

# OEM Pressure transmitter with dual output and pulse snubber Type MBS 1350

## Introduction



MBS 1350 pressure transmitters with dual output signal.

This is a combination of:

- Ratio-metric voltage signal on pressure + pressure switch
- Absolute voltage signal on pressure + pressure switch
- Ratio-metric voltage signal on pressure + temperature output
- Absolute voltage signal on pressure + temperature output

## Features

- Designed for use in severe industrial OEM applications
- Output signals:
  - *Pressure + switch*  
Pressure: 0-5 V, 1-5 V, 1-6 V, 0-10 V, 10-90% ratiometric voltage. Switch: 0/5 V logic switch
  - *Pressure + temperature*  
Pressure: 1-5 V, 1-6 V, 10-90% ratiometric voltage. Temperature: 1-5 V, 1-6 V, 10-90% ratiometric voltage
- For medium and ambient temperatures up to 125°C
- Wetted parts made of stainless steel
- A wide range of pressure and electrical connections
- EMC protection up to 100 V/m
- UL 508 recognized
- CE marked

## Description

The compact OEM pressure transmitter MBS 1350 is designed for use in industrial applications, where a combination of pressure signal and pressure switch or temperature signal is requested. The integrated pulse-snobber 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.

It offers a reliable performance even under harsh environmental conditions. The high degree of EMI protection equip the pressure transmitter to meet the most stringent industrial requirements.

## Application example

- Indication for overheated installations like pumps and motors
  - Indication of oil temperature in hydraulic circuits like transmission
  - Warning at excessive or inadequate pressure
  - Alarm function
- Please notice that neither pressure switch feature nor temperature signal feature may not be used for safety cut-out.

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 (10-90%)	1 ms
Overload pressure (static)	see table below
Burst pressure	See table below
Durability, P: 10-90% FS	>10 ×10 <sup>6</sup> cycles

Overload and burst pressure

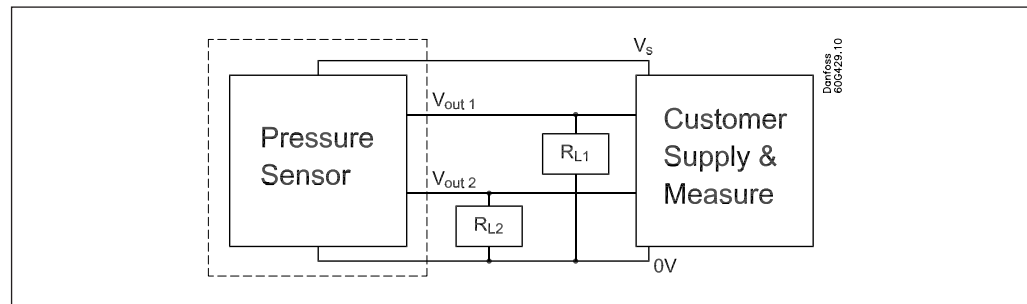
Nominal pressure [bar]	6	10	16	25	40	60	100	160	250	400	600
Overload pressure	21	30	48	105	210	210	300	480	750	1200	1500
Burst pressure	280	400	640	700	1400	1400	2000	1600	2500	4000	>4000

\* For higher pressure ranges, please contact Danfoss regarding MBS 1300.

Electrical specifications

Pressure output signal (Short-circuit protected)	0 to 5, 1 to 5 1 to 6 V	0 to 10 V	10 to 90% ratiometric
Supply voltage [UB], polarity protected	8 to 30 V	12 to 30 V	5 V ±0.5 V
Supply - current consumption	4.5 mA	4.5 mA	4.5 mA
Output impedance	≤90 Ω	≤90 Ω	≤90 Ω
Load [R <sub>L</sub> ] (connected to 0V)	R <sub>L</sub> ≥ 10 kΩ	R <sub>L</sub> ≥ 10 kΩ	R <sub>L</sub> ≥ 5 kΩ
Load [R <sub>L</sub> ] (connected to +V)	Not possible	Not possible	R <sub>L</sub> ≥ 5 kΩ

Wiring



*Pressure Output + Switch Function*

The load  $R_{L1}$  connected on  $V_{out1}$  indicates the ordinary pressure transmitter signal, being either 10-90%  $V_s$  (ratio-metric) or one of the absolute voltage signals 0-10 / 0-5 / 1-6 / 1-5 V d.c.

The target switch-point is set at the calibration at Danfoss and is not adjustable on-site.

The differential is fixed with approx. 1% of Full Span (FS).

The load  $R_{L2}$  connected on  $V_{out2}$  indicates a second configurable voltage output available on 4-pin connectors.

The sink/source capability is limited to 2.5 mA.

The pressure switch output stage is represented by 0 and 5 V irrespective of the supply voltage. It can be set to switch from 0 to 5 V d.c. on pressure rise or switch from 0 to 5 V d.c. on pressure fall.

Parameter	Min	Typ	Max	Units	Comments
Vout2 'Logic Level' - Absolute	0		5	V	Vout2 voltage 'logic level' are independent of the Vout1 calibration range
Vout2 'Logic Level' - Ratio-metric	0		$V_s$	V	Vout2 voltage 'logic level' are independent of the Vout1 calibration range
Vout2 Calibration Accuracy (Including Design Hysteresis)	-2		+2	%FS	Accuracy to the pressure-switch target. Hysteresis prevents ringing around the switch-point.
Vout2 Thermal Accuracy		$\pm 0.15$		%FS/ 10°C	Accuracy mostly determined by actual Vout1 thermal offset and thermal span performance

Temperature signal is not available when the pressure switch feature is selected.

*Pressure Output + Temperature Output*

The load  $R_{L1}$  connected on  $V_{out1}$  indicates the ordinary pressure transmitter signal, being either 10-90%  $V_s$  (ratio-metric) or one of the absolute voltage signals 1-6 and 1-5 V d.c.

It is a fully continuous signal that corresponds directly to the temperature of the pressure sensor element being in contact to the pressure fluid.

The temperature range is calibrated at Danfoss according to the requirements given by the user and is consequently not adjustable on-site.

The load  $R_{L2}$  connected on  $V_{out2}$  indicates a second configurable voltage output available on 4-pin connectors.

Max temperature range : -40°C to 125°C.  
Min temperature range : 0°C to 80°C.

The temperature output  $V_{out2}$  depends on the pressure transmitter signal (see scheme below).

Parameter	Min	Typ	Max	Units	Comments
Vout2 Output Voltage - Absolute	0.1		12	V	Typical output ranges as per Vout1 table. On 0-5 V and 0-10 V pressure transducers zero signal will be 0.1 V when temperature output is activated.
Vout2 Output Voltage - Ratio-metric	5		95	% $V_s$	Ratio-metric to supply voltage $V_s$
Vout2 Calibration Accuracy	-0.50		0.50	%FS	Room temperature set-point
Vout2 Thermal Total Error Band		$\pm 3$		%FS	Includes thermal span and non-linearity error between -20°C and +100°C. Note: Vout2 is NOT a measure of the ambient temperature

Pressure switch is not available when the temperature feature is selected.

*Environmental conditions*

Medium temperature range		-40°C → +125°C
Ambient temperature range		-40°C → +125°C
Compensated temperature range		-40°C → +125°C
Transport temperature range		-40°C → +125°C
EMC - Emission		EN 55022
EMC - Immunity RF field 100 V/m, 26Mhz-1Ghz		EN 61000-6-2, EN 61000-4-6, EN 61000-4-3
DC isolation		250 V
Vibration stability	20g, 10-2000 Hz, sinus	EN 60068-2-6
Shock resistance	100 g	EN 60068-2-27
Enclosure (depending on electrical connection)		See page 6

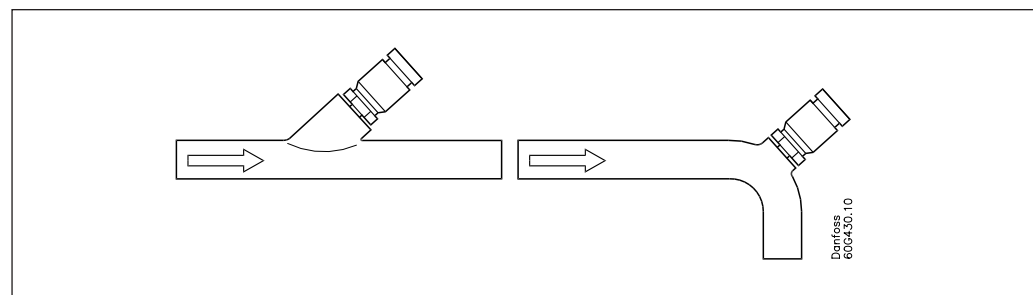
*Mechanical conditions*

Materials	Wetted parts	17-4PH
	Enclosure	AISI 304 or plastic
	Pressure connection	17-4PH
	Electrical connection	See page 6

**Installation guide line with temperature function**

The signalled temperature represents the temperature on the pressure sensor element inside the transmitter. Therefore the accuracy of the temperature signal depends on a suitable installation of the pressure transmitter.

To get the fastest response time it is recommend installing the pressure transmitter in a 45 angle relative to the flow or in a bend of the piping; see below. In this way the heat is “pumped” into the transmitter interiors.

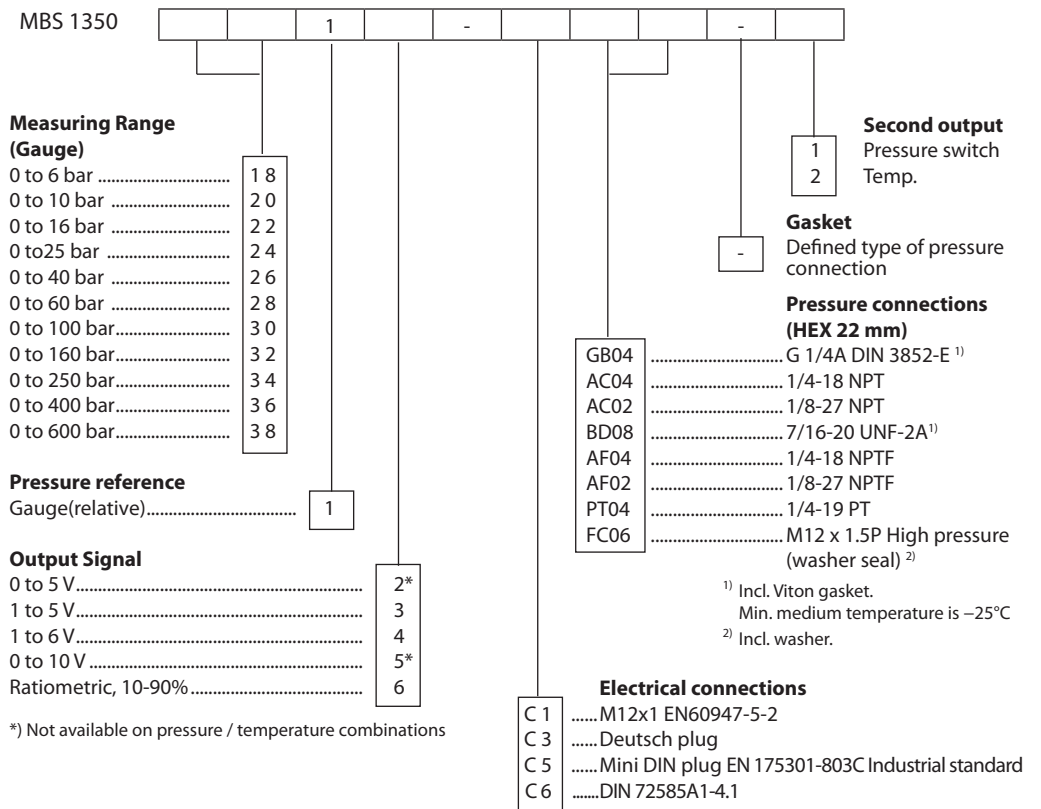


Also it is advisable to insolate the pressure transmitter from the ambient temperature or to prevent airflow around the transmitter (e.g. by motor hood).

**Ordering of adaptor code numbers**

From pressure connection	To pressure connection	Code no. - Single pack
G ¼" DIN 3852	7/16-20 UNF - flare	<b>063G0300</b>
	7/16-20 UNF - 2A	<b>063G0301</b>
	9/16-18 UNF - 2A	<b>063G0302</b>
	¼" NPT	<b>063G0303</b>
	R ¼"	<b>063G0304</b>

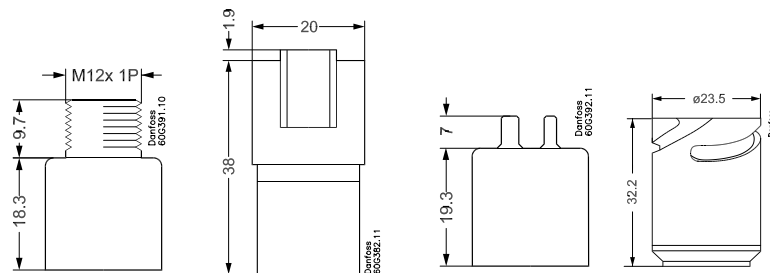
Ordering of versions



Dimensions/ Combination

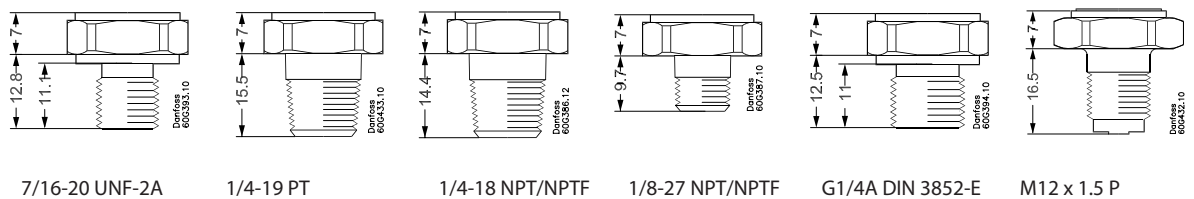
Type code	C1	C3	C5	C6
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M12x1 EN60947-5-2      Deutsch DT04      Mini DIN plug EN175301-803C Industrial standard      DIN 72585A1-4.1



Note: The diameter of all housings is 19 mm.

Note: HEX is 22 mm across flats.



Type code	BD08	PT04	AC04/AF04	AC02/AF02	GB04	FC06
Recommended torque	18-20 Nm	2-3 turns after finger tightend	2-3 turns after finger tightend	2-3 turns after finger tightend	30-35 Nm	30-35 Nm

Electrical connections

Type code page 5			
C1	C3	C5	C6
M12x1 EN60947-5-2  Danfoss 60C397.11	Deutsch DT04  Danfoss 60C396.12	Mini DIN plug EN175301-803C Industrial standard  Danfoss 60C396.12	DIN 72585A1-4.1  Danfoss 60C397.11
<i>Enclosure</i>			
IP 67	IP 67	IP40	IP67
<i>Material</i>			
SS, PBT 30% GFR Gold (Au) plated	Glass filled PBT 30% GFR Gold (Au) plated	304 ss, PBT 30% GFR Tin (Sn) plated	Glass filled PBT 30% GFR Gold (Au) plated
<i>Electrical connections, 0-5 V, 1-5 V, 1-6 V, 0-10 V, ratiometric 10-90%</i>			
Pin 1: + supply Pin 2: Output 1 Pin 3: ÷ supply Pin 4: Output 2	Pin 1: ÷ supply Pin 2: + supply Pin 3: Output 2 Pin 4: Output 1	Pin 1: Output 1 Pin 2: + supply Pin 3: Output 2 Pin 4: ÷ supply	Pin 1: + supply Pin 2: ÷ supply Pin 3: Output 1 Pin 4: Output 2