

Ultra-Fast Miniature Pressure Transducer

Series M5

Bandwidth 50 kHz / for use up to 180 °C

The piezoresistive pressure transducers Series M5 are ideal, thanks to the M5 fine thread, for taking measurements at close proximity in places where access is a problem and in very thin pipes – exactly the kinds of conditions associated with engine test benches. The front-flush design prevents gas bubbles interfering with fluid measurements and supports measurements up to 180 °C without a cooling adapter. The extreme dynamic range of 0...50 kHz makes it possible to record very fast pulsations just as reliably as those associated with static pressure values. A vibration-resistant Teflon FEP cable (IP67) ensures the 80 mV output signal is routed securely out of the hot environment and then onwards for processing.

Sensor technology

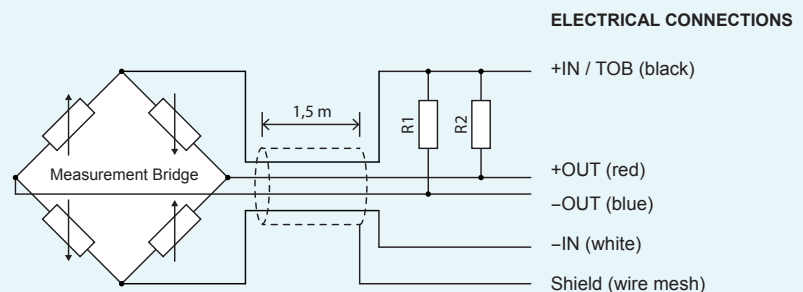
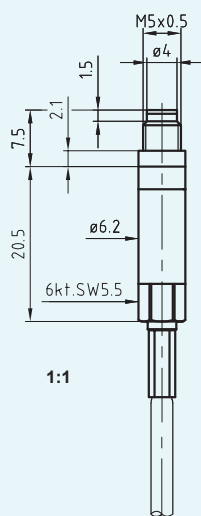
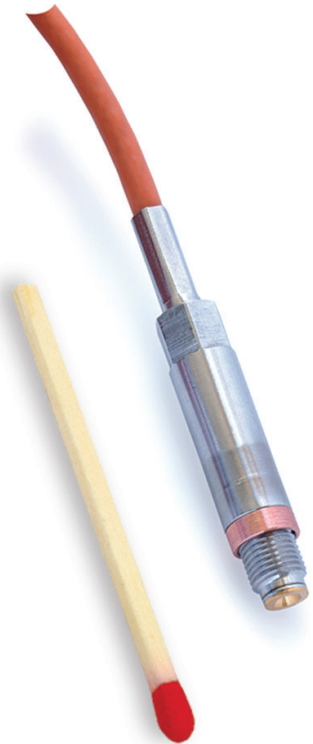
The Series M5 sensor incorporates a stable, piezoresistive pressure sensor chip which is backside-soldered directly to a supporting element designed for excellent fluid dynamics. This construction eliminates the disadvantages of sealants, adhesives, separating membranes or capillary tubes in high temperature environments. The practically-flush connection to the measurement media is critical to the excellent dynamic range of 0...50 kHz. The micromechanical design delivers absolute measuring ranges of 3, 10 and 30 bar, overpressure protection of up to 5 times measuring range and effective isolation of mounting forces, and a very low dead volume.

Conditions of use

Thanks to the materials used in the pressure connection (silicon oxide, stainless steel, and gold), the pressure transducers in the M5 series offer good media compatibility. They are designed for operating temperatures between -50 °C and +180 °C and come with a typical output signal range of 80 mV (based on a 1 mA supply) and an individual calibration certificate. The unit which incorporates a remote measurement amplifier is known as the Series M5HB (see the data sheet) and can achieve a total error band of $\pm 1\%$ FS for the operating temperature range.

Performance characteristics

- High operating temperature up to 180 °C
- Broad compensated temperature range, with a choice of either -20...125 °C or -40...180 °C
- Excellent dynamic response, up to 50 kHz (pulsation measurements)
- Insensitive to structure-borne vibration
- Extremely compact design, pressure connection: M5 x 0,5 fine thread
- Teflon FEP cable with IP67 ferrule, suitable for use on test benches
- Pressure ranges of 3 bar, 10 bar and 30 bar (absolute)



Comments

- The R1 or R2 resistor provides pre-compensation for the zero-point variation with temperature. The recommended value can be found in the calibration sheet.
- The shield is connected to the pressure transducer housing.
- Recommended tightening torque 1,5...2,5 Nm

Specifications

Absolute pressure ranges				
PAA	3	10	30	bar
Overpressure / burst pressure	15	50	90	bar
Typical sensitivity	30	8	3.2	mV/bar at 1 mA

PAA: Absolute pressure. Zero at vacuum.

Calibrated Temperature Range (choice of) -20...125 °C or -40...180 °C
Operating Temperature Range -50...180 °C

	Symbol	Conditions	Min.	Typ.	Max.	Unit
Bridge resistance	RB	25 °C	2,6	3,3	4	kΩ
Temperature coefficients for bridge resistance ¹⁾	α_{RB}	-40 to +180 °C	2,0	2,3	2,7	10 ⁻³ /K
	β_{RB}		3	5	8	10 ⁻⁶ /K ²
Supply (constant current source)	IB		0,1		1,0	mA
Linearity (best fitted straight line)	Lin			± 0,2	± 0,3	%FS
Zero point ²⁾	NP	25 °C	-25	-5	+15	mV
Temperature coefficient for zero point ²⁾	TCzero	-40 to +180 °C		-0,05		mV/K
Temperature coefficient for sensitivity	TCsens	-40 to +25 °C		-0,01		%K
		25 to 180 °C		0,06		
Pressure hysteresis			0,0		0,05	%FS
Temperature hysteresis		-40 to +180 °C			0,2	%FS

¹⁾ Bridge resistance as a function of temperature: $RB(T) = RB \cdot [1 + \alpha_{RB} \cdot (T - 25 \text{ °C}) + \beta_{RB} \cdot (T - 25 \text{ °C})^2]$

²⁾ Signals at a constant excitation current of 1,0 mA

Electrical Connections	4 open flexible wire ends (closed measurement bridge)
Insulation	1,5 m FEP cable with Ø 2,9 mm shield
Pressure Connection	> 10 MΩ @ 300 VDC
Materials in Contact with Media	Metric fine thread: M5 x 0,5
Media Compatibility	Stainless steel AISI 316L (DIN 1.4404 / 1.4435), silicon, gold, external copper seal
Protection	Gases, refrigerants, oils, fuels (diesel, petrol)
Options	Corrosive and abrasive media must be avoided For liquids (pressure peak) the 21PHB is recommended IP67 • Other pressure connections via thread adapter • Other compensated temperature ranges

Each sensor is measured as a function of pressure and temperature. The characteristics recorded are enclosed with the pressure transducers in a calibration sheet.

Typical characteristic curve for temperature coefficients (normalised at 25 °C)

