ENGINEERING
TOMORROW

Data sheet

OEM Pressure transmitters for heavy-duty applications
MBS 1600 and MBS 1650

The compact OEM pressure transmitter programme is designed for use in severe hydraulic applications. The programme consists of two series:

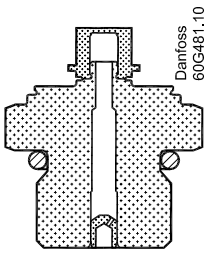
- MBS 1600 – without integrated pulse-snubber
- MBS 1650 – with integrated pulse-snubber

The integrated pulse-snubber offers a high degree of protection against cavitations and liquid hammer, and the well thought out design results in excellent vibration stability and an exceptional robustness. The high degree of EMI protection equips the pressure transmitter to meet most requirements.

Features

- Designed for use in severe OEM applications
- For medium and ambient temperatures up to 125 °C
- All standard output signals: 4 – 20 mA, 1 – 5 V, 1 – 6 V, 0 – 10 V
- Wetted parts made of stainless steel
- Immunity to electrical noise from VFD
- Immunity to direct coupled transients
- Immunity to pulse magnetic field
- Mis-wire protected
- Short circuit protected
- A wide range of pressure and electrical connections
- EMC protection up to 100 V/m
- MTTFd > 100 years

Pulse-snubber in MBS 1650



Application

Cavitation, liquid hammer and pressure peaks may occur in liquid filled 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.

The media viscosity has only little effect on the response time. Even at viscosities up to 100 cSt, the response time will not exceed 4 ms.

Technical data

Performance (EN 60770)

Accuracy (incl. nonlinearity, hysteresis and repeatability)	± 0.5% FS
Thermal zero point shift	<± 0.15% FS / 10K
Thermal span shift	<± 0.15% FS / 10K
Response time liquids (10 – 90%)	~ 1 ms[1])
Durability, P: 10 – 90% FS	>10 × 10^6 cycles

[1]) *Further details please contact Danfoss*

Overload and burst pressure – without pulse-snubber (MBS 1600)

Nominal pressure [bar]	6	10	16	25	40	60	100	160	250	400	500	600	1000[2])	1600[2])	2200[2])
Overload pressure	21	30	48	80	80	140	200	320	500	800	1400	1400	2000	2500	3000
Burst pressure	280	400	640	800	800	1400	2000	1600	2500	4000	>4000	>4000	>4000	>4000	>4000

[2]) *Only available with M12 × 1 1.5 P high pressure port, type FC06. Please contact Danfoss.*

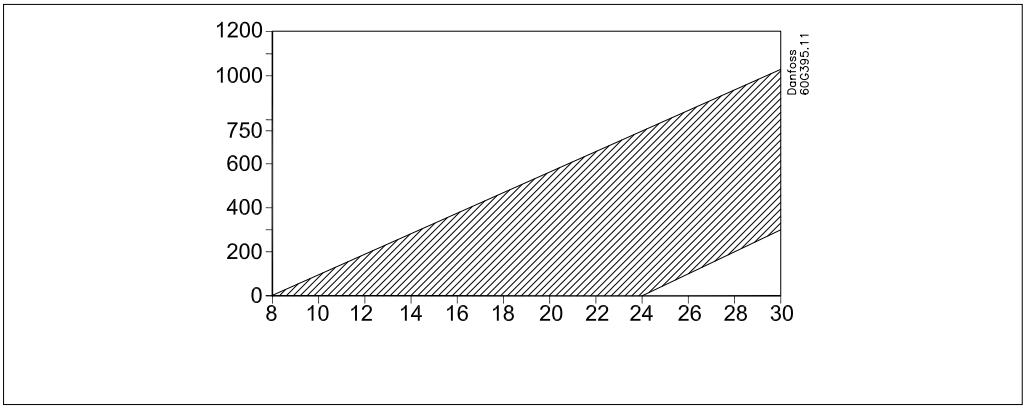
Overload and burst pressure – with integrated pulse-snubber (MBS 1650)

Nominal pressure [bar]	6	10	16	25	40	60	100	160	250	400	500	600
Overload pressure	21	30	48	120	120	210	300	480	750	1200	2100	2100
Burst pressure	280	400	640	800	800	1400	2000	1600	2500	4000	>4000	>4000

Electrical specifications

Nom. output signal (Short-circuit protected)	**4 – 20 mA (2 wire)**	**0 – 5 V, 1 – 5 V 1 – 6 V**	**0 – 10 V**
Supply voltage [U_B], polarity protected	8 – 32 V	8 – 32 V	12 – 32 V
Supply – current consumption	–	4.5 mA	4.5 mA
Output impedance	–	≤ 90 Ω	≤ 90 Ω
Load [R_L] (connected to 0 V)	See chart below	R_L ≥ 10 kΩ	R_L ≥ 10 kΩ
Load [R_L] (connected to + V)	See chart below	Not possible	Not possible

4 – 20 mA output - min. / max. resistance vs. supply voltage



Note:
Loop current should not exceed 22 mA continuous or 25 mA temporarily due to pressure peaks

Technical data
(continued)

Environmental conditions

Media temperature range		-40 – 125 °C
Ambient temperature range		See page 5
Compensated temperature range		-40 – 125 °C
Transport temperature range		-55 – 150 °C
EMC		EN 61326-2-3: 2013
Directive		2014/30/EU
Radiated immunity		100 Vm
Surge		Line-Earth (1 Kv - 42 ohm); Line-Line (0.5 kV-42 ohm)
ESD		8 Kv contact , 15 Kv air
Vibration stability	20 g, 10 – 2000 Hz, sinus	EN 60068-2-6
Shock resistance	100 g	EN 60068-2-27
Enclosure (depending on electrical connection)		See page 5

Mechanical conditions

Materials	Wetted parts	17 – 4 PH
	Enclosure	AISI 304 or plastic
	Pressure connection	17 – 4 PH
	Electrical connection	See page 5

Ordering standard

MBS 16.. 1 – –

Standard 0 0
with pulse-snubber 5 0

Gasket
– Defined type of pressure connection

Measuring range [1] (Gauge)

0 – 6 bar	18
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 – 500 bar	3 7
0 – 600 bar	3 8

Pressure connections (HEX 22 mm)

G B 0 4	G ¼ A DIN 3852-E [2]
A C 0 4	¼ – 18 NPT
A C 0 2	⅛ – 27 NPT
B D 0 8	7/16 – 20 UNF-2A [2]
A F 0 4	¼ – 18 NPTF
A F 0 2	⅛ – 27 NPTF
P T 0 4	¼ – 19 PT

Pressure reference
Gauge(relative) 1

Electrical connections

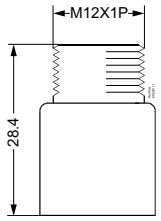
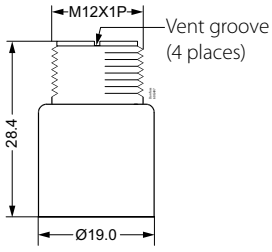
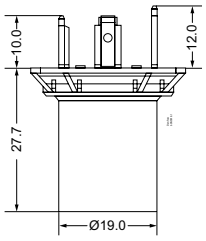
C 1	M12 × 1 EN60947-5-2
K 4	M12 × 1 EN60947-5-2 vented via thread
A 0	EN175301-803-A [3]

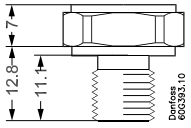
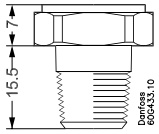
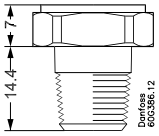
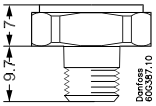
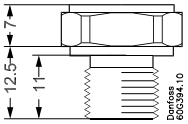
Output signal

4 – 20 mA	1
0 – 5 V	2
1 – 5 V	3
1 – 6 V	4
0 – 10 V	5

[1] For pressure range < 10 bar or >600 bar, please contact Danfoss
[2] Incl. Viton gasket. Min. medium temperature is -25 °C
[3] Mating connector, code.no 060G0008

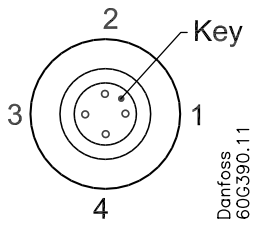
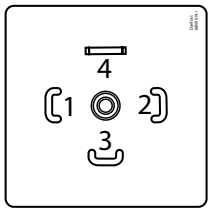
Dimension/Combination

Type code	C1	K4	A0
	M12 × 1 EN60947-5-2	M12 × 1 EN60947-5-2 vented via thread	EN175301-803-A
			

Note: HEX is 22 mm across flats.					
	7/16 – 20 UNF-2A	¼ – 19 Pt	¼ – 18 NPT / NPTF	**1/8** – 27 NPT / NPTF	G ¼ A DIN 3852-E
Type code	**BD08**	**PT04**	**AC04 / AF04**	**AC02 / AF02**	**GB04**
Recommended torque [2])	18 – 20 Nm	2 – 3 turns after fnger tightend	2 – 3 turns after fnger tightend	2 – 3 turns after fnger tightend	30 – 35 Nm

* For other combinations please contact Danfoss.
[2]) Depends of different parameters as packing material, mating material, thread lubrication and pressure level.

Electrical connections

Type code	C1/K4	A0
	 C1: M12 × 1 EN60947-5-2 K4: M12 × 1 EN60947-5-2 vented via thread	 EN175301-803-A
Ambient temperature 4 – 20 mA	-40 – 100 °C	-40 – 100 °C
Ambient temperature, 0 – 5 V, 1 – 5 V, 1 – 6 V, 0 – 10 V,	-40 – 125 °C	-40 – 125 °C
Enclosure (IP protection fulfilled together with mating connector)	IP67 IP54 with vented thread	IP65
Material	SS, PBT 30% GFR Gold (Au) plated	Glass filled PBT 30% Tin (Sn) plated
Electrical connections, 4 – 20 mA (2 wire)	Pin 1: + supply Pin 2: do not connect Pin 3: ÷ supply Pin 4: do not connect	Pin 1: + supply Pin 2: do not connect Pin 3: - supply connect Pin 4: do not connect
Electrical connections, 0 – 5 V, 1 – 5 V, 1 – 6 V, 0 – 10 V,	Pin 1: + supply Pin 2: output Pin 3: ÷ supply Pin 4: do not connect	Pin 1: + Pin 2: output Pin 3: - supply Pin 4: do not connect