Transmitter P 40 / P 41

- Measuring ranges from 0...0.25 bar up to 0...400 bar, absolute and gauge pressure
- Linearity error 0.3% (typical value, terminal-based)
- Output signal 4...20 mA (two-wire) or 0...10 V, 0...5 V, 1...6 V (three-wire)
- All parts wetted by process are of stainless steel
- Flush-fitting and manometer connections
- High overload limit
- Special measuring ranges on request
- Stainless steel housing
- Intrinsically safe versions EEx ib IIC T6

Application
Transmitters of the P4X series are intended for general applications in the area of industrial pressure measurement. The lowest measuring range for the P40 is 0...0.25 bar, whilst for the P41 it is 0...1 bar, due to the flush-fitting separating diaphragm. The highest measuring range for both versions is 0...400 bar, whereby the intermediate ranges are graduated according to DIN. Permissible overload is four times span (max. 600 bar).

P4X transmitters have a silicon pressure sensor with an isolated thin-film strain gauge of polysilicon. This measuring principle features a wide temperature range, low thermal effects and good long-term stability. Furthermore, the sensor’s low mass and small dimensions ensure good response to pulsating pressure media and vibrations.

The excellent properties of silicon sensors result in good reproducibility, minimal hysteresis, as well as a high overload limit of up to four times nominal pressure (max. 600 bar). Due to the low mass of the silicon sensor, fast pressure changes can also be detected.

The P40 transmitter has a process connection with an internal stainless steel separating diaphragm. The P41 has a flush-fitting external separating diaphragm, also of stainless steel, thus allowing its installation with practically no clearance volume. The sensing element is mounted behind the separating diaphragm, and silicone oil is used as pressure transmission fluid. Each sensor is fitted with a temperature-compensating circuit which reduces the effects of environmental temperature changes.

For applications with high pressure peaks, there is a version with built-in mechanical damping. In addition, the P41 with mechanical damping has a protective baffle plate fitted to all ranges ≥ 40 bar. Pressure peaks can be caused for instance by pumps, fast shut-off valves, solenoid valves, hydraulic actuators etc., especially with incompressible pressure media.

If required, the P4X transmitters can be supplied with an intrinsically safe version EEx IIC T6. Together with an intrinsically safe DC power supply, these versions can be used in Zone 1 hazardous areas. The P41 is also available to mount the coupling on Zone 0.

All transmitters have high immunity to interference, as documented by the CE marking.

Function
The pressure applied to the silicon sensor acts on the strain gauge bridge. The resistance change of the bridge results in a pressure-proportional output signal from the bridge. Temperature effects on span and zero are reduced to a minimum by a temperature-compensating circuit.

The amplifier electronics are available in two versions: two-wire technique with 4...20 mA output, and three-wire technique with 0...10 V, 0...5 V or 1...6 V output. The nominal pressure range is matched to the corresponding output signal at the factory.

The transmitters are energized with a suitable DC voltage.
**TECHNICAL DATA**

**INPUT**

Measuring ranges
- **Gauge pressure**
  - P40: 0...0.25 bar up to 0...400 bar
  - P41: 0...1 bar up to 0...400 bar

**Absolute pressure**
- P40: 0...0.25 bar up to 0...400 bar
- P41: 0...1 bar up to 0...400 bar

See “Ordering data”

Span start adjustment
Only on versions with cylindrical connector or DIN 43 650/A connector.
Adjustment range: ± 5% of span

Span adjustment
Only on versions with cylindrical connector or DIN 43 650/A connector.
Adjustment range: ± 5% of span

Overload limit
4 x span, max. 600 bar, (static overload)

Overload effect: ≤ 0.1% of span

Process media: Gases and liquids

Process connection
- P40: G 1/4 A, M 20 x 1.5; G 1/4 A according to DIN 16 288, Form B;
- Sealing washer: type B to DIN 16 258 (not supplied)
- P41: G 1/4 A, flush-fitting
- M 20 x 1.5, flush-fitting
- For metal sealing to DIN 3852, Form B, a sealing ring A21 x 26 mm ø to DIN 7603 must be used (not supplied).
- For elastomer sealing to DIN 3852, Page 2, an FPM (Viton) sealing ring must be used (included in delivery).

Materials wetted by process
- Diaphragm: 1.4435 (X2 CrNiMo 1810)
- Coupling: 1.4301 (X5 CrNi 189)

Filling medium: silicone oil

**OUTPUT**

Output signal
- 4...20 mA, two-wire
- 0...10 V, three-wire
- 0...5 V, three-wire
- 1...6 V, three-wire

Characteristic: linear

Conformity (terminal-based)
Typically 0.3% of span (max. 0.5% of span)

Load (4...20 mA)
Ri = (Us – 12 V) / 0.02 A
(where Us = supply voltage)

Load (0...10 V): Ri ≥ 5 kΩ
Load (0...5 V and 1...6 V): Ri ≥ 2 kΩ

Hysteresis: ≤ 0.1% of span

**SETTING TIME**
- approx. 300 ms (current output)
- approx. 12 ms (voltage output)

Other values on request.
Minimum values:
- approx. 1.5 ms without mech. damping;
- approx. 5 ms with mechanical damping

**POWER SUPPLY**

Two-wire version 4...20 mA
Supply voltage Us: 12...30 VDC
Supply voltage Us: 12...26 VDC for intrinsic safety

Power supply effect: ± 0.1%

Three-wire version 0...10 V
Supply voltage Us: 15...30 VDC
Power supply effect: ± 0.1%

Three-wire version 0...5 V, 1...6 V
Supply voltage Us: 12...30 VDC
Power supply effect: (0,1%)

Power consumption
- ≤ 6 mA (three wire)

**EXPLOSION PROTECTION**

Protection type
Intrinsic safety Ex ib T6 according to European Standards EN 50 014 and EN 50 020

Certificate of conformity
- P41: PTB-No. Ex-97.D.2045

Maximum values for circuit voltage:
- = 26 V
- current: = 100 mA
- Power consumption: = 0,8 W

Installation
Intrinsically safe versions may be mounted inside Zone 1 areas.
- P41: optional mounting the coupling on Zone 0

**ENVIRONMENTAL CONDITIONS**

Permitted ambient temperature
- -25...+70 °C
- -25...+65 °C (intr. safe version)

Permitted process temperature
- -25...+70 °C

Temperature effect on span start
Typically 0,2%/10 K (max. 0,4%/10 K)
With measuring ranges ≤ 0,6 bar, the values are 0,1%/10 K higher.

Temperature effect on span
Typically 0,2%/10 K (max. 0,4%/10 K)
With measuring ranges ≤ 0,6 bar, the values are 0,1%/10 K higher.

Storage temperature: -40...+85 °C

Climatic influence
Climatic category: 4 Z (with Z = 70 °C)
acording to VDI/VDE 3540
(coordinates to HSC according to DIN 40 040)

Shock and vibration
Shock test Eb: to DIN IEC 68-2-29
Vibration test Fc: to DIN IEC 68-2-6

**ELECTROMAGNETIC COMPATIBILITY**

according to EN 50 082-2 with CE marking

High-frequency interference
Amplitude modulated
- (80% AM, 1 kHz)
- Test to IEC 801-3, Level 3
- 25...1000 MHz, 10 V/m

Pulse modulated
(50% duty cycle, 200 Hz)
- 900 MHz, 10 V/m
- Effect: ≤ 5%

Low-frequency magnetic field
- 60 Hz and 30 A/m

Static discharge
4 kV with contact discharge
8 kV with air gap to grounded housing
Test to IEC 801-2, Level 3

High frequency, asymmetric
Amplitude modulated
- 10V, 80% AM, 1 kHz, 0,15...80 MHz,
- Test to IEC 801-4, Level 3

Transients, asymmetric
- Test to IEC 801-1, Level 3
- 2 kV, 5/50 ms, 5 kHz

Low frequency, asymmetric: 20 V, 50 Hz

Transients, asymmetric and symmetric
- Test to IEC 801-1, Level 3
- Common mode: 2 kV
- Direct mode: 1 kV
- All measurements with shielded cable.

**GENERAL**

Materials
- Housing: 1.4301 stainless steel
- Connector: polyamide

Protection type
- Versions with connector

Protection with fixed cable
IP 65 to IEC 529, EN 60 529

Electrical connections
- Angled connector to DIN 43 650/A
- Angled connector to DIN 43 650/C
- Cylindrical connector
- Fixed cable, length 1.5 m, 4 x 0,22 mm², screened, with venting tube

Mounting position
- Not critical (if mounted 90° from the vertical, the effect is ≤ 0,3% with the 0,25 bar version)

Mounting method
- Via process coupling; thread type depends on version

Mounting torque error: ≤ 0,2 %

Weight:
- approx. 250 g

Operating instructions
- P40: 9499 040 50001
- P41: 9499 040 50101
### Ordering data

<table>
<thead>
<tr>
<th>Coupling with built-in mechanical damping</th>
<th>Gauge pressure</th>
<th>Absolute pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...0.25 bar</td>
<td>02</td>
<td>27</td>
</tr>
<tr>
<td>0...0.4 bar</td>
<td>03</td>
<td>28</td>
</tr>
<tr>
<td>0...0.6 bar</td>
<td>04</td>
<td>29</td>
</tr>
<tr>
<td>0...1.0 bar</td>
<td>05</td>
<td>30</td>
</tr>
<tr>
<td>0...1.6 bar</td>
<td>06</td>
<td>31</td>
</tr>
<tr>
<td>0...2.5 bar</td>
<td>07</td>
<td>32</td>
</tr>
<tr>
<td>0...4 bar</td>
<td>08</td>
<td>33</td>
</tr>
<tr>
<td>0...6 bar</td>
<td>09</td>
<td>34</td>
</tr>
<tr>
<td>0...10 bar</td>
<td>10</td>
<td>35</td>
</tr>
<tr>
<td>0...16 bar</td>
<td>11</td>
<td>36</td>
</tr>
<tr>
<td>0...25 bar</td>
<td>12</td>
<td>37</td>
</tr>
<tr>
<td>0...40 bar</td>
<td>13</td>
<td>38</td>
</tr>
<tr>
<td>0...60 bar</td>
<td>14</td>
<td>39</td>
</tr>
<tr>
<td>0...100 bar</td>
<td>15</td>
<td>40</td>
</tr>
<tr>
<td>0...160 bar</td>
<td>16</td>
<td>41</td>
</tr>
<tr>
<td>0...250 bar</td>
<td>17</td>
<td>42</td>
</tr>
<tr>
<td>0...320 bar</td>
<td>18</td>
<td>43</td>
</tr>
<tr>
<td>0...400 bar</td>
<td>19</td>
<td>44</td>
</tr>
<tr>
<td>Special ranges ?)</td>
<td>23</td>
<td>48</td>
</tr>
</tbody>
</table>

### Output signal

- 4...20 mA, two-wire: 0
- 4...20 mA, two-wire, intrinsic safety EEx ib IIC T6: 1
- 1...6 V, three-wire: 2
- 0...10 V, three-wire: 3
- 0...5 V, three-wire: 4

### Transmitter P 40

**Process Coupling**

- G1/4A DIN 16288, Form B: 0
- M20 x 1.5 DIN 16288, Form B: 1
- G1/4A DIN 16288, Form B: 2

**Electrical connections**

- Angled connector to DIN 43650/A: 0
- Angled connector to DIN 43650/C: 4
- Cylindrical connector (Binder, see Accessories): 2
- Fixed cable, length 1.5 m: 5
- Fixed cable, length to specification: 9

### ACCESSORIES FOR CYLINDRICAL CONNECTORS

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Nr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector socket, IP 40</td>
<td>4012 151 62841</td>
</tr>
<tr>
<td>with screened cable, length 1.5 m, 4 x 0.14 mm²</td>
<td></td>
</tr>
<tr>
<td>Connector socket, IP 65</td>
<td>4012 151 62851</td>
</tr>
<tr>
<td>with screened cable, length 1.5 m, 4 x 0.14 mm²</td>
<td></td>
</tr>
</tbody>
</table>

1) Other values for span and span start on request, valid for nominal span ≥ 0.4 bar:
   - Span start: -100% ... -50% of respective nominal span.
   - Span: 50% ... 150% of respective nominal span.
   - Measuring limit with vacuum: 10 mbar absolute

2) No access to potentiometers for span and span start

3) Max. length 15 m
### Ordering data

**Ranges** | **Gauge pressure** | **Absolute pressure**
--- | --- | ---
0... 1,0 bar | 05 | 30
0... 1,6 bar | 06 | 31
0... 2,5 bar | 07 | 32
0... 4 bar | 08 | 33
0... 6 bar | 09 | 34

**Coupling**

- 0... 10 bar: 10 (35)
- 0... 16 bar: 11 (36)
- 0... 25 bar: 12 (37)
- 0... 40 bar: 13 (38)
- 0... 60 bar: 14 (39)
- 0... 100 bar: 15 (40)
- 0... 160 bar: 16 (41)
- 0... 250 bar: 17 (42)
- 0... 320 bar: 18 (43)
- 0... 400 bar: 19 (44)
- 0... 600 bar: 20 (45)
- Special ranges: 23 (48)

**Output signal**

- 4...20 mA, two-wire: 0
- 4...20 mA, two-wire, intrinsic safety EEx ib IIC T6: 1
- 1...6 V, three-wire: 2
- 0...5 V, three-wire: 3
- 4...20 mA, two-wire, intrinsic safety EEx ib IIC T6, mechanical damping and frame trap: 9

### Transmitter P41

**Process connection** (flush-fitting diaphragm)

- GI/6A metal sealing: 5
- M20 x 1,5 metal sealing: 6
- GI/6A FPM sealing: 7
- M20 x 1,5 FPM sealing: 8

**Electrical connection**

- Angled connector to DIN 43650/A: 0
- Angled connector to DIN 43650/C: 4
- Cylindrical connector (Binder, see Accessories): 2
- Fixed cable, length 1,5 m: 5
- Fixed cable, length to specification: 9

**Ranges** | **Gauge pressure** | **Absolute pressure**
--- | --- | ---
0... 1,0 bar | 05 | 30
0... 1,6 bar | 06 | 31
0... 2,5 bar | 07 | 32
0... 4 bar | 08 | 33
0... 6 bar | 09 | 34

**Coupling**

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- 0... 100 bar: 15 (40)
- 0... 160 bar: 16 (41)
- 0... 250 bar: 17 (42)
- 0... 320 bar: 18 (43)
- 0... 400 bar: 19 (44)
- Special ranges: 23 (48)

1) Other values for span and span start on request.
2) No access to potentiometers for span and span start.
3) Intrinsically safe version for Zone 0 only possible with Range Codes 55 to 98 (mechanical damping / flame trap).
4) Mechanical damping not effective below 6 bar.
5) Max. length 15 m.
### Fig. 1 Electrical connection

#### Two-wire

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>PIN 1</th>
<th>PIN 2</th>
<th>PIN 3</th>
<th>PIN 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN 43 650/A connector</td>
<td>Output (+)</td>
<td>Output (+)</td>
<td>Not connected</td>
<td>Measurement earth</td>
</tr>
<tr>
<td>DIN 43 650/C connector</td>
<td>Output (+)</td>
<td>Output (+)</td>
<td>Not connected</td>
<td>Measurement earth</td>
</tr>
<tr>
<td>Cylindrical connector</td>
<td>(red) output (+)</td>
<td>(black) not connected</td>
<td>(white) output (-)</td>
<td>Measurement earth</td>
</tr>
<tr>
<td>Fixed cable</td>
<td>(red) output (+)</td>
<td>(black) not connected</td>
<td>(white) output (-)</td>
<td>Measurement earth</td>
</tr>
</tbody>
</table>

### Fig. 2 Overall dimensions P40 (mm)

#### Version with DIN 43 650/A connector

- Dimensions: 151 mm x 156 mm
- Key: SW 27, PG 11

#### Version with DIN 43 650/C connector

- Dimensions: 142 mm x 147 mm
- Key: SW 27, PG 7

#### Version with cylindrical connector

- Dimensions: 133 mm x 138 mm
- Key: SW 27

#### Version with fixed cable

- Dimensions: 168 mm x 172 mm
- Key: SW 27

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*Note: Measurements are approximate and may vary.*
Fig. 3 Overall dimensions P41 (mm)

* +4mm on versions with mechanical damping and spans ≥ 40 bar

Version with DIN 43 650/A connector

Version with DIN 43 650/C connector

Version with cylindrical connector

Version with fixed cable

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