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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 exida according to IEC 61508/-1/-2/-3. These measuring devices are suitable for monitoring process level and process pressure up to SIL2. Further details can be found in the Safety Manual.

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-...

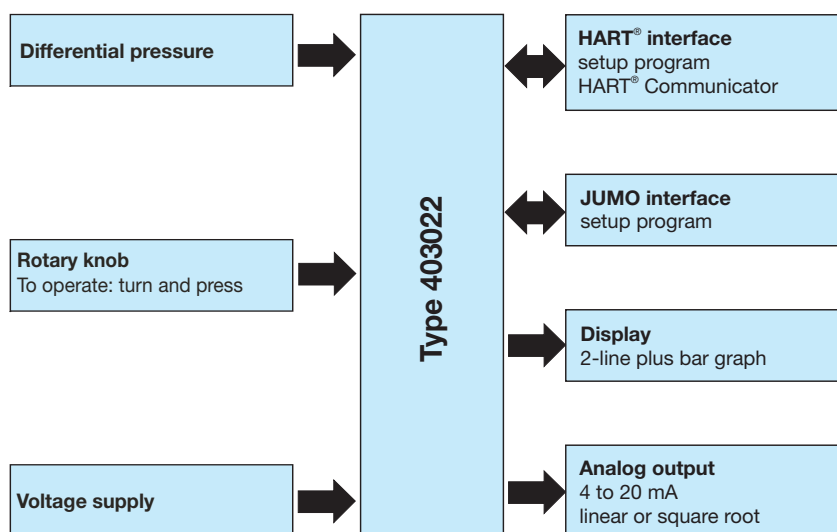


Type 403022/0-0-2-...



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

### Block diagram



### Special features

- Stainless steel case
- SIL certified (exida)
- 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<br>A zero offset is possible on-site or via setup   |
| Display <sup>a</sup>                   | LCD, two-line with bar graph   |
| Alignment                              | Display unit rotatable in 90° steps<br>Housing rotatable ±160°   |
| Size                                   | Display 22 × 35 mm, font size 7 mm/5-digits  |
| Color                                  | Black  |
| Portrayable measuring units            |  |
| Input pressure                         | inH <sub>2</sub> O, inHg, ftH <sub>2</sub> O, mmH <sub>2</sub> O, mmHg, psi, bar, mbar, kg/cm <sup>2</sup> , kPa, torr, MPa, mH <sub>2</sub> 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 <sup>b</sup>  |
| For output 410 (4 to 20 mA with HART®) | JUMO interface <sup>b</sup> and HART® interface  |

<sup>a</sup> optional; SIL version only available with display

<sup>b</sup> 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 <sup>a</sup> | -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 |                 |                   |

<sup>a</sup> Without SIL

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## Output

|  |  |
|--|--|
| analog output<br>For output 405 (4 to 20 mA)<br>For output 410<br>(4 to 20 mA with HART®)<br>Jump response time T60<br>Attenuation | 4 to 20 mA, 2-wire<br>4 to 20 mA, two-wire with HART® version 7<br><br>≤ 190 ms without attenuation<br>Adjustable 0 to 100 s                         |
| Burden<br>For output 405 (4 to 20 mA)<br>For output 410<br>(4 to 20 mA with HART®)   | $Burden \leq (U_B - 12\text{ V}) \div 0.022\text{ A}$<br>$Burden \leq (U_B - 12\text{ V}) \div 0.022\text{ A}$ ; additional: min. 250 Ω, max. 1100 Ω |

## Voltage supply

|   |   |
|---|---|
| For version<br>Explosion protection 0 (none)<br>Explosion protection 1 (ATEX Ex ia) | DC 12 to 36 V<br>DC 12 to 28 V<br>The voltage supply must be intrinsically safe and must not exceed the following maximum values:<br>$U_i \leq \text{DC } 28\text{ V}$<br>$I_i \leq 115\text{ mA}$<br>$P_i \leq 750\text{ mW}$<br>$C_i = 6\text{ nF}$<br>$L_i = 105\text{ }\mu\text{H}$ |
|---|---|


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## Mechanical features

|  |  |
|--|--|
| Process connection<br>Materials<br>Membranes<br>For process connection 20 (stainless steel)<br>For process connection 82 (HASTELLOY®)<br>For process connection 80 (tantalum)<br>Flange<br>Seal  | Stainless steel 316 L<br><br>HASTELLOY® C276, material-no. 2.4819<br><br>Tantalum<br>Stainless steel 316<br>PTFE   |
| Housing<br>Materials<br>For housing 1 (short, stainless steel)<br>For housing 2 (long, stainless steel)<br>For housing 3 (precision casting)<br>For material lid 20 (stainless steel)<br>For material lid 85 (plastic)<br>For electrical connection 36 (round plug M12 × 1)<br>For electrical connection 82 (cable fitting, plastic)<br>For electrical connection 93 (cable fitting, metal)<br>For operation 0 (without control knob)<br>For operation 1 (with control knob) | Stainless steel 1.4404<br>Stainless steel 1.4404, VMQ<br>Stainless steel 1.4408<br>Precision casting 1.4408, seal FPM<br>PA, seal FPM<br><br>Brass, nickel-plated<br><br>PA<br><br>Brass, nickel-plated<br><br>-<br><br>PA                                 |
| Explosion protection<br>For<br>Explosion protection 0 (without)<br>Explosion protection 1 (ATEX Ex ia)   | The device is <b>not</b> approved for use in an Ex-area.<br>EC-type examination certificate SEV 09 ATEX 0138 X<br> II 1G Ex ia IIC T4 Ga<br>II 1D Ex ia IIIC T105 °C Da |
| Weight<br>Type 403022/0-0-1 (housing, short)<br>Type 403022/0-0-2 (housing, long)<br>Type 403022/0-0-3 (housing, precision casting)<br>For extra code 694 (increased nominal pressure)   | Approx. 3.0 kg<br>Approx. 3.3 kg<br>Approx. 4.0 kg<br><br>The weight of the device increases by approximately 3.8 kg.  |

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## Environmental influences

|   |  |                   |                            |                                  |   |
|---|--|-------------------|----------------------------|----------------------------------|---|
| Admissible temperatures<br>Operation  | Version  | Temperature class | Maximum medium temperature | Ambient temperature <sup>a</sup> | Increased ambient temperature (extra code 681) <sup>a, b, c</sup> |
|   | 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<br>Operation<br>Storage   | 100 % including condensation on the device outer case<br>90 % without condensation         |                   |                            |                                  |   |
| Admissible mechanical load<br>Vibration strength<br>Shock resistance                                      | 2 g, 10 to 500 Hz according to DIN EN 60770-3<br>15 g for 6 ms according to IEC 60068-2-29 |                   |                            |                                  |   |
| Electromagnetic compatibility<br>Interference emission<br>Interference immunity                           | According to EN 61326<br>Class B <sup>d</sup><br>Industry                                  |                   |                            |                                  |   |
| Protection type<br>For version<br>Explosion protection 0 (without)<br>Explosion protection 1 (ATEX Ex ia) | IP66/67 according to DIN EN 60529<br>IP66 according to DIN EN 60529                        |                   |                            |                                  |   |

<sup>a</sup> Under -20 °C limited function: stationary use, increased danger of cable break, display without function; under -30 °C operation of the device not possible.

<sup>b</sup> 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.

<sup>c</sup> Without SIL

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

<sup>a</sup> Without SIL

<sup>b</sup> MSP = measuring span

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

<sup>d</sup> r = span of the nominal measuring range + adjusted measuring span

## Approvals and approval marks

| Approval mark | Test facility | Certificates/<br>certification numbers       | Inspection basis                         | Valid for              |
|---------------|---------------|--|--|------------------------|
| ATEX          | Electrosuisse | SEV 09 ATEX 0138 X,<br>issue 04 (2017-10-13) | EN 60079-0<br>EN 60079-11<br>EN 60079-26 | 403022/x-1-...         |
| EAC TR ZU     | RU            | RU C-DE.HB07.B.00086/20                      | TR ZU 012/2011 (Ex)                      | Extra code 226         |
| SIL           | exida         | JUMO 2203088 C001                            | IEC 61508:2010-1/-2/-3                   | Basic type extension 2 |

The special conditions for use can be found in the type examination certificate, which is available for download on the Internet on the respective product page.

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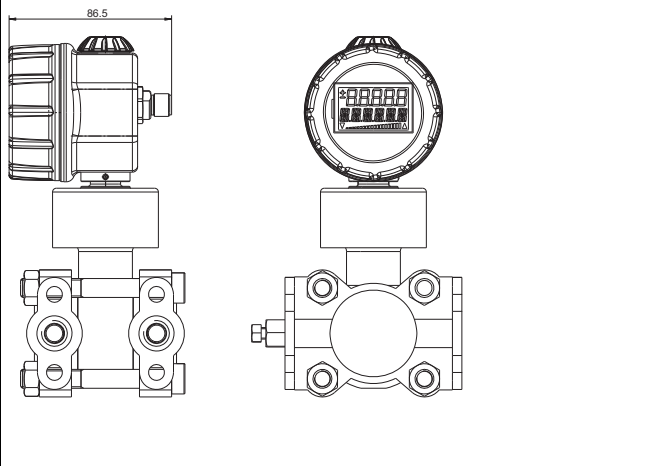
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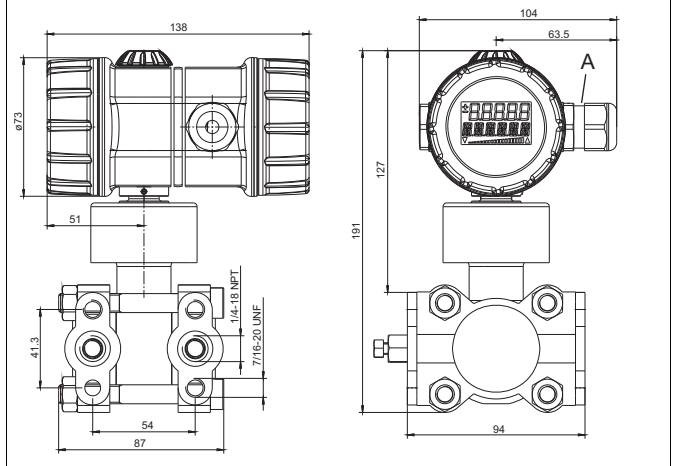


## Dimensions

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

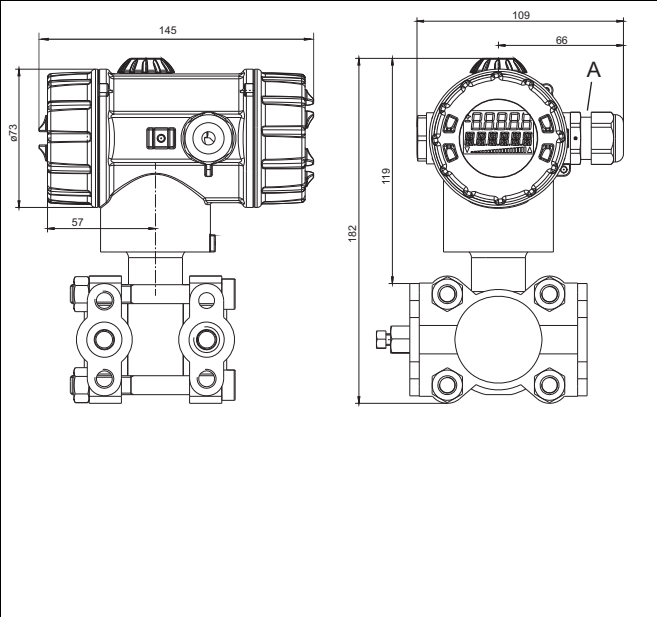


**Type 403022/0-0-2**  
 (long, stainless steel, with cable fitting)



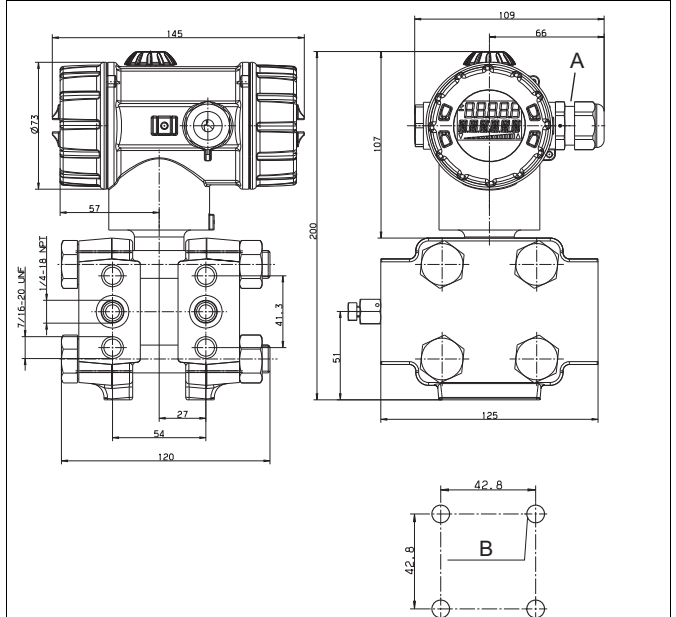
A M20 × 1.5 cable fitting

**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

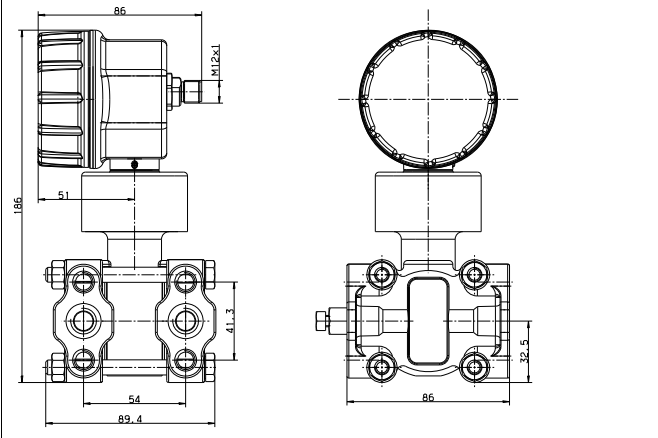
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**Type 403022/0-0-1 (without display and operation)  
for nominal measuring range -10 to +10 mbar,  
nominal pressure PN2 (bar)**





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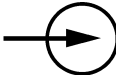


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## Connection diagram

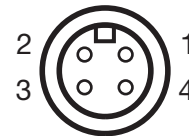
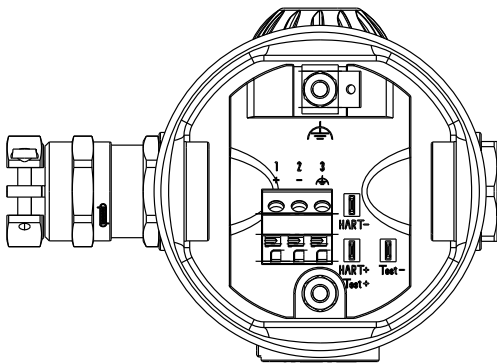
The connection diagram in the data sheet provides information on product selection.

**For the electrical connection, only use the installation instructions or the operating manual.**

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

### Cable fitting

### Round plug M12 × 1



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**JUMO Process Control, Inc.**

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## Order details

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



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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 |