

Pressure sensor module

Up to 1,000 bar

Model MTF-1

WIKA data sheet PE 83.01

Applications

- Sensor integration projects
- Battery-operated applications
- Applications with high pressures of up to 1,000 bar [15,000 psi]
- Implementation of condition monitoring

Special features

- Compact design for limited mounting spaces
- Low energy consumption reduces maintenance effort
- Dry, welded measuring cell from stainless steel for aggressive media
- Additional temperature indication for condition monitoring

Description

The model MTF-1 pressure sensor module is a simple and flexible option for integrating pressure measurement into a wide variety of applications. The pressure value is digitally processed in the module and output as a standardised digital or analogue signal. Thus, the MTF-1 module delivers precise data for applications with pressures of up to 1,000 bar. Adjustment of the output signal is carried out by WIKA at the factory, meaning time and cost expenditure for calibration during integration is eliminated.

Low energy consumption reduces maintenance effort

The model MTF-1 pressure sensor module is designed for energy-saving operation. The digital I²C signal transmits data extremely efficiently thanks to low basic energy consumption and fast switch-on times.

The energy-efficient sleep mode further reduces energy consumption. This makes the module particularly suitable for battery-operated solutions, ensures long cycles between battery changes and thus reduces maintenance costs.



Fig. left: Pressure sensor module, spanner width 19 mm
Fig. right: Pressure sensor module, spanner width 27 mm

Dry, welded measuring cell from stainless steel, also for aggressive media

The dry, stainless steel measuring cell is welded to the process connection and can therefore also be used with aggressive media. Even after long periods of use with many load cycles, the dry measuring cell of the model MTF-1 only exhibits a low signal drift – and ensures a permanently reliable data basis.

Additional temperature indication for condition monitoring

In order to evaluate the condition of the sensor, in many applications a temperature indication is helpful. Thanks to the digital I²C protocol, parallel to the pressure signal, the model MTF-1 provides a guideline value for the temperature in the sensor module, which can be used for condition monitoring of the instrument. With condition-based and preventive maintenance made possible by this, the service life can be significantly extended and repairs can be planned ahead.

Specifications

The model MTF-1 features a pressure output as standard. In versions with the I²C output signal the pressure sensor module has an additional temperature output. The following specifications refer to the pressure output. For details on the temperature output see table “Optional temperature output”.

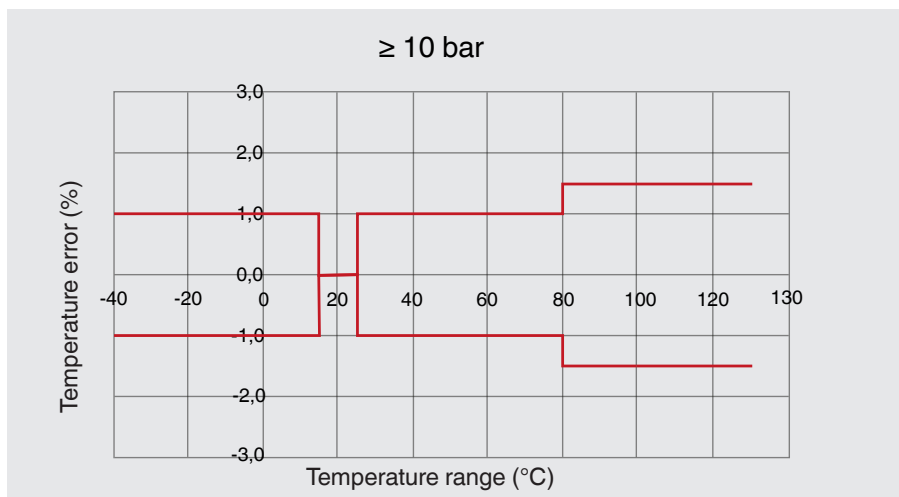
Optionally the model MTF-1 is available with an improved non-linearity. Depending on the selected non-linearity the following values result:

Accuracy specifications	Non-linearity $\leq \pm 0.25$ % of span	Non-linearity $\leq \pm 0.125$ % of span
Non-linearity per BFSL per IEC 62828-1	$\leq \pm 0.25$ % of span	$\leq \pm 0.125$ % of span
Accuracy	→ See “Max. measuring deviation per IEC 62828-1”	
Max. measuring deviation per IEC 62828-1	$\leq \pm 0.5$ % of span	$\leq \pm 0.25$ % of span ¹⁾

1) With I²C only possible with oversampling ≥ 4

Further details on: Accuracy specifications	
Signal noise	$\leq \pm 0.2$ % of span
Non-repeatability per IEC 62828-1	<ul style="list-style-type: none"> ■ ≤ 0.1 % of span for analogue signals and I²C with oversampling ≥ 4 ■ ≤ 0.15 % of span for I²C with oversampling < 4
Influence of supply voltage	Max. ± 0.1 %/10 V (for signal 1 ... 10 V)
Max. temperature error	→ See below
Long-term drift per IEC 62828-1	$\leq \pm 0.1$ % of span
Reference conditions	Per IEC 62828-1

Temperature error



For pressure ranges < 10 bar/150 psi, a higher temperature error at below -20 °C [-4 °F] and above 60 °C [140 °F] must be taken into account.

Measuring ranges, gauge pressure

bar	
0 ... 10	0 ... 160
0 ... 16	0 ... 250
0 ... 25	0 ... 400
0 ... 40	0 ... 600
0 ... 60	0 ... 1,000
0 ... 100	

psi	
0 ... 100	0 ... 1,000
0 ... 150	0 ... 1,500
0 ... 160	0 ... 2,000
0 ... 200	0 ... 3,000
0 ... 250	0 ... 4,000
0 ... 300	0 ... 5,000
0 ... 400	0 ... 6,000
0 ... 500	0 ... 7,500
0 ... 600	0 ... 10,000
0 ... 750	0 ... 15,000

Measuring ranges, vacuum and +/- measuring ranges

bar	
-1 ... +9	-1 ... +24
-1 ... +15	

psi	
-14.5 ... +160	-14.5 ... +300
-14.5 ... +200	

Other measuring ranges on request.

Further details on: Measuring range

Overpressure limit ¹⁾

Measuring ranges ≤ 600 bar/7,500 psi	2 times
Measuring ranges > 600 bar/7,500 psi	1.43 times
Vacuum resistance	Yes

1) The overpressure limit is based on the sensor element used. Depending on the selected process connection and sealing, restrictions in overpressure limit can result. With increased overpressure limit there are deviations in temperature error and long-term stability.

Process connection

Standard	Thread size	Max. measuring range	Overpressure limit	Sealing
EN 837	G 1/8 B	400 bar [5,800 psi]	572 bar [8,290 psi]	Copper
	G 1/4 B	1,000 bar [15,000 psi]	1,480 bar [21,400 psi]	■ Copper ■ Stainless steel
	G 1/2 B	1,000 bar [15,000 psi]	1,480 bar [21,400 psi]	■ Copper ■ Stainless steel
DIN EN ISO 1179-2 (formerly DIN 3852-E)	G 1/8 A	250 bar [3,000 psi]	358 bar [5,190 psi]	FPM/FKM
	G 1/4 A	600 bar [8,700 psi]	858 bar [12,400 psi]	■ NBR ■ FPM/FKM
	G 1/2 A	600 bar [8,700 psi]	858 bar [12,400 psi]	■ NBR ■ FPM/FKM
DIN EN ISO 9974-2 (formerly DIN 3852-E)	M10 x 1.0	250 bar [3,000 psi]	358 bar [5,190 psi]	FPM/FKM
ANSI/ASME B1.20.1	1/4 NPT	1,000 bar [15,000 psi]	1,480 bar [21,400 psi]	-

Further details on: Process connection	
Max. measuring range	→ See above
Overpressure limit	→ See above
Sealing	→ See above
Pressure port diameter	3.5 mm (standard for all process connections)
Possible limitations	Depending on the choice of sealing on the process connection, there may be limitations in the permissible temperature range.
NBR	-20 ... +100 °C [-4 ... +212 °F]
FPM/FKM	-20 ... +125 °C [-4 ... +257 °F]

Other process connections, sealings and pressure port diameters on request.


Output signal		
Signal type		
Analogue	DC 1 ... 10 V	
	DC 0.5 ... 4.5 V ratiometric	
Digital	I ² C	
Load in Ω		
DC 1 ... 10 V	≥ 10 k	
DC 0.5 ... 4.5 V ratiometric	≥ 4.5 k	
Measuring rate	> 1 kHz	
Signal clamping (optional for analogue signals)		
DC 1 ... 10 V	Zero point	DC 0.5 V
	Full scale	DC 11.5 V
DC 0.5 ... 4.5 V ratiometric	Zero point	DC 0.25 V
	Full scale	DC 4.75 V
Communication, digital signal	The MTF-1 is designed as a slave in the I ² C bus and sends a pressure value to the master when it requests this. If no interrogation occurs, the MTF-1 switches to the power-saving "sleep mode". → For a detailed description, see "I ² C protocol for models MPR-1 and MTF-1" at www.wika.com .	
Communication protocol	I ² C	
Voltage supply		
Supply voltage	DC 1 ... 10 V	DC 12 ... 30 V
	DC 0.5 ... 4.5 V ratiometric	DC 5 V ±10 %
	I ² C	1.8 ... 3.6 V
Current supply	DC 1 ... 10 V	≤ 3.5 mA
	DC 0.5 ... 4.5 V ratiometric	≤ 3.5 mA
	I ² C	<ul style="list-style-type: none"> ■ ≤ 2 mA with measurement ■ ≤ 1 µA in sleep mode
Dynamic properties		
Settling time per IEC 62828-1	Analogue signals	1 ms
	Digital signals	<ul style="list-style-type: none"> ■ 6 ms with oversampling = 1 (includes the switch-on time) ■ 24 ms with oversampling = 4 (includes the switch-on time)
Switch-on time	Analogue signals	20 ms
	Digital signals	2.5 ms
Switch-on drift	200 ms (only for analogue signals, not valid for I ² C)	
Response time I ² C	<ul style="list-style-type: none"> ■ 3 ms with a clock frequency of ≥ 400 kHz (oversampling = 1) ■ 12 ms with a clock frequency of ≥ 400 kHz (oversampling = 4) 	

Other output signals on request.

Electrical connection	
Connection type	JST female connector, 6-pin
Pin assignment	→ See below
Ingress protection (IP code) per IEC 60529	
Spanner width 19 mm	IP-3x
Spanner width 27 mm	IP-1x
Short-circuit resistance	
Analogue signals	S+ vs. U-
Digital signals	U+ and U- vs. SDA, SCL, RES
Reverse polarity protection	U+ vs. U- (only for analogue signals)
Insulation voltage	DC 500 V

Other electrical connections on request.

Pin assignment

JST female connector, 6-pin (model BM06B-SRSS-TB)			
		3-wire	I ² C
	U+	1	1
	U-/GND	4	4
	S+	2	-
	SDA	-	5
	SCL	-	6
	EOC	-	2
	Reset	-	3

Legend

U+	Positive power supply terminal
U-/GND	Negative power supply terminal/ground
S+	Analogue output
EOC	End of conversion
SCL	Serial clock
SDA	Serial data

Other pin assignments on request.

Materials	
Material (wetted)	
Process connection and sensor	Stainless steel 316L, PH grade steel
Sealing	→ See "Process connection"
Material (in contact with the environment)	
Case	Stainless steel 316L
Potting	Silopren®
Cover	PBT GF30

Operating conditions	
Medium temperature range ¹⁾	-40 ... +125 °C [-40 ... +257 °F]
Ambient temperature range ¹⁾	-40 ... +125 °C [-40 ... +257 °F]
Storage temperature range	-40 ... +70 °C [-4 ... +158 °F]
Vibration resistance per IEC 60068-2-6	20 g, 10 ... 2,000 Hz
Shock resistance per IEC 60068-2-27	600 g, 1 ms
Free fall per IEC 60068-2-31	
Individual packaging	1 m [3.3 ft]
Multiple packaging	0.5 m [1.6 ft]
Ingress protection (IP code) per IEC 60529	→ See "Electrical connection"
Service life	<ul style="list-style-type: none"> ■ 100 million load cycles ■ 10 million load cycles for measuring ranges > 600 bar/7,500 psi

1) Depending on the choice of sealing on the process connection and the electrical connection, there may be limitations in the medium and ambient temperature ranges (→ for limitations see "Process connection" and "Electrical connection").

Options for specific media	
Oil- and grease-free	
Residual hydrocarbon	< 1,000 mg/m ²
Oxygen, oil- and grease-free	
Residual hydrocarbon	< 200 mg/m ²
Packaging	Protection cap on the process connection, sealed in a vacuum bag
Max. permissible temperature range	-20 ... +60 °C [-4 ... +140 °F]
Max. measuring range	400 bar [5,800 psi]
Sealing	Stainless steel

Optional temperature output	
Output signal	Only available for output signal I ² C
Measuring range	-20 ... +100 °C [-4 ... +212 °F]
Accuracy	→ See "Max. measuring deviation"
Max. measuring deviation	
For measuring range -20 ... +60 °C [-4 ... +140 °F]	±3.5 K
For measuring range 60 ... 80 °C [140 ... 176 °F]	±4.75 K
For measuring range 80 ... 100 °C [176 ... 212 °F]	±6 K

Packaging and instrument labelling	
Packaging	Individual packaging
	Multiple packaging <ul style="list-style-type: none"> ■ Up to 45 pieces possible (spanner width 19 mm) ■ Up to 25 pieces possible (spanner width 27 mm)
Instrument labelling	<ul style="list-style-type: none"> ■ WIKA product label, lasered ■ Customer-specific product label on request

Manufacturer's information

Logo	Description
-	China RoHS directive

Test report

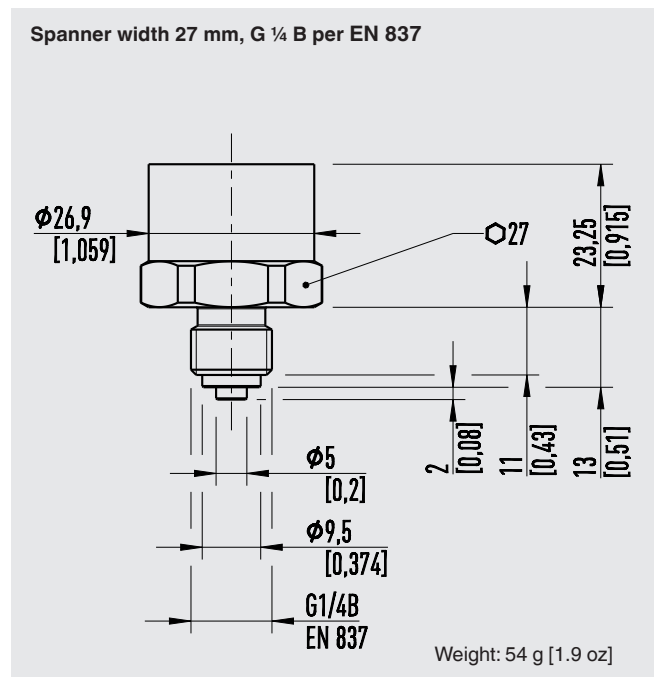
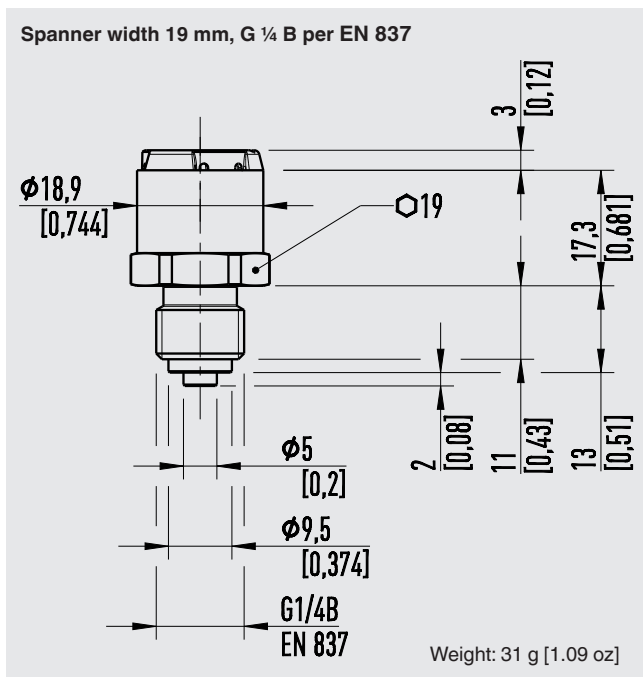
Test report	
Non-linearity 0.25 %	3 measuring points
Non-linearity 0.125 %	3 measuring points

Certificates (option)

Certificates	
Certificates	2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy)

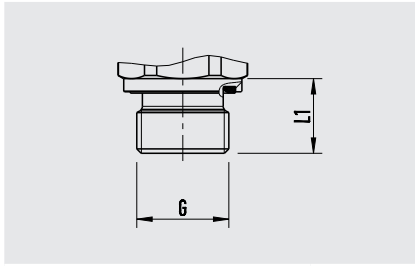
→ Approvals and certificates, see website

Dimensions in mm [in]

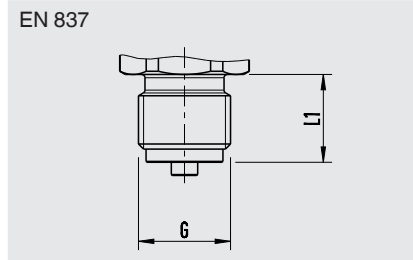


Process connections

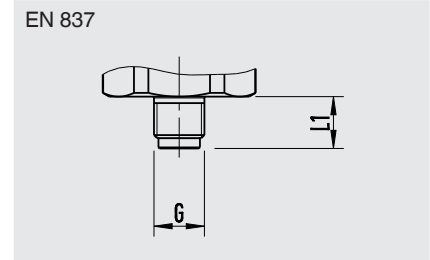
Spanner width 19 mm



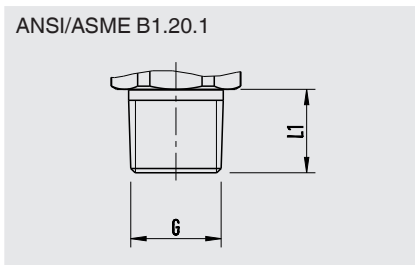
G	L1
G 1/8 A DIN EN ISO 1179-2	9.5 [0.37]
G 1/4 A DIN EN ISO 1179-2	14 [0.55]
M10 x 1.0 DIN EN ISO 9974-2	14 [0.55]



G	L1
G 1/4 B	13 [0.51]

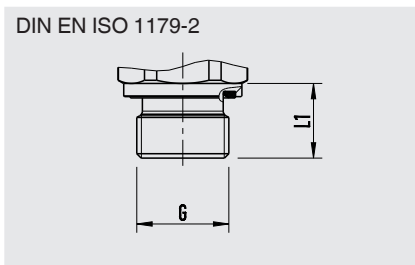


G	L1
G 1/8 B	10 [0.39]

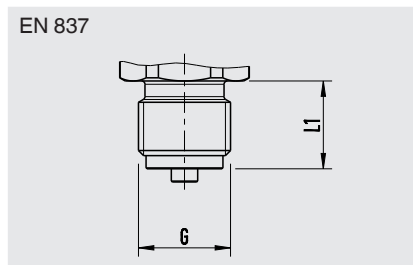


G	L1
1/4 NPT	13 [0.51]

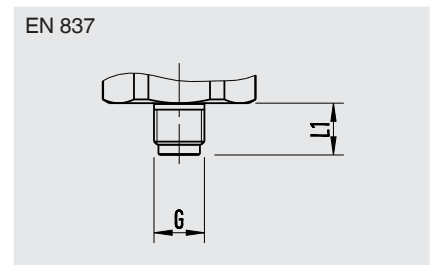
Spanner width 27 mm



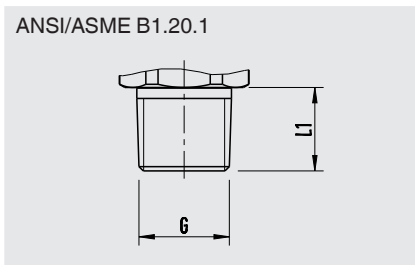
G	L1
G 1/4 A	14 [0.55]
G 1/2 A	17 [0.67]



G	L1
G 1/4 B	13 [0.51]
G 1/2 B	20 [0.79]



G	L1
G 1/8 B	15 [0.59]



G	L1
1/4 NPT	13 [0.51]

Accessories

Model	Description	Order number	
Sealings for process connection	G 1/8 B EN 837	Copper	11251051
		Stainless steel	14124338
	G 1/4 B EN 837	Copper	11250810
		Stainless steel	11250844
	G 1/8 A EN 837	FPM/FKM	14170413
	M10 DIN EN ISO 9974-2	FPM/FKM	14170413
	G 1/4 A DIN EN ISO 1179-2	NBR	1537857
		FPM/FKM	1576534
	G 1/2 B DIN EN ISO 1179-2	Copper	11250861
		Stainless steel	11251042
	G 1/2 A DIN EN ISO 1179-2	NBR	1039067
		FPM/FKM	1039075

Ordering information

Model / Design / Measuring range / Output signal / Non-linearity / Process connection / Sealing / Electrical connection / Certificates / Accessories

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