

Data Sheet

# Pressure transmitters Type **MBS 3200** and **MBS 3250**

For heavy duty applications



The compact high temperature pressure transmitter MBS 3200 is designed for use in hydraulic and almost all industrial applications, and offers a reliable pressure measurement, even under harsh environmental conditions.

MBS 3250 with integrated pulse-snubber is designed for use in hydraulic applications with severe medium 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.

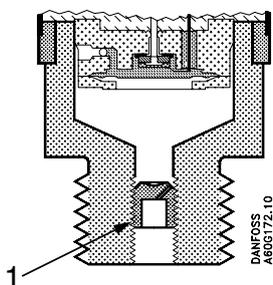
A robust design, an excellent vibration stability and a high degree of EMC / EMI protection equip the pressure transmitter to meet the most stringent industrial requirements.

## Features

- Designed for use in harsh industrial and hydraulic environments
- For media and ambient temperatures up to 125 °C
- With integrated pulse-snubber. Protected against cavitation, liquid hammering and pressure peaks (MBS 3250)
- All standard output signals: 4 – 20 mA, 0 – 5 V, 1 – 5 V, 1 – 6 V, 0 – 10 V, 1 – 10 V and ratiometric output signal: 10-90% of supply voltage
- Enclosure and wetted parts of AISI 316L
- A wide range of pressure and electrical connections
- Fully digitally compensated
- For use in Zone 2 explosive atmospheres
- UL approved

## Applications

### Applications (MBS 3250)



#### 1 Pulse-snubber

Cavitation, liquid hammer and pressure peaks may occur in 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 conditions (MBS 3250)

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.

## Product specification

### Technical data

**Table 1: 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 3250)	< 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

**Table 2: Electrical specifications**

Nom. output signal (short-circuit protected)	4 – 20 mA	0 – 5 V, 1 – 5 V, 1 – 6 V DC	0 – 10 V, 1 – 10 V DC	10 – 90% of supply voltage
Supply voltage [U <sub>b</sub> ], polarity protected	9 – 32 V DC	9 – 32 V DC	15 – 32 V DC	4.5 – 5.5 V DC
Supply – current consumption	–	≤ 5 mA	≤ 8 mA	≤ 5 mA at 5 V DC
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	0-5 V: 5.75 V, 1-5 V: 5.6 V, 1-6 V: 6.75 V	0-10 V: 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 DC

**Table 3: Environmental conditions**

Sensor operating temperature (depending on gasket material)	4 – 20 mA		-40 – 100 °C
	10 – 90% of supply voltage		-40 – 125 °C
	0 – 5 V, 1 – 5 V, 1 – 6 V, 0 – 10 V		
Media temperature range			-40 – 125 °C
Ambient temperature range (depending on electrical connection)			See <a href="#">Electrical connections</a>
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 20 g, 25 Hz – 2 kHz	IEC 60068-2-6
	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 <a href="#">Electrical connections</a>

**Table 4: Explosive atmospheres**

Zone 2 applications <sup>(1)</sup>	 Ex ce IIA T3 Gc -10°C < Ta < +85°C	EN60079-0; EN60079-7
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<sup>(1)</sup> When used in ATEX Zone 2 areas at low temperatures the cable and plug must be protected against impact.

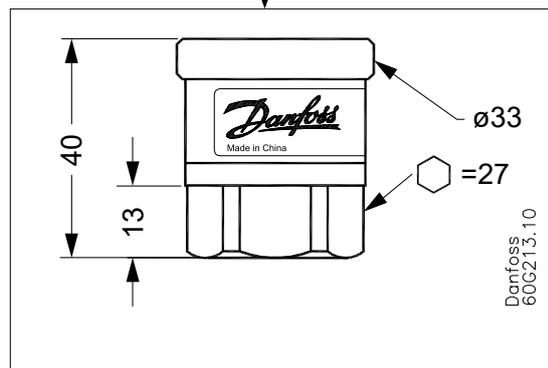
## Pressure transmitters, type MBS 3200 and MBS 3250

**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 <a href="#">Electrical connections</a>
	Pressure connection	See <a href="#">Dimensions/Combinations</a>
Net weight (depending on pressure connection and electrical connection)		0.2 – 0.3 kg

## Dimensions/Combinations

Type code	A1	G1	A3	E3	A8	C8
	EN175301-803-A Pg 9	AMP Econoseal	2 m screened cable	EN 60947-5-2 M12 x 1; 4-pin	AMP Superseal	ISO 15170-A1-3-2-Sn Bayonet



	G¼ A (EN 837)	G½ A (EN 837)	¼ - 18 NPT	½ - 14 NPT	DIN 3852-A-M 18 x 1.5	DIN 3852-E-G¼	DIN 3852-E-M 14 x 1.5	Din 3852-A-G 3/8
<b>Type code</b>	<b>AB04</b>	<b>AB08</b>	<b>AC04</b>	<b>AC08</b>	<b>GA12</b>	<b>GB04</b>	<b>FA09</b>	<b>GB06</b>
Recommended torque <sup>(1)</sup>	30 - 35 Nm	30 - 35 Nm	2-3 turns after finger tightened	2-3 turns after finger tightened	30 - 35 Nm	30 - 35 Nm	30 - 35 Nm	30 - 35 Nm

<sup>(1)</sup> Depends on various parameters such as seal material, coupling material, thread lubrication and pressure level

## Electrical connections

Table 6: Electrical connections

Type code	A1	G1	A3	E3	A8	C8
	EN 175301-803-A, Pg 9	AMP Econoseal J series (male)	2 m screened cable	EN 60947-5-2 M12 x 1; 4-pin	AMP Superseal 1.5 series (male)	ISO 15170-A1-3-2 Sn Bayonet
Ambient temperature 4 - 20 mA output	-40 – 100 °C	-30 – 100 °C	-30 – 85 °C	-25 – 90 °C	-30 – 100 °C	-40 – 100 °C
Ambient temperature 0 - 5 V, 1 - 5 V, 1 - 6 V, 0 - 10 V, 1 - 10 V output	-40 – 125 °C	-30 – 105 °C	-30 – 85 °C	-25 – 90 °C	-30 – 100 °C	-40 – 125 °C
Ambient temperature Ratiometric output, 10-80% of supply voltage	-40 – 125 °C	-30 – 105 °C	-30 – 85 °C	-25 – 90 °C	-30 – 100 °C	-40 – 125 °C
Enclosure (IP protection fulfilled together with mating connector)	IP65	IP67	IP67	IP67	IP67	IP67/IP69
Material	Glass filled polyamid, PA 6.6	Glass filled polyamid, PA 6.6 <sup>(1)</sup>	Poliolyfin cable with PE shrinkage tubing	Nickel plated brass, CuZn/Ni	Glass filled polyamid, PA 6.6 <sup>(2)</sup>	Glass filled polyamid PA 6.6 <sup>(2)</sup>
Electrical connection, 4 – 20 mA output (2 wire)	Pin1: + supply Pin 2: ÷ supply Pin 3: not used  Earth: Connected to MBS enclosure	Pin 1: + supply Pin 2: ÷ supply <sup>(3)</sup> Pin 3: not used	Brown wire: + supply Red wire: not used Orange: not used Screen: not connected to MBS enclosure	Pin1: + supply Pin 2: not used Pin 3: not used Pin 4: ÷ supply	Pin1: + supply Pin 2: ÷ supply Pin 3: not used	Pin1: + 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, 1 – 10 V output	Pin1: + supply Pin 2: ÷ supply Pin 3: + output  Earth: Connected to MBS enclosure	Pin 1: + supply Pin 2: ÷ supply Pin 3: + output	Brown wire: + output Black wire: ÷ supply <sup>(3)</sup> Red wire: not used Orange: not used Screen: not connected to MBS enclosure	Pin 1: + supply Pin 2: not used Pin 3: + output Pin 4: ÷ supply <sup>(3)</sup>	Pin 1: + supply Pin 2: ÷ supply <sup>(3)</sup> Pin 3: + output	-
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<sup>(1)</sup> Female plug: Glass filled polyester, PBT

<sup>(2)</sup> Wire: PTFE (teflon) Protection sleeve: PBT mesh (polyester)

<sup>(3)</sup> Common

## Ordering

### Ordering standard

MBS 3200 MBS 3250	-	-	-	-	-	-	-	-	-	-																																																																									
<p><b>Measuring range</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>0 – 1.0 bar</td><td style="text-align: center;">10</td></tr> <tr><td>0 – 1.6 bar</td><td style="text-align: center;">12</td></tr> <tr><td>0 – 2.5 bar</td><td style="text-align: center;">14</td></tr> <tr><td>0 – 4.0 bar</td><td style="text-align: center;">16</td></tr> <tr><td>0 – 6.0 bar</td><td style="text-align: center;">18</td></tr> <tr><td>0 – 10 bar</td><td style="text-align: center;">20</td></tr> <tr><td>0 – 16 bar</td><td style="text-align: center;">22</td></tr> <tr><td>0 – 25 bar</td><td style="text-align: center;">24</td></tr> <tr><td>0 – 40 bar</td><td style="text-align: center;">26</td></tr> <tr><td>0 – 60 bar</td><td style="text-align: center;">28</td></tr> <tr><td>0 – 100 bar</td><td style="text-align: center;">30</td></tr> <tr><td>0 – 160 bar</td><td style="text-align: center;">32</td></tr> <tr><td>0 – 250 bar</td><td style="text-align: center;">34</td></tr> <tr><td>0 – 400 bar</td><td style="text-align: center;">36</td></tr> <tr><td>0 – 600 bar</td><td style="text-align: center;">38</td></tr> </table> <p><b>Pressure reference</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Gauge (relative)</td><td style="text-align: center;">1</td></tr> <tr><td>Absolute</td><td style="text-align: center;">2</td></tr> </table> <p><b>Output signal</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>4 – 20 mA</td><td style="text-align: center;">1</td></tr> <tr><td>0 – 5 V</td><td style="text-align: center;">2</td></tr> <tr><td>1 – 5 V</td><td style="text-align: center;">3</td></tr> <tr><td>1 – 6 V</td><td style="text-align: center;">4</td></tr> <tr><td>0 – 10 V</td><td style="text-align: center;">5</td></tr> <tr><td>1 – 10 V</td><td style="text-align: center;">7</td></tr> <tr><td>10 - 90% of supply</td><td style="text-align: center;">6</td></tr> </table>	0 – 1.0 bar	10	0 – 1.6 bar	12	0 – 2.5 bar	14	0 – 4.0 bar	16	0 – 6.0 bar	18	0 – 10 bar	20	0 – 16 bar	22	0 – 25 bar	24	0 – 40 bar	26	0 – 60 bar	28	0 – 100 bar	30	0 – 160 bar	32	0 – 250 bar	34	0 – 400 bar	36	0 – 600 bar	38	Gauge (relative)	1	Absolute	2	4 – 20 mA	1	0 – 5 V	2	1 – 5 V	3	1 – 6 V	4	0 – 10 V	5	1 – 10 V	7	10 - 90% of supply	6	<p><b>Gasket/O-ring material</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>0</td><td>No gasket (see pressure connections)</td></tr> <tr><td>1</td><td>Viton (media temp.: -20 – 125 °C)</td></tr> <tr><td>3</td><td>O-ring, Viton (media temp.: -20 – 125 °C)</td></tr> </table> <p><b>Pressure connection</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>A B 0 4</td><td>G ¼ A (EN837) (MBS 3200)</td></tr> <tr><td>A B 0 8</td><td>G½ A (EN837)</td></tr> <tr><td>A C 0 4</td><td>¼ - 18 NPT</td></tr> <tr><td>A C 0 8</td><td>½ - 14 NPT (MBS 3200)</td></tr> <tr><td>G A 1 2</td><td>DIN 3852-A M18 × 1.5</td></tr> <tr><td>G B 0 4</td><td>DIN 3852-E-G ¼</td></tr> <tr><td>F A 0 9</td><td>DIN 3852-E-M 14 × 1.5</td></tr> <tr><td>G B 0 6</td><td>DIN 3852-A-G ⅜</td></tr> </table> <p><b>Electrical connection</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>A1</td><td>Plug, EN 175301-803-A, Pg 9</td></tr> <tr><td>G1</td><td>* Plug, AMP Econoseal, J Series, male, excl. female plug</td></tr> <tr><td>A3</td><td>Screened cable , 2 m</td></tr> <tr><td>E3</td><td>* Plug, EN 60947-5-2, M12 x 1, male, excl. female plug</td></tr> <tr><td>A8</td><td>* Plug, AMP Superseal, 1.5 Series, male, excl. female plug</td></tr> <tr><td>C8</td><td>Plug, ISO 15170-A1-3.2-Sn male, excl. female plug, Bayonet</td></tr> </table>	0	No gasket (see pressure connections)	1	Viton (media temp.: -20 – 125 °C)	3	O-ring, Viton (media temp.: -20 – 125 °C)	A B 0 4	G ¼ A (EN837) (MBS 3200)	A B 0 8	G½ A (EN837)	A C 0 4	¼ - 18 NPT	A C 0 8	½ - 14 NPT (MBS 3200)	G A 1 2	DIN 3852-A M18 × 1.5	G B 0 4	DIN 3852-E-G ¼	F A 0 9	DIN 3852-E-M 14 × 1.5	G B 0 6	DIN 3852-A-G ⅜	A1	Plug, EN 175301-803-A, Pg 9	G1	* Plug, AMP Econoseal, J Series, male, excl. female plug	A3	Screened cable , 2 m	E3	* Plug, EN 60947-5-2, M12 x 1, male, excl. female plug	A8	* Plug, AMP Superseal, 1.5 Series, male, excl. female plug	C8	Plug, ISO 15170-A1-3.2-Sn male, excl. female plug, Bayonet
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\* Gauge versions only available as sealed gauge versions

Preferred version

**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.

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### Valid certificates and declarations

File name	Document type	Document topic	Approval authority
E227388	Explosive - Safety Certificate	Hazardous Locations	UL
E31024	Electrical - Safety Certificate	-	UL
E311982	Electrical - Safety Certificate	-	UL
DK.C.30.018.A 31316	Measuring - Performance Certificate	-	GOST
064G9615.06	EU Declaration	ATEX/EMCD/RoHS	Danfoss
CN.C.30.004.A 59728-1	Measuring - Performance Certificate	-	GOST
CRN.0F18477.5123467890YTN	Pressure - Safety Certificate	CRN	TSSA
060R3160.00	Manufacturers Declaration	China RoHS	Danfoss
064R9402.00	Manufacturers Declaration	PED	Danfoss
E494625	Electrical - Safety Certificate	-	UL
1786330	Explosive - Safety Certificate	-	CSA

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