



**Data Sheet** 

# Pressure transmitter Type **MBS 33M**

For high accuracy marine applications



The high accuracy transmitter MBS 33M is designed for use in almost all marine applications, and offers a reliable pressure measurement, even under harsh environmental conditions.

The flexible pressure transmitter programme covers a 4 - 20 mA output signal, absolute or gauge (relative) versions, measuring ranges from 0 - 1 to 0 - 600 bar. 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 marine requirements.

## Features

- Designed for use in severe maritime environments
- All relevant marine approvals
- Enclosure and wetted parts of acid-resistant stainless steel (AISI 316L)
- Pressure ranges in relative (gauge) or absolute from 0 up to 600 bar
- Standard output signal: 4 20 mA
- A wide range of pressure connections
- Fully digitally compensated
- For use in ATEX Zone 2 explosive atmospheres
- UL approved



# **Product specification**

## **Technical data**

#### Table 1: Performance (EN 60770)

| Accuracy (incl. non-linearity, hysteresis and repeatability) |                                  | $\leq \pm 0.3\%$ FS (typ.)       |  |
|--|----------------------------------|----------------------------------|--|
|  |                                  | $\leq$ ± 0.8% FS (max.)          |  |
| Non-linearity BFSL (conformity)                              |                                  | $\leq \pm 0.2\%$ FS              |  |
| Hysteresis and repeatability                                 |                                  | $\leq \pm 0.1\%$ FS              |  |
| Thermal zero point shift                                     |                                  | $\leq \pm 0.1\%$ FS / 10K (typ.) |  |
|  |                                  | $\leq \pm$ 0.2% FS / 10K (max.)  |  |
| Thermal sensitivity (span) shift                             |                                  | $\leq$ ± 0.1% FS / 10K (typ.)    |  |
|  |                                  | $\leq \pm 0.2\%$ FS / 10K (max.) |  |
| Response time:   | Liquids with viscosity < 100 cSt | < 4 ms                           |  |
| Overload pressure (static)                                   |                                  | 6 × FS (max. 1500 bar)           |  |
| Burst pressure   |                                  | 6 × FS (max. 2000 bar)           |  |
| Power-up time  |                                  | < 50 ms                          |  |
| Durability, P: 10 – 90% FS                                   |                                  | $> 10 \times 10^6$ cycles        |  |
|  |                                  |                                  |  |

## Table 2: Electrical specifications

| Nom. output signal (short-circuit protected)          | 4 – 20 mA                                    |  |  |
|---|--|--|--|
| Supply voltage [U <sub>B</sub> ] (polarity protected) | 9 – 32 V DC (12 / 24 V DC nom.)              |  |  |
| Supply voltage dependency                             | < 0.1% FS / 10 V                             |  |  |
| Output limitation                                     | 22.4 mA                                      |  |  |
| Load $[R_L]$ (load connected to 0 V)                  | $R_{L} \le (U_{B}^{-} 9 V) / 0.02 A[\Omega]$ |  |  |

## **Table 3: Environmental conditions**

| Sensor operating temperature                                   | Normal      |                                     | -40 – 85 °C                       |
|--|-------------|-------------------------------------|-----------------------------------|
| Sensor operating temperature                                   | ATEX Zone 2 | -10 – 85 °C                         |                                   |
| Media temperature range  |             |                                     | -40 – 85 °C                       |
| Ambient temperature range (depending on electrical connection) |             |                                     | See Electrical connections        |
| 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  |             |                                     | $>100~\text{M}\Omega$ at 500 V DC |
| Mains frequency test   |             |                                     | Based on SEN 361503               |
| Vibration stability  | Sinusoidal  | 15.9 mm-pp, 5 Hz – 25 Hz            | IEC 60068-2-6                     |
|  |             | 20 g, 25 Hz – 2 kHz                 |                                   |
|  | Random      | 7.5 g <sub>rms</sub> , 5 Hz – 1 kHz | IEC 60068-2-64                    |
| Shock resistance   | Shock       | 500 g / 1 ms                        | IEC 60068-2-27                    |
|  | Free fall   | 1 m                                 | IEC 60068-2-32                    |
| Enclosure (depending on electrical connection)                 |             |                                     | See Electrical connections        |

### Table 4: Explosive atmospheres

Zone 2 applications<sup>(1)</sup>



EN60079-0; EN60079-7

<sup>(1)</sup> When used in ATEX Zone 2 areas at low temperatures the cable and plug must be protected against impact.

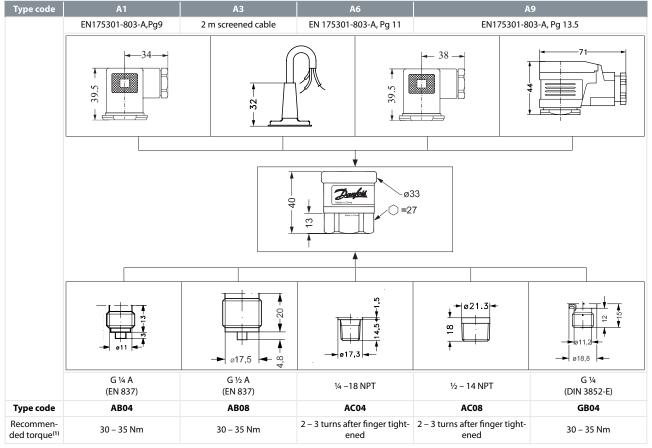
#### **Table 5: Mechanical characteristics**

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



# **Dimensions / Combinations**

## Table 6: Dimensions / Combinations



<sup>(1)</sup> Depends on different parameters as packing material, mating material, thread lubrication and pressure level

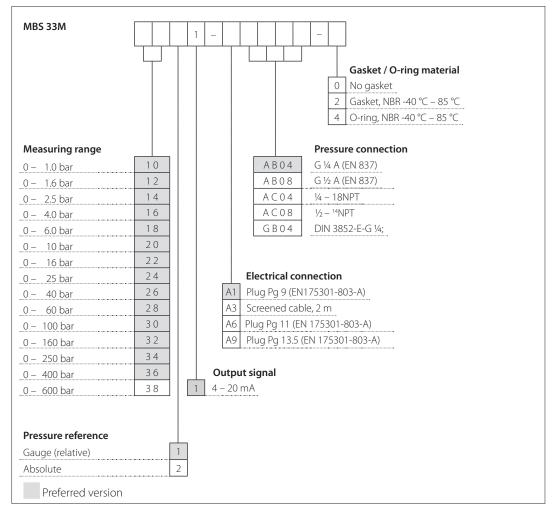
# **Electrical connections**

| Type code  | A1  | A3  | A6  | A9  |
|--|---|---|---|---|
|  | 3<br>2<br>(2<br>(2<br>(1)<br>(1)<br>(1)<br>(1)<br>(1)<br>(1)<br>(1)<br>(1)  | 2 m screened cable  | 3<br>2<br>2<br>EN 175301-803-A,<br>Pg 9   | 3<br>2<br>1<br>EN 175301-803-A,<br>Pg 11  |
| Ambient temperature  | -40 – 85 °C   | -30 – 85 °C   | -40 – 85 °C   | -40 – 85 °C   |
| Enclosure (IP protection fulfil-<br>led together with mating con-<br>nector) | IP65  | IP67  | IP65  | IP65  |
| Material   | Glass filled polyamid, PA 6.6   | Poliolyfin cable with PE shrink-<br>age tubing  | Glass filled polyamid, PA 6.6   | Glass filled polyamid, PA 6.6   |
| Electrical connection, 4 – 20 mA<br>output (2 wire)                          | Pin1: + supply<br>Pin 2: ÷ supply<br>Pin 3: not used<br>$\overbrace{=}^{+}$<br>Earth: Connected to MBS enclo-<br>sure | Brown wire: + supply<br>Black wire: + supply<br>Red wire: not used<br>Orange: not used<br>Screen: not connected to MBS<br>enclosure | Pin1: + supply<br>Pin 2: $\div$ supply<br>Pin 3: not used<br>()<br>Earth: Connected to MBS enclo-<br>sure | Pin1: + supply<br>Pin 2: $\div$ supply<br>Pin 3: not used<br>()<br>Earth: Connected to MBS enclo-<br>sure |



## Ordering

# **Ordering standard**



## **O** NOTE:

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.



## Certificates, declarations, and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at danfoss.com or contact your local Danfoss representative if you have any questions.

| Table 7: Certificates and | declarations |
|---------------------------|--------------|
|                           |              |

| File name                 | Document type                       | Document topic      | Approval authority |
|---------------------------|-------------------------------------|---------------------|--------------------|
| 18.10316.266              | Marine - Safety Certificate         | -                   | RMRS               |
| 19-20025                  | Marine - Safety Certificate         | -                   | LR                 |
| 05270-F0 BV               | Marine - Safety Certificate         | -                   | BV                 |
| 18-LD1740756-1-PDA        | Marine - Safety Certificate         | -                   | ABS                |
| TAA00000W0                | Marine - Safety Certificate         | -                   | DNV GL             |
| TJ18T00028                | Marine - Safety Certificate         | -                   | CCS                |
| TA17320M                  | Marine - Safety Certificate         | -                   | NKK                |
| SMS.W.II-2179-B.0         | Marine - Manufacturing Permission   | -                   | BV                 |
| E227388                   | Explosive - Safety Certificate      | Hazardous Locations | UL                 |
| E31024                    | Electrical - Safety Certificate     | -                   | UL                 |
| E311982                   | Electrical - Safety Certificate     | -                   | UL                 |
| E494625                   | Electrical - Safety Certificate     | -                   | UL                 |
| DK.C.30.018.A 31316       | Measuring - Performance Certificate | -                   | GOST               |
| 064G9615.06               | EU Declaration                      | ATEX/EMCD/RoHS      | Danfoss            |
| CRN.0F18477.5123467890YTN | Pressure - Safety Certificate       | CRN                 | TSSA               |
| 060R3160.00               | Manufacturers Declaration           | China RoHS          | Danfoss            |
| 064R9402.00               | Manufacturers Declaration           | PED                 | Danfoss            |
| 1786330                   | Explosive - Safety Certificate      | -                   | CSA                |

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