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JUMO Process Control, Inc.
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JUMO dTRANS p20 DELTA

Differential pressure transmitter

Brief description

The device with HART® interface combines maximum precision with simple operation. It is used to measure the system pressure of gases, steams, and liquids. The integrated LCD display shows measured values and device data.

The version with explosion protection "Ex ia (intrinsically safe)" allows the device to be installed up to 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 device 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 d" explosion protection version, see data sheet 403023.

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



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

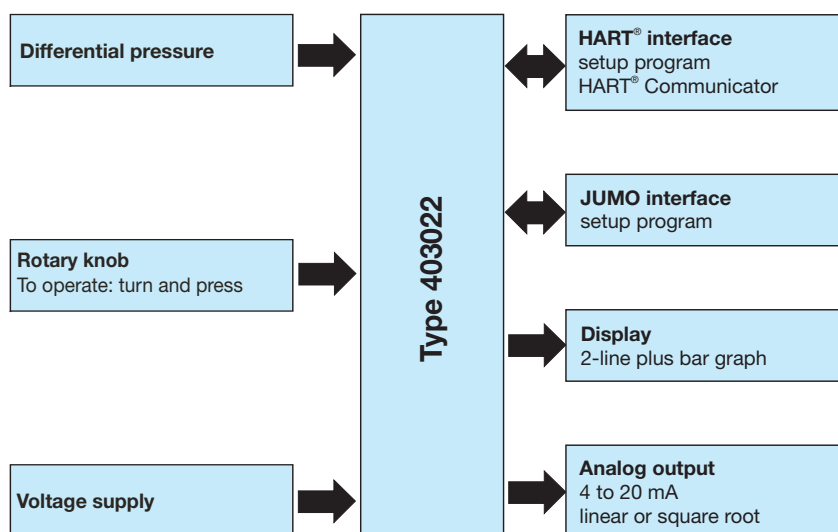


Type 403022/0-0-2-...



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

Block diagram



Special features

- Stainless steel case
- SIL certified (TÜV Nord)
- HART® interface
- Explosion protection Ex ia (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 and 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
Portrayable 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	-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
Nominal pressure (bar)	PN2	PN210	PN210, optionally PN420		

^a Without SIL

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Output

analog output For output 405 (4 to 20 mA) For output 410 (4 to 20 mA with HART®) Jump response time T60 Attenuation	4 to 20 mA, 2-wire 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 405 (4 to 20 mA) For output 410 (4 to 20 mA with HART®)	$Burden \leq (U_B - 12 \text{ V}) \div 0.022 \text{ A}$ $Burden \leq (U_B - 12 \text{ V}) \div 0.022 \text{ A}$; additional: min. 250 Ω, max. 1100 Ω

Voltage supply

For version Explosion protection 0 (none) Explosion protection 1 (ATEX Ex ia)	DC 12 to 36 V DC 12 to 28 V The voltage supply must be intrinsically safe and must not exceed the following maximum values: $U_i \leq \text{DC } 28 \text{ V}$ $I_i \leq 115 \text{ mA}$ $P_i \leq 750 \text{ mW}$ $C_i = 6 \text{ nF}$ $L_i = 105 \mu\text{H}$
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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 Materials For housing 1 (short, stainless steel) For housing 2 (long, stainless steel) For housing 3 (precision casting) For material lid 20 (stainless steel) For material lid 85 (plastic) For electrical connection 36 (round plug M12 × 1) For electrical connection 82 (cable fitting, plastic) For electrical connection 93 (cable fitting, metal) For operation 0 (without control knob) For operation 1 (with control knob)	Stainless steel 1.4404 Stainless steel 1.4404, VMQ Stainless steel 1.4408 Precision casting 1.4408, seal FPM PA, seal FPM Brass, nickel-plated PA Brass, nickel-plated - PA
Explosion protection For Explosion protection 0 (without) Explosion protection 1 (ATEX Ex ia)	The device is not approved for use in an Ex-area. EC-type examination certificate SEV 09 ATEX 0138 X  II 1G Ex ia IIC T4 Ga II 1D Ex ia IIIC T105 °C Da
Weight Type 403022/0-0-1 (housing, short) Type 403022/0-0-2 (housing, long) Type 403022/0-0-3 (housing, precision casting) For extra code 694 (increased nominal pressure)	Approx. 3.0 kg Approx. 3.3 kg Approx. 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	Increased ambient temperature (extra code 681) ^{a, b, c}
	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				
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 500 Hz according to DIN EN 60770-3 15 g for 6 ms according to IEC 60068-2-29				
Electromagnetic compatibility Interference emission Interference immunity	According to EN 61326 Class B ^d Industry				
Protection type For version Explosion protection 0 (without) Explosion protection 1 (ATEX Ex ia)	IP66/67 according to DIN EN 60529 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.

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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 bar to 6 bar	0 bar 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 ≤ 400	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 % from the nominal measuring range	≤ 1 %	≤ P × 0.0005 %	≤ P × 0.0003 %	≤ P × 0.0025 %	≤ P × 0.001 %
Long-term stability in % as 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

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Approvals and approval marks

Approval mark	Test facility	Certificates/certification numbers	Inspection basis	Valid for
ATEX	Electrosuisse	SEV 09 ATEX 0138 X, issue 04 (2017-10-13)	EN 60079-0 EN 60079-11 EN 60079-26	403022/x-1-...
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

Specific conditions of use

- 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“.
- 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 to +50	-50 to +65	-50 to +85	-50 to +85
Maximum permissible measuring temperature (°C)	+60	+70	+115	+175

- 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 to +60
Maximum permissible measuring temperature (°C)	+100

- 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 to +60
Maximum permissible measuring temperature (°C)	+100

- 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 to +60
Maximum permissible measuring temperature (°C)	+100

- In the temperature range of -40 to -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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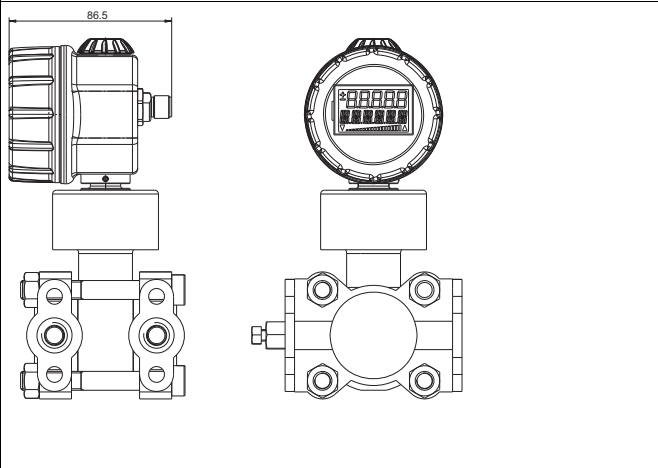
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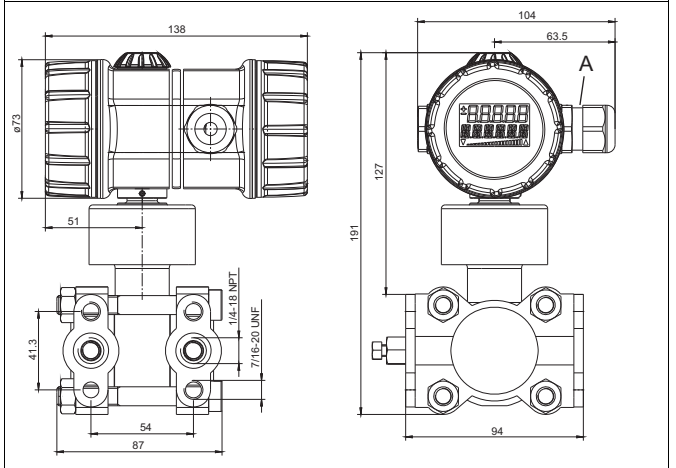


Dimensions

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

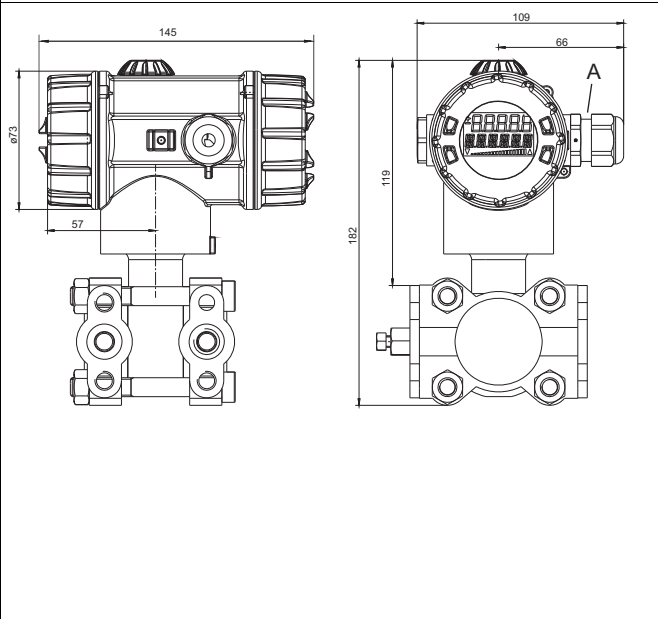


Type 403022/0-0-2
 (long, stainless steel, with cable fitting)



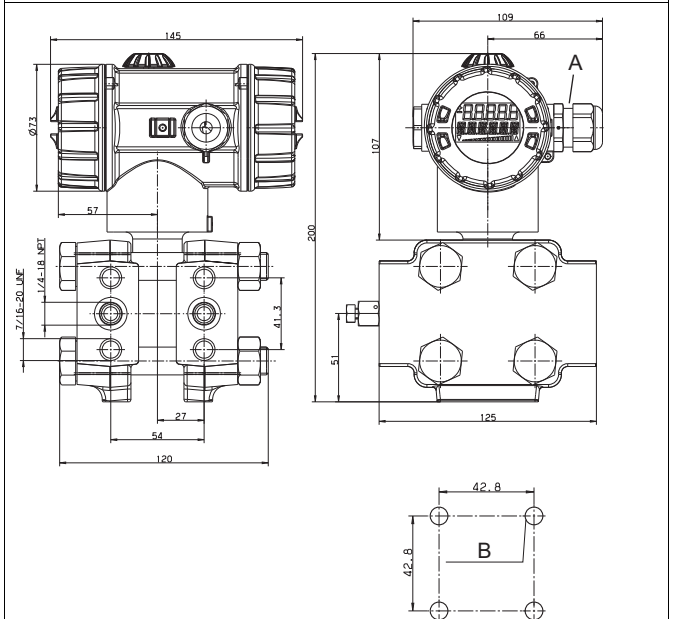
A M20 × 1.5 cable fitting

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



A M20 × 1.5 cable fitting

For extra code 694
 (increased nominal pressure PN420)



A M20 × 1.5 cable fitting

B M8 for mounting

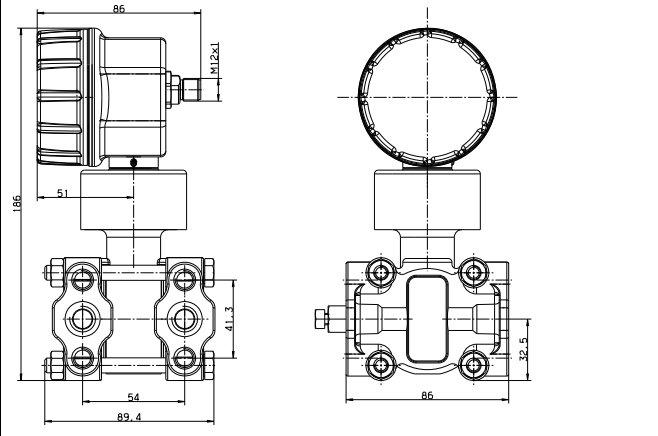
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**Type 403022/0-0-1 (without display and operation)
for nominal measuring range -10 to +10 mbar,
nominal pressure PN2 (bar)**



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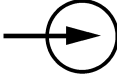
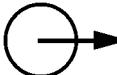

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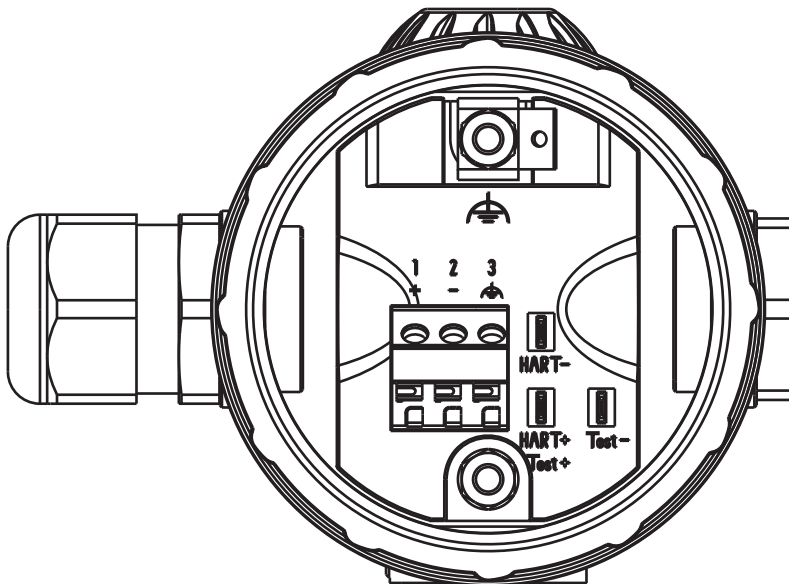


Connection diagram

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	
	82 (plastic), 93 (metal) Cable gland	36 Round plug M12 × 1
Voltage supply DC 12 to 36 V for none Ex version DC 12 to 28 V for Ex version		1 L+ 2 L-
Output 4 to 20 mA, two-wire Impressed current 4 to 20 mA in voltage supply		1 L+ 2 L- 3 L-
Current output test connection Inherent resistance of ammeter ≤ 10 Ω		TEST + TEST -
HART® test connection Burden must be present!		HART + HART -
Functional ground		3 4

Cable fitting



Round plug M12 × 1



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Order details

	(1) Basic type
403022	JUMO dTRANS p20 DELTA – Differential pressure transmitter
	(2) Basic type extension
0	None
2	SIL ^a
9	Special version
	(3) Explosion protection
0	None
1	ATEX Ex ia ^b
	(4) Housing
1	Short, stainless steel, with M12 connection ^c
2	Long, stainless steel, with cable fitting
3	Precision casting, with cable fitting M20
	(5) Electrical connection
36	Round plug M12 × 1
82	Plastic cable fitting
93	Metal cable fitting
	(6) Cover material
20	CrNi (stainless steel)
85	Plastic
	(7) Display
0	None
1	With display (LCD)
	(8) Operation
0	None
1	With control knob
	(9) Input – nominal measuring range
532	0 to 1 bar DP
530	-10 to +10 mbar DP ^{d, e}
531	-1 to +1 bar DP ^e
533	-1 to +6 bar DP
534	-1 to +100 bar DP
	(10) Output
405	4 to 20 mA, two-wire, without SIL
410	4 to 20 mA, two-wire with HART® protocol
	(11) Process connection
511	2× pressure connection 1/4-18 NPT according to DIN EN 837
998	Diaphragm seal version, screwed
	(12) Process connection material
20	CrNi (stainless steel)
80	Tantalum
82	NiMo
	(13) Measuring system, filling medium
01	Silicon oil
02	Halogenized oil for oxygen application

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Software

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

Stock versions

Order code	Input	Process connection	Part no.
403022/0-1-1-36-20-1-1-530-410-511-20-01/000	-10 to +10 mbar DP	2× pressure connection	00569267
403022/0-1-1-36-20-1-1-532-410-511-20-01/000	0 to 1 bar DP	1/4-18NPT DIN EN 837	00573301