Wide Plus

36 Series Pressure/Differential Pressure Transmitter

OPERATING MANUAL

NO：3T1001230317NGE

FUJIAN WIDE PLUS PRECISION INSTRUMENTS CO., LTD

Technical service hotline：800-858-1566　400-887-6339

⚠ 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.

Contents

1. Working principle

1.1 Schematic diagram

Please see Fig1-1 for the schematic diagram of 36 series transmitter.

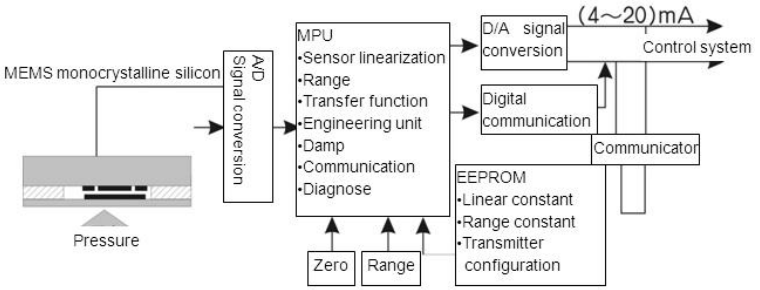


Fig. 1-1 Block diagram for working principle

1.2 Working principle of 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.

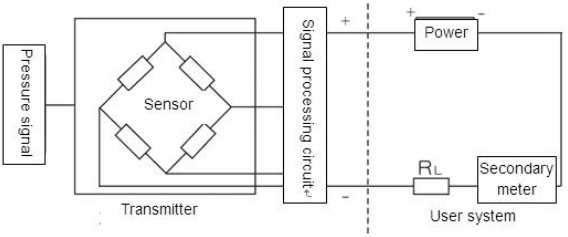


Fig. 1-2

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.

Digital communication

Test and configure the 36 seriest 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. Technical indicator

The technical parameters conform to the national standards GB/T 28474.1-2012 and GB/T 28474.2-2012

2.1 Performance index

(Zero-base range, reference conditions, silicone oil filling liquid, 316SS isolation diaphragm, 4~20mA analog output.The fine-tuned value is equal to the set point value of range.)

Influence of zero point: correct the zero position again or execute the pressure zero drift according to the field installation position etc.

Damping time constant: the total damping time constant can be obtained by the damping time constant of amplifier unit plus that of the diaphragm capsule. The damping time constant of amplifier unit is adjustable within the range of 0~100s.

Diaphragm capsule (silicone oil)

Time constant (S) (Set the time constant according to the actual condition of the field. It is suggested to be 1s.)

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.

Influence of power supply: less than ±0.005% range/v

2.2 Functional parameters

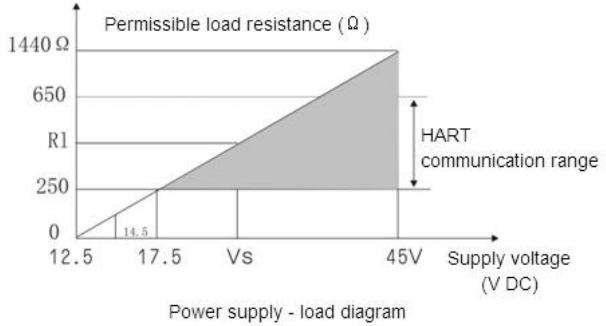
Output: two-wire 4-20mA, linear output or square root output is optional. The digital process variable overlaying on the 4-20mA signal can apply to all the host machines with HART protocol.

Power supply: An external power supply is needed. When the standard transmitter (4-20mA) works without load, the voltage is 14.5-45V DC.

Protection level: IP67

Loop load limit

The max. loop resistance is decided by the voltage of the external power supply, shown as in the following figure:



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.

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 Temperature limit

Environment: -20℃～＋70℃

Storage: -46℃～110℃

With header: -40℃～85℃

Process: if ≥atmospheric pressure, please see the following table:

Table 2. Process temperature limit of 36 series transmitter

Sensor (filled with Silicon oil)	-40 to 121℃
Sensor (filled with Inert liquid)	-30 to 121℃

Humidity limit: 0-100% relative humidity

Starting time: after power on, the transmitter will reach to the performance index within 2s

2.4 Mechanical performance index

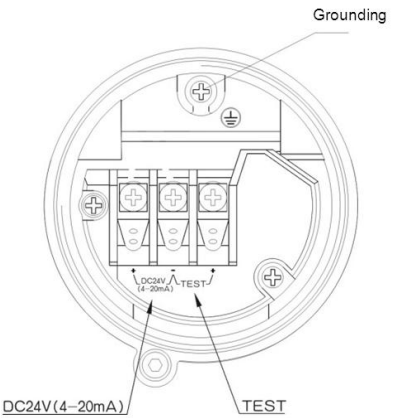
Electrical interface:

ANSI (American Standard), NPT1/2(F) female resistance
ISO (Chinese standard), M20×1.5 female thread

Process interface:

Without process joint (1/4 female NPT on the flange)
With waist-shaped joint: 1/2 taper tube female NPT
With T-shaped joint: M20×1.5 male NPT and back welding connecting tube (stainless steel)
With waist-shaped joint, 1/2 NPT transit joint and back welding connecting tube (stainless steel)

Wiring diagram of terminal side



Connecting terminal	
DC24V(4~20mA) + −	Power supply and output end
TEST + −	Connect to the testing terminal of ampere meter (impedance should be less than 10Ω)
⏚	Grounding terminal

3. Calibration

36 series 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.

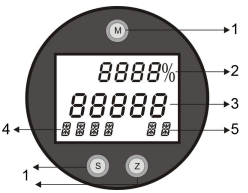


Fig. 3-1 LCD display screen

3.1 Menu

1) Menu 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

Under the measurement state, simultaneously press button (S) and button

(Z) for more than 3s. The LCD displays PV=0.Release the button and the reset is finished.

3.4 HART configuration software of transmitter

Wide Plus 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:

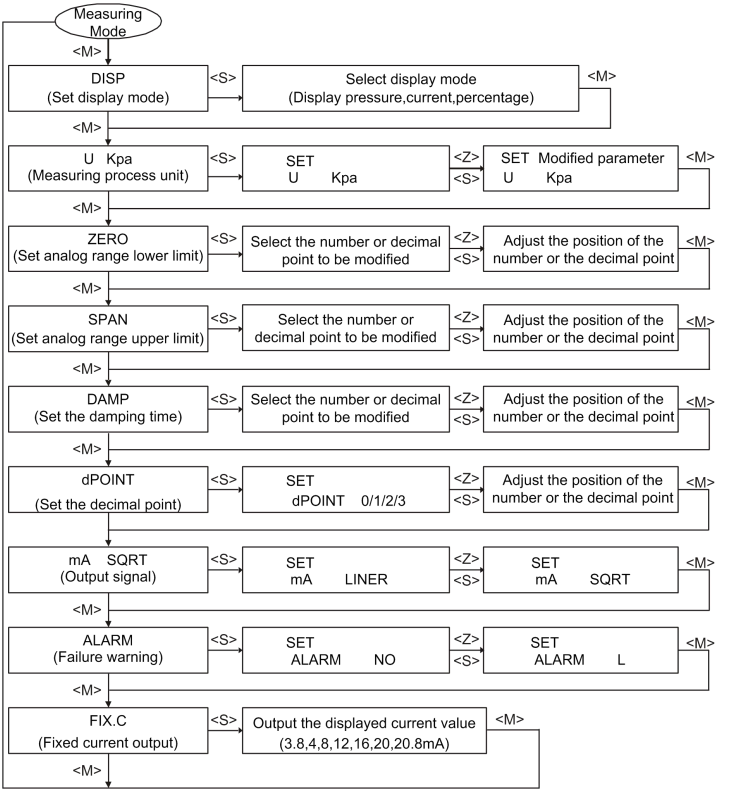


Fig. 3-2

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.)

Factory data reset

There are two ways to restore factory defaults:

- First press "S key", then switch on the transmitter power, continue to hold down the S key for 5 seconds .If the LCD screen displays LOADING, the transmitter is restoring data to the factory setting. Release the button.

In the measurement mode, long press Z key, LCD screen appears RECOVERY; Long press the S key again. If OK appears, it indicates that the transmitter has been restoring the data to the factory state; If Fail occurs, the transmitter has no backup data before delivery and cannot be restored before delivery.

3.6 Connection between the instrument and the communicator

Firstly, we will briefly introduce the connection of the external hardwares. The traditional connecting circuit of the two-wire-system transmitter is shown as in the following figure:

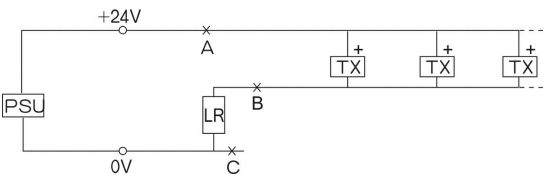


Fig. 3-3

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

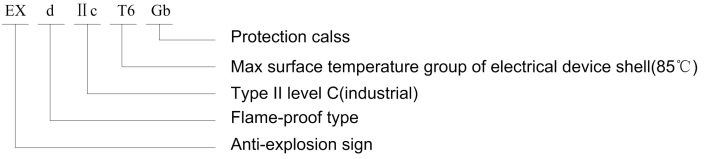
This product is suitable for use in dangerous places with explosive environment under the following standard atmospheric conditions, except for the modification of a part of the supplement to this part:

Temperature: -20℃ ~ +40℃;
Pressure: 80 kPa ~ 110 kPa;
Standard oxygen content in air (by volume) : 21%.
Special considerations are required for electrical equipment used in atmospheric conditions beyond this range and additional assessments and tests may be required.
On-site installation shall be equipped with cable lead-in devices that conform to GB/T3836.15-2017 standard and have obtained explosion-proof certificate. The outer diameter of cables shall be 5 ~ 6mm.
When the flameproof transmitter is used in dangerous places, the shell cover of the transmitter must be tightened. In order to ensure the safety of use, safety procedures should be strictly observed. It is absolutely not allowed to open the shell cover of the transmitter when it is powered on.
When installing flameproof transmitters, ensure that the outlet of the cable has a good seal.

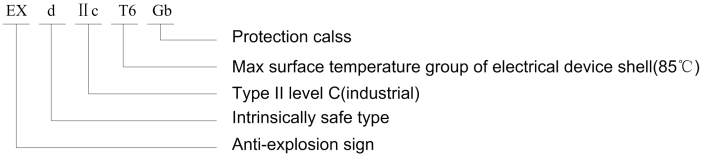
4.1 Anti-explosion sign

Sign for flame-proof type: Exd IIC T6 Gb
Product standard: Q/FSJY 008-2014
Sign for intrinsically safe type: Exia IIC T6 Ga
Product standard: Q/FJSR 001-2014

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 shell of the transmitter should be grounded;

3) The users are not allowed to replace the parts by themselves;
4) The highest surface temperature grade of the shell is T6 (≤85℃);
5) On-site installation shall be equipped with cable lead-in devices that conform to GB/T3836.15-2017 standard and have obtained explosion-proof certificate. The outer diameter of cables shall be 5 ~ 6mm.

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 Ui (V)	Max. input current Li (mA)	Max. input power Pi (W)	Max. internal equivalent parameter	
			Ci(nF)	Li(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) When the intrinsically safe transmitter is used in zone 0, measures should be taken to prevent the ignition hazard caused by impact or friction!
8) 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. Exploded view

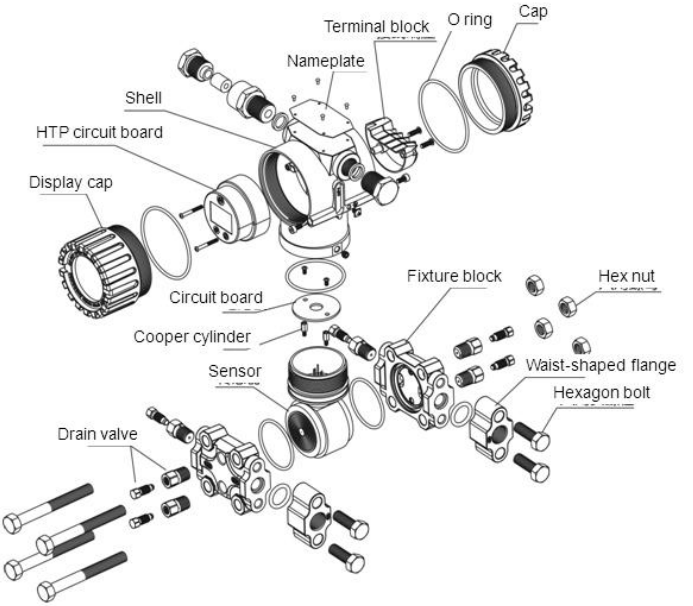


Fig. 5-1

6. Vulnerable parts

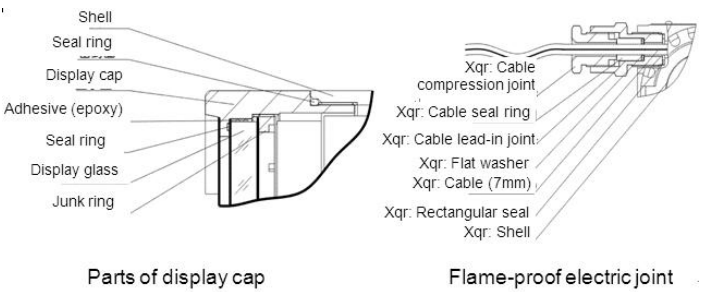


Fig. 6-1

7. Installation

7.1 External wiring diagram

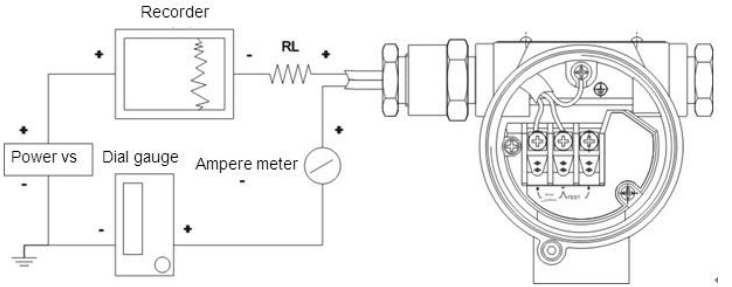
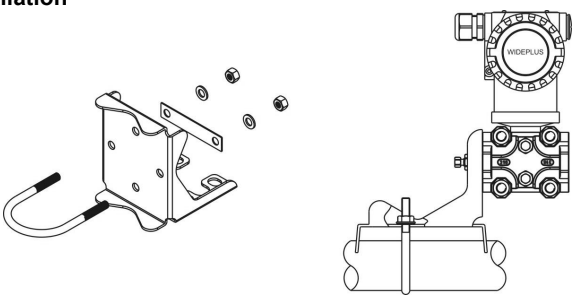
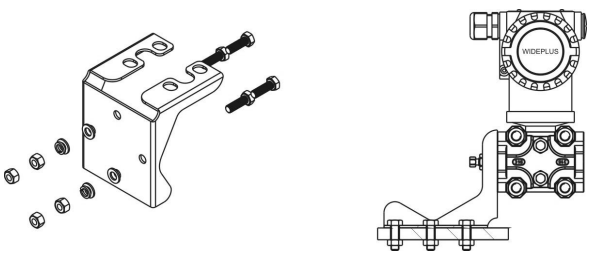


Fig. 7-1 External wiring diagram of 36 series transmitter

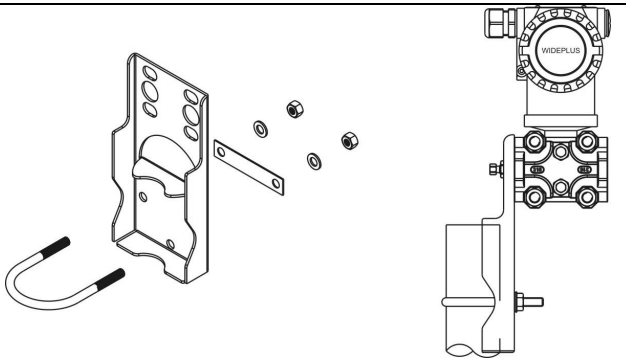
361 installation



Pipe installation (Code: B1)

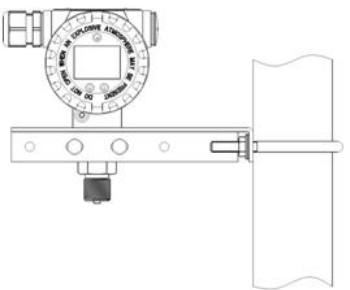


Panel mounting (Code: B2)

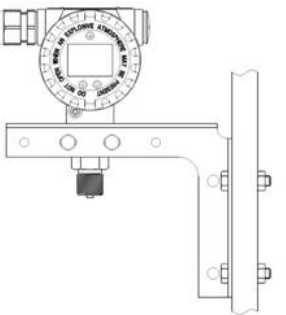


Pipe installation (Code: B3)

362 installation



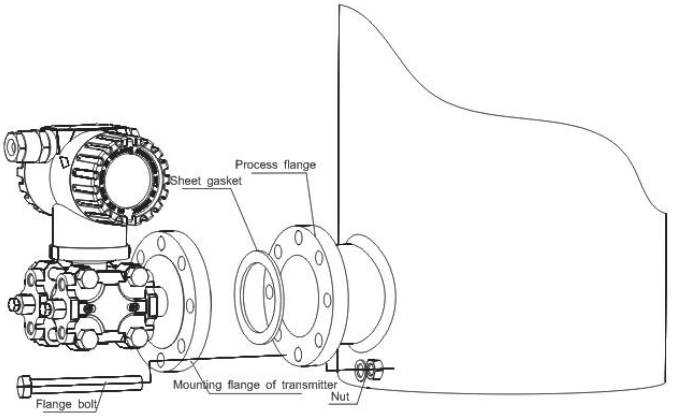
Piping rack installation (Code B4)



Flat bracket installation (Code B5)

363 installation

The transmitter should be installed through the high-pressure side chamber flange (see chart below). The users should prepare process flanges, gaskets, flange bolts and nuts.



The transmitter is sealed by a diaphragm and installed via flanges (see chart below). The users should prepare process flanges, gaskets, flange bolts and nuts.

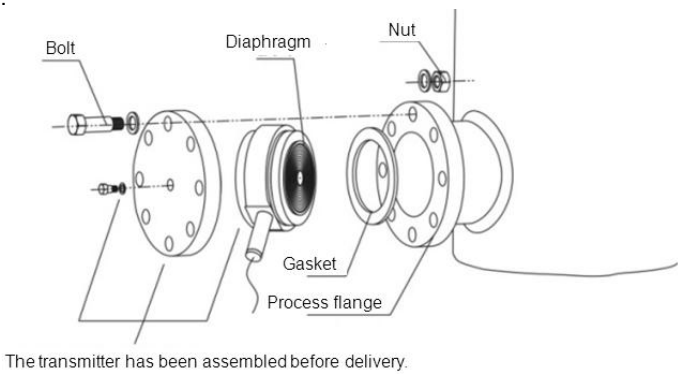


Fig.7-2

Notes:

1) While measuring the liquid level, the lowest liquid level (zero point) should be located at a place, which is more than 50mm away from the sealing center of the high-pressure side diaphragm, see Fig. 7-3.
2) Shown as in the HIGH, LOW labels, the flange diaphragm should be installed on the high and low pressure sides of the container.

3) In order to avoid the measuring error caused by temperature difference, the capillaries can be tied together. The capillaries should be fixed firmly on the container wall so as to avoid the influences of wind and vibrations. If the capillaries are too long, they should be rolled up and fastened by clamps.

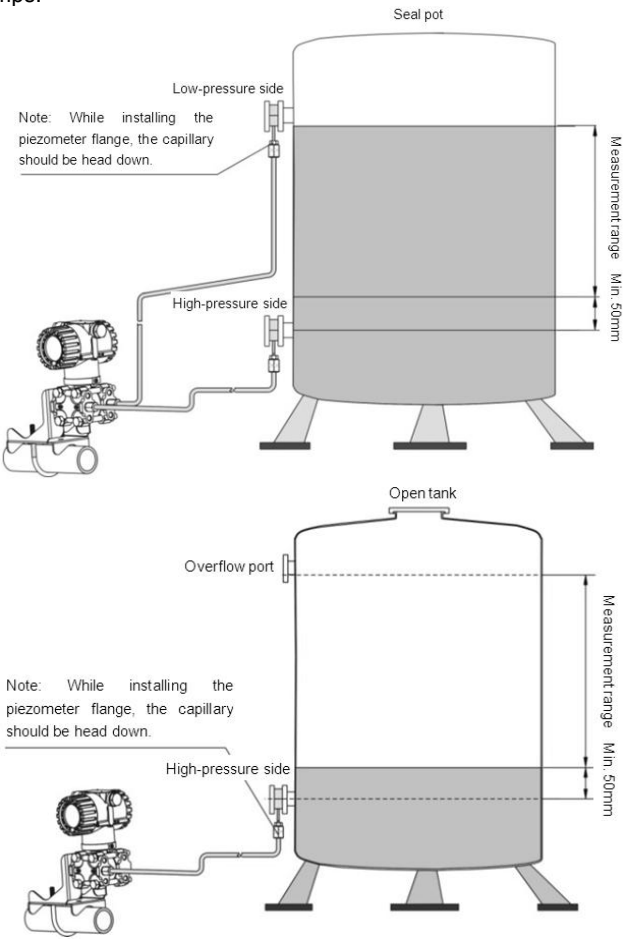


Fig.7-3

When installing the pressure gauge flange, place the metal protective tube of the capillary facing down.

The transmitter shall be installed below the high pressure side process connection so that the capillary seal fluid forms a positive drop pressure

363 remote transmission flange and production process connection: thread type, flange type and meet the health requirements of the anti-pollution type (ring type) structure. Flange type is divided into lower support flange and flat type. Flange specification is 1inch -3inch, working pressure is 1.9MPa, 5.1MPa(150,300 Ib), flat type only 3inch specifications, please refer to the following order information in the model and corresponding flange drawings. When installing pressure and differential pressure transmitters with remote flanges, the application and installation of both remote flanges and transmitters should be considered to ensure the best performance.

For the response time of the instrument is proportional to the capillary length and, with the temperature change, the volume of the filling liquid in the capillary will influence its output, the following matters should be noted:

(1) The capillary should be as short as possible;

(2) While installing a transmitter with one remote flange, the transmitter should be lower than or at the same height of the flange and the flow joint. While installing a transmitter with two remote flanges (The two flanges are mounted at different heights.), the transmitter should be installed below the midpoint, which is among the two flanges and flow joint.

(3) The remote flanges and the capillaries should not be exposed to the sunshine;

(4) If there are two remote flanges, the capillaries' lengths of these two flanges should be the same;

(5) The zero position of the transmitter should be adjusted by seasons.

7.1.1 Connecting pipe

The reference connecting pipe between the production equipment and the transmitter should precisely transmit the pressure of the tapping to the transmitter. Due to the following reasons, errors will occur:

(1) Leakage;
(2) Frictional loss – especially when the purificant is used;
(3) There is liquid in the gas pipeline (pressure head error);
(4) There is gas in the fluid pipeline.

7.1.2 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
Product qualification certificate	1 copy

7.3 Transportation and storage

1) The transmitter can be transported by land and waterway.

2) The transmitter and its accessories can be stored indoors (ambient temperature: -20～80℃, 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. Connector material and connecting mode;

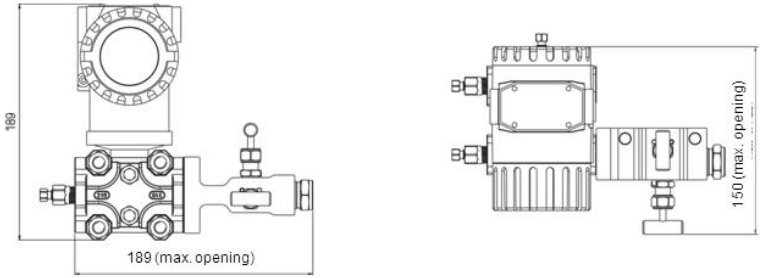
C. Sealing element material;

D. Accuracy;

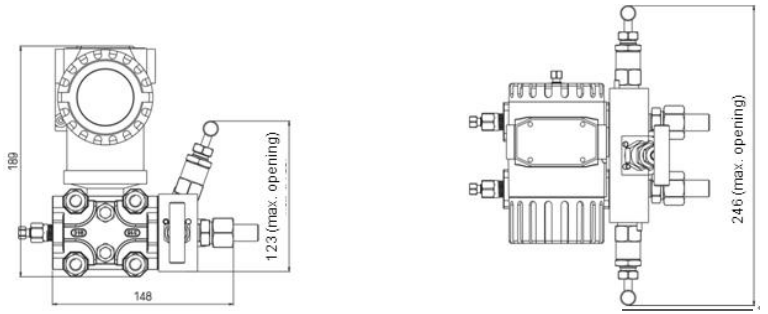
E. Range;

F. Whether have other requirements.

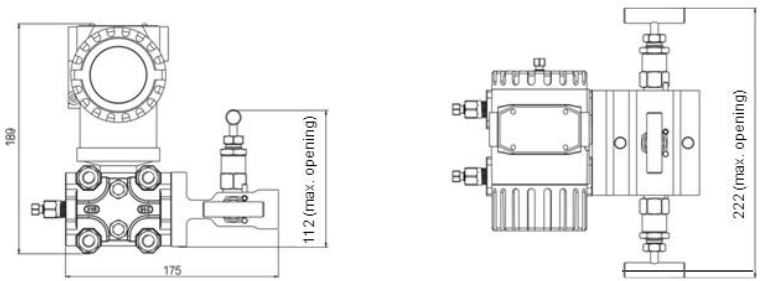
8. Dimension (with valve banks)



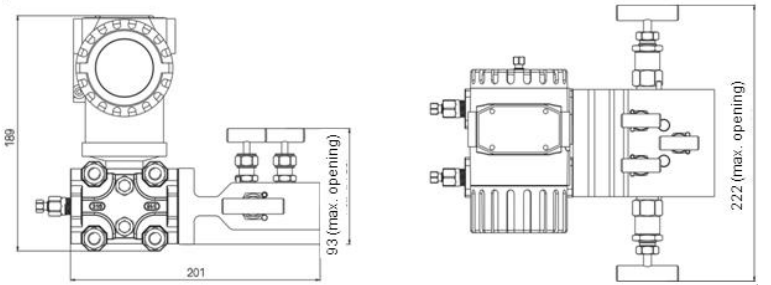
Dimension (with V2 series 2-valve manifold)



Dimension (with T3 series 3-valve manifold)



Dimension (with V3 series 3-valve manifold)



Dimension (with V5 series 5-valve manifold)

9. 36 series product outline drawing

9.1 361 outline drawing

9.2 362 outline drawing

Flange type

Clamp type

Straight mounted type

9.3 363 outline drawing

Remote double flange

Straight mounted single flange

Remote single flange

Product selection: See Product Selection Manual of 36 Series Intelligent Pressure/differential Pressure Transmitter for details.

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