

Data sheet

Pressure transmitter for high temperature marine applications

MBS 2100, MBS 2150, 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.

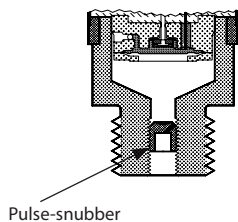
Features

- Designed for use in severe maritime environments
- For medium and ambient temperatures up to 125 °C
- All standard output signals:
 - MBS 2100 / 2150: Ratiometric
 - MBS 3300 / 3350: 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
- Temperature compensated, linearized and laser adjusted
- For use in Zone 2 explosive atmospheres

Approvals

Lloyds Register of shipping, LR
Germanischer Lloyd, GL
Bureau Veritas, BV
Det Norske Veritas, DNV
Registro Italiano Navale, RINA

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

**MBS 2150 and MBS 3350
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.)
	≤ ± 1.0% FS (max.)
Non-linearity BFSL (conformity)	≤ ± 0.2% FS
Hysteresis and repeatability	≤ ± 0.1% FS
Thermal error band (compensated temperature range)	≤ ± 1.0% FS
Response time	Liquids with viscosity < 100 cSt < 4 ms
	Air and gases (MBS 2150/3350) < 35 ms
Overload pressure (static)	6 × FS (max. 1500 bar)
Burst pressure	6 × FS (max. 2000 bar)
Durability, P: 10 – 90% FS	> 10 × 10 ⁶ 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
Supply voltage [U _B], polarity protected	9–32 V DC	10–30 V DC	15–30 V DC	4.75 – 8 V DC (5 V DC nom.)
Supply – current consumption	–	≤ 5 mA	≤ 8 mA	< 5 mA – 5 V
Supply voltage dependency	≤ ± 0.1% FS / 10 V			
Current limitation (linear output up to 1.5x nom. range)	28 mA (typ.)	–		
Output impedance	–	< 25 Ω		
Load [R _L] (load connected to 0 V)	$R_L \leq \frac{(U_B - 9V)}{0.02 A}$	R _L ≥ 10 kΩ	R _L ≥ 15 kΩ	R _L ≥ 10 kΩ at 5 V

Technical data
(continued)
Environmental conditions

Sensor temperature range (depending on gasket material)	Normal	-40 – 85 °C
	ATEX Zone 2	-10 – 85 °C
Max. media temperature	165 - (0.35 × Ambient temp.)	
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 ¹⁾	
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 _{rms} , 5 Hz – 1 kHz
Shock resistance	Shock	500 g / 1 ms
	Free fall	1 m
Enclosure (depending on electrical connection)	See page 6	

¹⁾ Output: > 1 GHz – deviation < 3%

Explosive atmospheres

Zone 2 applications	II 3G Ex nA IIA T3 Gc -20C<Ta<+85C	EN60079-0; EN60079-15
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When used in ATEX Zone 2 areas at temperatures <-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
	Pressure connections	See page 6
Net weight (depending on pressure connection and electrical connection)		0.2 – 0.3 kg

Ordering standard

MBS	[][][][][][][][][][][][]									
Output	[][][][][]					Pressure connection				
Ratiometric	2 1					G ¼ A (EN 837)				
4 – 20 mA and voltage	3 3					A B 0 4 (cartridge design without pulse-snubber)				
Type	[][][][][]					G B 0 4 DIN 3852E-G ¼; Gasket: DIN 3869-14- Viton (-25 – 125 °C)				
Standard	0 0					A B 0 8 G ½ A (EN 837)				
with pulse-snubber	5 0					D B 0 4 G ¼ female with flange ²⁾				
Measuring range	[][][][][]					Electrical connection				
-1 – 1.5 bar ¹⁾	8 6					A9 Plug (EN 175301-803-A), Pg 13.5				
-1 – 5.0 bar ¹⁾	8 8					DG Cable screened ship, 3 m				
0 – 1.0 bar	1 0					A1 Plug (EN 175301-803-A), Pg 9				
0 – 1.6 bar	1 2					A6 Plug (EN 175301-803-A), Pg 11				
0 – 2.5 bar	1 4					C8 Bayonet plug; ISO 15170-A1-3.2-Sn				
0 – 4.0 bar	1 6					Output signal				
0 – 6.0 bar	1 8					1 4 – 20 mA				
0 – 10 bar	2 0					2 0 – 5 V				
0 – 16 bar	2 2					3 1 – 5 V				
0 – 25 bar	2 4					4 1 – 6 V				
0 – 40 bar	2 6					5 0 – 10 V				
0 – 60 bar	2 8					6 10 – 90% of supply voltage – Only for MBS types 21xx				
0 – 100 bar	3 0					Pressure reference				
0 – 160 bar	3 2					1 Gauge (relative)				
0 – 250 bar	3 4					2 Absolute				
0 – 400 bar	3 6									
0 – 600 bar	3 8									

¹⁾ Sealed gauge only
²⁾ Viton gasket for flange and bolts for mounting included

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	A9	DG	A1	A6	C8
	EN 175301-803-A, Pg 13.5	Cable screened ship, 3 m	EN 175301-803-A, Pg 9	EN 175301-803-A, Pg 11	ISO 15170-A1-3.2-Sn Bayonet plug
	<p>Cartridge design</p>		<p>Block design</p>		
				<p>G 1/4 A female with flange</p>	
	G 1/4 A (EN 837)	DIN 3852-E-G 1/4 Gasket: DIN 3869-14-NBR	G 1/2 A (EN 837)	G 1/4 A female with flange	
Type code	AB04	GB04	AB08	DB04	
Recommended torque ¹⁾	30 – 35 Nm	30 – 35 Nm	30 – 35 Nm	–	

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

Electrical connections

Type code, See page 5	A9	DG	A1	A6	C8
	EN 175301-803-A, Pg 13.5	Cable screened ship, 3 m	EN 175301-803-A, Pg 9	EN 175301-803-A, Pg 11	ISO 15170-A1-3.2-Sn
Ambient temperature, 4 – 20 mA output	-40 – 100 °C	-30 – 100 °C	-40 – 100 °C	-40 – 100 °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	-40 – 125 °C	-40 – 125 °C	-40 – 125 °C
Enclosure (IP protection fulfilled together with mating connector)	IP65	IP67	IP65	IP65	IP68 / 69K
Material	Glass filled polyamid, PA 6.6	HABIA cable AB RTFRO with PE shrinkage tubing	Glass filled polyamid, PA 6.6	Glass filled polyamid, PA 6.6	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	Pin 1: + supply Pin 2: ÷ supply Pin 3: not used Earth: Connected to MBS enclosure	Pin 1: + supply Pin 2: ÷ supply Pin 3: not used Earth: Connected to MBS enclosure	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 ¹⁾ Pin 3: + output Earth: Connected to MBS enclosure	Black wire: + supply Blue wire: ÷ supply ¹⁾ Brown wire: + output Screen: Connected to MBS enclosure	Pin 1: + supply Pin 2: ÷ supply ¹⁾ Pin 3: + output Earth: Connected to MBS enclosure	Pin 1: + supply Pin 2: ÷ supply ¹⁾ Pin 3: + output Earth: Connected to MBS enclosure	Pin 1: + supply Pin 2: ÷ supply ¹⁾ Pin 3: + output Pin 4: not used

¹⁾ Common