4408, FPM seal
for electrical connection 36 (M12x1 round plug)	Nickel-plated brass
for electrical connection 82 (cable gland, plastic)	PA
for electrical connection 93 (cable gland, metal)	Nickel-plated brass
for operation 0 (without control knob)	-
for operation 1 (with control knob)	PA
Weight	
Type 403022/0-0-1 (short enclosure)	approx. 3.0 kg
Type 403022/0-0-2 (long enclosure)	approx. 3.3 kg
Type 403022/0-0-3 (precision casting enclosure)	approx. 4.0 kg
For extra code 694 (increased nominal pressure)	The instrument weight increases by approx. 2.5 kg

4.6 Ambient conditions

Permissible temperatures					
Operation	Version	Category	Max. medium temperature	Environment temperature[1]	Extended environment temperature (extra code 681)[1, 2]
	Standard		+110 °C	-40 to +85 °C	-50 to +85 °C
	II 1G Ex ia	T4	+100 °C	-40 to +60 °C	-50 to +60 °C
	II 1D Ex ia	T105 °C	+100 °C	-40 to +60 °C	-50 to +60 °C
Storage	-40 to +85 °C				

Permissible relative humidity	
Operation	100% incl. condensation on instrument outer sleeve
Storage	90% without condensation

Electromagnetic compatibility Interference emission Interference immunity	To EN 61326 Class B Industrial
Protection Version - Explosion protection 0 (none) - Explosion protection 1 (ATEX Ex ia)	 IP67 to DIN 60529 IP66 to DIN 60529

1 Restricted function below -20°C: stationary use, increased danger of broken cable, display does not function.

2 In the range of -40 to -50°C, the cover with the instrument viewing pane must also be protected against mechanical shock and impact. For details please contact JUMO.

4.7 Accuracy

Differential pressure					
Nominal measuring range	-10 to 10 mbar DP	-1 to 1 bar DP	0 to 1 bar DP	-1 to 6 bar DP	-1 to 100 bar DP
Factory setting for measurement range	0 to 10 mbar	0 to 1 bar	0 to 1 bar	0 to 6 bar	0 to 100 bar
Shortest span	1 mbar	5 mbar	5 mbar	0.350 bar	2.5 bar
Turndown ratio (r)	r ≤ 20	r ≤ 400	r ≤ 200	r ≤ 20	r ≤ 40.4
Linearity for a linear characteristic as % of the set span	0.1% for r ≤ 2	0.07% for r ≤ 10	0.07% for r ≤ 10	0.07% for r ≤ 5	0.07% for r ≤ 5
	r x 0.05% for 2 ≤ r ≤ 20	r x 0.007% for 10 ≤ r ≤ 400	r x 0.007% for 10 r ≤ 200	r x 0.014% for 5 r ≤ 20	r x 0.014% for 5 r ≤ 40.4
Accuracy at +20°C as % of the set span	0.2% for r ≤ 2	0.1% for r ≤ 10	0.1% for r ≤ 10	0.1% for r ≤ 5	0.1% for r ≤ 5
	r x 0.1% for 2 ≤ r ≤ 20	r x 0.01% for 10 ≤ r ≤ 400	r x 0.01% for 10 ≤ r ≤ 200	r x 0.02% for 5 ≤ r ≤ 20	r x 0.02% for 5 ≤ r ≤ 40.4
Accuracy for -20 to +85 as % of the set span	0.5% for r ≤ 2 (up to +60°C only)	0.2% for r ≤ 10	0.2% for r ≤ 10	0.2% for r ≤ 5	0.2% for r ≤ 5
	r x 0.25% for 2 ≤ r ≤ 20 (up to +60°C only)	r x 0.02% for 10 ≤ r ≤ 400	r x 0.02% for 10 ≤ r ≤ 200	r x 0.04% for 5 ≤ r ≤ 20	r x 0.04% for 5 ≤ r ≤ 40.4
Accuracy at -40 to +20 as % of the set span	1.0% for r ≤ 2	0.6% for r ≤ 10	0.6% for r ≤ 10	0.6% for r ≤ 5	0.6% for r ≤ 5
	r x 0.5% for 2 ≤ r ≤ 20	r x 0.06% for 10 ≤ r ≤ 400	r x 0.06% for 10 ≤ r ≤ 200	r x 0.12% for 5 ≤ r ≤ 20	r x 0.12% for 5 ≤ r ≤ 40.4
Accuracy for +60 to +85 as % of the set span	2.0% for r ≤ 2				
	r x 1.0% for 2 ≤ r ≤ 20				
Effect of static pressure P (bar) as % of nominal measuring range	≤ 1%	≤ P x 0.0005%	≤ P x 0.0003%	≤ P x 0.0025%	≤ P x 0.001%
Long-term stability as a % of the nominal measuring range	≤ 0.6%/year	≤ 0.1%/year	≤ 0.1%/year	≤ 0.1%/year	≤ 0.2%/year

4.8 Approvals/marks of conformity

Mark of conformity	Testing laboratory	Certificate/certification number	Test basis	Valid for
ATEX	electrosuisse	SEV 09 ATEX 0138 X	Directive 94/9/EG	ATEX Ex ia

5 Mounting

5.1 Before mounting

Danger

The system must be depressurized before mounting the JUMO dTRANS p20 differential pressure transmitter!

Note

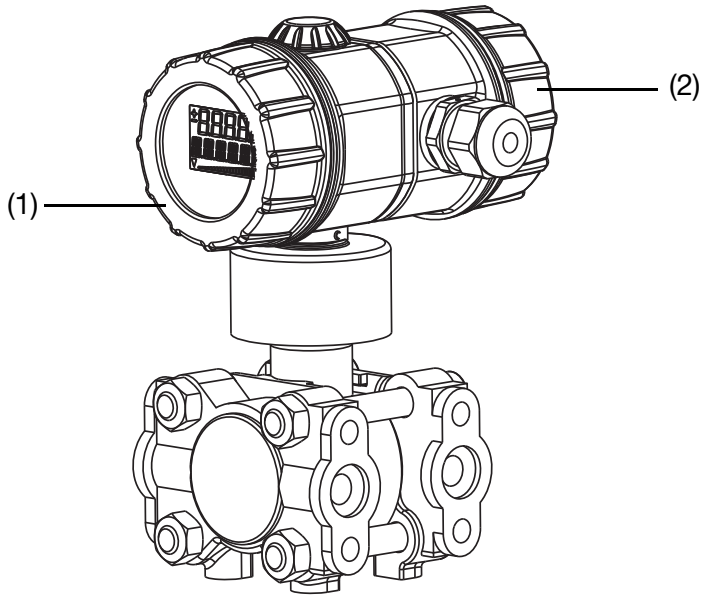
The installation location should be easily accessible, if possible in the vicinity of the measuring point and low in vibration. The permissible ambient temperature must be maintained (note any possible heat radiation).

The JUMO dTRANS p20 differential pressure transmitter can be installed above or under the pressure tapping point.

5.2 Unscrew the front ring or enclosure cover

Plastic cover ring

The front ring (1) and rear enclosure cover (2) can be unscrewed.



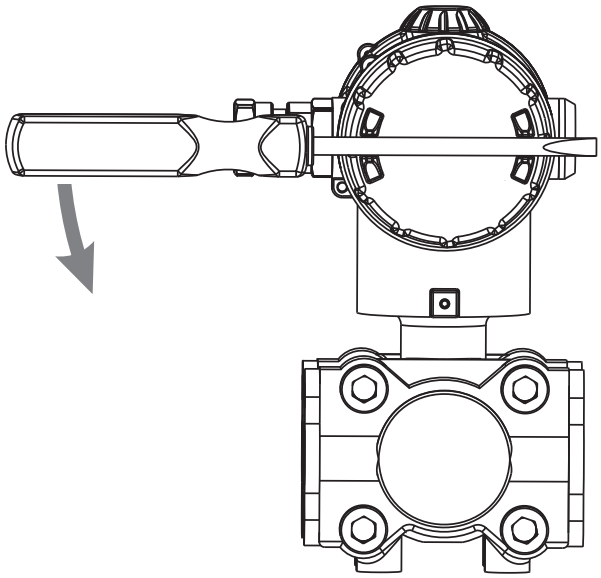
(1) Front ring (plastic)
(2) Enclosure cover (plastic)

Stainless steel cover

The front ring and the back of the casing cover can be unscrewed with the help of a screwdriver e.g..

Note

Torque by hand!

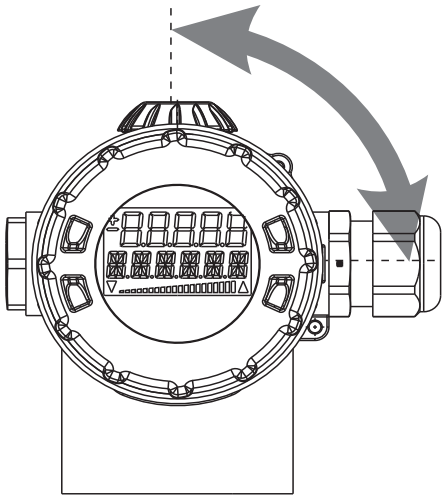


5 Mounting

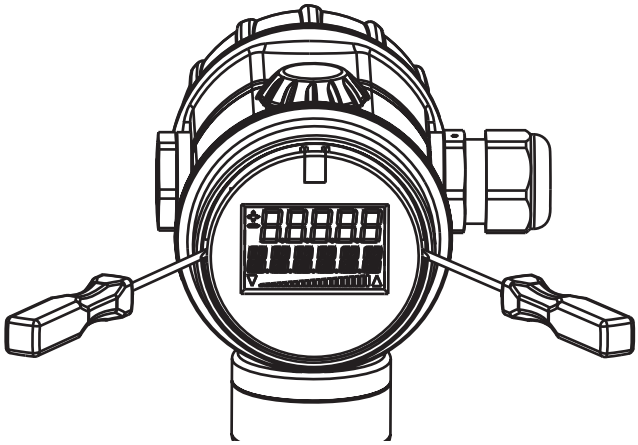
5.3 Rotating the LCD (display)

Installation position

The nominal position of the JUMO dTRANS p20 DELTA differential pressure transmitter is standing and vertical.



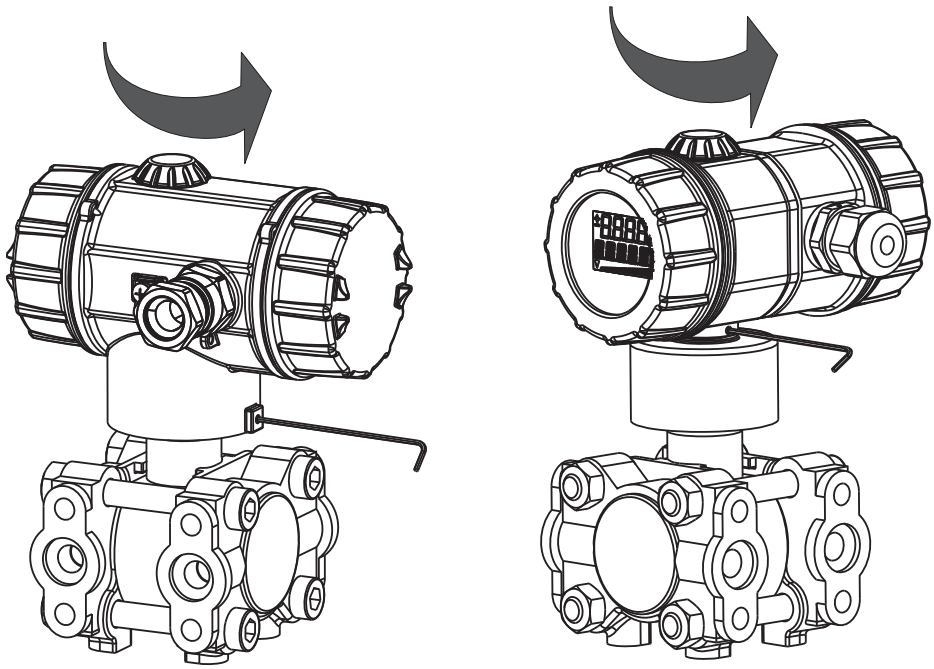
Depending on the specific features of the measuring point, the differential pressure transmitter can be installed in any other location. The LCD display can be rotated in 90° increments to reach the preferred installation position.



- ✱ Unscrew the front ring, See section 5.2 "Unscrew the front ring or enclosure cover", page 18.
- ✱ Pry out the electronics module with a narrow (small) screwdriver.
- ✱ Rotate the electronics module to the preferred position (in 90° increments) and reinsert it.
- ✱ Screw on the front ring finger-tight.

5.4 Rotating the enclosure

The enclosure can be rotated ± 160°



* Loosen the threaded pin with an allen wrench 1.5 mm (about 1/2 revolution is sufficient).
* Rotate the enclosure to the preferred position.
* Retighten the threaded pin **securely**.

5.5 Pressure connection

Seals

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

Check for leaks

If the pressure connection is made, it must be checked for leaks.

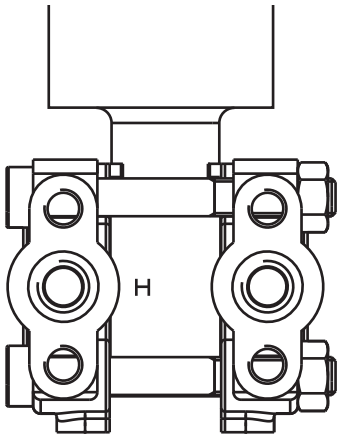
Danger

Improper operation of shut-off fittings can result in bodily injury and significant material damage!

Follow the specified order for opening and closing valves!

For **use in toxic media** the device must not be vented!

Differential pressure



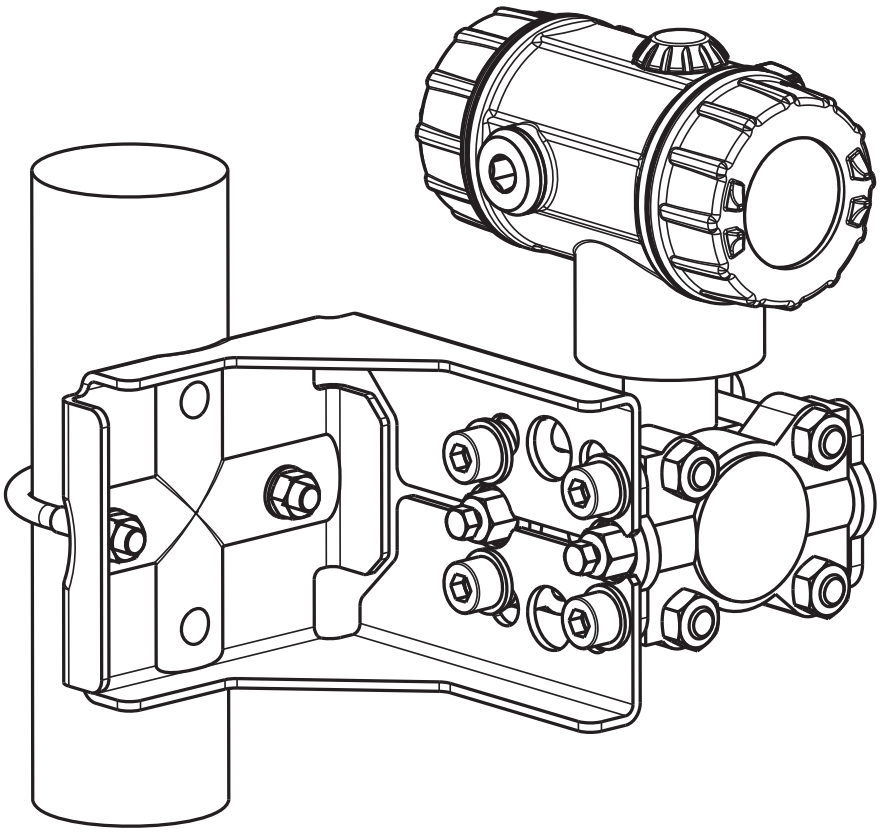
Note

The connection for the higher pressure is marked with the letter "H".

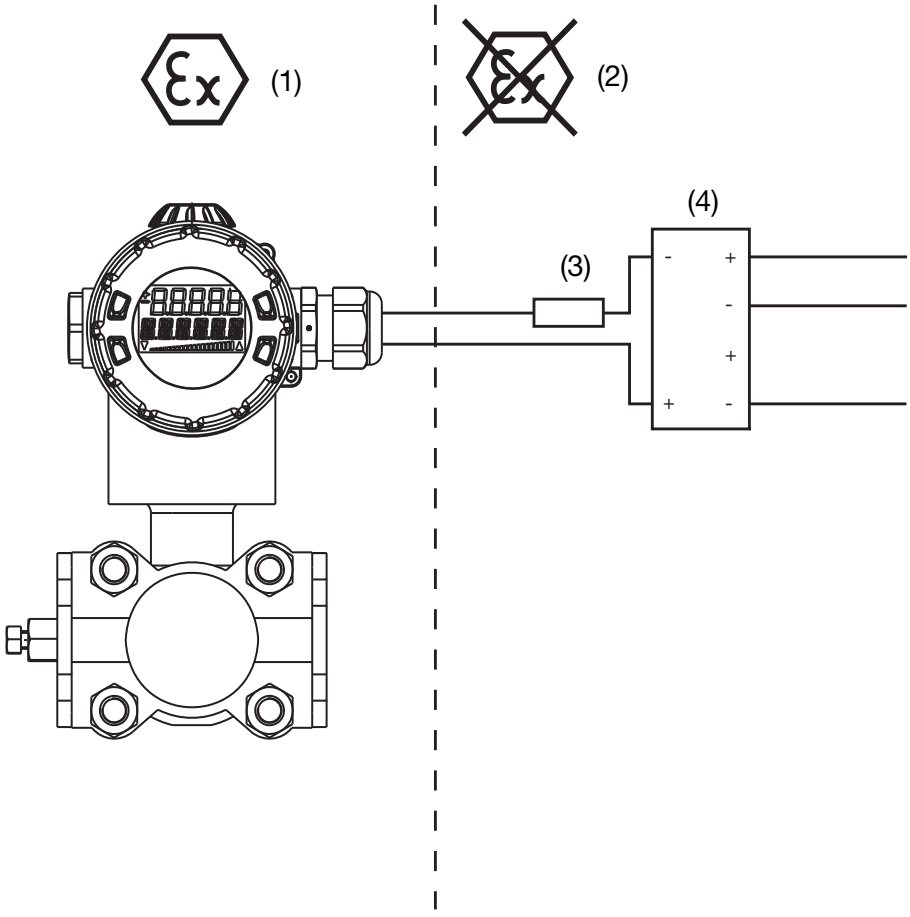
5.6 Bracket for wall und pipe mounting

(Sales no.: 40/00543777)

Mounting example



5.7 Assembly in the explosion area



(1) Hazardous (Ex) area Zone 0 / 20

(2) Non-hazardous area

(3) Burden (optional for HART ® interface)

(4) Power supply device with isolating converter for connecting explosion-protected transmitters

6 Installation

6.1 Installation instructions

Danger

The electrical connection must only be performed by qualified personnel!

Ground the instrument!

- ❏ If contact with live parts is possible when working on the device, it must be completely disconnected from the electrical supply.
- ❏ Electromagnetic compatibility meets the requirements of EN 61326,
- ❏ For connection to instruments with Ex approval see section "Electrical connection in Ex areas", page 30!
- ❏ Apart from faulty installation, incorrect settings on the instrument 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 instrument 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

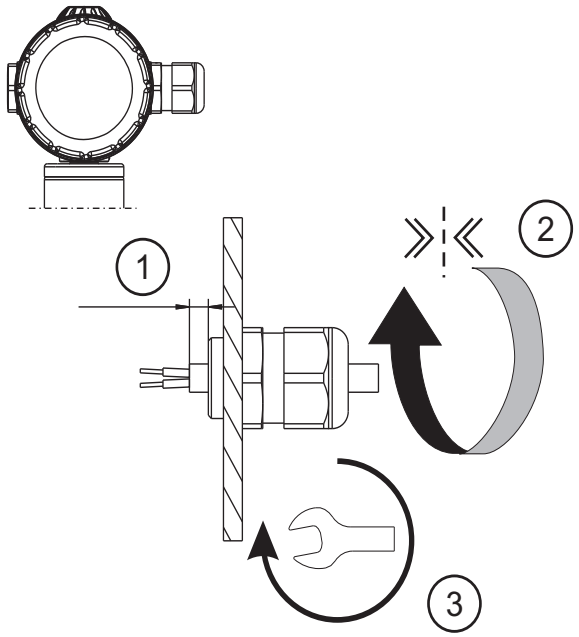
6.2 Instrument with cable gland

General information

Danger

For connection to instruments in Ex areas see section "Electrical connection in Ex areas", page 30!

- Permissible cable diameter for instruments with cable gland made of:
  Plastic 6 to 12 mm
  Metal 9 to 13 mm
- Max. wire cross-section 1.5 mm^2
- Lay signal lines separate from cables with voltages of > 60 V
- Use a shielded cable with twisted wires
- Avoid the vicinity of large electrical systems
- The full specification as per HART® Version 5.1, will only be achieved with a shielded cable.



(1) The connecting cable must extend at least 5 mm into the enclosure

(2) Tighten the screw fitting by hand until you encounter resistance

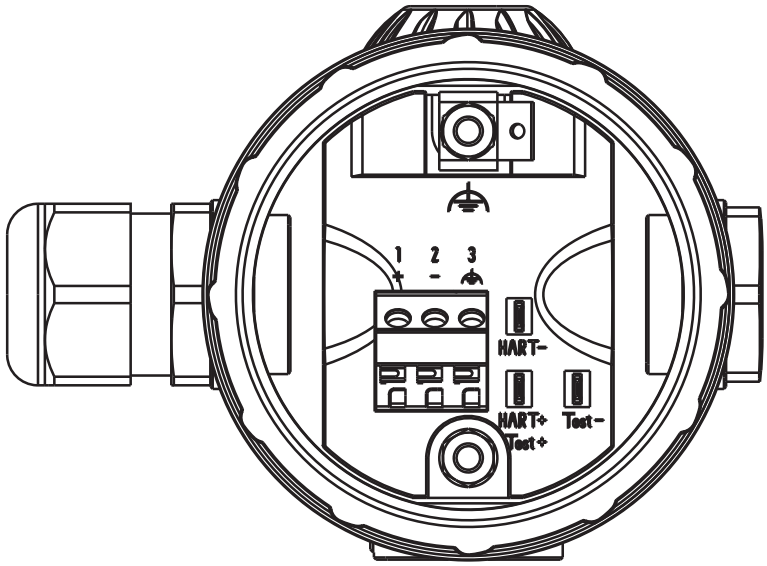
(3) Tighten the screw connection with a wrench:
plastic 4.5 Nm appr.
metal 8 Nm appr.

6 Installation

Connection

✱ Unscrew the housing cover from behind
see section 5.2 "Unscrew the front ring or enclosure cover", page 18.

✱ To connect the connecting cables, see the following illustration.

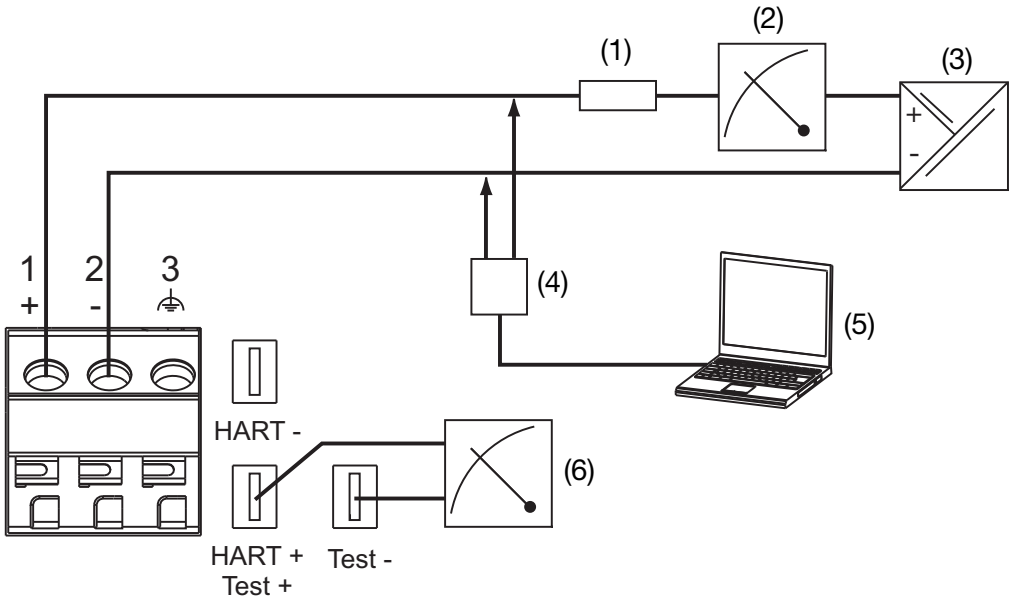


Pin configuration

Connection	Pin configuration
Power supply for **non** Ex version 11.5 to 36 V DC for Ex version 11.5 to 28 V DC	1 L+ 2 L-
Output 4 to 20 mA two wires Impressed current 4 to 20 mA in power supply	1 L+ 2 L-
Current output test connection Inherent resistance of ammeter ≤ 10 Ω	TEST + TEST -
HART® test connection The burden must be present!	HART + HART -
Functional ground[1]	3

[1] The device can be grounded at terminal 3 of the connector block, or by using the internal ground clamp.

Operation and test



(1) Total burden: Burden ≤ (UB - 11.5 V) / 0.022 A;
for HART® in addition: min. 250 Ω, max. 1100 Ω

(2) Display or recording instrument, controller, PLC, etc.

(3) Power supply:
for **non** Ex version 11.5 to 36 V DC
for Ex version 11.5 to 28 V DC

(4) HART® modem

(5) PC or Notebook

(6) Inherent resistance of ammeter ≤ 10 Ω

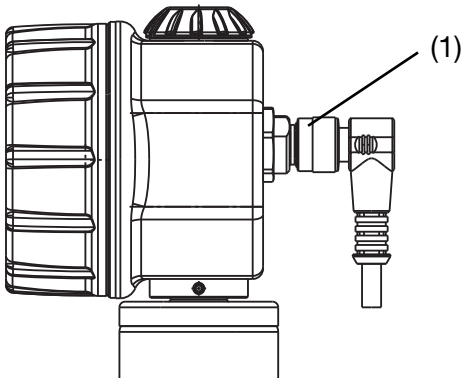
6 Installation

6.3 Instrument with M12 connector

Danger

For connection of the device in an Ex area see section "Electrical connection in Ex areas", page 30!

Connect the device to ground using pin 4 of the device connector see section "Pin configuration", page 29!



A suitable connection is provided by a

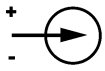
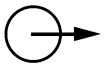
- 4-pin cable socket (straight) M12 x 1 with 2-m PVC cable
  Sales No.: 40/00404585 or a
- 4-pin angle box M12 x 1 with 2-m PVC cable
  Sales No.: 40/00409334.
- 5-pin cable connector M 12x1, straight, without cable
  Sales No.: 00419130
- 5-pin cable connector M 12x1, angled, without cable
  Sales No.: 00419133

For pin configuration see below.

General information

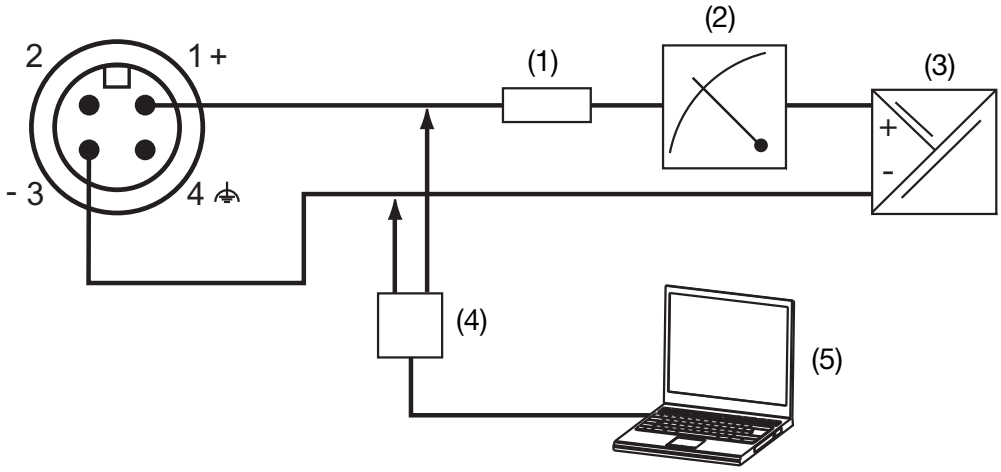
- Lay signal lines separate from cables with voltages of > 60 V
- Use a shielded cable with twisted wires
- Avoid the vicinity of large electrical systems
- The full specification as per HART® Version 5.1, will only be achieved with a shielded cable.

Pin configuration

Connection			Pin configuration	Color assignment[1]
				
Power supply for **non** Ex version for Ex version	11.5 to 36 V DC 11.5 to 28 V DC	+ - 	1 L+ 3 L-	Brown Blue
Output 4 to 20 mA two wires Impressed current 4 to 20 mA in power supply		+ - 	1 + 3 -	Brown Blue
Functional ground			4	Black
NC			2	White

[1] The following color assignment applies only to A-coded standard cables!

Operation



(1) Total burden ≤ (UB - 11.5 V) / 0.022 A;
for HART® in addition min. 250 Ω, max. 1100 Ω

(2) Display or recording instrument, controller, PLC, etc.

(3) Power supply
for **non** Ex version 11.5 to 36 V DC
for Ex version 11.5 to 28 V DC

(4) HART® modem

(5) PC or Notebook

6 Installation

6.4 Electrical connection in Ex areas

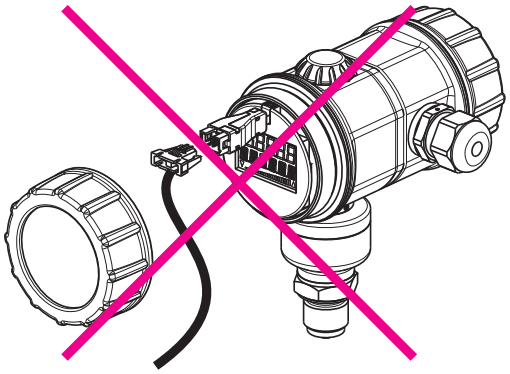
General information

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)
- Determination for project planning, selecting and setting up electrical systems in areas with an explosion hazard (IEC 60079-14:2007)
- EC type examination certificate
- Only certified measuring instruments may be used in intrinsically safe circuits!
- The intrinsically safe circuit must be limited to overvoltage category II as defined in IEC 60664-1 and the power of the circuit follows only out of a certified and intrinsically safe power source with a safety protection "ia".

Danger

Only the HART®
modem may be used in explosion-protected areas!
The JUMO interface must **not** be used!



The power supply must be intrinsically safe and must not exceed the following maximum values:

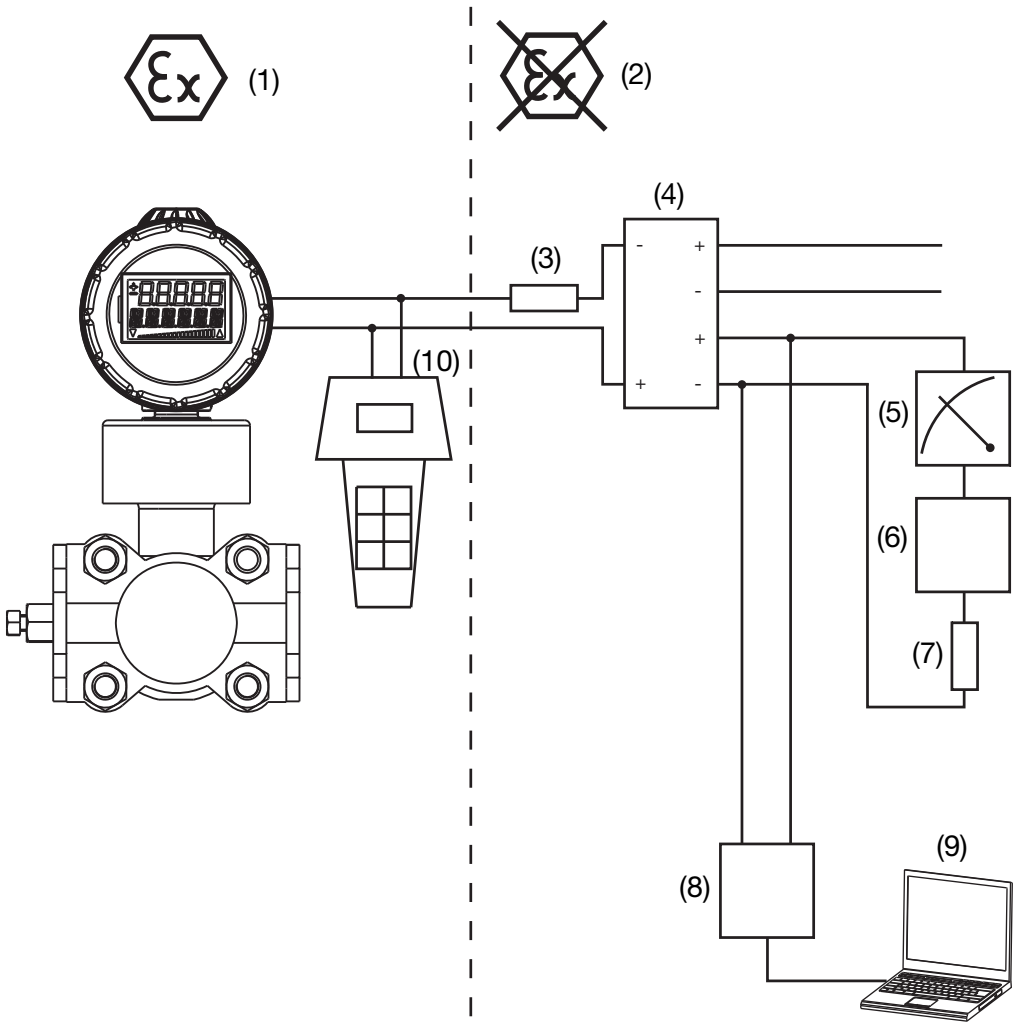
U_i: DC 28 V **I_i: 93 mA** **P_i: 750 mW**

Note

Connecting the HART® communicator or HART® modem is optional.

To ensure error-free communication, a minimum burden must be present on the signal circuit; see preceding pages.
When supply isolators are used, the burden is usually already integrated.

6.4.1 Connection diagram "EX"



(1) Hazardous (Ex) area Zone 0 / 20

(2) Non-hazardous area

(3) Burden for HART® ≤ (UB - 11.5 V) / 0.022 A in addition min. 250 Ω, max. 1100 Ω.
The current limiting resistor integrated into the power supply device must be included in the calculations in this case.

(4) Power supply device with isolating converter for connecting explosion-protected transmitters

(5) Display or recording instrument, controller, PLC, etc.

(6) Additional instruments

(7) Burden for HART® min. 250 Ω, max. 1100 Ω.
The current limiting resistor integrated into the power supply device must be included in the calculations in this case.

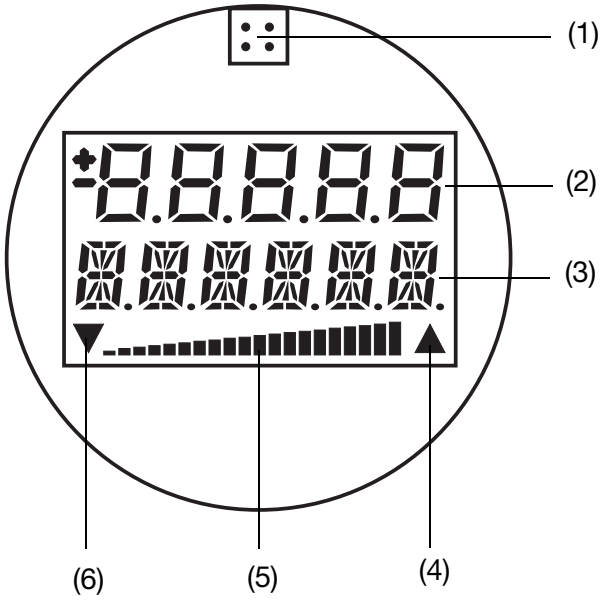
(8) HART® modem

(9) PC or Notebook

(10) HART® communicator intrinsically safe

7 Operation

7.1 Display



(1) Socket for JUMO setup interface (behind a cap)

(2) Measured value

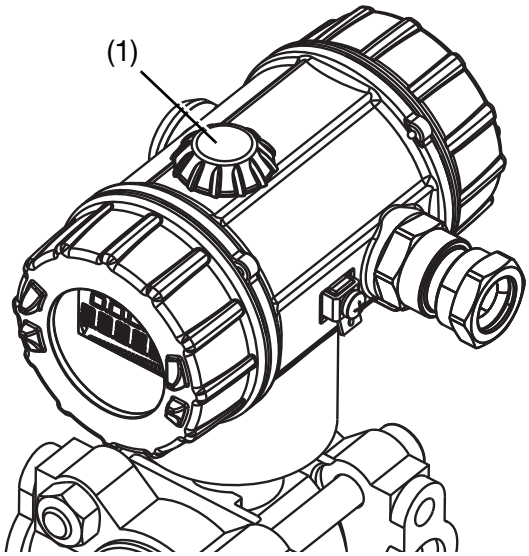
(3) Unit of measure

(4) Overrange

(5) Output current (4 to 20 mA)

(6) Underrange

7.2 Operation with rotary knob or with setup program



The instrument can be

- operated with the rotary knob (1)
- or with the optional setup program.

Note

In addition to operation by rotary knob, all actual values and parameters can be displayed or set very easily with the setup program. In addition, the setup program offers a series of useful additional functions such as:

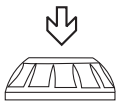
- Recording of measured value
- Graphical presentation of temperature and pressure
- Extensive diagnostic messages
- Display of complete order code and instrument configuration (can be printed out, for example for project documents or reordering).

The setup program can optionally access the instrument through the following interfaces:

- JUMO setup interface.
  The PC interface cable with USB/TTL converter (USB connecting cable) is required to connect the PC with the instrument:
  Sales No.: 70/00456352.
- HART® interface.
  A HART® modem is required to connect the PC with the instrument: Sales No.: 40/00443447.

7 Operation

Rotate and press

	Rotate Select parameters or adjust values.
	Press Confirm parameters or values.

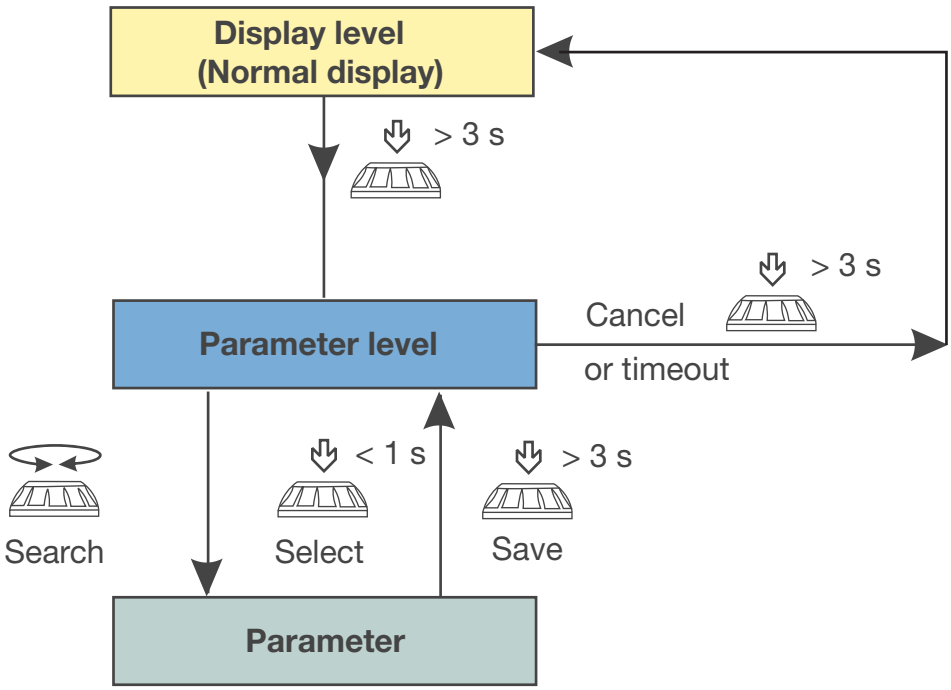
7.3 The level concept

Two levels

Operation is on two levels:

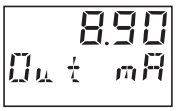
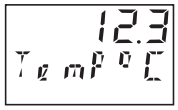
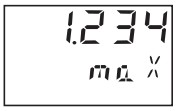
Note

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



7.3.1 The display level

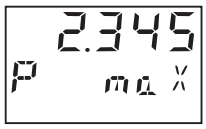
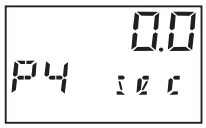
The measured pressure and other parameters are shown on the display level. The output current is shown as a percentage in a bar diagram on the third line. It is not possible to change parameters on the display level!

Action	Display (example)	Explanation
		Display of pressure with unit of measure.
		Display of measured value as a % or Measured value scaled with a freely selectable unit of measure.
		Display of output current in mA.
		Display of sensor temperature in °C or °F.
		Display of the saved minimum pressure in the selected unit of measure.
		Display of the saved maximum pressure.
		Display of the pressure value and sensor temperature in the selected unit of measure.

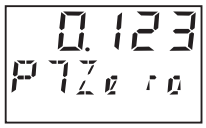
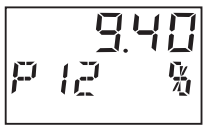
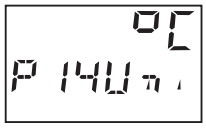
7 Operation

7.3.2 The parameter level

Instrument parameters can be displayed and changed on the parameter level.

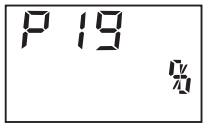
Action	Display (example)	Explanation	Selection[1]
		**P min** Saved minimum pressure	Reset by  > 3 seconds
		**P max** Saved maximum pressure	Reset by  > 3 seconds
		**P0 Den** "Density" density correction	0.01 to **1.00** to 99.99
		**P1 Uni** "Unit" unit of measure for pressure	inH2O inHG ftH2O mmH2O mmHG PSI **bar** mbar kg/cm2 kPa TORR MPa mH2O
		**P2 mA** Current at beginning of measurement	**4.00** to 20.00 mA
		**P3 mA** Current at end of measurement	4.00 to **20.00** mA
		**P4 sec** Damping	**0.0** to 100.0 s
		**P5 RS** "Range start" beginning of measurement	Nominal measuring range

[1] Factory setting is shown in **bold**.

Action	Display (example)	Explanation	Selection[1]
		**P6 RE** "Range end" end of measurement	Nominal measuring range
		**P7 Zero** Zero-point adjustment	Current pressure
		**P8 mA** Current sensor	3.60 to **4.00** to 21.60 mA
		**P9 Err** Current in case of error	ErLo = 3.6 mA **ErHi = 21.6 mA** LASt = Last value
		**P10 Key** Keyboard lock	**O = No lock** LA = All, interface free LO = All, without beginning of measurement LS = All, without beginning or end LALL = All, incl. interface
		**P11 Chr** "Characteristic" curve	**Lin = Linear** SLin = Linear until start of root extraction SoFF = Off until start of root extraction
		**P12 %** Point at which root extraction begins	5.0 to **9.4** to 15.0% of nominal measuring range
		**P13 SWV** Software version	Editing not possible
		**P14 Uni** Unit of measure for temperature	°**C** / °F

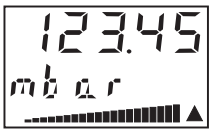
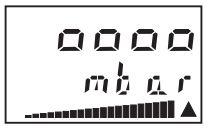
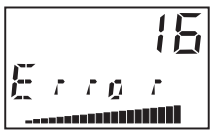
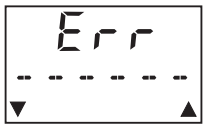
[1] Factory setting is shown in **bold**.

7 Operation

Action	Display (example)	Explanation	Selection[1]
		**P15 OFF** Offset of pressure value (zero point offset)	Nominal measuring range
		**P16 SCS** Scaling start	-9999 to **0** to 9999
		**P17 SCE** Scaling end	-9999 to **100** to 9999
		**P18 SCD** Scaling decimal point	**Auto = Automatic** 0 = No places after decimal point 1 = 1 place after decimal point 2 = 2 places after decimal point 3 = 3 places after decimal point
		**P19 %** Unit for scaling	**% (factory setting)** kg/sec kg/min kg/h t/min t/h l/sec l/min l/h m3/sec m3/min m3/h L m3 UsrTXT
		**P20 h** Operating hours	Editing not possible

[1] Factory setting is shown in **bold**.

8.1 Eliminating errors and faults

Error/fault	Possible cause	Remedy
Display: None	No power supply	Turn on the power supply
	Instrument faulty	Send the instrument to the supplier for repairs
Display: 	Overrange, overpressure	Bring the pressure back into the measuring range or adjust the measuring range
Display: 	Underrange, unterpressure	
Display: 	Pressure can no longer be displayed, overpressure	Adjust scaling or unit of measure
Display: 	Pressure can no longer be displayed, underpressure	
Display: 	An error was discovered in the electronics during the self test	Send the instrument to the supplier for repairs
Display: 	Temperature sensor faulty	Send the instrument to the supplier for repairs
The rotary knob is not respon-ding 	Keyboard lock	Override keyboard lock
	Instrument faulty	Send the instrument to the supplier for repairs

9 Appendix

9.1 EC-Type Examination Certificate

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(1) **EC-Type Examination Certificate**

(2) Equipment or protective system intended for use in potentially explosive atmospheres **- Directive 94/9/EC**

(3)	Examination certificate number:	**SEV 09 ATEX 0138 X**
(4)	Equipment:	Process pressure transmitter JUMO dTRANS p20 type 403025 or JUMO dTRANS p20 Delta type 403022
(5)	Manufacturer:	JUMO GmbH & Co. KG
(6)	Address:	Moritz-Juchheim-Strasse 1, DE-36039 Fulda

(7) The equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) Electrosuisse SEV, notified body No. 1258 in accordance with article 9 of the Council Directive of the European Communities of 23 March 1994 (94/9/EC), certifies that this equipment has been found to comply with the essential health and safety requirements relating to the design and construction of equipment or protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The results of the examination are recorded in confidential report no 09-IK-0103.01 including extension 1.

(9) Compliance with the essential health and safety requirements has been assured by compliance with:

EN 1127-1:07 **EN 60079-0:09** **EN 60079-11:07**
EN 60079-26:07 **EN 61241-11:06**

(10) If the sign «X» is placed after the certificate number, it indicates that the equipment or protective system is subjected to special conditions for safe use specified in the schedule to this certificate.

(11) This examination certificate relates only to design and construction of the specified equipment in accordance with the directive 94/9/EC. Further requirements of this directive apply to the manufacturing process and the placing on the market of the equipment.

(12) The marking of the equipment shall include the following:

see Appendix page 5: (19) Marking

Electrosuisse
Notified Body ATEX

Martin Plüss
Product Certification

Fehraltorf, 2011-08-05

SEV 09 ATEX 0138 X / page 1 of 5

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(13) **Appendix**

(14) **EC-Type Examination Certificate**

(15) Description of the equipment

The process pressure transmitter JUMO dTRANS p20 type 403025 or JUMO dTRANS p20 DELTA type 403022 serves for converting a physical measured quantity (pressure) into a standard electrical signal (4...20 mA). The device is intended for use within potentially explosive atmospheres. The stainless steel enclosure of the pressure transmitter has the type of protection IP 66 according to IEC 60529. The pressure transmitter can be housed in three different types of enclosure.
The process pressure transmitter JUMO dTRANS p20 type 403025 or JUMO dTRANS p20 DELTA type 403022 is attached to tanks or pipes by means of a process connection. The pressure measuring cell serves for zone separation and is made of stainless steel, Hastelloy®, Monel or titanium. This zone separation takes place by means of the diaphragm and subsequent flashback safe gap or the flashback safe gaps can also be integrated directly in the process connection upstream of the pressure measuring cell/pressure sensor.

Ratings

Input and supply circuits — with type of protection intrinsic safety Ex ia IIC

only for connection to certified intrinsically safe circuits.
Maximum values:

Ui ≤	28	V	
Ii ≤	93	mA	
Pi ≤	750	mW	
Ci =	6	nF	(effective internal capacitance)
Li =	105	µH	(effective internal inductance)

or

Input and supply circuits — with type of protection intrinsic safety Ex ia IIIC

only for connection to certified intrinsically safe circuits.
Maximum values:

Ui ≤	28	V	
Ii ≤	93	mA	
Pi ≤	750	mW	
Ci =	6	nF	(effective internal capacitance)
Li =	105	µH	(effective internal inductance)

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(16) Test Report 09-IK-0103.01 including extension 1

(17) Special conditions for safe use

1. The intrinsically safe circuit must be limited to overvoltage category I as defined in IEC 60664-1 and the circuits must be supplied exclusively from a certified intrinsically safe power source with the protection level "ia".
2. Assignment between the maximum permissible ambient temperature in the electronics enclosure, measuring temperature and temperature class for the JUMO dTRANS p20 type 403025 process pressure transmitter is shown in the following table:

Temperature class	T6	T5	T4	T3
Maximum permissible ambient temperature in top part of enclosure with electronics (°C)	-50 … +50	-50 … +65	-50 … +85	-50 … +85
Maximum permissible measuring temperature (°C)	+60	+70	+115	+175

3. Assignment between the maximum permissible ambient temperature in the electronics enclosure, measuring temperature and temperature class for the JUMO dTRANS p20 DELTA type 403022 process pressure transmitter is shown in the following table:

Temperature class	T4
Maximum permissible ambient temperature in top part of enclosure with electronics (°C)	-50 … +60
Maximum permissible measuring temperature (°C)	+100

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4. Assignment between the maximum permissible ambient temperature in the electronics enclosure, measuring temperature and maximum surface temperature for the JUMO dTRANS p20 type 403025 process pressure transmitter is shown in the following table:

Surface temperature (°C)	T105
Maximum permissible ambient temperature in top part of enclosure with electronics (°C)	-50 … +60
Maximum permissible measuring temperature (°C)	+100

5. Assignment between the maximum permissible ambient temperature in the electronics enclosure, measuring temperature and maximum surface temperature for the JUMO dTRANS p20 DELTA type 403022 process pressure transmitter is shown in the following table:

Surface temperature (°C)	T105
Maximum permissible ambient temperature in top part of enclosure with electronics (°C)	-50 … +60
Maximum permissible measuring temperature (°C)	+100

6. 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.

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9 Appendix

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(18) Fundamental essential health and safety requirements
Fulfilled by the standards applied

(19) The marking of the equipment shall include the following:

For JUMO dTRANS p20 type 403025: II 1/2G Ex ia IIC T6 … T3 Ga/Gb
II 1/2D Ex ia IIIC T105°C Da/Db

or

For JUMO dTRANS p20 DELTA type 403022: II 1G Ex ia IIC T4 Ga
II 1D Ex ia IIIC T105°C Da

Electrosuisse
Notified Body ATEX

Martin Plüss
Product Certification

Fehraltorf, 2011-08-05

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ZAM3e

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9.2 EC Declaration of Conformity

JUMO GmbH & Co. KG
Moritz-Juchheim-Straße 1
36039 Fulda, Germany

Telefon: +49 661 6003 - 0
E-Mail: mail@jumo.net
Internet: www.jumo.net

EG Konformitätserklärung

EC Declaration of Conformity / Déclaration CE de conformité

Dokument-Nr. *Document No. / Document n°*	CE 442
Hersteller *Manufacturer / Etabli par*	JUMO GmbH & Co. KG
Anschrift *Address / Adresse*	Moritz-Juchheim-Straße 1, 36039 Fulda
Produkt *Product / Produit*	Beschreibung: Druckmessumformer Typ/ Serie: dTRANS p20 Typenblatt-Nr.: 40.3025

Wir erklären in alleiniger Verantwortung, dass das bezeichnete Produkt die Schutzanforderungen der Europäischen Richtlinien erfüllt.
We hereby declare in sole responsibility that the designated product fulfills the safety requirements of the European directives.
Nous déclarons sous notre seule responsabilité que le produit remplit les directives européennes.

Richtlinie *Directive / Directive*		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 CE sur le produit*
2004/108/EG	[EMV-Richtlinie]	10
94/9/EG	[Explosionsschutz-Richtlinie-ATEX]	11

EG-Baumusterprüfbescheinigung
Type examination / Tests échantillon

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Angewendete Normen
Standards applied / Normes appliquées

DIN EN 61326-2-3	Ausgabe: 05.2007	EN 61241-11	Ausgabe: 2006
EN 1127-1	Ausgabe: 2007		
EN 60079-0	Ausgabe: 2009		
EN 60 079-11	Ausgabe: 2007		
EN 60 079-26	Ausgabe: 2007		

Anerkannte Qualitätssicherungssysteme der Produktion
Recognized quality assurance systems used in production / Organisme notifié agréé

nach Richtlinie 94/9/EG Modul D */ Directive 94/9/EC Module D / Directive européenne 94/9/CE module D*
TÜV NORD CERT GmbH, Am TÜV 1, D 30519 Hannover, Germany
Kennnummer 0044, Mitteilungsnummer TÜV 99 ATEX 1454 Q.
Identification No. 0044, Notification No. TÜV 99 ATEX 1454 Q / N° d'identification 0044, N° de signification TÜV 99 Atex 1454 Q

nach Richtlinie 97/23/EG Modul D */ Directive 97/23/EC Module D / Directive européenne 97/23/CE module D*
TÜV SÜD Industrie Service GmbH, Dudenstraße 28, 68167 Mannheim, Germany
Kennnummer 0036, Zertifikat-Nr. DGR-0036-QS-179-02
Identification No. 0036, Certificate No. DGR-0036-QS-179-02 / N° d'identification 0036 , N° de certificat DGR-0036-QS-179-02

Aussteller:
Issued by: / Etabli par:

Firma */ Company / Société*
JUMO GmbH & Co. KG, Fulda

Ort, Datum:
Place, date: / Lieu, date:

Fulda, 2011-02-17

Rechtsverbindliche Unterschrift
Legally binding signature
Signature juridiquement valable

Geschäftsbereichsleitung Verkauf und Produktion
Head of Division Sales and Production
Direction du département Ventes et Production
ppa. Wolfgang Vogl

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