Intrinsically safe presure transmitters for hazardous environments

Type MBS 4201, MBS 4251, MBS 4701 and MBS 4751

Technical brochure

Features

- Ex II 1G EEx ia IIC T4 - T6 in compliance with ATEX 100a
- Applicable in potentially explosive atmosphere: Zone 0, Zone 1, Zone 2 (gases and vapour)
- Enslosure and wetted parts of acid-resistant stainless steel (AISI 316L)
- Pressure ranges in relative (gauge) or absolute from 0 up to 600 bar
- Output signal: 4 - 20 mA
- A wide range of pressure connections
- Temperature compensated and laser calibrated
- MBS 4251 and MBS 4751 with integrated pulse snubber for protection against cavitation and liquid hammering
- MBS 4701 and MBS 4751 zero and span adjustment

Description

The intrinsically safe pressure transmitter program is designed for use in hazardous environments and offers a reliable pressure measurement, even in harsh applications with severe medium influences like cavitation, liquid hammer or pressure peaks.
The flexible pressure transmitter program is EEx ia IIC T6 explosion protected according to ATEX 100a and covers a 4-20 mA output signal, absolute and gauge (relative) versions, measuring ranges from 0-1 to 0-600 bar, zero point and span adjustment, plug connection and a wide range of pressure connections.
Excellent vibration stability, robust construction, and a high degree of EMC/EMI protection equip the pressure transmitter to meet the most stringent industrial requirements.

Ordering standard versions MBS 4701

Plug: Pg 9 (EN 175301-803-A)
Output: 4-20 mA
Pressure connection: G ½ A (EN 837)

Measuring range Pe [1] [bar]	Type no.	Code no.
0-1	MBS 4701-1011-1AB08	**060G4303**
0-1.6	MBS 4701-1211-1AB08	**060G4300**
0-2.5	MBS 4701-1411-1AB08	**060G4304**
0-4	MBS 4701-1611-1AB08	**060G4305**
0-6	MBS 4701-1811-1AB08	**060G4306**
0-10	MBS 4701-2011-1AB08	**060G4307**
0-16	MBS 4701-2211-1AB08	**060G4301**
0-25	MBS 4701-2411-1AB08	**060G4308**
0-40	MBS 4701-2611-1AB08	**060G4309**
0-60	MBS 4701-2811-1AB08	**060G4302**
0-100	MBS 4701-3011-1AB08	**060G4310**

MBS 4751 with pulse snubber

0-160 bar	MBS 4751-3211-1AB08	**060G4311**
0-250 bar	MBS 4751-3411-1AB08	**060G4312**
0-400 bar	MBS 4751-3611-1AB08	**060G4313**
0-600 bar	MBS 4751-3811-1AB08	**060G4314**

1) Relative/ gauge

Technical data

Performance (EN 60770)

MBS type		Standard version		With zero point and span adjustment	
		MBS 4201	MBS 4251	MBS 4701	MBS 4751
		-	with pulse snubber	-	with pulse snubber
Accuracy (incl. non-linearity, hysteresis and repeatability)		±1% FS	±1% FS	±0.5% FS	±0.5% FS
Non-linearity BFSL (conformity)		≤ ±0.2% FS			
Hysteresis and repeatability		≤ ±0.1% FS			
Thermal error band (compensated temperature range)		≤ ±1% FS			
Response time	Liquids with viscosity < 100 cSt	< 4 ms	< 4 ms	< 4 ms	< 4 ms
	Air and gases	< 4 ms	< 35 ms	< 4 ms	< 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			
Zero point adjustment	0-1 to 0-10 bar mearsuring range	-	-	-5 to +20 % FS	
	0-16 to 0-40 bar measuring range	-	-	-5 to +10% FS	
	0-60 to 0-600 bar measuring range	-	-	-2.5 to +5% FS	
Span adjustment	0-1 to 0-600 bar measuring range	-	-	-5 to +5% FS	

Electrical specifications

Nom. output signal (short curcuit protected)	4 to 20 mA
Supply voltage, UB (polarity protected)	10 to 28 V dc
Supply voltage dependency	≤ ±0.05% FS/10 V
Current limitation (linear output signal up to 1.5 × rated range)	30-35 mA
Load [R_L] (load connected to 0 V)	$R_L \leq \frac{U_B - 10\ V}{0.02\ A}$ [Ω]

Environmental conditions

Media temperature range				See page 5
Ambient temperature range				See page 5
Compensated temperature range				0 to + 100°C
Transport temperature range		Plug version/cable version		–50 to +100°C/-30 to +80°C
EMC - Emission				EN 61000-6-3
EMC Immunity	Electrostatic discharge	Air mode	8kV	EN 61000-6-2
		Contact mode	4 kV	EN 61000-6-2
	RF	Field	10 V/m, 26 MHz - 1 GHz	EN 61000-6-2
		Conducted	10 V_{rms}, 150 kHz - 30 MHz	EN 61000-6-2 1)
	Transient	Burst	4 kV (CM), Clamp	EN 61000-6-2
		Surge	1 kV (CM, DM) Rg = 42 Ω	EN 61000-6-2
Insulation resistance				> 100 MΩ at 100 V
Vibration stability	Sinusoidal	20 g, 25 Hz - 2 kHz		IEC 60068-2-6
	Random	7.5 g_{rms}, 5 Hz - 1 kHz		IEC 60068-2-64
Shock resistance	Shock	500 g/1ms		IEC 60068 - 2 - 27
	Free fall			IEC 60068 - 2 - 32
Enclosure (depending on electrical connection)				See page 5

1) In the frequency range of 150 kHz - 3 MHz the error is > 1 % FS

Mechanical characteristics

Materials	Wetted parts	EN 10088-1; 1.4404 (AISI 316 L)
	Enclosure	EN 10088-1; 1.4404 (AISI 316 L)
Weight (depending on pressure connection)		0.2 - 0.3 kg

Ordering special versions

MBS 4201 -
MBS 4251 -
MBS 4701 -
MBS 4751 - 1 - [ ] [ ] [ ] [ ]

Measuring range

0 - 1 bar	1 0
0 - 1.6 bar	1 2
0 - 2.5 bar	1 4
0 - 4 bar	1 6
0 - 6 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

Pressure connection

A B 0 8	G ½ A (EN 837)
A C 0 4	¼ -18 NPT
A C 0 8	½ -14 NPT
G B 0 4	DIN 3852-E-G ¼ Gasket: DIN 3869-14 NBR
F A 0 8	ISO 6149-2, M14 x 1.5-6g, O-ring NBR

Electrical connection

Figures refer to plug and standard PIN configuration - see page 5

1	Plug Pg 9 (EN175301-803-A)
3	Screened cable, 2 m[1)]
7	ISO 15170-A1-3.2-Sn, male [1)] (Bayonet plug)

[1)] MBS 4201 and MBS 4251 only

Output signal

1 ..... 4 - 20 mA

Pressure reference

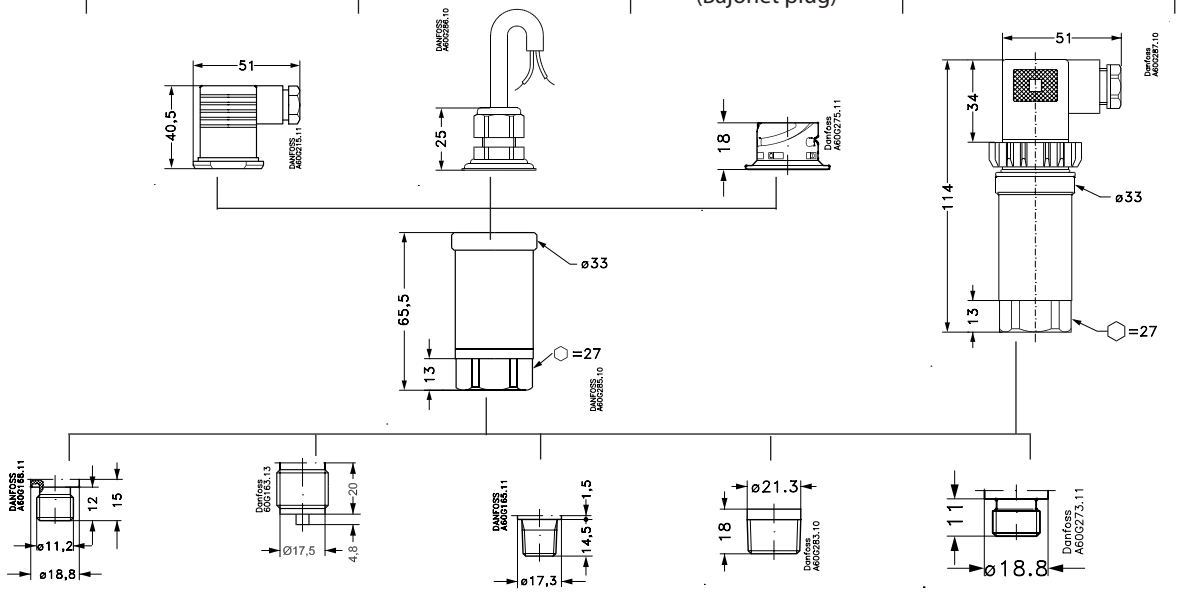
Gauge (relative)	1
Absolute	2

Preferred versions

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

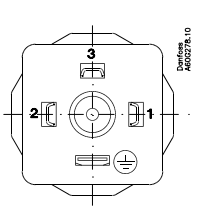
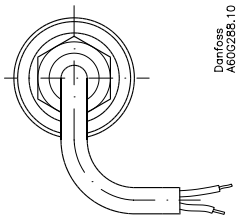
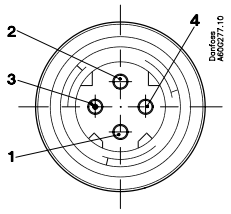
	Non adjustable versions MBS 4201, MBS 4251			Adjustable versions MBS 4701, MBS 4751
Type code	1	3	7	1
	EN175301-803-A, Pg 9	2 m cable	ISO 15170-A1-3.2-Sn (Bajonet plug)	EN175301-803-A, Pg 9



	DIN 3852-E-G ¼ Gasket DIN 3869-14-NBR	G½A (EN 837)	¼ - 18 NPT	½ - 14 NPT	ISO 6149-2 M14 x 1.5 - 6g Incl. O-ring NBR
	GB04	AB08	AC04	AC08	FA08
Recommended torque 1)	30-35 Nm	30-35 Nm	2-3 turns after finger tightened	2-3 turns after finger tightened	30-35 Nm

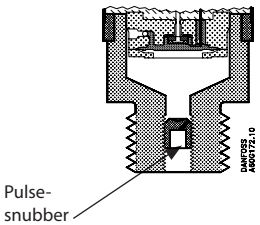
1)Depends of different parameters as packing material, mating material, thread lubrication and pressure level.

Electrical connections

Type code page 4						
	1		3		7	
	EN 175301-803-A 		Cable versions 		ISO 15170-A1-3-2-Sn (bayonet plug) 	
Ambient temperature	-40 to + 85°C		-30 to + 85°C		-40 to + 85°C	
Material	Glass filled Polyamid, PA 6.6		PVC cable		Glass filled Polyester, PBT	
Enclosure 1)	IP 65		IP67		IP67/IP69K	
Ex-certification - Conformity specifications						
Ambient temperature						
Eex ia IIC T4	−40 to 100°C		−30 to 80°C		−40 to 100°C	
Eex ia IIC T5	−40 to 75°C		−30 to 75°C		−40 to 75°C	
Eex ia IIC T6	−40 to 50°C		−30 to 50°C		−40 to 50°C	
Medium temperature						
Eex ia IIC T4	−40 to 125°C		−40 to 125°C		−40 to 125°C	
Eex ia IIC T5	−40 to 95°C		−40 to 95°C		−40 to 95°C	
Eex ia IIC T6	−40 to 50°C		−40 to 50°C		−40 to 50°C	
Power supply Ui	28 V dc		28 V dc		28 V dc	
Short circuit rating Ii	100 mA		100 mA		100 mA	
Power limitation Pi	0.7 W		0.7 W		0.7 W	
Internal capacity Ci	≤ 40 nF		≤ 40 nF + 0.2 nF/m cable		≤ 40 nF	
Internal inductivity Li	≤ 0.1 mH		≤ 0.1 mH + 0.8 µH/m cable		≤ 0.1 mH	
Electrical connection, 4-20 mA output (2 wire)						
Standard configuration	Pin 1:	+ Supply	Black 1:	+ Supply	Pin 1:	+ Supply
	Pin 2:	− Supply	Black 2:	− Supply	Pin 2:	− Supply
	Pin 3:	Not used	Screen:	Not connected	Pin 3:	Ventilation
	Earth:	Connected to MBS enclosure		to MBS enclosure	Pin 4:	Not used

1) (IP protection fulfilled together with mating connector)

MBS 4251 and MBS 4751 Application and media conditions



Application

Cavitation, liquid hammer and pressure peaks may occour in hydraulic systems with changes in flow velocity, e.g. fast closing of a valve or pump starts and stops.

The problem may occour on inlet and outlet side, even at rather low operating pressures.

Media condition

Clogging of the nozzle may occour in liquids containing particles. Mounting the transmitter in an upright position minimizes the risk of clogging, because the flow in the nozzle is restricted to the start-up period when the dead volume behind the nozzle orifice is relatively big (0.3 mm). 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.