

## Data sheet

# Pressure transmitters for industrial applications

## Type MBS 4050



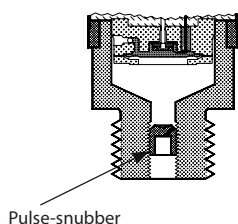
The standard heavy duty pressure transmitter MBS 4050 with integrated pulse-snubber is designed for use in industrial applications with severe media influences like cavitation, liquid hammer or pressure peaks and offers a reliable pressure measurement, even under harsh environmental conditions.

The flexible pressure transmitter programme covers different output signals, absolute or gauge (relative) versions, measuring ranges from 0 – 1 to 0 – 600 bar and a wide range of pressure and electrical connections.

Excellent vibration stability, robust construction, and a high degree of EMC / EMI protection equip the pressure transmitter to meet the most stringent industrial requirements.

**Features**

- Designed for use in severe industrial environments
- Resistant to cavitation, liquid hammer and pressure peaks
- Enclosure and wetted parts of acid-resistant stainless steel (AISI 316L)
- Pressure ranges in relative (gauge) or absolute from 0 up to 600 bar
- All standard output signals:  
4 – 20 mA, 0 – 5 V, 1 – 5 V, 1 – 6 V, 0 – 10 V
- A wide range of pressure and electrical connections
- Temperature compensated and laser calibrated
- For use in Zone 2 explosive atmosphere

**Application and media conditions**

*Application*

Cavitation, liquid hammer and pressure peaks may occur in liquid filled hydraulic systems with changes in flow velocity, e.g. fast closing of a valve or pump starts and stops.

The problem may occur on the inlet and outlet side, even at rather low operating pressures.

*Media condition*

Clogging of the nozzle may occur in liquids containing particles. Mounting the transmitter in an upright position minimizes the risk of clogging, because the flow in the nozzle is limited to the start-up period until the dead volume behind the nozzle orifice is filled. The media viscosity has only little effect on the response time. Even at a viscosities up to 100 cSt, the response time will not exceed 4 ms.

**Technical data**
*Performance (EN 60770)*

|  |                                  |                               |
|--|----------------------------------|-------------------------------|
| Accuracy (incl. non-linearity, hysteresis and repeatability) |                                  | < ± 0.5% FS (typ.)            |
|  |                                  | < ± 0.8% FS (max.)            |
| Non-linearity BFSL (conformity)                              |                                  | ≤ ± 0.2% FS                   |
| Hysteresis and repeatability                                 |                                  | ≤ ± 0.1% FS                   |
| Thermal zero point shift                                     |                                  | ≤ ± 0.1% FS / 10K (typ.)      |
|  |                                  | ≤ ± 0.2% FS / 10K (max.)      |
| Thermal sensitivity (span) shift                             |                                  | ≤ ± 0.1% FS / 10K (typ.)      |
|  |                                  | ≤ ± 0.2% FS / 10K (max.)      |
| Response time  | Liquids with viscosity < 100 cSt | < 4 ms                        |
|  | Air and gases                    | < 35 ms                       |
| Overload pressure (static)                                   |                                  | 6 × FS (max. 1500 bar)        |
| Burst pressure   |                                  | 6 × FS (max. 2000 bar)        |
| Durability, P: 10 – 90% FS                                   |                                  | > 10 × 10 <sup>6</sup> cycles |

*Electrical specifications*

|  |  |                        |                        |
|--|--|------------------------|------------------------|
| Nom. output signal (short-circuit protected)         | 4 – 20 mA  | 0–5 V, 1–5 V, 1–6 V    | 0–10 V                 |
| Supply voltage [U <sub>B</sub> ], polarity protected | 10–30 V  | 9–30 V                 | 15–30 V                |
| Supply – current consumption                         | –  | ≤ 5 mA                 | ≤ 8 mA                 |
| Supply voltage dependency                            | ≤ ± 0.05% FS / 10 V                              | ≤ ± 0.05% FS / 10 V    | ≤ ± 0.05% FS / 10 V    |
| Current limitation                                   | 28 mA (typ.)                                     | –                      |                        |
| Output impedance                                     | –  | < 25 Ω                 | < 25 Ω                 |
| Load [R <sub>L</sub> ] (load connected to 0 V)       | R <sub>L</sub> ≤ (U <sub>B</sub> - 10V) / 0.02 A | R <sub>L</sub> ≥ 10 kΩ | R <sub>L</sub> ≥ 15 kΩ |

**Technical data**  
*(continued)*
**Environmental conditions**

|  |                              |                                     |
|--|------------------------------|-------------------------------------|
| Sensor temperature range                                       | Normal                       | -40 – 85 °C                         |
|  | ATEX Zone 2                  | -10 – 85 °C                         |
| Media temperature range  | 115 - (0.35 × Ambient temp.) |                                     |
| Ambient temperature range (depending on electrical connection) | See page 6                   |                                     |
| Compensated temperature range                                  | 0 – 80 °C                    |                                     |
| Transport / storage temperature range                          | -50 – 85 °C                  |                                     |
| EMC – Emission   | EN 61000-6-3                 |                                     |
| EMC – Immunity   | EN 61000-6-2                 |                                     |
| Insulation resistance  | > 100 MΩ at 100 V            |                                     |
| Mains frequency test   | Based on SEN 361503          |                                     |
| Vibration stability  | Sinusoidal                   | 15.9 mm-pp, 5 Hz – 25 Hz            |
|  |                              | 20 g, 25 Hz – 2 kHz                 |
|  | Random                       | 7.5 g <sub>rms</sub> , 5 Hz – 1 kHz |
| Shock resistance   | Shock                        | 500 g / 1 ms                        |
|  | Free fall                    | 1 m                                 |
| Enclosure (depending on electrical connection)                 | See page 6                   |                                     |

**Explosive atmospheres**

|                     |   |                       |
|---------------------|---|-----------------------|
| Zone 2 applications | <b>II 3G</b><br><b>Ex nA IIA T3 Gc</b><br><b>-20C&lt;Ta&lt;+85C</b> | EN60079-0; EN60079-15 |
|---------------------|---|-----------------------|

When used in ATEX Zone 2 areas at temperature <-10 °C the cable and plug must be protected against impact.

**Mechanical characteristics**

|   |                        |                                 |
|---|------------------------|---------------------------------|
| Materials   | Wetted parts           | EN 10088-1; 1.4404 (AISI 316 L) |
|   | Enclosure              | EN 10088-1; 1.4404 (AISI 316 L) |
|   | Electrical connections | See page 6                      |
| Net Weight (depending on pressure connection and electrical connection) |                        | 0.2 – 0.3 kg                    |

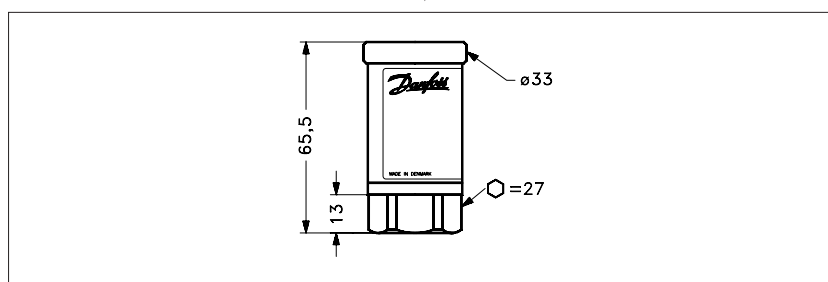
Ordering standard

|  |    |  |  |                            |  |
|--|----|--|--|----------------------------|--|
| <b>MBS 4050</b>  |    | -  |  |                            |  |
| <b>Measuring range</b>                                   |    |  |  | <b>Pressure connection</b> |  |
| 0 – 1.0 bar  | 10 | AB08                                       | G ½ A (EN 837)   |                            |  |
| 0 – 1.6 bar  | 12 | AC04                                       | ¼ – 18 NPT   |                            |  |
| 0 – 2.5 bar  | 14 | FA12                                       | DIN 3852/3, M18 × 1.5 – 6g, NBR  |                            |  |
| 0 – 4.0 bar  | 16 | GB04                                       | DIN 3852-E-G ¼ A, gasket DIN 3869-14 NBR                                 |                            |  |
| 0 – 6.0 bar  | 18 | FD10                                       | 9/16 – 18 UNF – 2A (SAE J514) NBR O-ring                                 |                            |  |
| 0 – 10 bar   | 20 | <b>Electrical connection</b>               |  |                            |  |
| 0 – 16 bar   | 22 | 1  | Plug Pg 9 (EN175301-803-A)   |                            |  |
| 0 – 25 bar   | 24 | 2  | * Plug, AMP Econoseal, J series, male, excl. female plug (move to front) |                            |  |
| 0 – 40 bar   | 26 | 3  | Screened cable, 2 m  |                            |  |
| 0 – 60 bar   | 28 | 4  | * Plug AMP 173065, male flying leads 125 mm excl. female plug            |                            |  |
| 0 – 100 bar  | 30 | 5  | * Plug, EN 60947-5-2, M12 × 1, male excl. female plug                    |                            |  |
| 0 – 160 bar  | 32 | 6  | Plug Pg 11 (EN 175301-803-A)   |                            |  |
| 0 – 250 bar  | 34 | <b>Output signal</b>                       |  |                            |  |
| 0 – 400 bar  | 36 | 1  | 4 – 20 mA  |                            |  |
| 0 – 600 bar  | 38 | 2  | 0 – 5 V d.c.   |                            |  |
|  |    | 3  | 1 – 5 V d.c.   |                            |  |
|  |    | 5  | 1 – 6 V d.c.   |                            |  |
|  |    | 6  | 0 – 10 V d.c.  |                            |  |
| <b>Pressure reference</b>                                |    |  |  |                            |  |
| Gauge (relative)   | 1  |  |  |                            |  |
| Absolute   | 2  |  |  |                            |  |
| * Gauge versions only available as sealed gauge versions |    | <input type="checkbox"/> Preferred version |  |                            |  |

Non-standard build-up combinations may be selected. However, minimum order quantities may apply. Please contact your local Danfoss office for further information or request on other versions.

Dimensions/Combinations

| Type code | 1                    | 2             | 3                  | 4                                      | 5                           | 6                     |
|-----------|----------------------|---------------|--------------------|--|-----------------------------|-----------------------|
|           | EN175301-803-A, Pg 9 | AMP Econoseal | 2 m screened cable | AMP 173065, male, Flying leads, 125 mm | EN 60947-5-2 M12 x 1, 4 Pin | EN 175301-803-A, Pg11 |
|           |                      |               |                    |  |                             |                       |



|                                  | DIN 3852-E-G ¼ A gasket DIN 3869-14 NBR | DIN 3852/3 M18 x 1.5 - 6g NBR, O-ring | G ½ A (EN 837) | ¼ - 18 NPT                         | 9/16 - 18 UNF-2A (SAE J514) NBR, O-ring |
|----------------------------------|---|---------------------------------------|----------------|------------------------------------|---|
| Type code                        | GB04                                    | FA12                                  | AB08           | AC04                               | FD10                                    |
| Recommended torque <sup>1)</sup> | 30 - 35 Nm                              | 30 - 35 Nm                            | 30 - 35 Nm     | 2 - 3 turns after finger tightened | 30 - 35 Nm                              |

<sup>1)</sup> Depends of different parameters such as gasket material, mating material, thread lubrication and pressure level

Electrical connections

| Type code  | 1  | 2   | 3  | 4  | 5  | 6  |
|--|--|---|--|--|--|--|
|  |  |   |  |  |  |  |
|  | EN 175301-803, Pg 9  | AMP Econoseal J series (male)                                       | 2 m screened cable   | AMP 173065, male Flying leads 125 mm   | EN 60497-5-2 M12 x 1; 4 Pin  | EN 175301-803-A, Pg 11   |
| Ambient temperature  | -40 – 85 °C  | -40 – 85 °C   | -30 – 85 °C  | -40 – 85 °C  | -25 – 85 °C  | -40 – 85 °C  |
| Enclosure (IP protection fulfilled together with mating connector) | IP65   | IP67  | IP67   | IP67   | IP67   | IP65   |
| Material   | Glass filled polyamid, PA 6.6  | Glass filled polyamid, PA 6.6                                       | Poliolyfin cable with PE shirkage tubing   | Glass filled polyester, PBT  | Nickel plated brass, CuZn/Ni   | Glass filled polyamid, PA 6.6  |
| Electrical connection, 4 – 20 mA output (2 wire)                   | Pin 1: + supply<br>Pin 2: ÷ supply<br>Pin 3: not used<br><br>Earth: Connected to MBS enclosure               | Pin 1: + supply<br>Pin 2: ÷ supply<br>Pin 3: not used               | Brown wire: + supply<br>Black wire: ÷ supply<br>Red wire: not used<br>Orange: not used<br>Screen: not connected to MBS enclosure             | Pin 1: (red): + supply<br>Pin 2: (black): - supply<br>Pin 3: (white): not used               | Pin 1: + supply<br>Pin 2: not used<br>Pin 3: not used<br>Pin 4: ÷ supply               | Pin 1: + supply<br>Pin 2: ÷ supply<br>Pin 3: not used<br><br>Earth: Connected to MBS enclosure               |
| Electrical connection, 0 – 5 V, 1 – 5 V, 1 – 6 V, 0 – 10 V output  | Pin 1: + supply<br>Pin 2: ÷ supply <sup>2)</sup><br>Pin 3: + output<br><br>Earth: Connected to MBS enclosure | Pin 1: + supply<br>Pin 2: ÷ supply <sup>2)</sup><br>Pin 3: + output | Brown wire: output<br>Black wire: ÷ supply <sup>2)</sup><br>Red wire: + supply<br>Orange: not used<br>Screen: not connected to MBS enclosure | Pin 1: (red): + supply<br>Pin 2: (black): - supply <sup>2)</sup><br>Pin 3: (white): + output | Pin 1: + supply<br>Pin 2: not used<br>Pin 3: + output<br>Pin 4: ÷ supply <sup>2)</sup> | Pin 1: + supply<br>Pin 2: ÷ supply <sup>2)</sup><br>Pin 3: + output<br><br>Earth: Connected to MBS enclosure |

<sup>1)</sup> Female plug: Glass filled polyester, PBT

<sup>2)</sup> Common