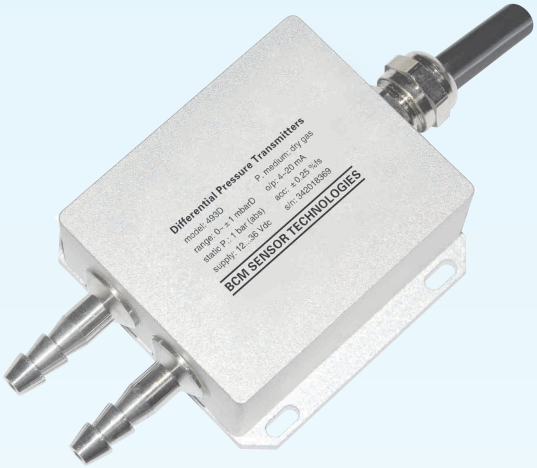
Model 493D
Low Differential Pressure Transmitters

Description

Model 493D is a differential pressure transmitter, which is specifically developed to measure very low differential pressure (down to 0~5 mbar), for low pressure applications such as for air flow monitoring and control (e.g., in clean rooms), and for manometers as well as medical devices.

The 493D transmitters are manufactured of two different structures according to its measuring range: for the measuring range ⩽ 50 mbar its sensing element is protected by silicone gel, while for the measuring range >50 mbar the sensing element is protected by 316L stainless steel. As such, the pressure medium has to be non-corrosive to silicone gel when the measuring ranges ⩽ 50mbar, while when the measuring ranges >50mbar the 493D transmitters can be contacted directly to any medium if it is compatible with 316L SS.

To meet requirements of different applications, the mechanical interface of 493D transmitters is made of G1/8” female threads, M10 male threads, or push-on hose fittings, while its electrical interface is designed with either an M12 connector or a cable outlet. In addition, various kinds of output signal are available for selection, e.g., 4~20mA, 1~5Vdc, RS485, 10%~90%Vs ratiometric, or SPI. For environmental protection the 493D transmitters can meet the requirement of IP66 rating so that it can be used in wet weather conditions.



Features

- measuring ranges: 0~±5mbar, ..., ~±1000mbar
- accuracy: 0.5%fs
- selectable output:
  4~20 mA (standard), 1~5Vdc,
  RS485, 10%~90%Vs ratiometric, or SPI
- protection rating: IP66

Applications

- flow monitoring or control
- pressure control of clean rooms
- medical devices
- manometers
- test equipment

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Technical Data

Parameters		Units	Specifications							Notes
pressure medium			gases							1
nominal ranges		mbarD	0~±5	~±10	~±20	~±50	~±100	~±500	~±1000	2
static pressure		mbarA	1100	1100	1200	1200	1200	1500	2000	
proof pressure	high pressure side	%fs	200							3
	low pressure side	%fs	150							
burst pressure	high pressure side	%fs	300							
	low pressure side	%fs	200							
output signal	current loop	mA	4~20 (standard)							
	voltage output	V	1~5V, 10%~90%Vs ratiometric							
	digital		RS485, SPI							
accuracy		%fs	±0.5							4
long-term stability		%fs/year	⩽ 1							
power supply (Vs)	current loop	Vdc	12, ..., 30							
	voltage output	Vdc	12, ..., 30 (for 1~5V), 3.3, ..., 5 (for ratiometric output)							
	digital	Vdc	8, ..., 30 (for RS485), 3, ..., 5 (for SPI)							
load resistance	current loop	Ω	⩽ (Vs - 10) / 0.02A - R_{cable}							
	voltage output	kΩ	> 5							
insulation resistance		MΩ	⩾ 500 @500Vdc							
compensated temperature range		°C	0~50							
medium temperature range		°C	-40 ~ +85							
ambient temperature range		°C	-40 ~ +85							
storage temperature range		°C	-40 ~ +85							
temperature drift of zero		%fs	⩽ ±2.5							5
temperature drift of span		%fs	⩽ ±2.5							5
life time		cycles	10^8							
response time		ms	⩽ 1							6
process interface			Refer to mechanical interface specified in Dimensions.							
electrical interface			Refer to electrical interface specified in Dimensions.							
environment protection			IP66							
diaphragm material			silicone gel (for ranges ⩽ 50mbar), 316L SS (for ranges >50mbarD)							
wetted parts material			304 SS							
housing material			aluminum alloy							
net weight (without cable)		gram	~150							

General conditions for measurements: media temp. = 25°C ±1°C, ambient temp. = 25°C ±1°C, humidity = 50%RH ±5%RH, barometric pressure: 860~1060 mbar, max. vibration = 0.1 g (i.e. 0.98m/s/s).

Notes:
1. The pressure medium should be compatible with wetted parts material and pressure diaphragm.
2. The nominal range of “0~±5mbarD” refers to that measuring range in application can be maximum -5mbarD~+5mbarD. For details of how to indicate measuring range in an ordering code, one can refer to “pos. 2: nominal range vs measuring range(^) in Ordering Information”.
3. “fs” refers to the full scale of measuring range.
4. Accuracy = sqrt(non-linearity^2 + hysteresis^2 + repeatability^2).
5. Calculated as the total drift in output over the compensated temperature range, and normalized by the full scale output at 25°C. E.g., for a transmitter of 4~20mA output, its temperature drift of zero is ⩽±1.5%fs which refers to ⩽±0.24mA (= (20mA - 4mA) * 1.5%).
6. Response time for a 0 bar to fs step change, 10% to 90% rise time.

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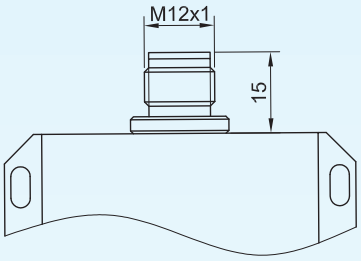
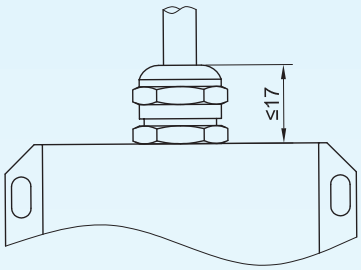
Dimensions

electrical interface

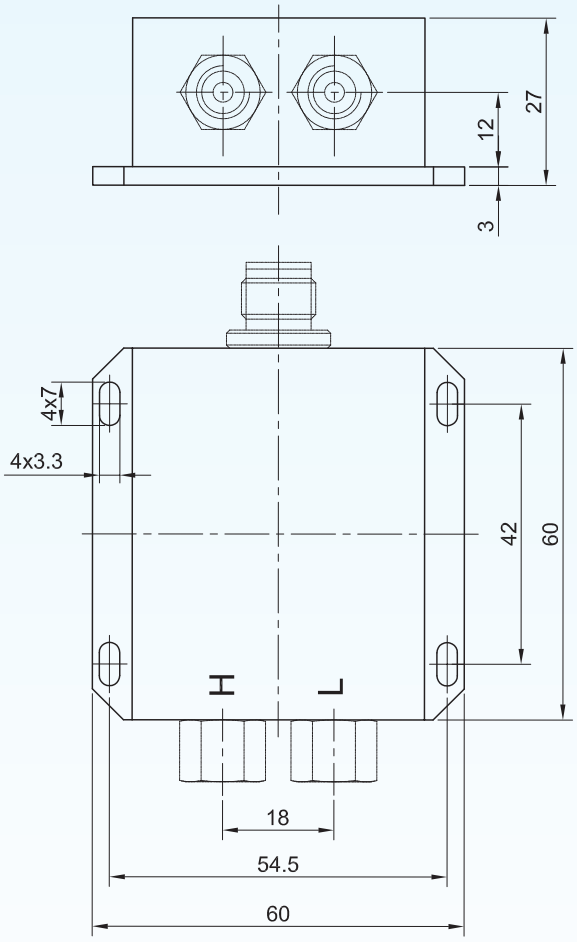


M12 connector
(standard)



Fixed cable

housing (or case)



Notes: All dimensions are in mm.

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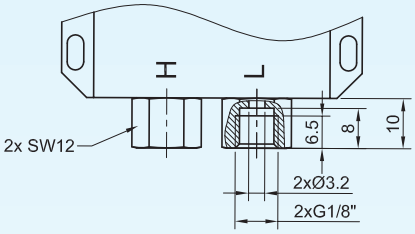
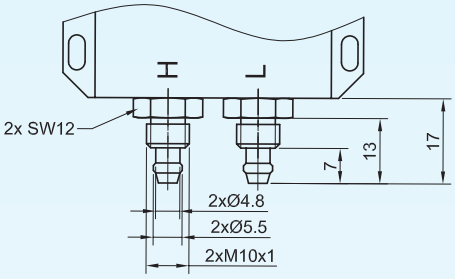
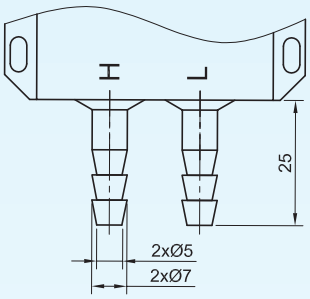
mechanical interface



G1/8" female threads
(standard)



M10x1 male threads



Φ7mm push-on hose fittings

Notes: - All dimensions are in mm.

- Buyer can combine any listed mechanical interface with any listed electrical interface when defining Ordering Code.
- In case the required interface is not listed, Buyer can define it as a customized specification in Ordering Code.

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Ordering Information

position (pos.) 1: model

493D

pos. 2: nominal range vs measuring range (^)

(-5/+5)mbarD
(-10/+10)mbarD
(-20/+20)mbarD
(-50/+50)mbarD
(-100/+100)mbarD
(-500/+500)mbarD
(-1000/+1000)mbarD

pressure reference

D: differential pressure

(^): The transmitter's nominal range is also called its full scale (fs). When a transmitter is purchased, its measuring range has to be calibrated to have a right output signal fitting to its application. Therefore, its measuring range has to be clearly indicated by Buyer when he is defining its Ordering Code (see it in "pos. 2") for purchase. The measuring range is the pressure range which Buyer will measure or monitor with this transmitter. Therefore, the measuring range must be either within or maximum equal to one of the listed nominal ranges.

For example, if Buyer wants to purchase a 493D transmitter of 4~20 mA output signal to measure or monitor differential pressures from -3mbar to +5mbar, he needs to purchase the transmitter of nominal range 0~±5mbar. To do so, he has to indicate (-3/+5)mbarD in Ordering Code for "pos.2". By doing this, before this transmitter is delivered to Buyer, it will be calibrated with its output signal 4mA corresponding to the differential pressure of -3mbar while 20mA corresponding to +5mbar. In case the measuring range in Buyer's application is from 0 to +4mbar, he needs to purchase the 493D transmitter of nominal range 0~±5mbar as well. In this case, he has to indicate (0/+4mbarD) in Ordering Code for "pos.2". By doing so, when this 493D transmitter is in calibration process, it will be calibrated with its output signal 4mA corresponding to the differential pressure of 0 mbar while 20mA corresponding to +4mbar.

pos. 3: static pressure

1100mbarA (for ±5mbarD, ±10mbarD)
1200mbarA (for ±20mbarD, ±50mbarD, ±100mbarD)
1500mbarA (for ±500mbarD)
2000mbarA (for ±1000mbarD)

pos. 4: output signal

4/20mA (standard) 1/5V RS485 10%/90%Vs (ratiometric) SPI

pos. 5: accuracy

0.5%fs

pos. 6: mechanical interface

G1/8(F) = G1/8" female threads
M10 = M10x1 male threads
Φ7PHF = Φ7mm push-on hose fittings

pos. 7: electrical interface

M12 = M12 connector.
M12/5/(#)/PVC/1(&) = M12 connector with a Φ5mm shielded PVC cable of 1m length.
5.6/(#)/PVC/1(&) = Φ5.6mm shielded PVC cable of 1m length, one end fixed on transmitter, the other end with free wires.
5.6/(#)/PVC/1(&)/M12 = Φ5.6mm shielded PVC cable of 1m length, one end fixed on transmitter, the other end with a M12 connector.

(#): 2 = 2-color wires suitable for 4/20mA current loop;
3 = 3-color wires suitable for 1/5V, or 10%/90%Vs voltage output;
4 = 4-color wires suitable for RS485 output;
6 = 6-color wires suitable for SPI output.

(&): 1m is standard cable length, but users can define a desired cable length according to application.

pos. 8: customized specifications

The "(*)" is necessary only if any customized specification is required, otherwise it is omitted.

pos.1	pos. 2	pos. 3	pos. 4	pos. 5	pos. 6	pos. 7	pos. 8

Examples of Ordering Code

- standard transmitter:
  493D-0/10mbarD-1100mbarA-4/20mA-0.5%fs-G1/8(F)-M12/5/2/PVC/1
  493D-(-5/+8)mbarD-1100mbarA-4/20mA-0.5%fs-G1/8(F)-M12/5/2/PVC/1
- customized transmitter:
  493D-(-5/+8)mbarD-1100mbarA-4/20mA-0.5%fs-G1/8(F)-M12/5/2/PVC/1/Molex0430250200-(*)
  (*): Customized specification = detachable cable of which one end is a mating M12 connector to connect to the transmitter while the other end is a Molex plug of P/N 0430250200 which is specified by Buyer.

The listed specifications, dimensions, and ordering information are subject to change without prior notice.

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