Model 160M
Piezoresistive Differential Pressure Transducers

Description

Model 160M is a differential pressure transducer of piezoresistive working principle. This model is widely used in pneumatic or hydraulic systems for industrial automation and process control. For instance, it has been integrated in smart valves and flow monitoring systems for differential pressure applications.

Thanks to the unique design of sensing elements integrated in the 160M, this transducer can provide its users with a high ratio up to 40 between differential pressure and static pressure. In addition, the 160M can measure differential pressures down to the range of -60~+60mbar. On the other hand it can sustain a static pressure up to 400bar.

For the purpose of temperature sensing, the 160M is integrated with a thermal diode in two different ways, which result in two available circuits. One circuit (5 terminals) has the thermal diode connected together with the Wheatstone bridge while the other (6 terminals) has the thermal diode completely independent.

The threads of the 160M-series for electrical interface is designed to either M27x2 (type-I, 160M(I)) or M56x1.5 (type-II, 160M(II)), providing wider suitability for manufacturing of smart differential pressure transmitters.

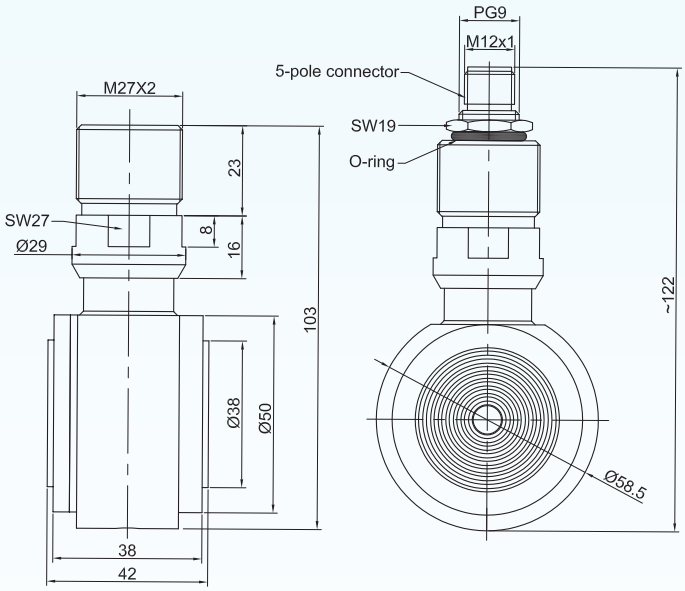
Features

- differential pressure down to -60~+60mbar
- static pressure up to 400bar
- easy assembly and wide compatibility
- rigid and robust design

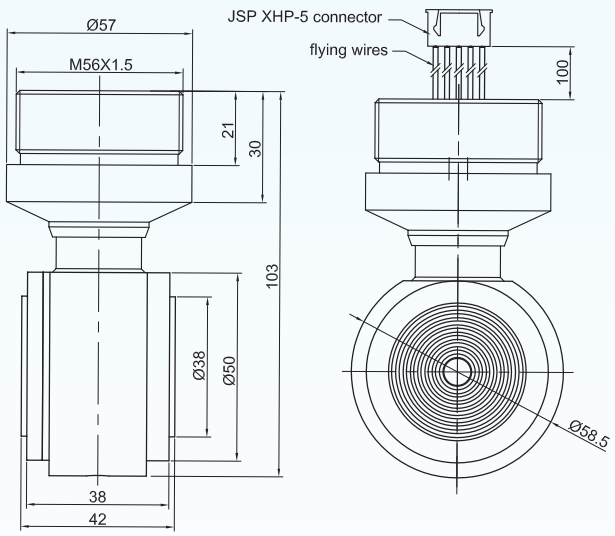
Applications

- smart valve
- biomedical instruments
- process control systems
- pneumatic or hydraulic systems
- liquid level control systems
- flow measuring systems

Dimensions



type-I: M27x2 threads



type-II: M56x1.5 threads

Note: All dimensions are in mm.

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Technical Data

Parameters		Units	Specifications		Notes
pressure media			gas or liquid compatible with diaphragm material		
differential pressure range		bar	-0.06~+0.06	-0.4+0.4, -2.5~+2.5 -5~+10	1
proof pressure		bar	160bar	160bar	
burst pressure			Refer to maximum static pressure.		
static pressure		bar	250bar	400bar	
output sensitivity at fs		mV/V	⩾ 20		2
excitation		Vdc	5 typical, 12 max.		
zero offset		mV/V	⩽ ±5		
accuracy		%fs	±0.3 if range ⩾ 0.1bar; ±1.3 if range < 0.1bar		2 & 3
static pressure effect on zero offset		%fs/100bar	⩽ ±0.1 if range ⩾ 0.1bar; ⩽ ±0.15 if range < 0.1bar		
long-term stability		%fs/year	⩽ ±0.05		
temperature sensor	measuring range	°C	-40 ~ +125		
	accuracy	°C	±1		
input resistance		kΩ	6±1		
output resistance (R)		kΩ	6±1		
insulation resistance		MΩ@500Vdc	⩾ 100		
storage temperature range		°C	-50 ~ +125		
ambient temperature range		°C	-40 ~ +85		
medium temperature range		°C	-20 ~ +125, if 160M is filled with type-A oil (standard)		
			-40 ~ +130, if 160M is filled with type-B or type-C oil		
			-40 ~ +205, if 160M is filled with type-D oil		
temperature coefficient of zero offset		%fso/°C	⩽ ±0.05		4
temperature coefficient of span		%fso/°C	⩽ ±0.1		4
temperature coefficient of bridge resistance		%R/°C	⩽ ±0.11		
thermal hysteresis		%fs	⩽ ±0.1 for ranges ⩾ 0.1bar; ⩽ ±0.5 for ranges < 0.1bar		
influence due to installation orientation		mbar	⩽ ±5		5
fatigue life		cycles	10^7		
warm-up time		s	⩽ 10		6
response time		ms	⩽ 1		7
threads at electrical interface		standard	M27x2 male, i.e., 160M(I)		
		option	M56x1.5 male, i.e., 160M(II)		
electrical interface		standard	5 flying wires of 100mm length		8
		option	5 flying wires with JST HXP-5 connector, 100mm wire length		8
			5-pin M12 connector with matting connector		8
			5-pin M12 connector with 1m detachable cable		8
diaphragm material			316L stainless steel (standard), hastelloy-C		
housing material			304 stainless steel		
filling oil			type-A for common industry (standard)		
			type-B for oxygen industry		
			type-C for tobacco and food industry		
			type-D for high temperature applications		
net weight		gram	~850		

General test conditions: flow medium: standard air of pressure 760mm of mercury column;
temperature: 20°C; humidity: 50%RH; excitation voltage: 5Vdc.

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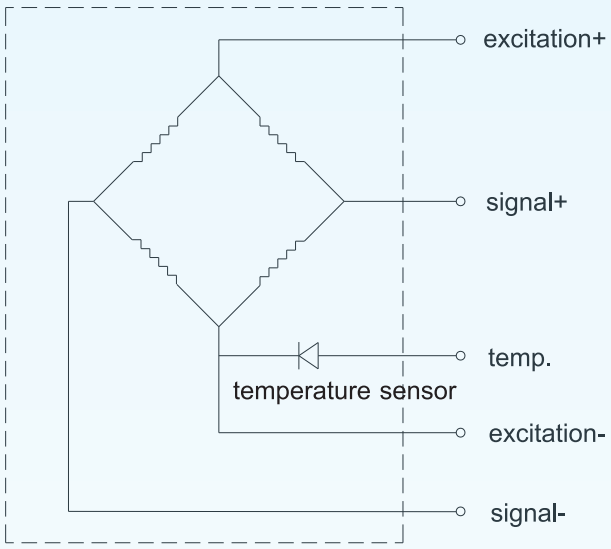
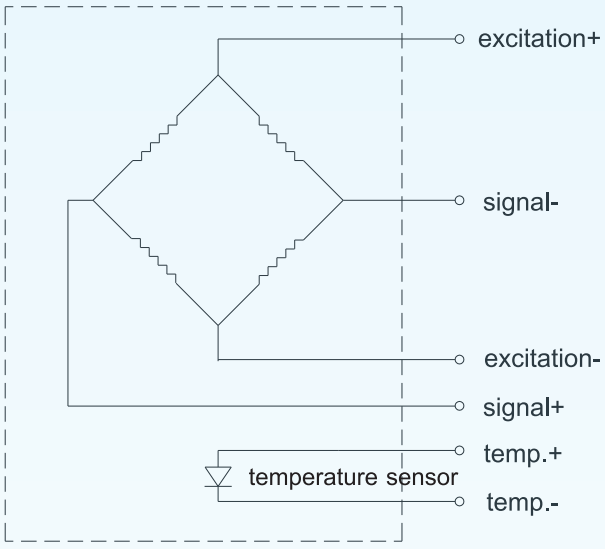
Notes:
1. For customized ranges, consult BCM SENSOR.
2. “fs” refers to “full scale”.
3. Accuracy = sqrt (non-linearity^2 + hysteresis^2 + repeatability^2).
4. Calculated as a rate of output change between -40°C and 85°C, and normalized by the output at 25°C. The transducer is not temperature compensated.
5. Under same differential pressure, the maximum variation of the output signal between horizontal installation (i.e., installing the transducer with its diaphragm horizontally) and vertical installation.
6. The warm-up time is measured from the transducer powered to the moment when the transducer gives the measurement which can be used.
7. The response time is measured from the wake-up moment in the sleep mode to the moment when the output rises to 90% of maximum value.
8. If the 6-terminal circuit is selected, there will be 6 flying wires or the flying wires with the JST HXP-6 connector, or the M12 connector will have 6 pins.

Bridge Circuit Diagrams



5-terminal circuit (standard)



6-terminal circuit (option)

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Ordering Information

pos.1	pos. 2	pos. 3	pos. 4	pos. 5	pos. 6	pos. 7	pos. 8	pos. 9	pos. 10	pos. 11
position (pos.) 1: model 160M(I) 160M(II)										
	pos. 2: pressure ranges and references (-60/+60)mbarD (-2.5/+2.5)barD D: differential pressure (-400/+400)mbarD (-5/+10)barD									
		pos. 3: output signal 20mV/V								
			pos. 4: accuracy 0.3%fs, if range ⩾100mbar 1.3%fs, if range < 100mbar							
				pos. 5: static pressure 250bar, if range = -60/+60mbar 400bar, if range ⩾400mbar						
					pos. 6: material of pressure diaphragm 316LSS (standard) Hastelloy-C					
						pos. 7: filling oil A: for common industry (standard) B: for oxygen industry C: for tobacco and food industry D: for high temperature applications				
							pos. 8: bridge circuit 5Tcircuit: 5-terminal circuit (standard) 6Tcircuit: 6-terminal circuit			
								pos. 9: threads at electrical interface M27x2 for 160M(I) M56x1.5 for 160M(II) Other thread types available on request.		
									pos. 10: electrical interface FW: flying wires of 100mm length(#) (standard) JST: 100mm(#) wires with JST HXP connector M12C: M12 connector + matting connector M12C/PVC/1: M12 connector + 1m(#) detachable cable. (#): The wire/cable length can be customized, e.g., FW(50mm).	
										pos. 11: customized specifications "(*)" is necessary only if any customized parameter is required, otherwise it is neglectable.

Examples of Ordering Code

- standard:
  160M(I)-(-60/+60)mbarD-20mV/V-1.3%fs-250bar-316LSS-A-5Tcircuit-M27x2-FW
- customized:
  160M(I)-(-60/+60)mbarD-20mV/V-1.3%fs-250bar-316LSS-A-6Tcircuit-M30x2-JST(60mm)-(*)
  (*): Customized thread type = M30x2 thread.

All the listed specifications, dimensions, and data are subject to change without prior notice.

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