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JUMO dTRANS p20 DELTA Ex d

Differential pressure transmitter with explosion-proof enclosure

Brief description

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

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

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

The pressure transmitter with 4 to 20 mA and HART® protocol was evaluated with regard to functional safety and is certified by TÜV Nord according to DIN EN 61508/1-2, edition 2.0. These measuring devices are suitable for monitoring process level and process pressure up to SIL2. Further details can be found in the Safety Manual.

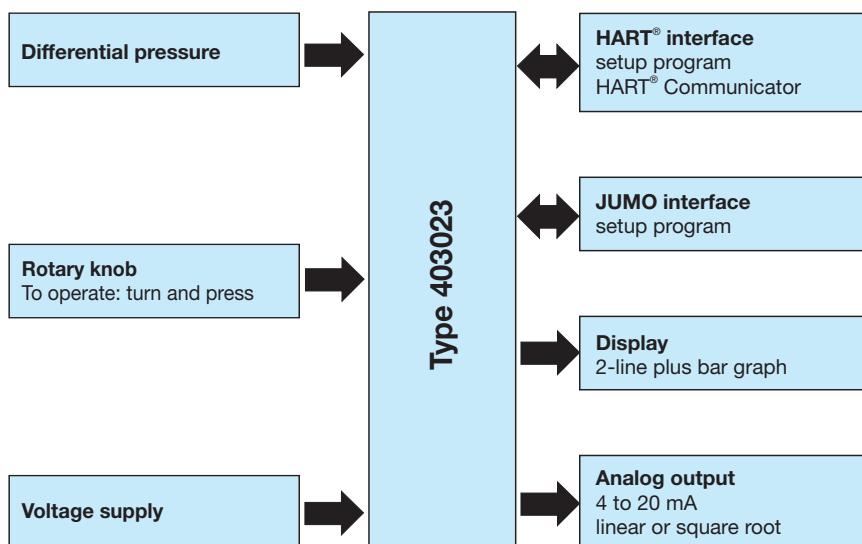
For the „Ex ia“ explosion protection version, see data sheet 403022.

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



Type 403023

Block diagram



Special features

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

Approvals/approval marks (see "Technical data")



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Technical data

General Information

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

^a optional; SIL version only available with display

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

Input

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

^a Without SIL

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Output

Analog output For output 410 (4 to 20 mA with HART®) Jump response time T60 Attenuation	4 to 20 mA, two-wire with HART® version 7 (optionally with HART® version 5, extra code 932, always with SIL version) ≤ 190 ms without attenuation Adjustable 0 to 100 s
Burden For output 410 (4 to 20 mA with HART®)	Burden ≤ $(U_B - 12 \text{ V}) \div 0.022 \text{ A}$; additional: min. 250 Ω, max. 1100 Ω

Voltage supply

Voltage supply	DC 12 to 36 V
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Mechanical features

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

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Environmental influences

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

- ^a Under -20 °C limited function: stationary use, increased danger of cable break, display without function; under -30 °C operation of the device not possible.
- ^b In the range from -40 to -50 °C the device must be permanently in operation. Furthermore, the lid with the device inspection glass must additionally be protected against mechanical impact and shock effects. Please contact JUMO for further details.
- ^c Without SIL
- ^d The product is suitable for industrial use as well as for households and small businesses.

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Accuracy

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

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

^a Without SIL

^b MSP = measuring span

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

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

Approvals/approval marks

Approval mark	Test facility	Certificates/certification numbers	Inspection basis	Valid for
ATEX	Electrosuisse	SEV 10 ATEX 0127 X	EN 60079-0 EN 60079-1 EN 60079-26 EN 60079-31	403023/...
EAC	RU	RU C-DE.ME92.B.00440	-	Extra code 226
SIL	TÜV Nord (German Technical Inspection Agency)	No. SEBS-A. 140944/16 V1.0	DIN EN 61508/-1/-2	Basic type extension 2 and 3

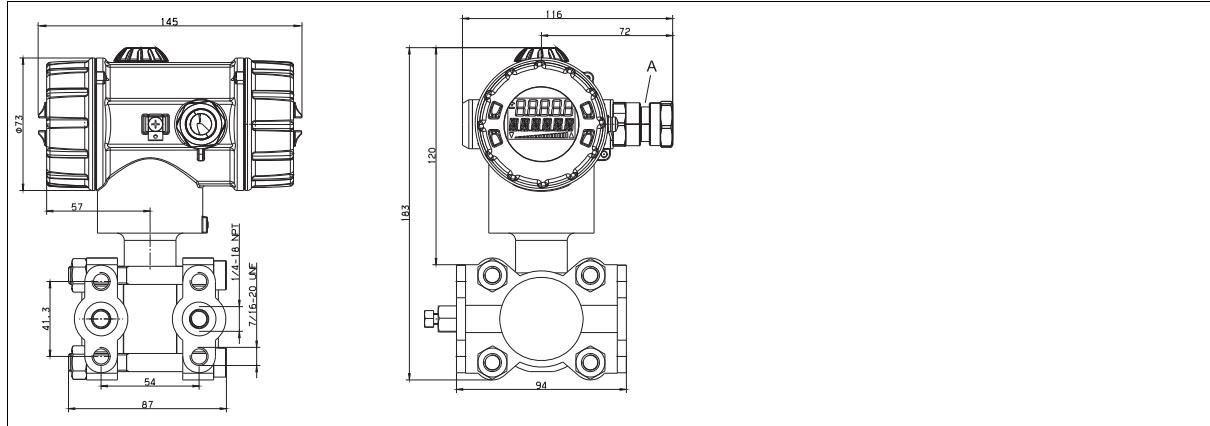
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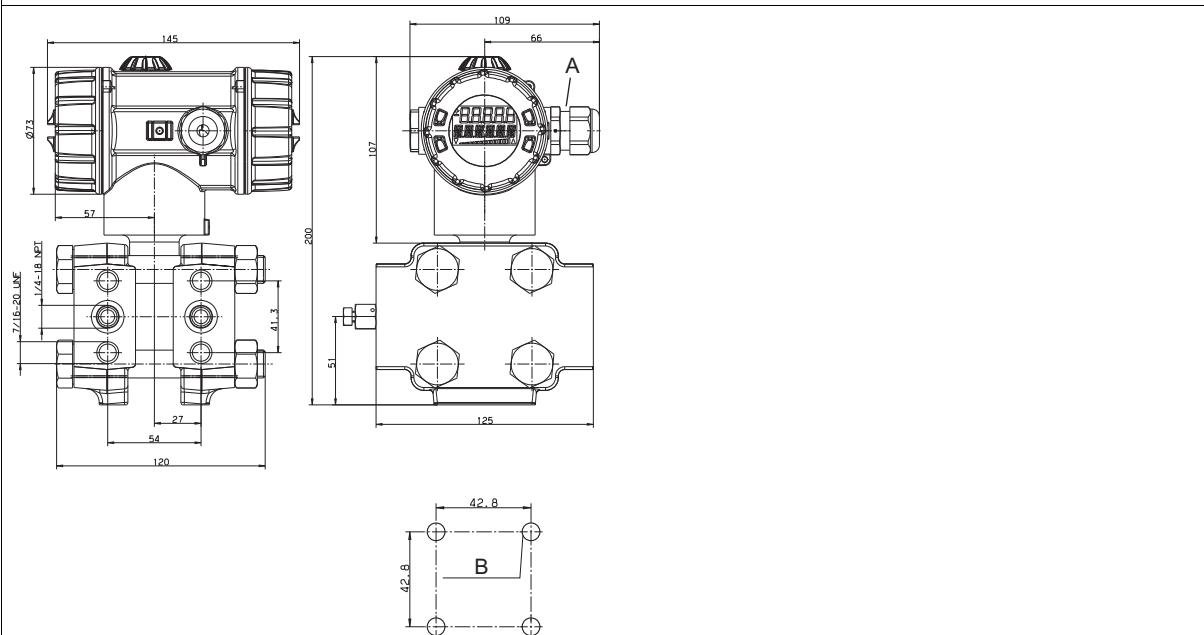


Dimensions



A M20 x 1.5 cable fitting

For extra code 694 (increased nominal pressure PN420)



A M20 x 1.5 cable fitting

W M8 for installation

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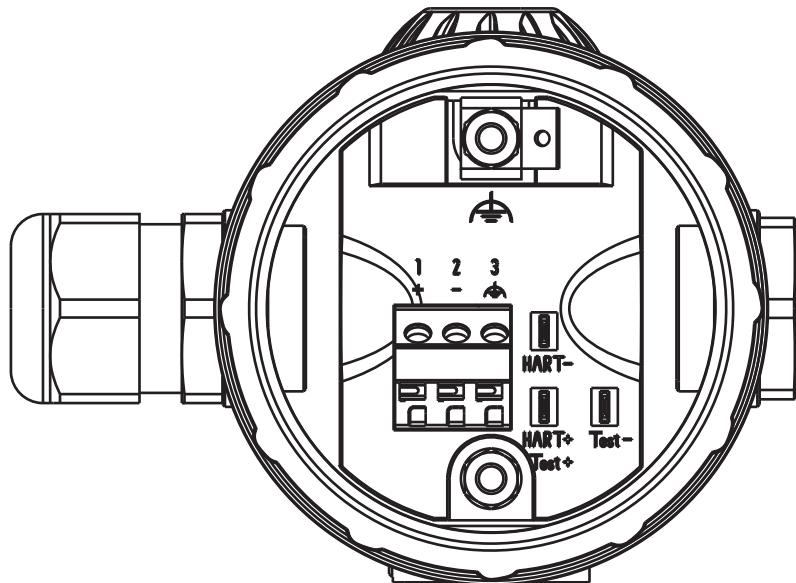


Connection diagram

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

Connection	Terminal assignment
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	1 L+ 2 L-
In voltage supply	
Test connection for current output Internal resistance of the ammeter $\leq 10 \Omega$	TEST + TEST -
Test connection for HART® The burden must be present!	HART + HART -
FE (functional grounding conductor)	3
Grounding or potential equalization	Outside of the housing

Cable gland



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Order details

(1) Basic type	
403023 JUMO dTRANS p20 DELTA Ex d – differential pressure transmitter with flameproof enclosure	
(2) Basic type extension	
0 None	
2 SIL ^a	
3 SIL, customer-specific ^a	
9 Special version	
(3) Display	
0 None	
1 With display	
(4) Operation	
0 None	
1 With control knob	
(5) Input – nominal measuring range	
532 0 to 1 bar DP	
530 -10 to +10 mbar DP ^{b, c, d}	
531 -1 to +1 bar DP ^c	
533 -1 to +6 bar DP	
534 -1 to +100 bar DP	
(6) Output	
410 4 to 20 mA, two-wire with HART® protocol	
(7) Process connection	
511 1/4-18 NPT according to DIN EN 837	
998 Suitable for connection to membrane diaphragm seal	
(8) Process connection material	
20 CrNi (stainless steel)	
80 Tantalum	
82 NiMo	
(9) Measuring system, filling medium	
01 Silicon oil	
02 Halogenized oil for oxygen application	
(10) Extra codes	
000 None	
100 Default customer-specific setting ^e	
226 With GOST/EAC approval ^f	
624 Oil and grease free	
633 Mounting brackets for 2" tube	
634 With TAG number	
635 With NACE manufacturer's declaration ^g	
681 Expanded admissible ambient temperature ^d	
694 Increased nominal pressure PN 420 bar	
932 With HART® version 5, always with SIL version (basic type extension 2 and 3)	

^a SIL version always with LCD display (display 1), connection 4 to 20 mA (output 410) and HART® version 5 (extra code 932)

^b This input is only available with a process connection made out of stainless steel (process connection 20).

^c The inputs are not available with an increased nominal pressure (extra code 694).

^d Without SIL

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

^f Upon request

^g Only with NiMo (process connection material 82); not for pressure ranges -10 to +10 mbar and -1 to +1 bar

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Order code										
Order example	403023	/ 0	- 1	- 1	- 532	- 410	- 511	- 20	- 01	/ 000

Accessories

Article	Part no.
PC interface with USB/TTL converter ^a	00456352
HART® modem USB ^b	00443447
SET oval flange 1/2" NPT/accessories set 7/16-20UNF	00543775
Mounting kit, set includes 7/16-20UNF screws	00543777

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

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

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

Software

Description	Part no.
JUMO setup dTRANS p20 series	00537577

JUMO dTRANS p20 series, DD (device description)	Upon request
JUMO dTRANS p20 series, DTM (device type manager)	Upon request