

Pressure transmitter type MBS 33M (Marine)



Introduction



The Danfoss MBS 33M is an electronic pressure transmitter designed for direct installation at the measuring point. It has been developed to monitor and regulate pressure in maritime and industrial environments.

The output signal is an amplified, linearized and temperature-compensated current signal of 4 to 20 mA. The signal can be transmitted over a long distance without difficulty.

Features

- Stainless steel enclosure and diaphragm.
- Accuracy class 1.
- Pressure range from 1-7500 psi.
- G $1/2$ A pressure connection
- 10 to 30 V d.c. supply voltage
- 4 to 20 mA output signal
- Electrical connection is by DIN plug (43650) or fixed cable (2 m cable fitted to unit as standard).

The transmitter is available in two versions:
a: relative (gauge) pressure transmitter
b: sealed gauge pressure transmitter

The relative pressure transmitter uses atmospheric pressure as reference (effective pressure, gauge (Pe)).

To eliminate the effect of atmospheric pressure on measuring accuracy, relative pressure transmitters up to and including 360 psi are vented to atmosphere (behind the measuring diaphragm).

Pressure transmitters for over 360 psi are supplied as sealed gauge pressure transmitters which means they are calibrated at atmospheric pressure as reference.

On sealed gauge pressure transmitters below 360 psi, variations in atmospheric pressure have small effect on measuring accuracy.

Applications

The MBS 33M pressure transmitter is designed for operation in harsh industrial environments.

The climatic environment

The pressure transmitter is reliable, even when subjected to extreme humidity and temperature. The enclosure is moulded in with a silicone compound, which gives maximum protection against dust and moisture.

The electrical environment

The pressure transmitter has a built-in HF filter which gives high protection against electromagnetic noise and interference. This feature applies to the effects of:

- mobile telephones and walkie-talkies (HF interference)
- electric motor start and stop (transient voltages)

The mechanical environment

The MBS 33M construction provides resistance to pressure surge, overpressure, and vibration up to 20 g ($g = 9.81 \text{ m/s}^2$) in the frequency range 20 Hz to 2 kHz.

Applications include:

Diesel engines, gears, compressors, pumps, boilers, generator sets, hydraulic and pneumatic control systems, lifts and powerpacks.

Operating Principles

The MBS 33M pressure transmitter operates on the piezoresistive principle, i.e. four resistors (silicon strain gauges) of equal size are diffused at particular points onto a silicon chip that acts as a diaphragm in such a way that its geometric form changes when it is subjected to a pressure.

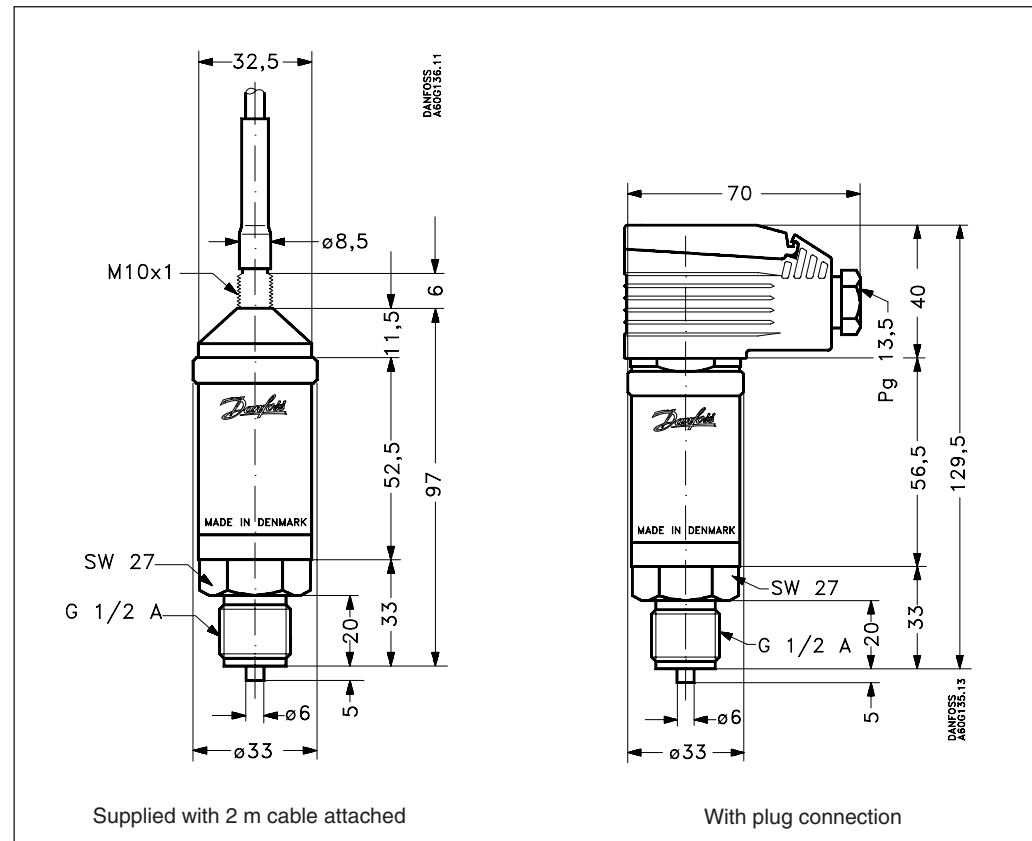
If the silicon chip is affected by pressure, the chip and the four resistors become deformed so that (due to the piezoresistive effect) they are no longer of equal size.

Since the resistors are connected in a Wheatstone bridge, voltage proportional to the pressure is produced across the bridge and is led to the signal converter. The converter is based on thickfilm and SMD (surface mounted device) technology.

Approvals

- Lloyd's Register of Shipping
- Det Norske Veritas
- Germanischer Lloyd
- Registro Italiano Navale
- American Bureau of Shipping
- Bureau Veritas
- Nippon Kaiji Kyokai
- Deutsche-Schiffs-Revision und Klassifikation
- Polski Rejestr. Stufkōw
- USSR Register of Shipping

Dimensions (mm)



Technical data

Output

Linearity (Best fit straight line)	< ±0.2% FS
Hysteresis and repeatability	< ±0.1% FS
Thermal zero point shift (compensated range from 0 to +85 °C)	±0.02% FS/°C
Thermal sensitivity shift (compensated range from 0 to +85 °C)	±0.02%/°C
Operating temperature	-40 to 85 °C
Transport temperature	-50 to 85 °C

Electrical specification

Supply voltage (polarity protected)	10 to 30 V d.c.
Voltage dependency	< 0.1% FS/10 V
Output signal	4 to 20 mA
Current limitation	28 mA
Max. load	$\frac{V_{\text{supply}} - 10 \text{ V}}{0.02 \text{ A}}$ [Ω]
Response time	< 4 ms

Electrical connection

Pole plug (DIN 43650) 1: Supply + 2: Supply - 3: Not in use 4: Connected to enclosure	Pg 5
Screened cable. Temperature rating -65 °C to +155 °C (ETFE) Ethylene tetrafluoroethylene Blue: Supply + Black: Supply - Screen insulated from enclosure	Length 2 m Ø 6 mm 2 × 0,75 mm ²

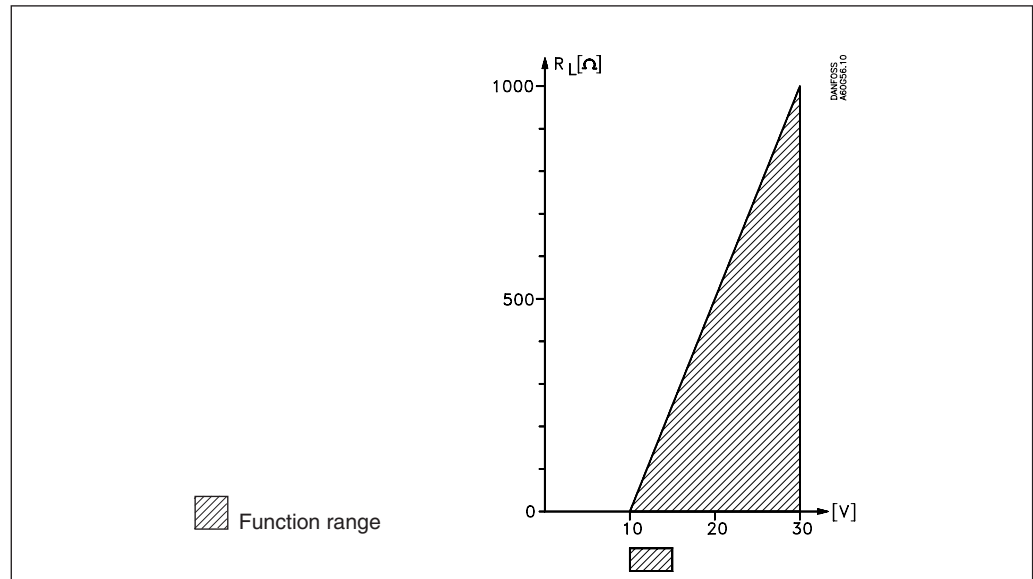
EMC-specification

Emission	EN 50081-1
Immunity	EN 50082-1
Electrostatic discharge 8 kV	IEC 801-2
HF, field 10 V/m 26 MHz - 1 GHz	IEC 801-3
HF, conducted 3 Vrms 150 kHz - 100 MHz	IEC 801-6
HF, conducted 1 Vrms 10 kHz - 150 kHz	
LF, conducted 3 Vrms 50 Hz - 10 kHz	
Transient, burst 2 kV com. mode / 1 kV diff.mode/4 kV clamp	IEC 801-4
Transient, surge 1 kV RS = 42 Ω	IEC 801-5
Mains frequency test 500 V 50 Hz	SEN 361503
Insulation resistance	>100 MΩ @ 100 V d.c.

Mechanical characteristics

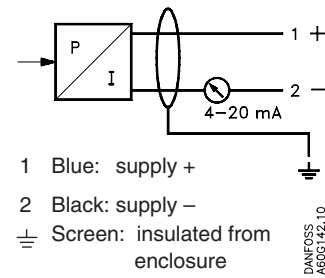
Parts in contact with medium	AISI 316 / W.No. 1.4401
Enclosure material	AISI 316L / W.No. 1.4404
Vibration stability, Sinusoidal, 20 g / 20 Hz - 2 kHz Random, 7.5 RMS / 20 Hz - 1 kHz	IEC 68-2-6 IEC 68-2-34/ IEC 68-2-36
Shock resistance, Shock, 500 g / ms Free fall	IEC 68-2-27 IEC 68-2-32
Enclosure, plug version DIN 43650	IP 65
Enclosure, cable version	IP 67
Cable, temperature rating	-65 to +155°C
Pressure connection (ISO 228/1) (DIN 16.288/B)	G 1/2 A
Width across flats	27 mm
Weight	0,3 kg

Max. load resistance as function of supply voltage

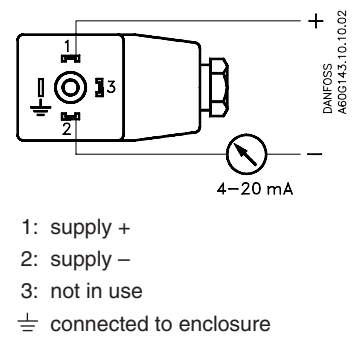
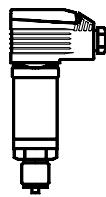


Electrical connection
2-wire, 4-20 mA

Cable connection:

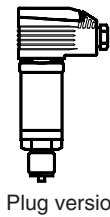


Plug connection



Code numbers

MBS 33M for **absolute pressure** measuring, 4-20 mA output signal

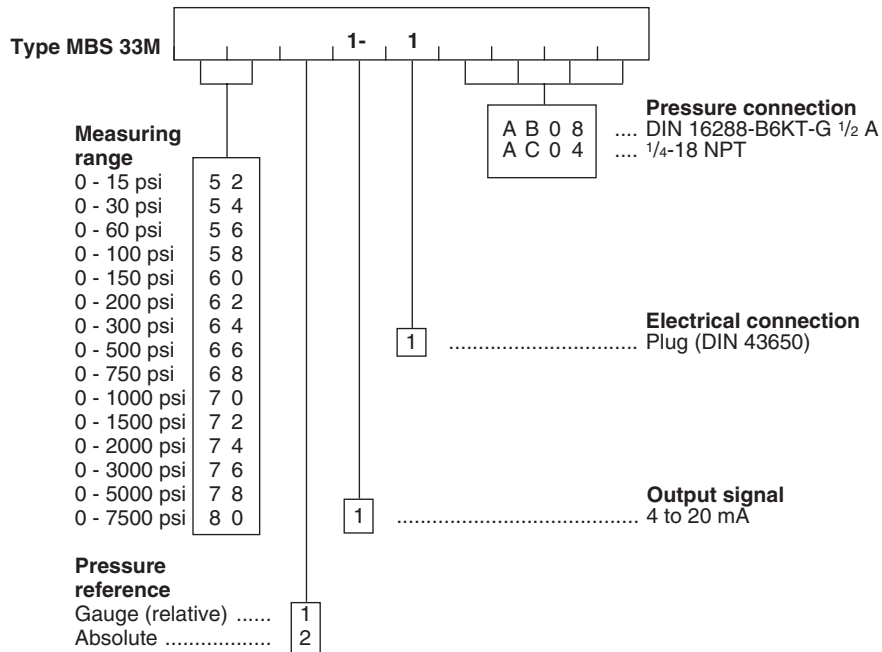


Pressure Connections	Pressure ranges P_e (abs)	Max. operation pressure	Min. burst pressure	Code no.
1/4-18 NPT	0 - 15 psi	30 psi	2900 psi	060G1200
	0 - 30 psi	120 psi	2900 psi	060G1201
	0 - 50 psi	220 psi	2900 psi	060G1202
	0 - 75 psi	300 psi	2900 psi	060G1203
	0 - 100 psi	300 psi	2900 psi	060G1204
	0 - 200 psi	750 psi	2900 psi	060G1205
	0 - 300 psi	750 psi	2900 psi	060G1206
	0 - 500 psi	1450 psi	12000 psi	060G1207

MBS 33M for **gauge pressure** measuring, 4-20 mA output signal

Pressure Connections	Pressure ranges P_e (gauge)	Max. operation pressure	Min. burst pressure	Code no.
1/4-18 NPT	0 - 15 psi	30 psi	750 psi	060G1208
	0 - 30 psi	120 psi	750 psi	060G1209
	0 - 50 psi	120 psi	750 psi	060G1210
	0 - 75 psi	300 psi	750 psi	060G1211
	0 - 100 psi	300 psi	750 psi	060G1212
	0 - 200 psi	750 psi	1500 psi	060G1213
	0 - 300 psi	750 psi	1500 psi	060G1214
	0 - 500 psi	1450 psi	12000 psi	060G1215
	0 - 750 psi	2900 psi	12000 psi	060G1216
	0 - 1000 psi	2900 psi	12000 psi	060G1217
	0 - 2000 psi	5800 psi	12000 psi	060G1218
	0 - 3000 psi	8700 psi	23000 psi	060G1219
	0 - 5000 psi	8700 psi	23000 psi	060G1220
	0 - 7500 psi	13000 psi	34000 psi	060G1221

Ordering, special versions



Conversion table

	Pascal (= Newton per square metre) (N/m ²) Pa	Newton per square millimetre N/mm ²	bar	Kiloponds per square metre (mm H ₂ O) kp/m ²	Meter water gauge m H ₂ O	Technical atmosphere (kp/cm ²) at	Physical atmosphere atm	Torr (0 °C) mm Hg	Inches Hg (0 °C) in Hg	Poundforce pr. square inch (lbf/in ²) psi
1 Pa	1	10 ⁻⁶	10 ⁻⁵	0,1020	1,020 · 10 ⁻⁴	1,020 · 10 ⁻⁵	9,869 · 10 ⁻⁶	7,500 · 10 ⁻³	2,953 · 10 ⁻⁴	1,450 · 10 ⁻⁴
1 N/mm ²	10 ⁶	1	10	1,020 · 10 ⁵	102,0	10,20	9,869	7,5 · 10 ³	295,3	145,0
1 bar	10 ⁵	0,1	1	10,197 · 10 ³	10,20	1,020	0,9869	750	29,53	14,50
1 kp/m ²	9,80665	9,807 · 10 ⁻⁶	9,807 · 10 ⁻⁵	1	10 ⁻³	10 ⁻⁴	0,9678 · 10 ⁻⁴	0,07355	2896 · 10 ⁻³	1,422 · 10 ⁻³
1 m H ₂ O	9806,7	9,807 · 10 ⁻³	0,09807	1000	1	0,1	0,09678	73,55	2,896	1,422
1 at	98,066 · 10 ³	0,09807	0,9807	10 ⁴	10	1	0,9678	735,5	28,96	14,22
1 atm	101,325 · 10 ³	0,1013	1,013	10,333 · 10 ³	10,33	1,033	1	760	29,92	14,70
1 mm Hg	133,32	1,333 · 10 ⁻⁴	1,333 · 10 ⁻³	13,60	0,01360	1,360 · 10 ⁻³	1,316 · 10 ⁻³	1	0,03937	1,934 · 10 ⁻²
1 in Hg	3387	3,387 · 10 ⁻³	0,03387	345,3	0,3453	0,03453	0,03342	25,4	1	0,4912
1 psi	6895	6,895 · 10 ⁻³	0,06895	703,1	0,7031	0,07031	0,06804	51,71	2,036	1

ISO 9001 quality approval



Danfoss A/S is certificated in accordance with international standard ISO 9001. This means that Danfoss fulfils the international standard in respect of product development, design, production and sale.

Danfoss Industrial Controls offers the following product range:

1. Contactors and thermal relays in the power range up to 55 kW.
2. Solenoid valves and thermostatic valves for many purposes.
3. Pressure controls, thermostats, pressure and temperature transmitters covering the ranges 0 - 8700 psi and -50°C to 300°C.

Data sheets containing technical specifications available on request:

Contactors and motor starters

CI contactors and TI thermal relays, plus a wide range of spare parts and accessories

Combined circuit breaker and manual motor starter, type CTI

Mini contactors types CI 4 - 5, CI 4 - 9 and thermal relays type TI 9, TI 9C

Contactors types CI 60, CI 72, CI 85, CI 105 and

thermal relays types TI 80, TI 90, TI 110

Data sheet IK.40.F-

Data sheet IK.40.K-

Data sheet IK.40.L-

Data sheet IK.40.M-

Industrial valves

Solenoid valves for building services (stockists)

Solenoid valves for OEMs

HP pneumatic valves and 3-way solenoid valves type EVIP 2

AVTA, IVR, IVF thermostatic valves

and IVT setting section

Modulating solenoid valve type EVSIM

with associated ESIC signal converter

2-way solenoid valve for steam type EVSIS 3 - 20

Solenoid valve coil with Ex approval

Data sheet IK.10.C-

Data sheet IK.10.F-

Data sheet IK.10.D-

Data sheet IK.10.E-

Data sheet IK.10.K-

Data sheet IK.10.L-

Data sheet IK.10.H-

Thermostats and pressure controls

RT thermostats and pressure controls

KPS thermostats and pressure controls

CAS thermostats and pressure controls

CS pressure switches

EMP pressure transmitters

EMT temperature transmitters

Thermostats and pressure controls type KPI and KP

Pressure transmitter type MBS 33

Pressure transmitter type MBS 33 and EMP 2 with sanitary process coupling

Data sheet IK.20.D-

Data sheet IK.20.E-

Data sheet IK.20.F-

Data sheet IK.20.N-

Data sheet IK.20.H-

Data sheet IK.20.J-

Data sheet IK.20.P-

Data sheet IK.20.O-

Data sheet IK.20.T-

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