



BPT362 Series
Intelligent Pressure Transmitter

OPERATING MANUAL



BASI INSTRUMENT AB, P.O. Box 53, SE-27506 VOLLSJÖ, SWEDEN
NO:BPTM015141203

Warning

- Please pay attention to the warning signs of the packing!
- The measured medium should not be frozen to prevent from breaking the sensor!
- Only the qualified and authorized personnel can install, use and maintain the transmitter. The qualified personnel are the persons with the related certificates of qualification and authorization, who are experienced in the assembly, electrical connection, using and operation of the transmitters and the similar devices.
- The tools with the required dielectric strength should be used to ensure safety during the electric connection.
- Please comply with the related safety regulations of electrical installation. For the anti-explosion transmitters, the anti-explosion regulations and standards should be observed. For this transmitter can be used under high pressure and in the corrosive mediums, it should be handled properly to avoid the personal injuries and the possible damages. While used in other countries, the corresponding national regulations should also be observed.
- The power supply of the device should be double isolated from the network voltage.

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1. Working principle

1.1 Schematic diagram

Please see Fig1-1 for the schematic diagram of BPT362 series intelligent transmitter.

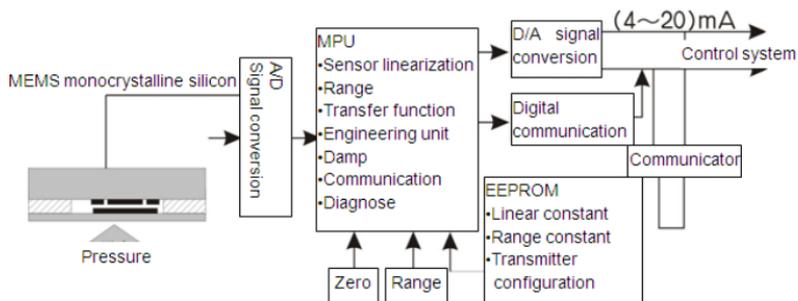


Fig. 1-1 Block diagram for working principle

1.2.1 Working principle of BPT362 series intelligent transmitter

Transmitter is composed of sensor and signal processing circuit. There is Wheatstone bridge on the pressure sensing surface of the sensor. The resistance value of the bridge arm will change with the increasing of pressure and then convert to standard (4~20)mA signal output via signal processing circuit, shown as in Fig. 1-2.

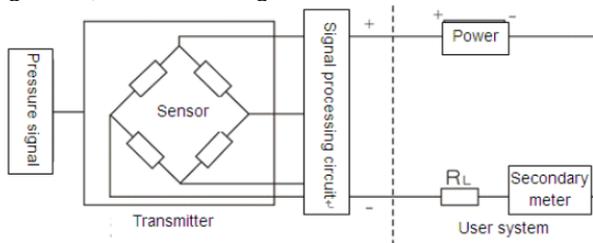


Fig. 1-2

1.2.2 D/A conversion

After D/A conversion, the corrected digital signals, which are transmitted by the microprocessor, can be converted into 4~20mA analog signals and then output.

1.2.3 Digital communication

Test and configure the BPT362 intelligent transmitter through a communicator or complete the communication by an upper computer with HART communication protocol. HART protocol adopts the BELL202 Frequency Shift Keying (FSK) technology and realizes the communication by overlaying the 1200Hz or 2200Hz digital signal onto the 4~20mA signals. While communicating, there is no frequency signal interference.

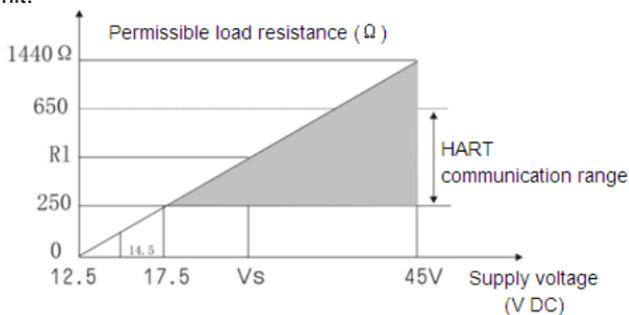
2.1 Functional parameters

Application: the measurement of liquid, gas and steam

Range

Converter type	Range code	Min. range	Max. range
BPT362A	1	12.5KPa	250KPa
	2	0.5MPa	10MPa
	3	2MPa	20MPa
	4	5MPa	40MPa
	5	16MPa	80MPa
BPT362G	1	12.5KPa	250KPa
	2	0.15MPa	3MPa
	3	0.5MPa	10MPa
	4	2MPa	20MPa
	5	5MPa	40MPa
	6	16MPa	80MPa

Load limit:



Power supply - load diagram

Note: The supply voltage range of the transmitter with backlight display is 14.5~45V
 The supply voltage range of the intrinsic-safety series transmitter is 14.5 ~ 28V.
 The working voltage during HART communication should be larger than 17.5V.

Power supply: An external power supply is needed. When the transmitter works without load, the voltage is 14.5-36V DC.

Positive and negative transference of zero point:

The zero point can shift between the barometric pressure and the range upper limit or 0KPa and the range upper limit. In addition, the calibration range should be larger than or equal to the min. range and the range upper limit cannot be larger than URL (range upper limit).

Time response:

Time constant: 200ms

Delay time: < 0.1s

Refresh rate: 20times/s (min.)

2.2 Temperature limit

Process: Sensor (filled with Silicon oil): -40°C to 121°C

 Sensor (filled with Inert liquid): -30°C to 121°C

Environment: -20°C ~ + 70°C

Storage: -46°C to 110°C

 -40°C to 85°C (LCD gauge outfit)

Humidity limit: 0-100% relative humidity

Starting time

Output code: 2s without warm-up

Fault mode

 Output code

 While discovering the faults of sensor or microprocessor by self diagnosis, the transmitter will output one high or low alarm signal to prompt the users. The alarm output value is subject to the factory configuration mode of the transmitter:

 Linear output: $3.8 < I < 20.8$

C4: I=20.8mA high fault

CN: I=3.8mA low fault

2.3 Performance index

(Zero-base range, reference conditions, silicone oil filling liquid, 316SS isolation diaphragm)

Damping time: Set the time constant according to the actual condition of the field. It is suggested to be 1s.

Influence of vibrations: less than 0.065%URL

Vibration test conditions: peak-peak value 4mm (5-15Hz)

Accelerated speed 2g (15-150Hz) and 1g (150-2000Hz)

Influence of power supply: < 0.01% range/v

Influence of installation position: there will be no null drift effect by changing the installation position, which is parallel to the diaphragm surface. If the change between the installation position and the diaphragm surface do not exceed 90°, the null shift within 0.4KPa can be corrected by zero setting without influencing the range.

Protection limit of transient voltage

The electromagnetic compatibility accords with the national standard:

IEC6100-4-2 Electrostatic discharge immunity test IIIB

IEC6100-4-4 Electrical fast transient pulse clusters anti-interference test IIIB

IEC6100-4-5 Surge (shock) immunity test IIIB

General index: test according to IEC801-3

2.4 Mechanical performance index

Electrical interface:

ANSI (American Standard), NPT1/2(F) female

ISO (standard), M20×1.5 female thread

Process interface: 1/2 female NPT, 1/2 male NPT, M20×1.5 female NPT/inner bore Φ3 (standard), M20×1.5 male NPT/inner bore Φ10 (viscous media)

Materials of process connecting pieces:

Isolation diaphragm:

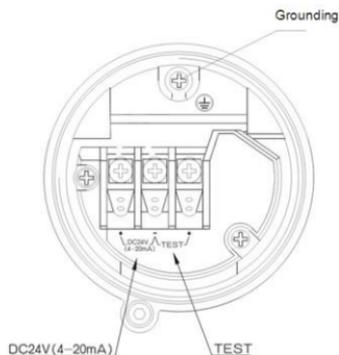
316 stainless steel and hastelloy C

Process interface:

316L stainless steel CF-3M

Wiring diagram of terminal side

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Connecting terminal	
DC24V (4~20mA) $\begin{matrix} + \\ - \end{matrix}$	Power supply and output end
TEST $\begin{matrix} + \\ - \end{matrix}$	Connect to the testing terminal of ampere meter (impedance should be less than 10Ω)
⏏	Grounding terminal

3. Calibration

BPT362 series intelligent transmitter has been calibrated before out of factory. Please refer to this manual for the detailed modifications. This section introduces how to set the output unit, range, output type, damp, zero position of sensor and 4~20mA output.



Fig. 3-1 LCD display screen

3.1 Menu

- 1) Buttons
- 2) Present measured value/full range (%)
- 3) Present measured value (or display the PV value or the corresponding current value) or fault messages
- 4) Menu name or fault messages
- 5) Unit of the measured value

3.2 Adjustment of zero position and range

- 1) Button introduction:

Zero setting button (Z), full-scale setting button (S) & function button (M)

- 2) Zero setting and full-scale setting by buttons

- ◆ Unlocking: simultaneously press button (Z) and button (S) for more than 3s (the LCD displays: OPEN).
- ◆ Zero setting: if the range of the gauge pressure transmitter exceeds 10Mpa, zero setting should be executed in the field. Apply the zero-point pressure on the transmitter. After unlocking, press button (Z) for 3s, the output current will be 4.000mA. Then zero setting is finished (the LCD displays: LSET).
- ◆ Full-scale setting: apply the full-scale pressure on the transmitter. After locking, press button (S) for 3s, the output current will be 20.000mA. Then the full-scale setting is finished (the LCD screen displays: HSET).

3.3 PV value reset

- 1) Under the measurement state, simultaneously press button (S) and button (Z) for more than 3s. The LCD displays OPEN (Unlocking);
- 2) Release and then repress the above mentioned two buttons for more than 3s. The LCD displays 0000. Then back to the measurement state;
- 3) Release the button and the reset is finished.

3.4 HART configuration software of intelligent transmitter

BASI also provides the HART upper computer software and HART decoder. The transmitter can be debugged via HART communication interface and the parameters can also be set, adjusted and recovered.

3.5 Parameter settings:

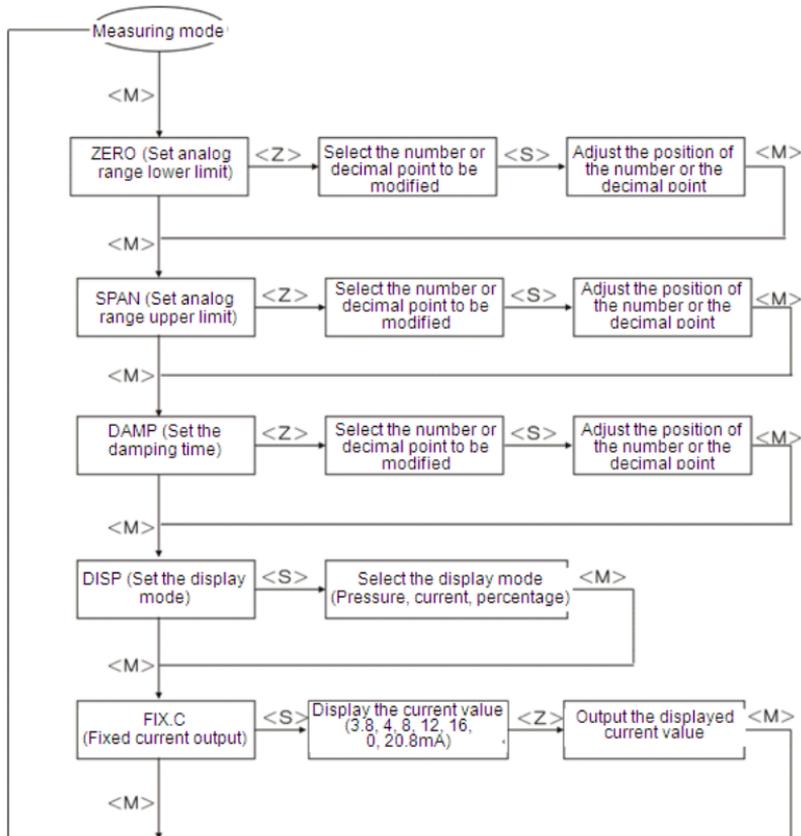


Fig. 3-2

Explanation: while setting the parameters, the transmitter will return to the measurement mode without pressing any button within 2 minutes (the set data will not be saved.)

3.6 Connection between the instrument and the communicator

Firstly, we will briefly introduce the connection of the external hardware.

The traditional connecting circuit of the two-wire-system transmitter is shown as in the following figure:

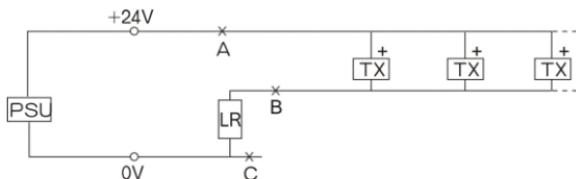


Fig. 3-3

The communication circuit of the master machine cannot be connected to the two terminals of the power supply directly. However, it can be connected to the two ends of the field (A, B) as well as to those of the load resistance (B, C) (Under both circumstances, the circuit should be powered by the power supply.). The permissible load resistance of HART is 250 ~ 650Ω. Shown as in Fig. 3-2, PSU is the power, LR is the load resistance and TX is the intelligent transmitter. It is a multilevel on-line mode of HART, which can allow up to 15 intelligent instruments every time.

4. Introduction of anti-explosion

4.1 Anti-explosion sign

Sign for flame-proof type: Exd IIC T6 Gb

Product standard: Q/FJSJY 008-2014

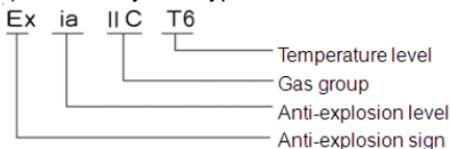
Sign for intrinsically safe type: Exia IIC T6 Ga

Product standard: Q/FJSR 008-2014

a) Flame-proof type



b) Intrinsically safe type



4.2 Notices for anti-explosion

4.2.1 Flame-proof type

- 1) Please open the cover after power off;
- 2) The outer diameter of the lead-in cable should be same as the inner diameter of the seal ring. Please tighten the gland nut so that the seal ring can grip the cable shroud;
- 3) The shell of the transmitter should be grounded;
- 4) The users are not allowed to replace the parts by themselves;
- 5) The highest surface temperature grade of the shell is T6 ($\leq 85^{\circ}\text{C}$);
- 6) Please install, use and maintain the transmitter according to the operating manual and the related terms of **GB3836.15-2000 Electrical Apparatus for Explosive Gas Atmospheres. Part 15: Electrical Installation in Hazardous Areas (Other Than Mines)**.

4.2.2 Intrinsically safe type

- 1) For the anti-explosion gaseous environment, please adopt the intrinsically safe systems composed of the associated anti-explosion apparatuses. The grounding of the system should comply with the operating manual of the transmitters and other associated apparatuses. The wiring terminal should be connected correctly;
- 2) The parameters and the max. internal equivalent parameters of intrinsic safety are as follows:

Max. input voltage U_i (V)	Max. input current I_i (mA)	Max. input power P_i (W)	Max. internal equivalent parameter	
			C_i (nF)	L_i (mH)
28	93	0.65	0.03	0

- 3) It is not allowed to open the cover before power off;
- 4) The users are not allowed to replace the parts by themselves to avoid unnecessary breakdown;
- 5) Please repair the transmitter in the occasions without flammable gas;
- 6) The shield cable with insulating sheath should be used as cable jumper and the shielding layer should be grounded.
- 7) Please install, use and maintain the transmitter according to the operating manual and **GB3836.13-1997 Electrical Apparatus for Explosive Gas Atmospheres Part 13: Repair and Overhaul for Apparatus Used in Explosive Gas Atmospheres, GB3836.15-2000**

Electrical Apparatus for Explosive Gas Atmospheres. Part 15: Electrical Installation in Hazardous Areas (Other Than Mines), GB3836.16-2006 Electrical Apparatus for Explosive Gas Atmospheres Part 16: Inspection and Maintenance of Electrical Installation (Other Than Mines) and GB50257-1996 Code for Construction and Acceptance of Electric Device for Explosion Atmospheres and Fire Hazard Electrical Equipment Installation Engineering.

5. Structure

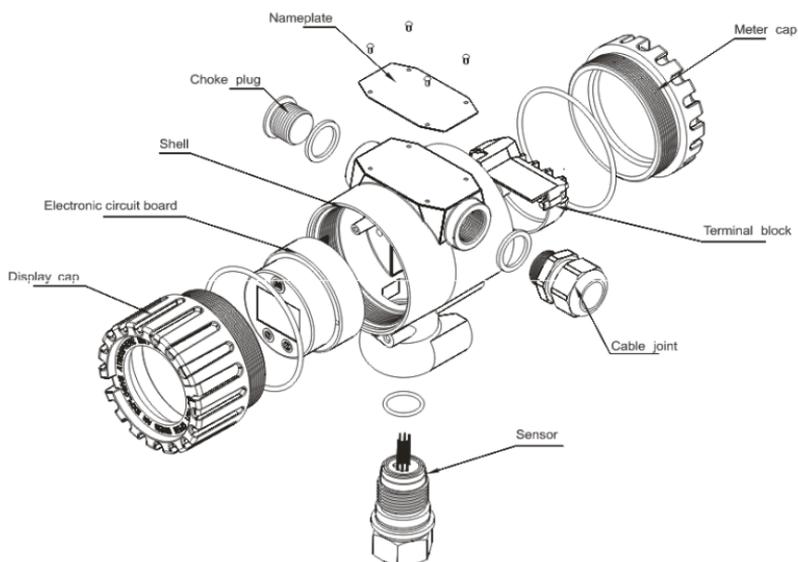


Fig. 5-1 Parts of BPT362 series pressure transmitter

6. Vulnerable parts

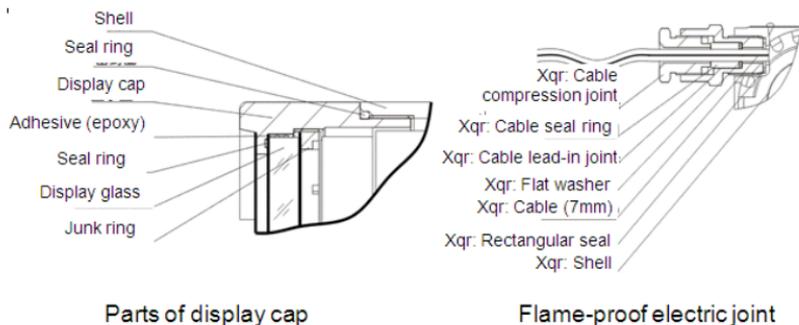


Fig. 6-1

7. Installation

7.1 External wiring diagram

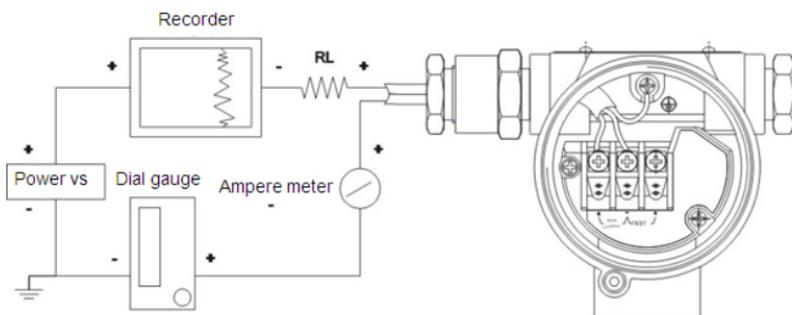
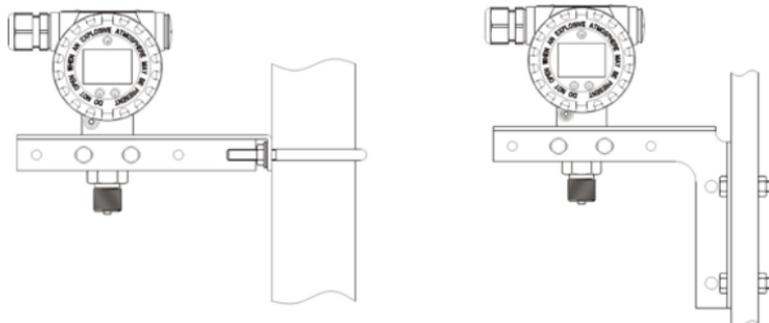


Fig. 7-1 External wiring diagram of BPT362 series intelligent transmitter



Piping rack installation (Code B4)

Flat bracket installation (Code B5)

Fig. 7-2 Installation modes**7.1.1 Installation and operating requirements**

- A. The transmitter can be directly installed on the measured point at any angles. If the interface cannot accord with the interface on the field, it can be connected by adapters;
- B. The transmitter should be installed in the occasions with less temperature changes, vibrations and shocks.
- C. If the transmitter should be used outdoors, please place it in a protection box so as to prevent from sunlight and rains;
- D. While measuring steam or other media at high temperature, please don't exceed the temperature limit. If necessary, install the lead-in tube or other cooling devices.
- E. A pressure stop valve should be installed between the transmitter and the medium for inspection and overhaul. Pressure buffers should be used in the occasions with large pressure fluctuations.

7.2 Unpack and product completeness**Unpack**

Before unpacking, please check the outer packing, transmitter model, specification and accessories.

Product completeness

Product	Quantity
Transmitter	1 piece
Operating manual	1 copy

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Product qualification certificate	1 copy
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7.3 Transportation and storage

- 1) The transmitter can be transported by land and sea.
- 2) The transmitter and its accessories can be stored indoors (ambient temperature: -20 ~ 80°C, relative humidity: ≤90%) and there should not be corrosive gas which will corrode the transmitter.

7.4 Ordering instruction

The matters needing attention while selecting the models:

- A. Sensor material;
- B. Whether used in an anti-explosion occasion;
- C. Connector material and connecting mode;
- D. Sealing element material;
- E. Accuracy;
- F. Range;
- G. Whether have other requirements.

8. Selection guide

BPT362A Series Absolute Pressure Transmitter

Model	Transmitter type	
BPT362A-	Absolute pressure transmitter	
Code	Range	Overpressure
1	0-12.5 ~ 250KPa	500KPa
2	0-0.5 ~ 10MPa	20MPa
3	0-2 ~ 20MPa	60MPa
4	0-5 ~ 40MPa	80MPa
5	0-16 ~ 80MPa	120MPa
Code	Filling liquid	Diaphragm
1	Silicone oil	316L stainless steel
2	Fluorocarbon oil	316L stainless steel
3	Silicone oil	Hastelloy C
4	Fluorocarbon oil	Hastelloy C
Code	Process interface	
F	1/2 female NPT	
M	1/2 male NPT	
A	M20x1.5 male NPT/inner hole Φ3 (standard)	
B	M20x1.5 male NPT/inner hole Φ10 (viscous media)	
Code	Electrical interface	
A	1/2 female NPT	

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M	M20x1.5 female NPT
Code	Gauge outfit
-M	LCD display
-N	Without gauge outfit
Code	Anti-explosion grade
N	Ordinary type (without anti-explosion)
D	Flame-proof type ExdIICT6
I	Intrinsically safe type ExiallCT6
Code	Mounting bracket
N	Without bracket
B4	Pipe-mounted flat bracket (2" pipe)
B5	Flat bracket
Code	Installed with valve bank (Optional)⁽¹⁾
V2	2-valve manifold
Code	Other options
H	The measuring accuracy is 0.075%FS
S	The contacted parts adopt 316 stainless steel ⁽²⁾
Q4	Verification certificate (please contact BASI)
C4	High alarm
CN	Low alarm (If the user do not select, it will be no alarm for default.)
Example	BPT362A-11FA-MDB4

Note: If needing higher precision, please contact the marketing representatives of BASI Instrument AB

Note (1): "Installed with valve bank" is optional. Unless otherwise requested, the materials will be 316 stainless steels. If you choose this option, only "P: without process joint" can be selected.

Note (2): The default contact parts adopt 304 stainless steels.

BPT362G Series Pressure Transmitter

Model	Transmitter type	
BPT362G-	Pressure transmitter	
Code	Range	Overpressure
1	0-12.5 ~ 250KPa	4MPa
2	0-0.15 ~ 3MPa	15MPa
3	0-0.5 ~ 10MPa	20MPa
4	0-2 ~ 20MPa	60MPa
5	0-5 ~ 40MPa	80MPa
6	0-16 ~ 80MPa	120MPa

BPT362 Series Intelligent Pressure Transmitter

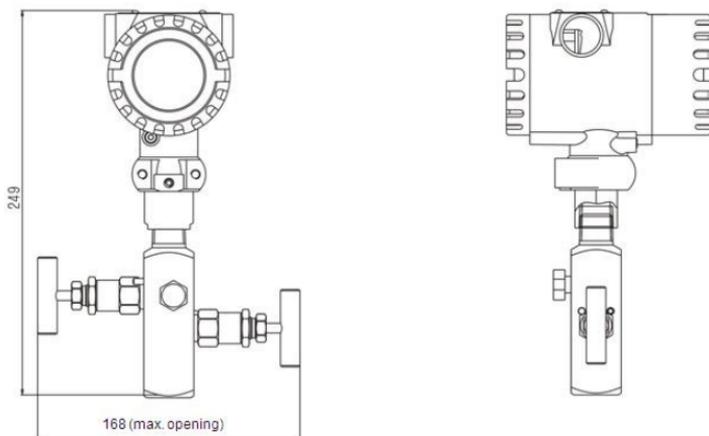
Code	Filling liquid	Diaphragm
1	Silicone oil	316L stainless steel
2	Fluorocarbon oil	316L stainless steel
3	Silicone oil	Hastelloy C
4	Fluorocarbon oil	Hastelloy C
Code	Process interface	
F	1/2 female NPT	
M	1/2 male NPT	
A	M20×1.5 male NPT/inner hole Φ3 (standard)	
B	M20×1.5 male NPT/inner hole Φ10 (viscous media)	
Code	Electrical interface	
A	1/2 female NPT	
M	M20×1.5 female NPT	
Code	Gauge outfit	
-M	LCD display	
-N	Without gauge outfit	
Code	Anti-explosion grade	
N	Ordinary type (without anti-explosion)	
D	Flame-proof type ExdIICT6	
I	Intrinsically safe type ExiaIICT6	
Code	Mounting bracket	
N	Without bracket	
B4	Pipe-mounted flat bracket (2" pipe)	
B5	Flat bracket	
Code	Installed with valve bank (Optional)⁽¹⁾	
V2	2-valve manifold	
Code	Other options	
H	The measuring accuracy is 0.075%FS	
S	The contacted parts adopt 316 stainless steel ⁽²⁾	
Q4	Verification certificate (please contact BASI)	
C4	High alarm	
CN	Low alarm (If the user do not select, it will be no alarm for default.)	
Example	BPT362G-11FA-MDB4	

Note: If needing higher precision, please contact the marketing representatives of BASI Instrument AB

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Note (2): The default contact parts adopt 304 stainless steels.

9. Dimension (with valve)



Dimension (with V2 series 2-valve manifold) (Unit: mm)

BASI