

Data sheet

## Pressure transmitter for high temperature marine applications

### MBS 3300 and MBS 3350



The compact high temperature pressure transmitter 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 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.

A robust design, an excellent vibration stability, and a high degree of EMC / EMI protection equip the pressure transmitter to meet the most stringent marine requirements.

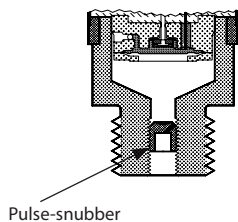
#### Features

- Designed for use in severe maritime environments
- For medium and ambient temperatures up to 125 °C
- All standard output signals:
  - Ratiometric 10 - 90% of supply
  - 4 – 20 mA
  - 0 – 5 V, 1 – 5 V, 1 – 6 V, 0 – 10 V
- Enclosure and wetted parts of AISI 316L
- A wide range of pressure and electrical connections
- Fully digitally compensated
- For use in ATEX Zone 2 explosive atmospheres
- UL approved

#### Approvals

Det Norske Veritas/Germanischer Lloyd, DNV GL  
Lloyds Register of Shipping, LR  
Bureau Veritas; BV  
Registro Italiana Navale, RINA

Nippon Kaiji Kyokai, NKK  
American Bureau of Shipping, ABS  
Korean Register of Shipping, KR  
China Classification Society, CCS  
Russian Maritime Register of Shipping, RMRS

**Application and media conditions (MBS 3350)**

**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)		$\leq \pm 0.5\%$ FS (typ.)
		$\leq \pm 1.0\%$ FS (max.)
Non-linearity BFSL (conformity)		$\leq \pm 0.2\%$ FS
Hysteresis and repeatability		$\leq \pm 0.1\%$ FS
Thermal error band (compensated temperature range)		$\leq \pm 1.0\%$ FS
Response time	Liquids with viscosity < 100 cSt	< 4 ms
	Air and gases (MBS 3350)	< 35 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 × 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	10 – 90% of supply voltage
Supply voltage [U <sub>g</sub> ], polarity protected	9–32 V DC (12 / 24 V DC nom.)	9–32 V DC (12 / 24 V DC nom.)	15–32 V DC (12 / 24 V DC nom.)	4.5 – 5.5 V DC (5 V DC nom.)
Supply – current consumption	–	$\leq 5$ mA	$\leq 8$ mA	< 5 mA – 5 V
Supply voltage dependency	< 0.1% FS / 10 V	< 0.05% FS / 10 V		–
Ratiometricity	–	–		< 0.05% FS / 4.5 - 5.5 V
Output limitation	22.4 mA	0-5V: 5.75 V 1-5V: 5.6 V 1-6V: 6.75 V	0-10V: 11.5 V	≈ supply voltage
Sink / Source	–	< 1 mA		
Load [R <sub>L</sub> ] (load connected to 0 V)	R <sub>L</sub> ≥ (U <sub>B</sub> - 9 V) / 0.02 A	R <sub>L</sub> ≥ 10 kΩ	R <sub>L</sub> ≥ 15 kΩ	R <sub>L</sub> ≥ 10 kΩ at 5 V

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

Sensor operating temperature (depending on gasket material)	4 – 20 mA		-40 – 100 °C
	10 – 90% of supply voltage 0 – 5 V, 1 – 5 V, 1 – 6 V, 0 – 10 V		-40 – 125 °C
Media temperature range			-40 – 125 °C
Ambient temperature range (depending on electrical connection)			See page 6
Compensated temperature range			0 – 100 °C
Transport/storage temperature range			-50 – 125 °C
EMC – Emission			EN 61000-6-3
EMC – Immunity			EN 61000-6-2
Insulation resistance			> 100 MΩ 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 page 6

**Explosive atmospheres**

Zone 2 applications	<b>II 3G</b> <b>Ex nA IIA T3 Gc</b> <b>-10 °C &lt; Ta &lt; +85 °C</b>	EN60079-0; EN60079-15
---------------------	---	-----------------------

When used in ATEX Zone 2 areas at low temperatures 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
	Pressure connections	See page 6
Net weight (depending on pressure connection and electrical connection)		0.2 – 0.3 kg

Ordering standard

MBS 33..

Gasket / O-ring material	
0	No gasket
1	Gasket, Viton -20 °C – 125 °C
3	O-ring, Viton -20 °C – 125 °C

Pressure connection	
A B 0 4	G ¼ A (EN 837) (MBS 3300 only)
G B 0 4	G ¼ (DIN 3852E)
A B 0 8	G ½ A (EN 837)
C D 2 8	G ¼ female with flange <sup>2)</sup>
A C 0 4	¼ - 18NPT

Type	
Standard	0 0
with pulse-snubber	5 0

Measuring range	
-1 – 4.0 bar <sup>1)</sup>	8 6
-1 – 10 bar <sup>1)</sup>	8 8
0 – 1.0 bar	1 0
0 – 1.6 bar	1 2
0 – 2.5 bar	1 4
0 – 4.0 bar	1 6
0 – 6.0 bar	1 8
0 – 10 bar	2 0
0 – 16 bar	2 2
0 – 25 bar	2 4
0 – 40 bar	2 6
0 – 60 bar	2 8
0 – 100 bar	3 0
0 – 160 bar	3 2
0 – 250 bar	3 4
0 – 400 bar	3 6
0 – 600 bar	3 8

Electrical connection	
A 1	Plug (EN 175301-803-A), Pg 9
DG	Cable screened ship, 3 m
A 6	Plug (EN 175301-803-A), Pg 11
A 9	Plug (EN 175301-803-A), Pg 13.5
C 8	Bayonet plug; ISO 15170-A1-3.2-Sn
F 4	Cable, screen, ship 2 m
E 3	* EN 60947-5-2, M12 x 1, male excl. female plug

Output signal	
1	4 - 20 mA
2	0 – 5 V
3	1 – 5 V
4	1 – 6 V
5	0 - 10 V
6	10 – 90% of supply voltage

Pressure reference	
1	Gauge (relative)
2	Absolute

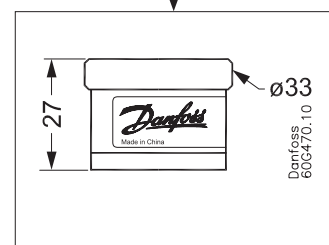
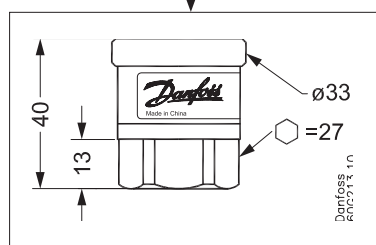
<sup>1)</sup> Sealed gauge only  
<sup>2)</sup> Viton gasket for flange and bolts for mounting included  
\* Gauge versions only available as sealed gauge versions

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	A1	A6	A9	F4 / DG	E3	C8
	EN 175301-803-A Pg 9	EN 175301-803-A Pg 11	EN 175301-803-A Pg 13.5	Cable screened ship 2 m / 3 m	EN 60947-5-2; M12 x 1 male excl. female plug	ISO 15170-A1-3-2-Sn Bayonet



	G $\frac{1}{4}$ A (EN 837)	G $\frac{1}{4}$ (DIN 3852-E)	G $\frac{1}{2}$ A (EN 837)	$\frac{1}{4}$ - 18 NPT	G $\frac{1}{4}$ A female with flange
<b>Type code</b>	<b>AB04</b>	<b>GB04</b>	<b>AB08</b>	<b>AC04</b>	<b>CD28</b>
Recommended torque <sup>1)</sup>	30 - 35 Nm	30 - 35 Nm	30 - 35 Nm	2 - 3 turns after finger tightened	

**Electrical connections**

Type code, See page 5	A1 / A6 / A9	DG	F4	E3	C8
	EN 175301-803-A, Pg 9/11/13.5	Cable screened ship, 3 m	Cable screened ship 2m	EN 60947-5-2 M12 x 1; 4-pin	ISO 15170-A1-3.2-Sn Bayonet
Ambient temperature, 4 – 20 mA output	-40 – 100 °C	-30 – 100 °C	-30 – 100 °C	-25 – 90 °C	-40 – 100 °C
Ambient temperature, 0 – 5 V, 1– 5 V, 1– 6 V, 0– 10 V and ratiometric output	-40 – 125 °C	-30 – 125 °C	-30 – 125 °C	-25 – 90 °C	-40 – 125 °C
Enclosure (IP protection fulfilled together with mating connector)	IP65	IP67	IP67	IP67	IP67
Material	Glass filled polyamid, PA 6.6	RTFRO with PE shrinkage tubing	Polylefin cable with PE Shrinkage tubing	Nickel plated brass, CuZn/Ni	Glass filled polyester PBT
Electrical connection, 4 – 20 mA output (2 wire)	Pin 1: + supply Pin 2: ÷ supply Pin 3: not used  Earth: Connected to MBS enclosure	Black wire: + supply Blue wire: ÷ supply Brown wire: not used Screen: Connected to MBS enclosure	Brown wire: + supply Black wire: ÷ supply Red wire: not used Orange: not used Screen: not connected to MBS enclosure	Pin 1: + supply Pin 2: not used Pin 3: not used Pin 4: - supply	Pin 1: + supply Pin 2: ÷ supply Pin 3: not used Pin 4: not used
Electrical connection, 0 – 5 V, 1– 5 V, 1– 6 V, 0– 10 V and ratiometric output	Pin 1: + supply Pin 2: ÷ supply <sup>1)</sup> Pin 3: + output  Earth: Connected to MBS enclosure	Black wire: + supply Blue wire: ÷ supply <sup>1)</sup> Brown wire: + output Screen: Connected to MBS enclosure	Red wire: + Supply Black wire: - Supply <sup>1)</sup> Brown wire: Output Orange: Not used Screen: Not connected to MBS enclosure	Pin 1: + supply Pin 2: not used Pin 3: + output Pin 4: - supply <sup>1)</sup>	Pin 1: +supply Pin 2: output Pin 3: Ventilation Pin 4: ÷supply <sup>1)</sup>

<sup>1)</sup> Common