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JUMO dTRANS p20 DELTA

Differential pressure transmitter

Type 403022/0-0-1-...

Type 403022/0-0-2-...

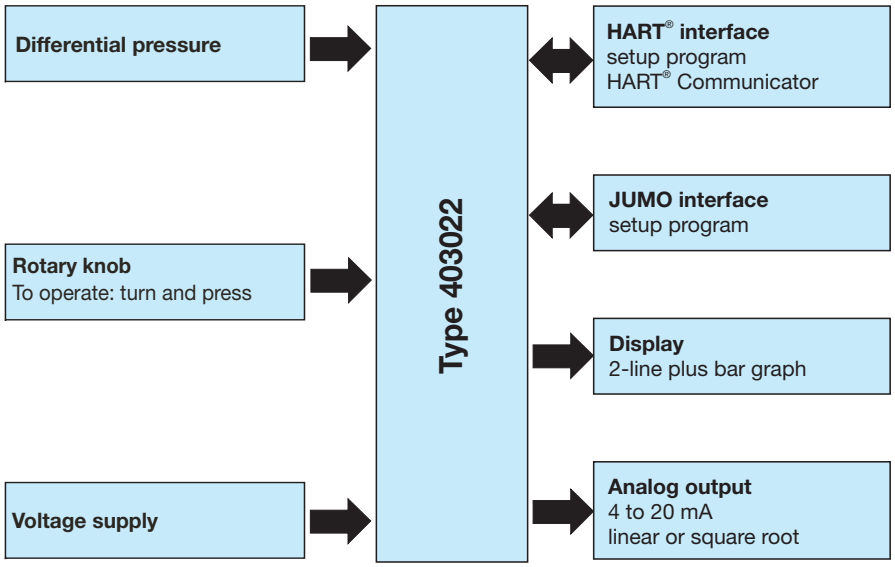
Type 403022/0-0-3-...

Brief description

The JUMO dTRANS p20 DELTA differential pressure transmitter with HART® interface combines maximum precision with simple operation. It is used to measure the differential pressure of gases, vapors and liquids. The integrated LCD shows measurements 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 housing 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.

For the "Ex d" explosion protection version, see data sheet 403023.
For the relative and absolute pressure version, see data sheet 403025 and 403026.

Block diagram



Key features

- Stainless steel housing
- HART® interface
- Ex ia explosion protection (gas and dust) according to ATEX, INMETRO and GOST-R
- 0.07 % linearity
- Rotary knob for ease of operation
- Setup program
- LCD display with bar graph
- Display scaling with a choice of measurement units
- Display of sensor temperature
- Display of minimum and maximum pressures
- Current sensor function
- Characteristic and display also adjustable for flow measurement

Approvals/marks of conformity (see Technical data)

INMETRO

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Technical data

General

Reference conditions	DIN 16086, DIN EN 60770 and DIN IEC 770/5.3
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
Permissible load change	> 10 million
Location	
Mounting position	Any
Calibration position	Device standing vertically, process connection on bottom
Position-dependent zero point offset	≤ 1 mbar Zero point calibration possible locally or via setup.
Display	LCD, two-line with bar graph
Alignment	Display unit can be rotated 90° at a time Housing can be rotated ±160°
Size	Display field 22 × 35 mm/font size 7 mm/5-digit
Color	Black
Measurement unit display options	
Input pressure	inH_2O, inHg, ftH_2O, mmH_2O, mmHg, psi, bar, mbar, kg/cm^2, kPa, Torr, MPa, mH_2O
Measurement value	% or scaled with a freely adjustable measurement unit
Output current	mA
Sensor temperature	°C; °F
Additional display data	Minimum pressure, maximum pressure, error, overrange, underrange, operating hours
Operation	
Local	With rotary knob and LCD
Setup program	Via interface
Interface	
Standard	JUMO interface[a], socket at front
For output 410 (4 to 20 mA with HART®)	JUMO interface[a] and HART® interface

[a] 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.

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		

Output

Analog output	
For output 405	4 to 20 mA, two wires
For output 410	4 to 20 mA, two 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; additional: min. 250 Ω, max. 1100 Ω

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Voltage supply

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

Mechanical properties

Process connection	
Materials	
Membrane	
For process connection 20 (Edelstahl)	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	PTFE
Housing	
Material	
For housing 1 (short, stainless steel)	Stainless steel 1.4404
For housing 2 (long, stainless steel)	Stainless steel 1.4404, VMQ
For housing 3 (precision casting)	Precision casting 1.4408
For cover material 20 (stainless steel)	Precision casting 1.4408, seal FPM
For cover material 85 (plastic)	PA, FPM seal
For electrical connection 36 (M12 × 1 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
Explosion protection	
For explosion protection 0 (none)	The instrument is **not** approved for use in hazardous (Ex) areas.
For explosion protection 1 (ATEX Ex ia)	EC type examination certificate SEV 09 ATEX 0138 X ⟨Ex⟩ II 1G Ex ia IIC T4 Ga II 1D Ex ia IIIC T105 °C Da
Weight	
Type 403022/0-0-1 (short housing)	Approx. 3.0 kg
Type 403022/0-0-2 (long housing)	Approx. 3.3 kg
Type 403022/0-0-3 (precision casting housing)	Approx. 4.0 kg
For extra code 694 (increased nominal pressure)	The instrument weight increases by approx. 3.8 kg.

Ambient conditions

Permissible temperatures					
Operation	Version	Category	Max. medium temperature	Ambient temperature[a]	Extended ambient temperature (extra code 681)[a, b]
	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				

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Permissible relative humidity	
Operation	100 % incl. condensation on instrument outer sleeve
Storage	90 % without condensation
Permissible mechanical loading	
Vibration performance	2 g, 10 to 500 Hz to DIN EN 60770-3
Shock resistance	15 g for 6 ms to IEC 60068-2-29
Electromagnetic compatibility	To EN 61326
Interference emission	Class B
Interference resistance	Industry
Protection	
Version	
Explosion protection 0 (none)	IP67 to DIN EN 60529
Explosion protection 1 (ATEX Ex ia)	IP66 to DIN EN 60529

[a] Restricted function below -20 °C: stationary use, increased danger of broken cable, display does not function; device cannot be operated when temperature is under -30 °C.

[b] In the range from -40 to -50 °C the device must be permanently in operation. Additionally, the lid with the device inspection glass must also be protected against mechanical impact and shock effects. Please contact JUMO for further details.

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 measuring range	0 to 10 mbar	0 to 1 bar		0 to 6 bar	0 to 100 bar
Minimum span	1 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 linear characteristic as % of the set span	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 ≤ 40.4
Accuracy at +20°C as % of the set span	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 % für 10 ≤ r ≤ 400	r × 0.01 % for 10 ≤ r ≤ 200	r × 0.02 % for 5 ≤ r ≤ 20	r × 0.02 % for 5 ≤ r ≤ 40.4
Accuracy at -20 to +85 °C as % of the set span	0.5 % for r ≤ 2 (up to +60 °C)	0.2 % for r ≤ 10		0.2 % for r ≤ 5	
	r × 0.25 % for 2 ≤ r ≤ 20 (up 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 ≤ 40.4
Accuracy at -40 to +20 °C as % of the set span	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 ≤ 40.4
Accuracy at +60 to +85 °C as % of the set span	2.0 % for r ≤ 2				
	r × 1.0 % for 2 ≤ r ≤ 20				
Effect of static pressure P (bar) as % of nominal measuring range	≤ 1%	≤ P × 0.0005 %	≤ P × 0.0003 %	≤ P × 0.0025 %	≤ P × 0.001 %
Long-term stability as % of nominal measuring range	≤ 0.6 %/year	≤ 0.1 %/year			≤ 0.2 %/year

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Approvals/marks of conformity

Mark of conformity	Testing laboratory	Certificate/certification number	Test basis	Valid for
ATEX	electrosuisse	SEV 09 ATEX 0138 X	EN 60079-0 EN 60079-11 EN 60079-26	403022/x-1-...
INMETRO	CEPEL	CEPEL 13.2213X	IEC 60079 IEC 60529	Extra code 227
GOST-R				

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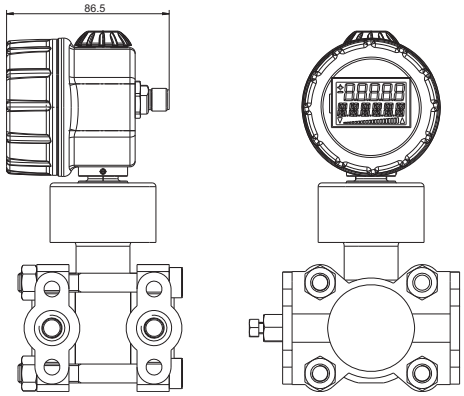
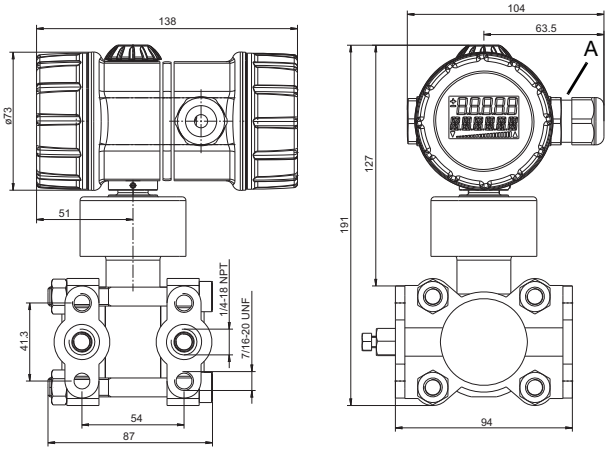
Dimensions

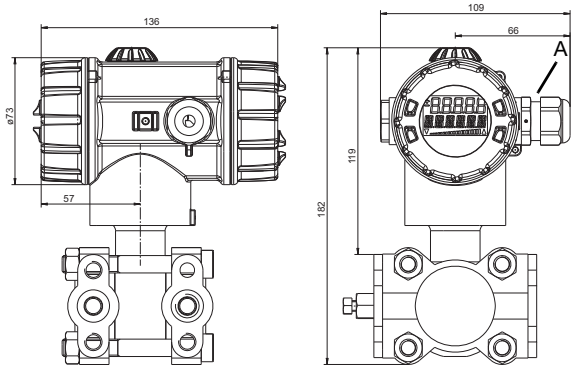
Type 403022/0-0-1 (short, stainless steel, with M12 connection)



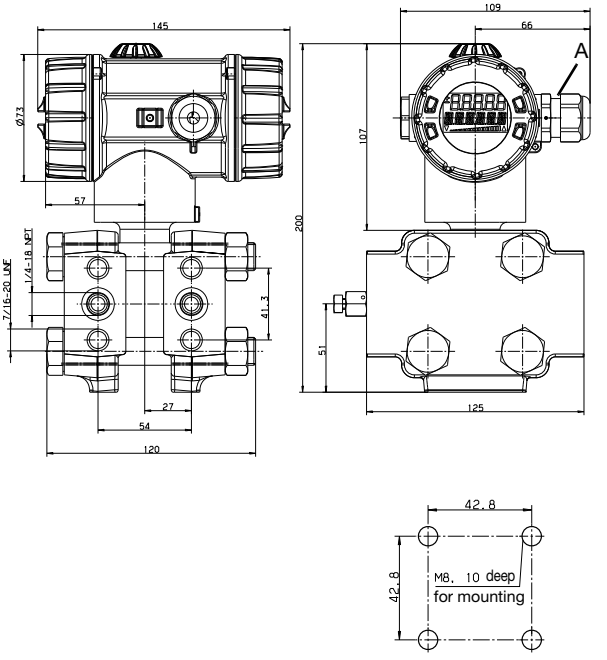
Type 403022/0-0-2 (long, stainless steel, with cable gland)



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



For extra code 694 (increased nominal pressure PN420)



A Cable gland M20 × 1.5

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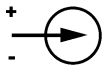
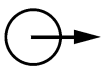
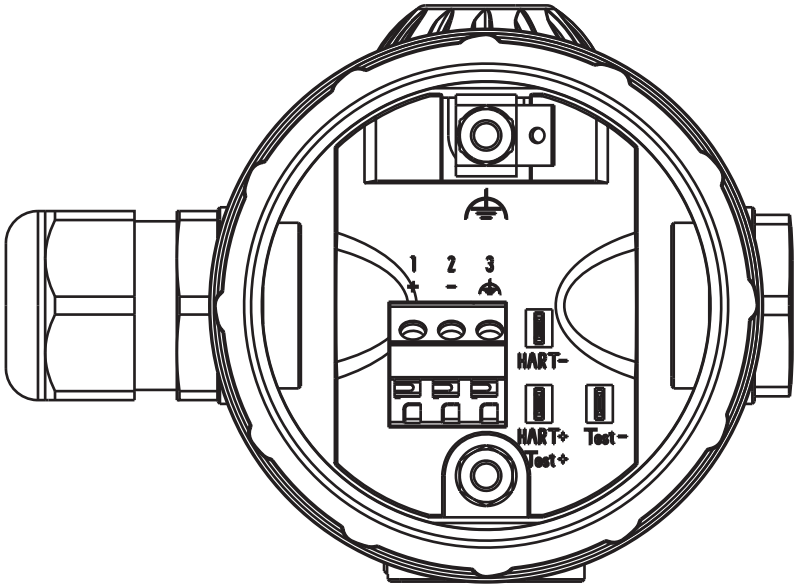
Elektrical connection

Connection	Terminal assignment	
	Cable gland	Round plug M12 × 1
Voltage supply DC 11.5 to 36 V for **none** Ex version DC 11.5 to 28 V for Ex version + - 	1 L+ 2 L-	1 L+ 3 L-
Output 4 to 20 mA two wire Impressed current 4 to 20 mA in voltage supply + - 	1 L+ 2 L-	1 L+ 3 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 	3	4

Cable gland



Round plug M12 × 1

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Order details

	(1)	**Basic type**
403022		JUMO dTRANS p20 DELTA
	(2)	**Basic type extension**
0		None
9		Special design
	(3)	**Explosion protection**
0		None
1		ATEX Ex ia[a]
	(4)	**Housing**
1		Short, stainless steel, with M12 connection[b]
2		Long, stainless steel, with cable gland
3		Precision casting, with cable gland
	(5)	**Electrical connection**
36		Round plug, M12 × 1
82		Cable gland, plastic
93		Cable gland, metal
	(6)	**Cover material**
20		CrNi (stainless steel)
85		Plastic
	(7)	**Display**
0		Without display (LCD)
1		With display (LCD)
	(8)	**Operation**
0		Without control knob
1		With control knob
	(9)	**Nominal measuring range**
530		-10 to +10 mbar DP[c, d]
531		-1 to +1 bar DP[d]
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 wire
410		4 to 20 mA, two wire with HART® protocol
	(11)	**Process connection**
511		2× pressure connection 1/4-18 NPT, to EN 837
998		Suitable for connecting to a diaphragm seal
	(12)	**Process connection material**
20		CrNi (stainless steel)
80		Tantalum
82		NiMo
	(13)	**Measuring system filling medium**
01		Silicon oil
02		Halogenized oil
	(14)	**Extra codes**
000		None
100		Customized setting[e]
226		With GOST R approval
227		With INMETRO approval
624		Free of oil and grease

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	633	With mounting kit for wall and pipe mounting
	634	With TAG number
	635	With manufacturer declaration NACE[f]
	681	Extended admissible ambient temperature
	694	Increased nominal pressure PN 420 bar

[a] ATEX Ex ia does not apply in connection with a cable gland made out of plastic (82) and the output 4 to 20 mA (405).
[b] The short case is only available with a round plug M12 × 1 (36) as electrical connection.
[c] This input is only available with a process connection made out of stainless steel (20).
[d] This inputs specified above are not available with an increased nominal pressure (694).
[e] Please specifiy required setting in plain text. For factory setting see "Accuracy" section in data sheet.
[f] Only with process connection material 82 (NiMo)

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)		(11)		(12)		(13)		(14)
Order code		/		-		-		-		-		-		-		-		-		-		-		-		/	
Order example	403022	/	0	-	0	-	2	-	82	-	20	-	1	-	1	-	532	-	405	-	511	-	20	-	1	/	000

Accessories

Article	**Part no.**
PC interface with USB/TTL converter[a]	00456352
HART® modem USB[b]	00443447
4-pole terminal box, straight, M12 × 1, with 2 m PVC cable	00404585
4-polige terminal box, angled, M12 × 1, mit 2 m PVC cable	00409334
5-pole terminal box M12 × 1, straight, without cable	00419130
5-pole terminal box M12 × 1, angled, without cable	00419133
SET oval flange 1/2" NPT/accessories set 7/16-20UNF	00543775
Mounting kit, set includes 7/16-20 UNF screws	00543777

	Data Sheet
Manifolds	409706
Pressure separator with milk 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 B 1.201	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

Article	**Part no.**
JUMO Setup dTRANS p20 series	00537577