ISEN-CY3051/3351/1151 Remotesingle(double) flange pressure(liquidlevel,differential pressure) transmitter

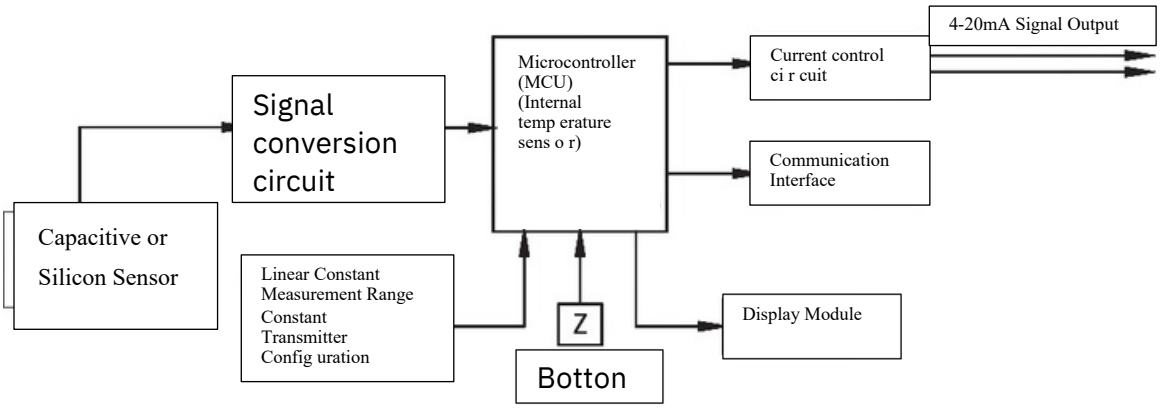
The 3051 seriescapacitive pressureand differentialpressure transmitter isa new generation product introduced byour company with foreign advanced technology and equipment; key materials, components and parts are all imported, and the whole machine has been strictly assembled and tested. It has the characteristics of advanced design principle, high precision, good stability, small and exquisite appearance, HART communication, complete varieties and specifications, easy installation and use, etc. It is easy to install and compatible with traditional 1151 series products and can be directly replaced.

Product Featur es

- gh precision and ex cellent stability
- Two-wire system (special models available in four-wire)
- Compact, lightweight, and rugged vibration-resistant design
- No moving mechanical parts , ensuring high reliability and easy maintenance
- Unified structure across the full series, with strong component interchangeability
- Explosion-proof construction, suitable for all-weather operation
- SmartHART fieldbus protocol suppo rt
- Self-diagnosis and remote diagnostic capabilities

Wor king Principle

1. The figure below is th e basic working principle electrical block diagram of the smart transmitter. The working principle and fun ctions of each component will be described below.



Transmitter principle block diagram

1. Intelligent circuit board

1) A/D conversion: The A/D conversion circuit uses a dedicated low-power integrated circuit to convert the analog current output by the demodulator into a digital quantity with an accuracy of up to 18 bits, which is provided to the microprocessor

Working Principle(Continued)

processor as input signal.
1) Microprocessor: The microprocessor of the smart transmitter controls the A/D and D/A conversion work, and can also complete self-diagnosis and realize digital communication. When working, a digital pressure value is processed by the microprocessor and stored as a digital value to ensure precise correction and conversion of engineering units. In addition, the microprocessor can also complete the linearization, range ratio, damping time and other function settings of the sensor.
2) EEPROM memory: EEPROM stores all configuration, characterization and digital fine-tuning parameters. This memory is non-volatile, so even if the power is off, the stored data can still be kept intact to realize intelligent communication at any time.
3) D/A conversion: D/A conversion converts the calibrated digital signal sent by the microprocessor into a 4- 20mA analog signal and outputs it to the loop.
4) Digital communication: Transmitters with HART protocol can test and configure smart transmitters through a communicator. Or complete communication through any upper system host that supports HART communication protocol. The HART protocol uses the industrial standard BELL202 frequency shift keying (FSK) technology to achieve communication by superimposing a 1200Hz or 2000Hz digital signal on a 4-20mA signal. During communication, the frequency signal does not interfere with the 4-20mA process. Transmitters without HART protocol can be tested and configured with dedicated adapters and software.
5) Display and buttons: Smart transmitters with LCD display can display the pressure value, current value, 0%- 100% proportional display and temperature value of the sensor measured by the transmitter, and the transmitter can be configured through the buttons on the LCD panel.
Smart transmitters without display can also perform operations such as zeroing and active calibration on the transmitter through the S and Z buttons on the line panel.

Application Field

Differential pressure transmitter is a kind of measuring equipment widely used in various fields, mainly used to measure the pressure difference of liquid or gas and convert it into standard signal output. Its main application areas include: Oil and gas industry: monitoring the liquid level and pressure changes inside the oil tank to control the flow in and out of the oil tank; measuring the flow of oil and gas in land, offshore and submarine applications;
Water and sewage treatment: used to monitor filters in sewage treatment plants; Power industry: used to monitor water sprinkler systems and steam or hot water heating systems; Metallurgical industry: used to monitor pressure drop on valves and pump control;
Gas analysis field: used to monitor gas composition and p ressure changes in boilers or burners, monitor steam or gas flow in steam turbines or gas turbines, such as gas generators, gas flow control, gas pressure m easurement in furnace front instruments and filter differential pressure detection, etc.

Product Line

1 CY1151

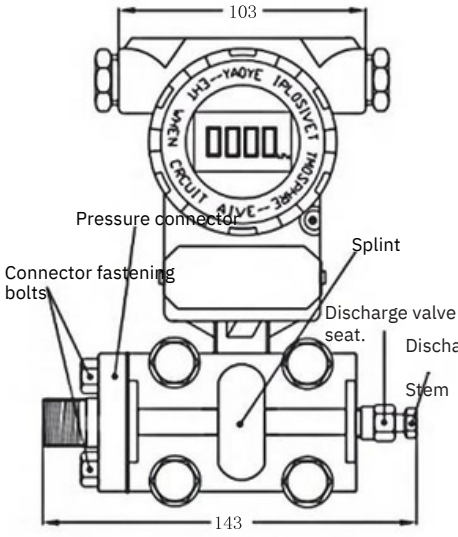
2 CY3051-1

3 CY3051-2

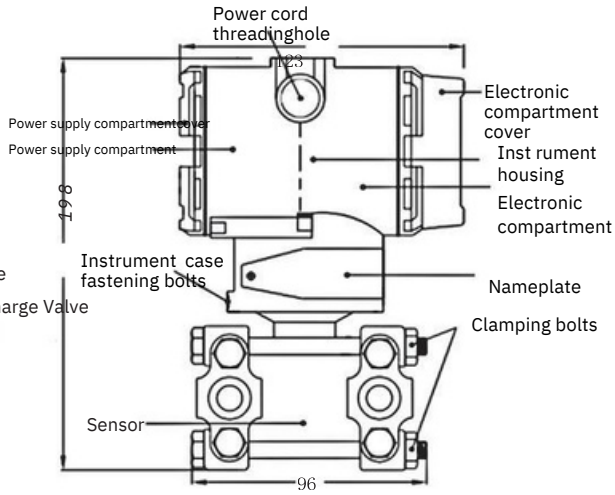
Product Lined (Continued)

Transmitter appearance, structure and dimensions (reference)

The transmitter is mainly composed of a pressure/differential pressure sensor (referred to as the delta chamber), a clamping plate also known as a pressure chamber, a pressure connector, fastening bolts, a relief valve, an instrument case and electronic components.



Front view of differential pressure transmitter



Differential pressure transmitter side

Technical Specification

- Function parameters

Range of use	Liquids, gases and vapours.
Measurement rage	See Table 1
Signal output	Two-wire 4- 20mAisolated DC signal superimposed on HART digital signal output, linearor squareroot output can be selected, and the maximum output current does not exceed 22mA.
Power supply	DC 12~45V; HARTcommunication: 15.5~45V DC; normal working voltage: 24V DC.

Technical Specification (Continued)

Load range	When communicating with HART, the resistance in the power supply loop should be ≥250 ohms and the power supply voltage should be ≥15.5 volts.
Communication distance	The diameter of the connecting wire is greater than 0.6mm and the communication distance is approximately 1500 meters.
Display	Intelligent LCD 5.5-digit digital + backlight (white/green optional) display; combined use of F1, F2 and F3 buttons on the LCD display, the display can cyclically or fixedly display: kPa, mA, %, ℃, mmH2O, MPa, Pa, mbar, atm, psi, Torr engineering units, can achieve no pressure to modify the measurement range (passive migration), set fixed current output, modify damping time, set linear, square root output and backup and restore data and other functions.
Zero position and range mi gr ati on	The lower limit of the measuring range is not lower than the lower limit of the maximum measuring range, and the upper limit is not higher than the upper limit of the maximum measuring range, that is, the workingrange does notexceed the limit value of the sensor, and the zero position and range can be set at any corresponding point of 4-20mA.
Zero pressure fine adjustment	Refer to the button instructions for steps.
Damping value	Electronic dampingadjustable range: 0 to 32 seconds.
Magnification fa ctor	It can be adjusted within the range of 1 to 128 times as needed.
Fault alarm	When the self-diagnostic routine detects a fault, the analog output is above 20.8mA or below 3.9mA.
Data recovery	When data is damaged, it can be restored on-site with three buttons.
Temperature compensation	The computer collects temperature data and sends it to the transmitter for temperature compensation.
Temperature indication	Indicates the ambient temperature of the field where the transmitteris working.
Working temperature	-40～85℃, with LCD display: -35～85℃.
Storage temperature	－ 45～ 9 0℃。
Safety protection	AND circuit protection design, anti-static shock, surge current, and overload protection are powerful.

Table1 Measurement range and accuracy

Pressure Type	Measurement Range	Range Code	Accuracy Level
DP、GP	(0—0.16~1)kPa	2F	Level 0.1 Level 0.2 Level 0.5 Level 1.0
DP 、HP	(0—1~6)kPa	3E	
	(0-6~ 40) kPa	4E	
	(0-40~ 200) kPa	5E	
GP 、AP	(0-0.16~1)MPa	6E	
	(0-0.4~2.0)MPa	7E	
GP	(0-1.6~10)MPa	8E	
	(0-4~20)MPa	9E	
	(0-6~40)MPa	0E	

Load characteristic diagram:

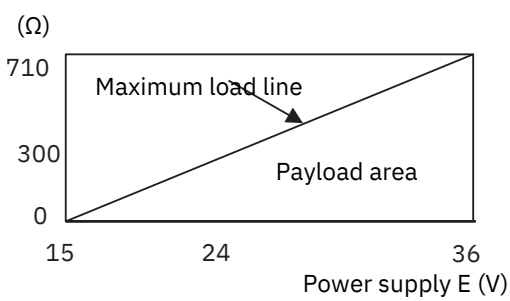


Table 2 Basic error after migration

Accuracy level	Basic error/%
0.1	±0.2
0.2	±0.4
0.5	±1.0
1.0	±2.0

Table 3 Transmitter t emperature coeff icient

Accuracy level	Temperature coefficient/%FS/10℃
0.1	±0.1
0.2	±0.5
0.5	±1.0
1.0	

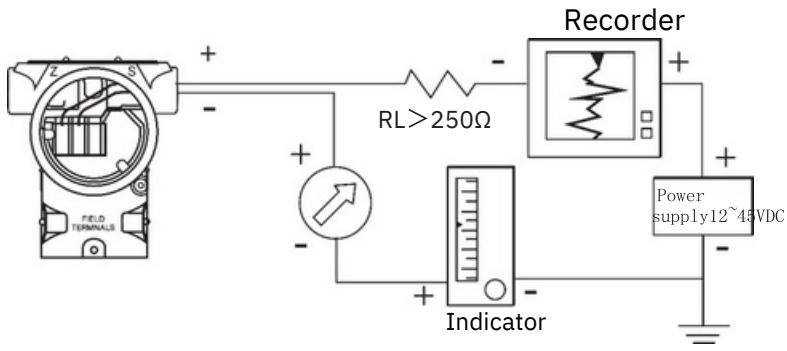
Technical Specification (Continued)

- Technical Specification

Basic error	±0.075％0.1% 0.2%
End base consistency error	±0.1 %0.2％0.3％
Repeatability error	0.1％0.2% 0.3%
Backlash	0.1 %0.2％0.3％
Stability	Within the range, the basic error shall not exceed within one year.
Anti-interference characteristics	Add 1～100kHz, peak 1～380VAC variable frequency interference signal to the power supply and housing, 4～20mA output, change <±0.2%
Temperature effect	For DP and GP types, the range code is 4～8, the error is <±0.15%/10℃, the maximum range limit; for other types and other ranges, the error is doubled.
Constant current performance	Change < 0.075%.
Insulation performance	Power supply to ground resistance ＞400MΩ.
Response time	When powered on, the response time is <2 seconds
Sensitivity	Lower limit and range change < 0.01%.
Power supply voltage change	Lower limit and range change < 0.02%
Steady-state change	Power supply interrupted for a short time, change < 0.02%
Over range	Overrange: lower limit and range change < 0.05%
Static pressure error	DP class, for 14MPa, lower limit change < ±0.3%; HP class, for 32MPa, lower limit change < ±0.5%
External magnetic field effect	In 400A/m (root mean square) magnetic field, change < 0.05%
Mechanical vibration	Vibration frequency: 50Hz, full amplitude: 0.2mm, 2 hours of vibration, residual lower limit and range change < 0.075%
Installation position effect	When the sensor center measuring diaphragm is not vertical, a zero position system error of no more than 0.24kPa may be generated, but this error can be eliminated by adjusting the zero pressure fine-tuning, and has no effect on the range
Structural material	Material of parts in contact with the medium such as pressure chamber, joint, relief valve, isolation diaphragm
Pressure connection	The connection hole on the pressure chamber is 1/4-18NPT, and the connection hole on the pressure connector is 1/2-14NPT. The center distance can be changed by adjusting the connector.
Electrical connection	The transmitter housing has two M20×1.5 screw holes for connecting the cable conduit. There are wiring terminals and test pads inside the housing. When connecting to a communicator, it can be fixed on the test pads.
Volume absorption	Volumetric absorption: < 0.16 cm2

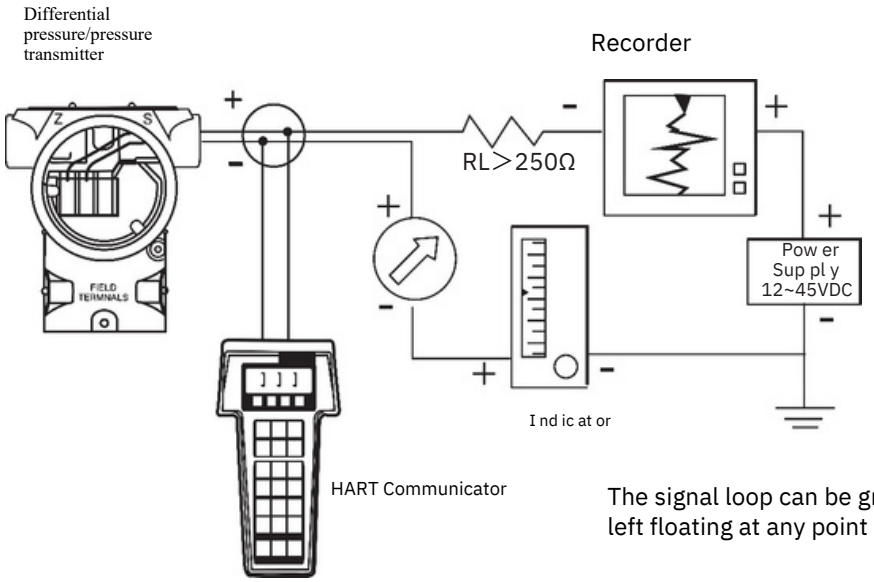
Electrical wiring diagram

- Electrical wiring diagram

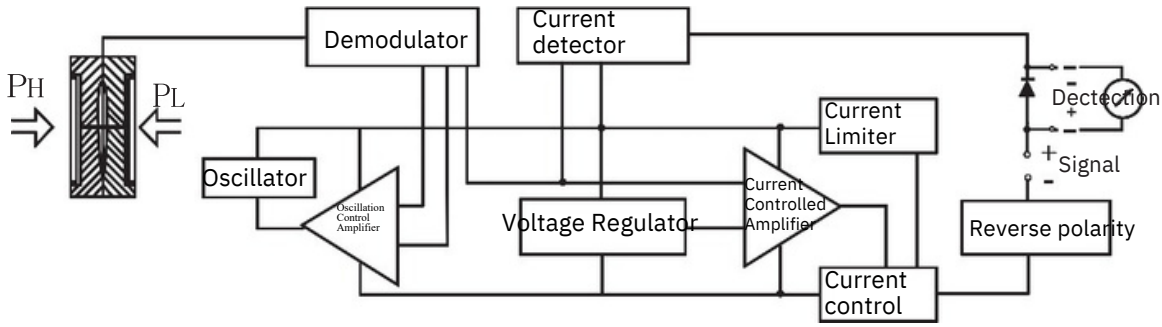


Electrical Wiring Diagram (Continued)

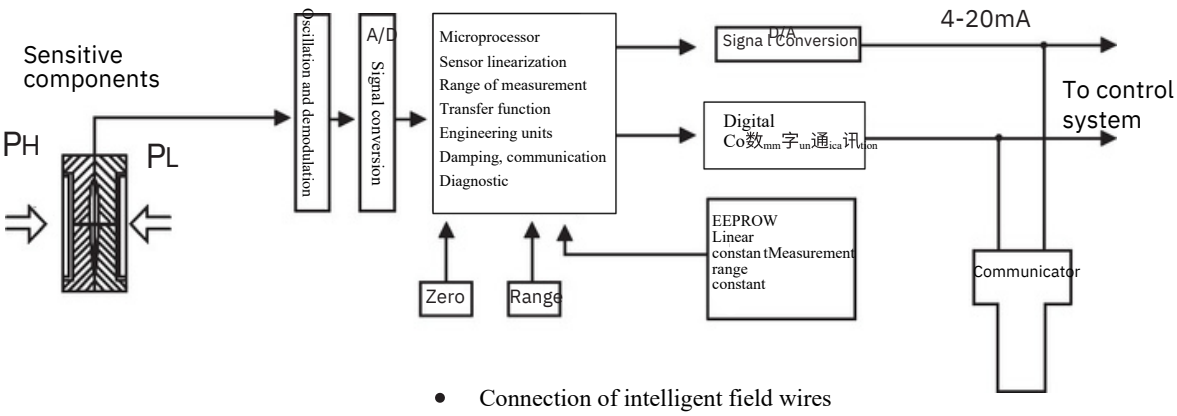
- Connection of intelligent field conductors



Circuit Block Diagram



- Connection of non-intelligent field wires



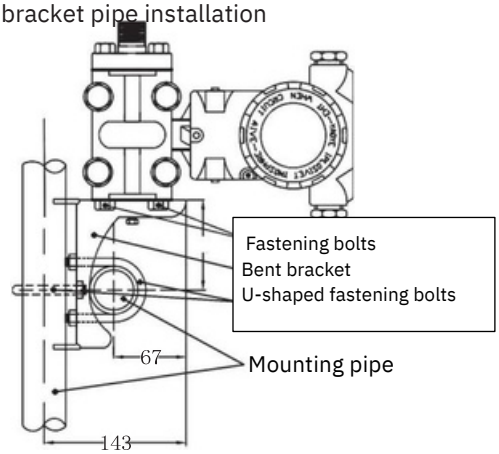
- Connection of intelligent field wires

Transmitter mechanical installation and measurement

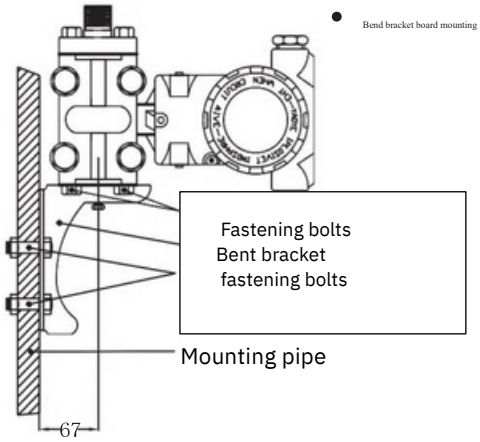
1. Installation type and precautions

The transmitter can be installed at the measuring point, on the wall or clamped on a 2″ (about 50-60mm in diameter) pipe using a mounting bracket (transmitter accessory). The transmitter installation types mainly include: bent bracket pipe mounting, bent bracket board mounting, flat bracket pipe mounting and flat bracket board mounting. As shown in the figure: (for user selection)

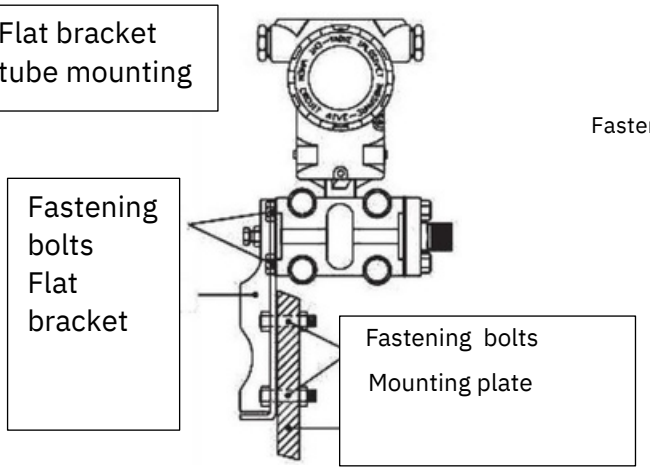
- Bend bracket pipe installation



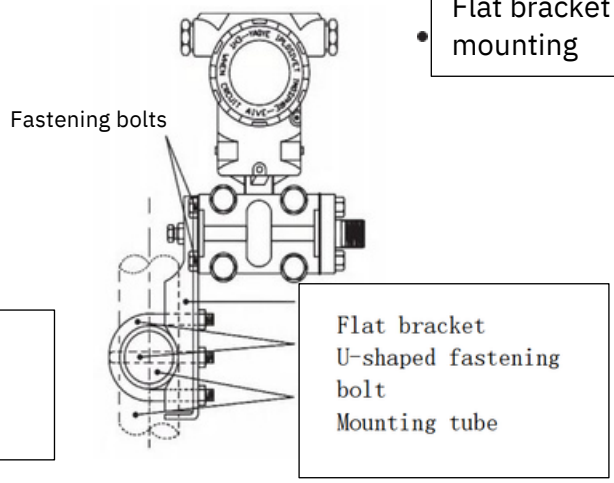
- Bend bracket board mounting



- Flat bracket tube mounting



- Flat bracket board mounting



The pressure connection hole on the pressure chamber of the transmitter is an NPT1/4 threaded hole, and the pressure connection hole on the joint is an NPT1/2 cone tube screw or flat tube screw.

To ensure the sealing of the joint, when installing the pressure connection, the fastening bolts should be tightened evenly with a wrench alternately, and the maximum tightening torque is about: 40N·m. Do not tighten a single bolt at one time. For easy installation, the transmitter body can be rotated. As long as the pressure chamber is in a vertical position, there will be no zero position change. If the pressure chamber is installed horizontally

(for example, when measuring flow on a vertical pipeline), the influence of the liquid column pressure caused by the different heights of the pressure pipe must be eliminated, and the zero position must be readjusted through the buttons on the transmitter, the encoder knob, or the HART communication software or the handheld operator to perform "zero pressure fine-tuning".

Whether the transmitter and the pressure pipe are installed correctly will directly affect the accuracy of its pressure and differential pressure measurement. Therefore, it is very important to correctly master the installation of the transmitter and the pressure pipe. Due to the needs of the process flow or to save pressure pipe materials, the transmitter is often installed in sites with relatively harsh working conditions. To reduce the severity of the working conditions, it should be installed in places with small temperature gradients and temperature fluctuations, and without shock and vibration.

Whether the installation position of the transmitter on the process pipeline is correct is related to the measured medium. In order to obtain the best installation effect and achieve a good working state, the following conditions should be fully paid attention to during installation:

① Prevent the transmitter from contacting with corrosive or overheated measured media;

② Prevent slag from depositing in the pressure pipe;

③ The pressure pipe should be as short as possible;

Transmitter Mechanical Installation and Measurement (Continued)

④The pressure of the liquid column in the pressure pipes on both sides should be kept balanced;

⑤The pressure pipe should be installed in a place with small temperature gradient and temperature fluctuation.

For the installation of transmitters with remotetransmission flanges, the application relationship between the transmitte r and the remote transmission flange should be considered to ensure the best installation performance. The specific measures are as follows:

①The shorter the capillary, the better;

②When installing a transmitter with one remote transmission flange, when measuring the liquid level of the conta iner, the transmitter should be kept at the same level as the process joint and flange or lower than the pressure port and flange (see Figure 1 below). For transmitters with two remote transmission flanges and flanges ins talled at different heights, the transmitter should be installed at or below the midpoint between the two flanges and the pressure port (see Figure 2 below).

③The remote transmission flange and capillaryinstalled on site should be avoided from direct sunlight;

④For transmitters with two remote transmission flanges, the capillarylengths of the two should be as similar as possible.

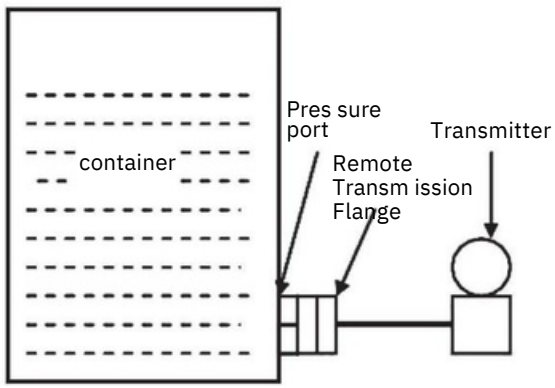


Figure 1 Transmitter installation with single flange

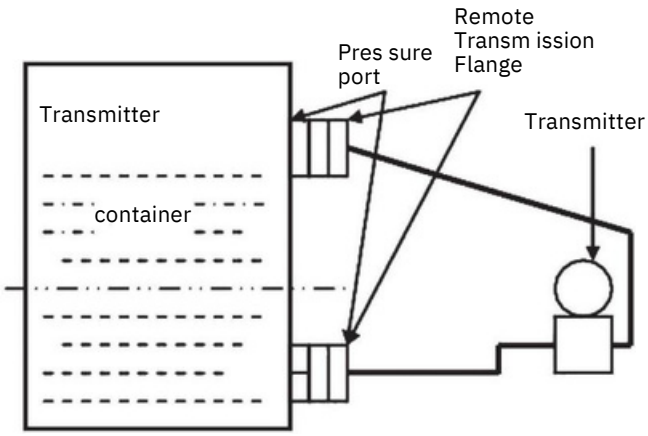


Figure 2 Transmitter installation with dou ble flange

Causes of errors and solutions

The pressure pipe connects the transmitter and the process pipeline together, and transmits the pressure at the pressure tapping on the proce ss pipeline to the transmitter. During the pressure transmission process, the following reasons maycause errors:

①Leakage;

②Wear loss (especiallywhen using detergent) ;

③Gas in the liquid pipeline causes pressure error;

④Liquid accumulates in the gas pip eline, causing pressure error;

⑤The densitydifference between the two press ure pipes caused bythe temperature difference causes pressure error; the following methods can be used to reduce the error:

①The pressure pipe should be as short as possible;

②Wh en measuring liquid or steam, the pressure pipe should be connected to the process pipeline as far as possible, and its slope should not be less than 1/12;

③When measur ing gas, the pressure pipe should be connected to the process pipeline as far as possible, and its slope should not be less than 1/12;

④The layout of the liquid pressure pipe should avoid high points in the middle, and the layout of the gas pressure pipe should avoid low points in the middle;

⑤The two pressure pipes should maintain the same temperature;

⑥To avoid friction, the diameter of the pressure pipe should be large enough;

⑦There should be no gas in the pressure pipe filled with liquid;

Causes of errors and solutions (continued)

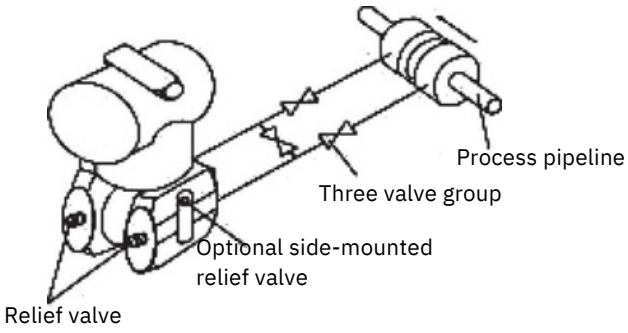
⑧When using isolation liquid, the liquid in the pressure pipes on both sides should be the same;

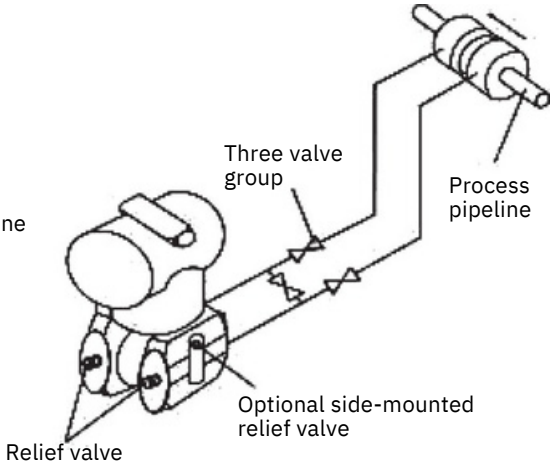
⑨When using cleaning agent, the connection of the cleaning agent pipe should be close to the pressure port of the process pipeline. The length and diameter of the pipeline through which the cleaning agent passes should be the same, and the cl eaning agent should be prevented from passing through the transmitter.

Measuring range

1. Measuring liquids

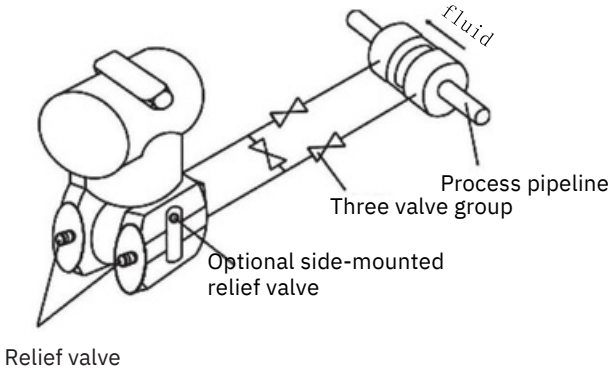
When measuring liquids, the pressure tapping port should be opened on the side of the process pipe to avoid slag deposition. At the same time, the transmitter should be installed next to or below the pressure tapping port to allow bubbles to be disch arged into the process pipe. For transmitters with a relief valve in the pressure chamber, the relief valve should be placed upward to discharge the gas in the measured medium.

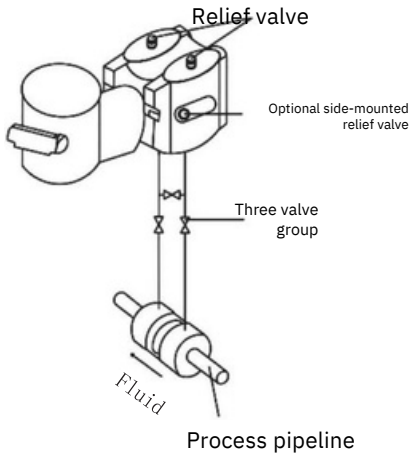




2. Measuring gas

When measuring gas, the pressure tapping port should be opened on the side or top of the process pipeline, and the transmitter should be installed beside or above the process pipeline so that the accumulated liquid can easily flow into the process pipeline. For transmitters with a relief valve in the pressure chamber, the relief port of the relief valve should be placed downward to discharge the accumulated liquid in the measured medium.

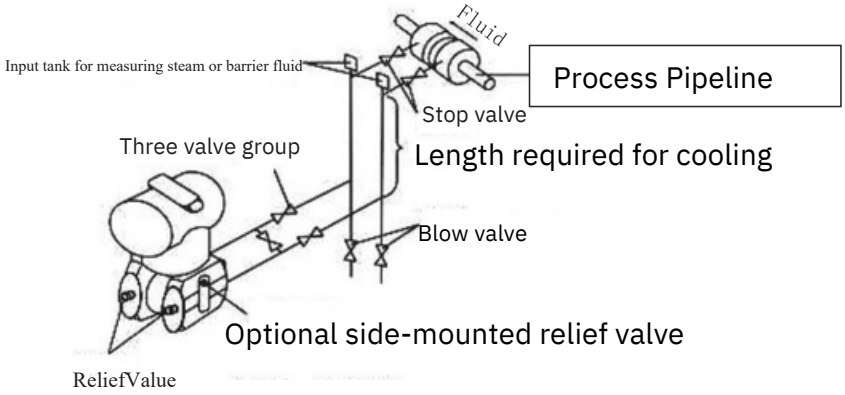




3. Measuring steam

When measuring steam, the pressure tapping port should be opened on the side of the process pipeline, and the transmitter should be installed below the pressure tapping port so that the condensate can fill the pressure pipe. When measuring steam, the pressure pipe should be filled with water to prevent the steam from directlycontacting the transmitter. When the transmitter is working, its volume change is verysmall, so there is no need to install a condensate tank. Note that when measuring steam or other high-temperature media, the temperature to which the transmitter is subjected should not exceed its maximum temperature of use.

Measuring range (continued)



4.Measuring liquid level

Use atransmiter with a remote transmsion lange to meaure the liqud level. For measumng the liquid level of eeneral viscous meda. use a fat flane For media with hichviscosity that are easyto precipltate and suspend, use an inset tiange for measurement. During installation, the measuring diaphragm must penetrate deep into the inner wall olthe cont ainer and should at least be tangent to the inner wall ofthe container.

1) Measuring the liquid level of an op en containe

The pressure tapping port athe lowe r end ofthe con&ainer is conected to the high-presure side ofthe transmiterthrough a fange, while the low-presure side ofthetransmiter is connected to the atmosphere. There a rethre posible instalation and conecion methods for the transmiter at the pressure tapping por ofthe container. Thmethod for determining the measurement range value of the tra nsmitter is as folows.

① W hen the transmiteris instaled at the same leve l as the presure tapping pont and the lower limit liquid level is level with the pressure tapping port (se Figure 3),themeasurement range value ofthe transmiter is determined as foows: x is the vertical distance between the upper limit liquid level to the lower imit liquid level to bemeasured:X

risthe specific gravity of the measured liquid; g is the acceleration of gravity,Px is the pressur e generated by the liquid column X.The measurementrange is from0 to Px.

Since: Px= x· r·g, the measurementrange of thetransmitter= 0~x.r·g

For example:x=6500mm,r=1g/cm3,g(lmmH20=9.8lPa)

Get: Px=x·r·g=6500x1x9.81=63.77kPa

Therefore: the measurementrangeofthetransmitteris: (0 ~ 63.77kPa)

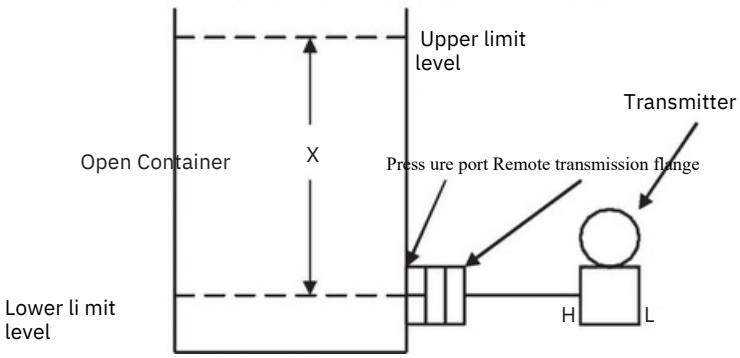


Figure 3 Transmitter and pressure port level

②When the transmitter is higher than the pressure port and the lower limit liquidlevel is level with the pressure port (see Figure 4), the measurement range isdetermined as follows: x i s the vertical distance between the upper limit liquid leveland t he lower limit liquid leve l to be measured; h is the vertical distance betweenthe pressure port and the high pressure side of the transmitter, r is the specificgr avity of the measured liquid; r0 is the specific gravity of the filling liquid in t heremote transmission flange, g is the acceleration of gravity, Px is the pressureg enerated by the me asured liquid c olumn x; Ph is the negative pressure generatedby the filling liquid co lumn h on the tr ansmitter. The measuring range is from Ph to Px+Ph

Since: Ph= -h·r0·g, Px=x·r·g

So: the measuring range ofthe transmitter= -h·r0·g~ g(x·r-h·r0)

Figure 4 The transmitter is h igher than the pr essu re port

For example: given x=6500mm,h=500mm,r=1g/cm3, r0 =1.9g/cm3, g(1mm H 20=9.81Pa),we get: Px=x·r·g= 6500x 1x9.81 = 63.77 kPa

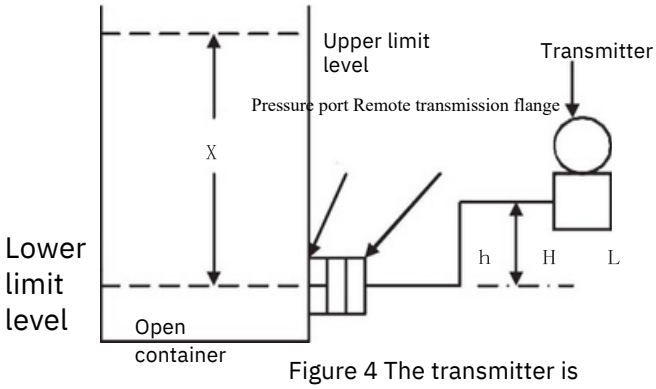


Figure 4 The transmitter is higher than the pressure port

Measuring range(continued)

Ph=-h·r0·g= -500x1.9x9.81 = -9.32 kPa

Therefore:Themeasureme nt range value ofthe transmitter is: (-9.32 kPa~ 54.45kPa)

③When the transmitter is lower than the pressu re port and the lowe r limit liquid level is levelwith the pressure port (see Figure 5), the measurement range value is determined as follows: xis the vertical di stance between the upper limit liquid level to the lower limit liquid level;h is the vertical dist ance between the pressure port and the high pressure side of the transmitterr is the specific gravity of t he measured l iquid;r0 is the specific gravity ofthe fil ling liquid i n the remote transmission flange, g is the acceleration of gravity; Px is the pressuregenerated bythemeasuredliquidcolumnx; Ph is the positive pressure generate d by the filling liquid column h on the transm itter.

The measurement range is from Ph to Px + PhSince: Ph=h·r0·g, Px =x·r·g So: the m easurement range o fthe transmitter= h·r0·g~ g (x·r + h·r0)

Lower limit liquid level

Fi gure 5 The trans mitter islower than the pressure port H

For example: given x=6500mm,h =500mm,r=1g/cm3, r0=1.9g/cm3, g (lmm HO=9.81Pa) we get:Px=x·r·g=6500x1x9.81=63.77 kPa

Ph=h·r0· g 500x1.9x9 .81=9.32 kPa

Therefore: the measuring range of the transmitteris: (9.3 2 kPa ~ 73.09 kPa)

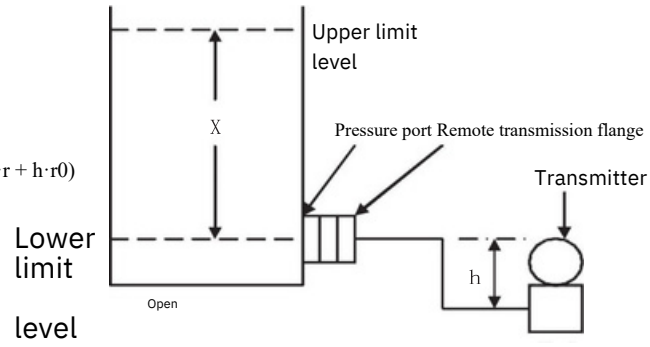


Figure 5 The transmitter is lower than the pressure port H L

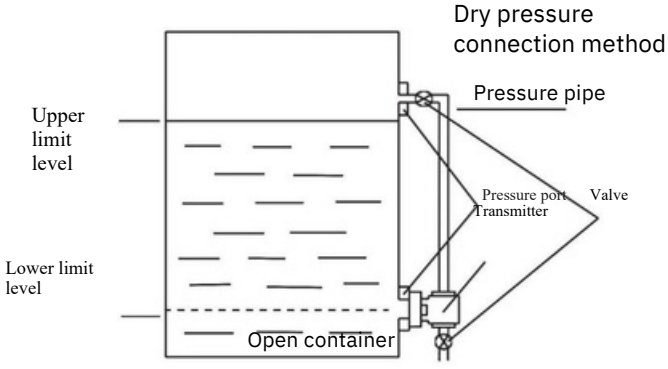
④ The sanitary clamp pressure transmitter is a special product designed for the food and pharmaceutical fields. The standard 50.5MM flat membrane pressure interface can be quickly connected through the clamp and sanitary pipe. The sanitary clamp pressure transmitter is widely used in food, pharmaceutical, brewing, fermentation and other industries. It is mainly divided into: conventional type, high temperature heat dissipation type, digital dis play type. The core part of the sanitary clamp pressuretransmitter uses a high-precision, high-stability diffused silicon pressure chip from a well-known company, which fully complies with the sanitary standards of the pharmaceutical and food industry. Through a high-reliability amplifier circuit, the pressure of the measured medium is converted into a 4~20mADC standard signal. The high-qualit y pressure sensor, exquisite packaging technology and perfect assembly process of the sanitary clamp pressure transmitter ensure the high quality and excellent performance of the product.

2. Measuring the liquid level of a closed container

The pressure in the closed container above the liquid surface affects the pressure measured at the bottom. Therefore, the pressure at the bottom of the closed container is equal to the pressure generated by the liquid plus the pressure of the closed container on the liquid surface. To obtain the accurate value of the liquid level, the pressure of the closed container on the liquid surface should be subtracted from the measured pressure at the bottom of the container. Therefore, a pressure tapping port must be opened at the top of the closed container to offset the low-pressure side of the transmitter, and the resulting differential pressure is proportional to the liquid level.

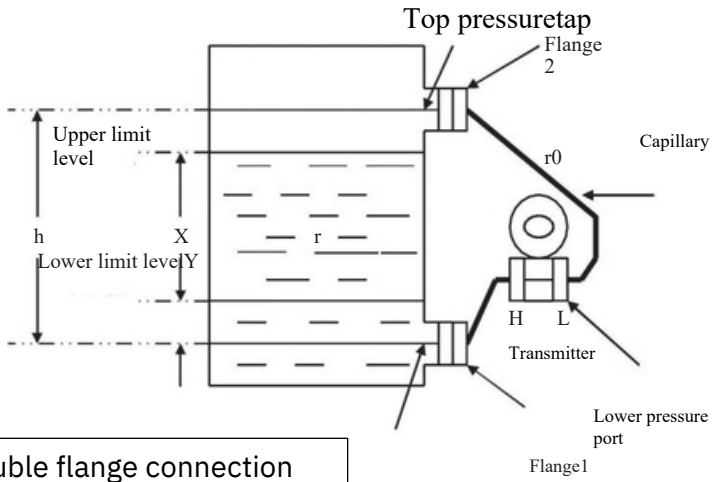
①Dry pressure connectionmethod

If the gas on the liquid surface in the closed container does not condense, and the pressure pipe connected to the low-pressure side of the transmitter is always kept dry, in this case, the installation connection of the transmitter is called the dry pressure connection method. When using the dry pressure connection method, the method for determining the measurement range value is the same as the methodof "measuring the liquid level of an open container".



Measuring range (continued)

②Double flange connection method
If the gas on the liquid surface in the closed container will condense, when the dry pressure connection method is used, the pressure pipe connected to the low-pressure side of the transmitter will gradually accumulate liquid, causing measurement errors. To eliminate this error, remote transmission flanges should be installed at the top and bottom pressure ports of the closed container, respectively, which is called the double flange connection method, as shown in the figureon the right.

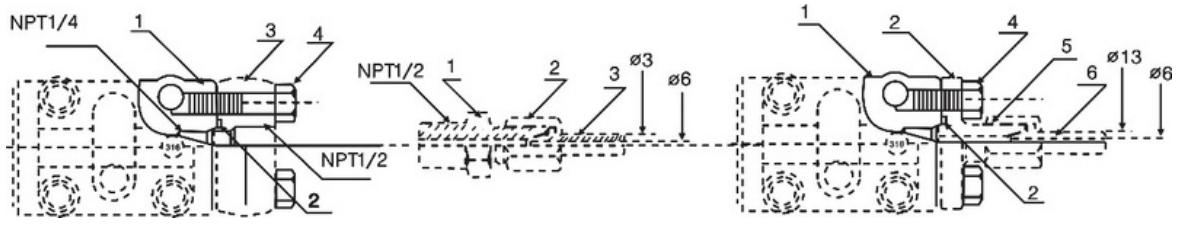


Double flange connection method

When using the double flange connection method for installation, the low pressure (L) side should be connected to the top pressure port, the high pressure (H) side should be connected to the bottom pressure port, and the transmitter should be installed in the middle. In this way, the transmitter will generate a negative differential pressure due to the height of the filling liquid in the capillary tube. Its size is determined by the height difference between the high and low pressure ports of the sealed container and the specific gravity of the filling liquid in the capillary tube, and has nothing to do with the installation position of the transmitter. If the negative differential pressure is small, it can be eliminated by adjusting the zero pressure fine-tuning method; if the negative differential pressure is large, it should be calculated when determining the measurement range value, as follows:

X is the vertical distance between the upper limit level and the lower limit level of the measured liquid;
Y is the vertical distance between the lower limit level and the lower pressure tapping port;
h is the height difference between the upper and lower pressure tapping ports;
r is the specific gravity of the measured liquid; r0 is the specific gravity of the filling liquid in the remote transmission flange; g is the acceleration of gravity; the above are known quantities , Px is the pressure generated by the measured liquid column x; Py is the pressure generated by the measured liquid column Y;
Ph is the pressure generated by the filling liquid in the capillary; the measurement range value is from Py-Ph to Px +Py-Ph. Due to: Px = x·r·g, Py = y·r·g, Ph = h·r0·g
So: the measurement range of the transmitter is (Py-Ph)~(Px+Py-Ph) =g(y·r－h·r0)～g〔(x+y)r－h·r0〕

Pressure-indic ating connection head structure



A: N PT1/2 cone tube internal thread c onnector (Selection code is "J")
1——Transmitter pressure chamber flan ge ;
2——"0" ring;
3——N cone tube internal thread connector;
4——Bolt

B: NPT1/2 pressure connector with pressure pipe welded
to the rear (Selection code is "K")
1——NPT1/2 and ball cone connection transition connector;
2——Nut M20X1 .5;
3——Ball joint;
4——Ball head (Φ13 can be welded to the pressure pipe)

C: M20X1.5 T-shaped thread connector (Selection code is "M")
1——Transmitter pressure chamber flange;
2——"0" ring;
3 ——Ball cone connector M20X1.5 internal thread;
4——Bolt;
5——Nut M20X1.5;
6——Spherical joint (Φ 13 can be welded with the pressure pipe)

CY1151 Pressure Transmitter (Gauge Pressure/Absolute Pressure) Selection Table

Model	Product Name
ISEN-CY1151	Pressure Transmitter

Code	Pressure Type
GP	Gauge Pressure
AP	Absolute Pressure

	Code	Measuring range
	2	0-0.16~1.6kPa
	3	0-1.0~ 10kPa
	4	0-6.0~40.0kPa
	5	0-40.0~250.0kPa
	6	0-0.16~1.0MPa
	7	0-0.4~2.5 MPa
	8	0-0.16~10 MPa
	9	0-4~20MPa

	Code	Output
	1	Non-intelligent (4-20mA DC)
	2	Intelligent digital type
	3	Intelligent type (4-20mA superimposed HART protocol)
	4	RS485/MODBUS

	Code	Structural Materials			
		Flange connector	Vent/drain valve	Isolation diaphragm	Filling fluid
	12	Cadmiumplated carbon steel	316L stainless steel	316Lstainlesssteel	Silicone oil
	13	Cadmiumplated carbon steel	Hastelloy C	Hastelloy C	Silicone oil
	14	Cadmiumplated carbon steel	Monel	Monel	Silicone oil
	15	Cadmiumpl ated carbon steel	316L stainless steel	Tantalum	Silicone oil
	22	316L stainless steel	316L stainless steel	316L stainless steel	Silicone oil
	23	316L stainless steel	316L stainless steel	Hastelloy C	Silicone oil
	24	316L stainless steel	316L stainless steel	Monel	Silicone oil
	25	316L Stainless Stee l	316L Stainless Stee l	Tantalu m	Silicone oil
	33	Hastelloy C	Hastelloy C	Hastello y C	Silicone oil
	35	Hastelloy C	Hastelloy C	Tantalum	Silicone oil
	44	Monel	Monel	Monel	Silicone oil

	Code	Options (no selection, l eave blank; multiple selections are allowed)
	A	No meter
	B	LED digital display
	C	LCD liquid crystal display
	D	Tube-mounted curved bracket
	E	Plate-mounted curved bracket
	F	Tube-mounted flat bracket
	G	Exhaust/drain valveon the rear end of the flange
	H	Exhaust/drainvalveonthesideoftheflangeonthetop(ifnotfilled,nosidedrain valve will be installed)

CY1151 Pressure Transmitter (Gauge Pressure/Absolute Pressure) Selection Table (Continued)

	I	Flange side exhaust/drain valve at the bottom (if not filled, no side relief valve will be installed)	
	J	1/2-14NPT cone pipe internal thread connector	
	K	1/2-14NPT pressure connector with φ14 pressure connector welded to the rear	
	M	M20x1.5 T-shaped thread connector	
		Code	Explosion-proof grade
		P	Standard type (non-explosion-proof)
		E	Flameproof type ExdIIBT5 or ExdIIBT6
		A	Intrinsically safe type ExibIICT6 or ExiaIICT6

Selection Example

Example: ISEN-CY1151-GP4122FJP, pressure transmitter, gauge pressure, measuring range 0-6.0~40.0kPa, non-intelligent output (4-20mA DC), flange connector 316L Stainless Steel, exhaust/drain valve 316L Stainless Steel, isolation diaphragm 316L Stainless Steel, filling liquid Silicone oil, pipe-mounted flat bracket, 1/2-14NPT cone pipe internal thread connector, explosion-proof grade standard type (non-explosion-proof).

ISEN-CY1151-AP4122FJP, pr essure transmitter, absolute pressure, measuring range 0-6.0~40.0kPa, non-in telligent output (4-20mA DC), flange connector 316L Stainless Steel, exhaust/drain valve 316L Stainless Steel, isolation diaphragm 316L Stainless Steel, fillin g liquid Silicone oil, pipe-mounted flat bracket, 1/2-14NPT cone pipe internal thread connector, explosion-proof grade standard (non-explosion-proof).

CY1151 Differential Pressure Transmitter Selection Table

Model	Product Name
ISEN-CY1151	Differential pressure transmitter

Code	Pressure type
DP	Differential pressure type
DR	Micro differential pressure type
HP	High static pressure type

	Code	Measuring range	Static Pressure
	3	0-1.0~6.0kPa Differential pressure type	4MPa
	4	0-6.0~40.0kPa Differential pressure type	10MPa
	5	0-40.0~200.0kPa Differential pressure type	10MPa
	6	0-0.16~1.0MPa Differential pressure type	10MPa
	7	0-0.4~2.5 MPa Differential pressure type	10MPa
	8	0-0.16~10 Mpa Differential pressure type	10MPa
	2A	0-0.16~1.6kPa Micro Differential pressure type	1MPa
	2B	0-0.16~1.6kPa Micro Differential pressure type	2.5MPa
	2C	0-0.16~1.6kPa Micro Differential pressure type	4MPa
	3A	0-1.0~6.0kPa High static pressure type	10MPa
	4A	0-6.0~40.0kPa High static pressure type	25MPa
	4B	0-6.0~40.0kPa High static pressure type	32MPa
	5A	0-40.0~200.0kPa High static pressure type	25MPa
	5B	0-40.0~200.0kPa High static pressure type	32MPa
	6A	0-0.16~10 MPa High static pressure type	25MPa
	6B	0-0.16~10 MPa High static pressure type	32MPa
	7A	0-0.4~2.5 MPa High static pressure type	25MPa
	7B	0-0.4~2.5MPa High static pressure type	32MPa

	Code	Output
	1	Non-intelligent (4-20mA DC)
	2	Intelligent digital type
	3	Intelligent type (4-20mA superimposed HART protocol)
	4	RS485/MODBUS

	Code	Structural Materials			Filling fluid
		Flange joint	Exhaust/drain valve	Isolation diaphragm	Silicone oil
	12	Cadmium plated carbon steel	316L Stainless Steel	316L Stainless Steel	Silicone oil
	13	Cadmium plated carbon steel	Hastelloy C	Hastelloy C	Silicone oil
	14	Cadmium plated carbon steel	Monel	Monel	Silicone oil
	15	Cadmium plated carbon steel	316L Stainless Steel	Tantalum	Silicone oil
	22	316L Stainless Steel	316L Stainless Steel	316L Stainless Steel	Silicone oil
	23	316L Stainless Steel	316L Stainless Steel	Hastelloy C	Silicone oil
	24	316L Stainless Steel	316L Stainless Steel	Monel	Silicone oil
	25	316L Stainless Steel	316L Stainless Steel	Tantalum	Silicone oil
	33	Hastelloy C	Hastelloy C	Hastelloy C	Silicone oil

CY1151 Differential Pressure Transmitter Selection Table (Continued)

	3	Hastelloy C	Hastelloy C	Tantalum	Silicone oil
	5	Monel	Monel	Monel	

4	Code	Options (no selection, no fill, multiple selections are allowed)
4	A	No meter
	B	LED digital display
	C	LCD liquid crystal display
	D	Tube-mounted curved bracket
	E	Plate-mounted curved bracket
	F	Tube-mounted flat bracket
	G	Exhaust/drain valve at the rear end of the flange
	H	Exhaust/drain valve on the side of the flange at the top (if not filled, no side discharge valve is installed)
	I	Exhaust/drain valve on the side of the flange at the bottom (if not filled, no side discharge valve is installed)
	J	1/2-14NPT cone pipe internal thread connector
	K	1/2-14NPT pressure connector rear welded φ14 pressure connector
	M	M20x1.5 T-shaped thread connector

	Code	Explosion-proof grade
	P	Standard type (no explosion-proof)
	E	Flameproof type ExdIIBT5 or ExdIIBT6
	A	Intrinsically safe type ExibIICT6 or ExiaIICT6

Selection Example

Example:ISEN- CY1151-DR4122FJP, differential pressure transmitter, measuring range0-6.0~40.0kPa (differential pressure type), static pressure 10MPa, non-intelligent output (4-20mADC),flangeconnector 316L stainless steel, exhaust/drain valve 316L stainless steel, isolation diaphragm316Lstainlesssteel, filling liquid Silicone oil, pipe-mounted flat bracket, 1/2-14NPT cone pipe internalthreadconnector, explosion-proof grade standard type (no explosion-proof).

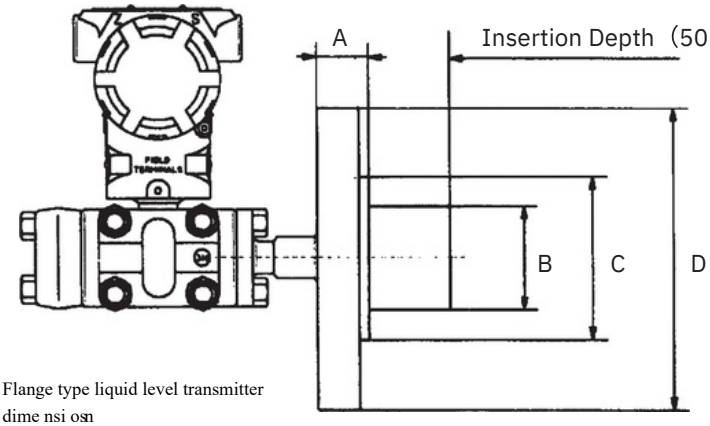
ISEN- CY1151-DR2A122FJP, micro differential pressure transmitter, measuring range0-0.16~1.6kPa(micro differential pressure type), static pressure 1MPa, non-intelligent output (4-20mADC),flangeconnector 316L stainless steel, exhaust/drain valve 316L stainless steel, isolation diaphragm316Lstainlesssteel, filling liquid Silicone oil, pipe-mounted flat bracket, 1/2-14NPT cone pipe internalthreadconnector, explosion-proof grade standard type (non-explosion-proof).

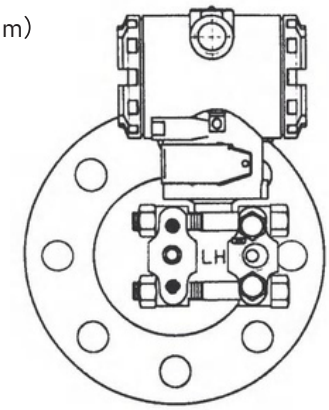
ISEN- CY1151-HP4B122FJP, high static pressure differential pressure transmitter,measuringrange0-6.0~40.0kPa (high static pressure type), static pressure 32MPa, output non-intelligent(4-20mADC),flange connector 316L stainless steel, exhaust/drain valve 316L stainless steel, isolationdiaphragm316L stainless steel, filling liquid Silicone oil, pipe-mounted flat bracket, 1/2-14NPTtaperedpipeinternal thread connector, explosion-proof grade standard (non-explosion-proof).

CY3051 Single flange differential pressure level gauge

The installation standard of the single flange level transmitter is in accordance with ANSI. The flange has 3" and 4" specifications. The flange grade is 150LB 2.5MPa). The flange installation dimensions are shown in the following chart. If the user adopts the GB9116-88 standard, please indicate DN=80, 100, PN=2MP.

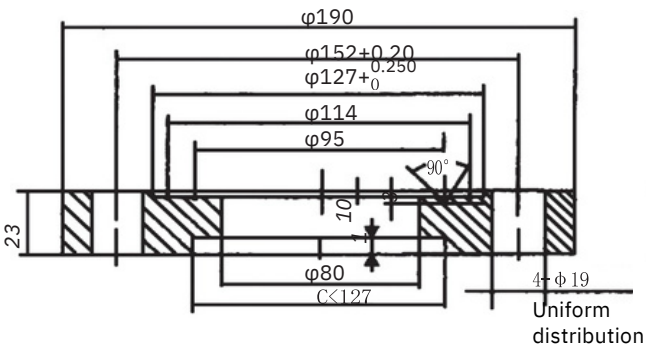
The materials of the liquid-contacting diaphragm are 316L, Hastelloy C-276, Monel, Tantalum, etc. If the user does not specify, the 3"150LB installation flange and the liquid-contacting diaphragm material 316L will be supplied.

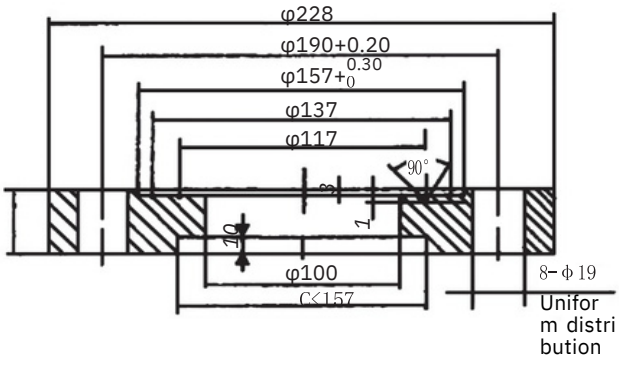




Flange type liquid level transmitter dime nsi osn
(D, D1, n, d, A, B dimensions in the figure are shown in the table below)

Flange size						Bolt hole		
Size	Specification	DiameterD	A	B	C	Number n	Diameter d	Distribution diameter D1
3 "	150Lb	190	30	66	127	4	19	152
4 "	150Lb	228	30	89	157	8	19	190
3 "	300Lb	210	35	66	127	8	22	168
4 "	300Lb	254	38	89	157	8	22	200

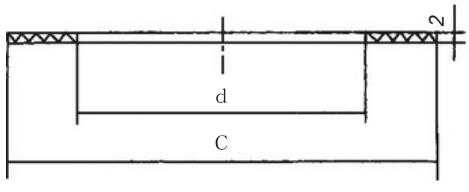




3" 150LB flange user process connection flange flange

Matching flange	C	d
3"	127	80
4"	157	100

4" 150LB flange user process connection



Note: The flangesealing ring user can selectthesealing gasket material according to the characteristics of the measured medium. Our company recommends asbestos rubber, nitrile rubber,fluororubber, nylon, polytetrafluoroethylene and other materials.

CY3051 Single flange differential pressure level gauge selection table

Model	Product Name
ISEN-CY3051	Single flange differential pressure level gauge

Code	Measuring range
4	0-6.0~40.0kPa
5	0-40.0~200.0kPa
6	0-0.16~1.0MPa
7	0-0.4~2.5MPa

Code	Output
1	Non-intelligent (4-20mA DC)
2	Intelligent digital type
3	Intelligent type (4-20mA superimposed HART protocol)
4	RS485/MODBUS

Code	Nominal diameter	Insertion length	High-pressure side isolation diaphragm material
A0	80mm	0(Flat)	316L stainless steel
A2	80mm	50mm	316L stainless steel
A4	80mm	100mm	316L stainless steel
A6	80mm	150mm	316L stainless steel
B0	100mm	0(Flat)	316L stainless steel
B2	100mm	50mm	316L stainless steel
B4	100mm	100mm	316L stainless steel
B6	100mm	1 5 0 mm	316L stainless steel
C0	50mm	0(Flat)	316L stainless steel
C2	50mm	5 0 m m	316L stainless steel
C4	50m m	100mm	316L stainless steel
C6	50mm	150mm	316L stainless steel
Y	Customized	Customized	316L stainless steel

Code	Flange Installation
A	3 " 150Lb
B	4 " 150Lb
C	3 " 300Lb
D	4 " 300Lb
E	2 " 150Lb
F	2 " 300Lb

Structural Materials				
Code	Low pressure side flange connector	Exhaust/drain valve	Isolation diaphragm	Filling fluid
22	316L stainless steel	316L stainless steel	316L stainless steel	Silicone oil
23	316L stainless steel	316L stainless steel	Hastelloy C	Silicone oil
24	316L stainless steel	316L stainless steel	Monel	Silicone oil
25	316L stainless steel	316L stainless steel	Tantalum	Silicone oil

CY3051 Single flange differential pressure level gauge selection table Selection table (continued)

	Code	High-pressure side filling system	
	D	Silicone oil	
	F	Inert oil	
	Code	Option (no selection, leave blank, multiple selections are allowed)	
	A	No meter	
	B	LED digital display	
	C	LCD liquid crystal display	
	Code	Explosion-proof grade	
	P	Standard type (no explosion-proof)	
	E	Flameproof type ExdIIBT5 or ExdIIBT6	
	A	Intrinsically safe type ExibIICT6 or ExiaIICT6	

Selection Example

Example: ISEN-CY3051-41A0A22DBP, single flange differential pressure level gauge, measuring range 0-6.0~40.0kPa, non-intelligent output (4-20mA DC), nominal diameter 80mm, insertion depth 0 (flat), high pressure side isolation diaphragm material 316L stainless steel, mounting flange 3" 150Lb, low pressure side flange connector 316L stainless steel, exhaust/drain valve 316L stainless steel, isolation diaphragm 316 stainless steel, filling liquid silicone oil, high pressure side filling system silicone oil, LED digital display, explosion-proof grade standard (no explosion-proof).

CY3351 Double flange differential pressure level gauge

3351DP/GP remote differential pressure/pressure transmitter provides a reliable m easurement method to avoid direct contact between the measured medium and the isolation diaphragm of the transmitte r. It is mainly
applicable to the following workingco nditions:

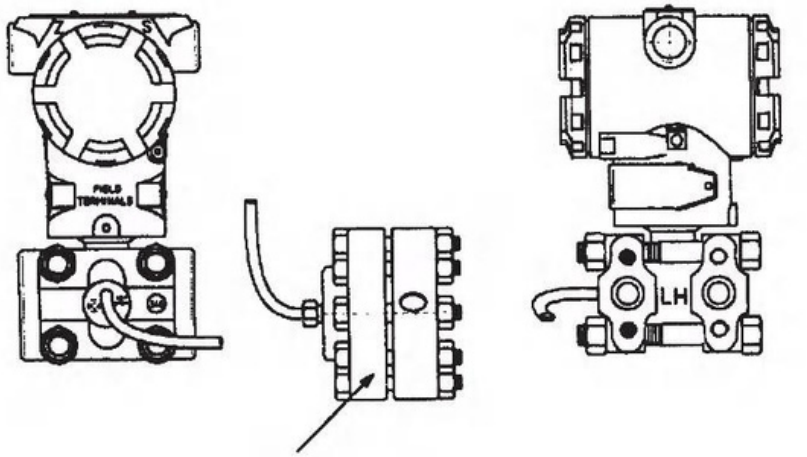
1. It is necessary to isolate the high temperatu re medium from the transmitter
2. The measured medium has a corrosive effec t on the sensitive element of the transmitter
3. Suspended liquid or high viscosity medium
4. Liquid level measurement of sealed pressure vessels
5. The measuring head needs to be strictly purified when replacingthe measured medium
6. The measuring head must be kept clean and hygienic
7. The measured medium solidifies or solidifies due to changes in environmental or process temperature

3351DP/GP remote differential pressure/pressure transmitter still has various characteristics of 1151DP/GP differential pressure/pressure trans mitte r.

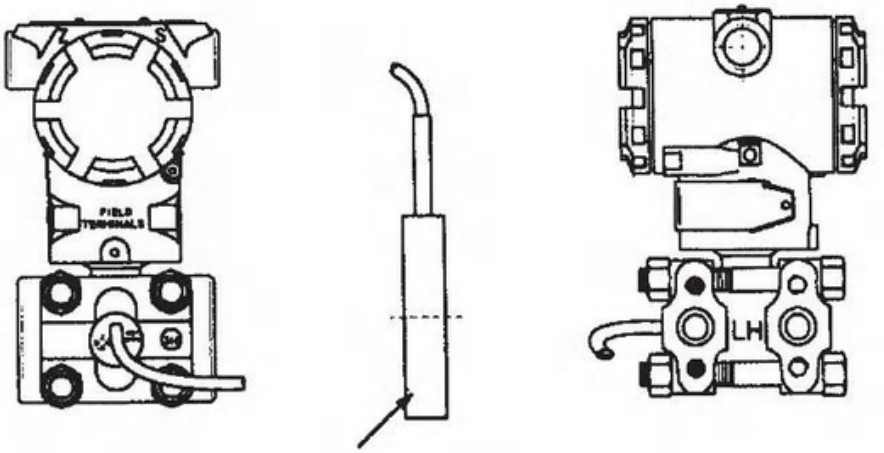
It provides a variety of structural materials, and the remote transmission device assemblyis welded with a strongreliability. The low volume design of the liquid filling reduces the influence of temperature. According to user requirements, the DC200 series silicone oil is filled inside. The use temperature of high temperature silicone oil is: -15 ~+315C, and the use temperature of ordinary silicone oil is: -40~ +149°C.

The upper limit of the remote transmission device's working pressure is the rated value of the remote transmission device selected by the user : the working pressure is not less than 3.5kPa (absolute pressure).

CY3351Outline Drawing Dimension

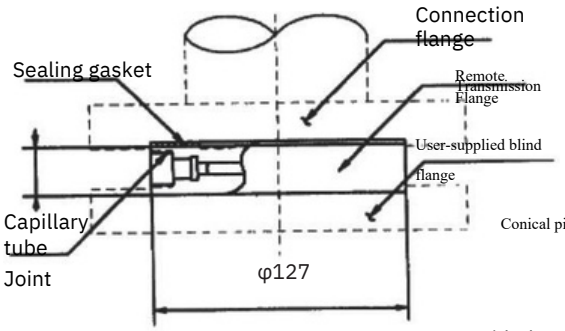


Standard capillary threaded remote transmission device

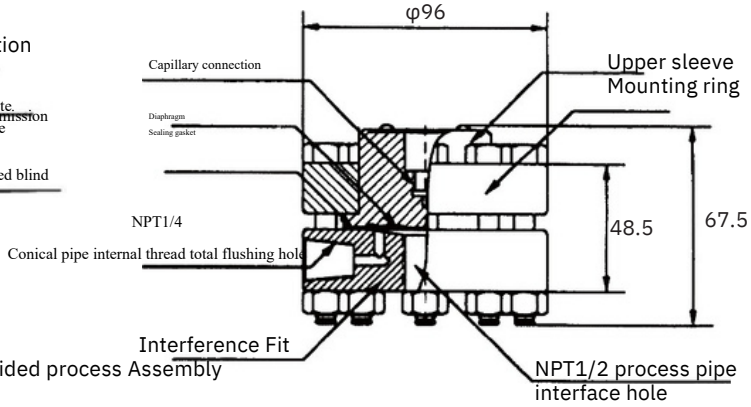


Flat remote transmission device

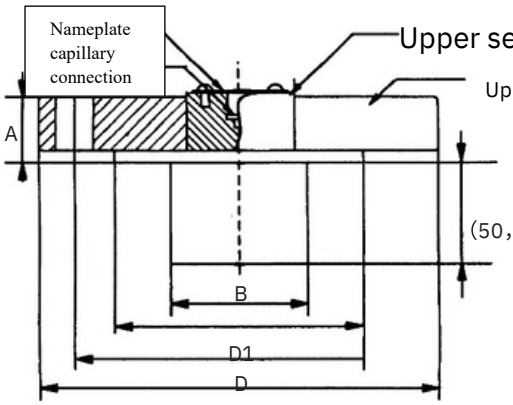
CY3351 Remote Transmission Device Dimensions



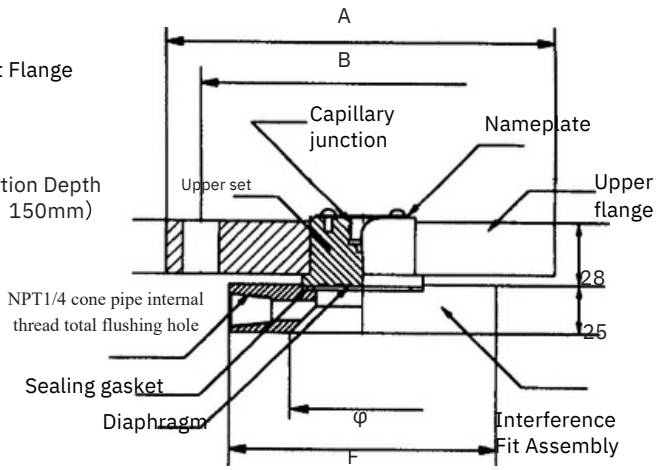
1199PFW flat remote transmission device dimensions (standard 3", working pressure 2.5MPa)



1199RTW type threaded installation remote transmission device dimensions (maximum working pressure 10MPa



1199EFW plug-in remote transmission device dimensions (standard 3", working pressure 2.5MPa)



1199RFW flange mounted remote transmission device dimensi

RFW type flange mounted remote transmission device dimensions

Upper flange size						Lower flange size			
Nominal pipe d iam eter (inch)	Nominal pressure LB/MPa	Boss diameter C	Outer d iam eter A	Thickn ess D	Screw hole center distance B	Number of screw holes n	Bolthole diameter d	DiameterE (mm)	DiameterF (mm)
1	150/2	61.4	108	1 4.3	7 9.4	4	16	26.9	66.5
	300/5	66.9	124	17.2	88.9	4	20		
1-1/ 2	150/2	73	127	17.2	98.4	4	16	41.9	78.7
	300/5	73	156	20.7	114.5	4	23		
2	150/2	92.1	152	19.1	120.6	4	20	52.2	95.2
	300/5	92.1	165	22.2	127.0	8	20		

CY3351 Remote Transmission Device Dimensions (Continued)

3	150/2	12	191	23.8	152.4	4	20	79	127
	300/5	7	210	25.5	168.3	8	23		
4	150/2	12	229	23.8	190	8	20	103	157.26
	300/5	7	254	31.8	200	8	23		

CY3351 Double flange differential pressure level gauge selection table

Model	Product Name
ISEN-CY3351	Double flange differential pressure level gauge

Code	Remote transmission type
DP	Remote transmission differential pressure transmitter
GP	Remote transmission pressure transmitter

	Code	Measuring range
	4	0-10.0~40.0kPa
	5	0-40.0~250.0kPa
	6	0-0.16~1.0MPa
	7	0-0.4~2.5MPa
	8	0-1.6~10.0MPa

	Code	Output
	1	Non-intelligent (4-20mA DC)
	2	Intelligent digital type
	3	Intelligent type (4-20mA superimposed HART protocol)
	4	RS485/MODBUS

	Code	Flange connector	Plug	Isolation diaphragm
	22	316L stainless steel	316L stainless steel	316L stainless steel
	23	316L stainless steel	316L stainless steel	HaC
	24	316L stainless steel	316L stainless steel	Monel
	25	316L stainless steel	316L stainless steel	Tantalum

	Code	Remote transmission device
	1	One remote transmission device
	2	Two remote transmission devices

	Code	Options (no selection, leave blank, multiple selections are allowed)
	A	Linear indicator (0~100% scale)
	B	LED digital display
	C	LCD digital display
	D	Tube-mounted bent branch
	E	Plate-mounted bent branch
	F	Tube-mounted flat branch

CY3351 Double flange differential pressure level gauge selection table (continued)

	Code	Explosion-proof grade
	P	Standard type (no explosion-proof)
	E	Flameproof ExdIIBT5 or ExdIIBT6
	A	Intrinsically safe Type ExibIICT6 orExiaIICT6

Selection Example

Example: ISEN-CY3351GP-61221AFP, double flange differential pressure level gauge, remote pressure transmitter, measuring range 0-0.16~1.0MPa, flange joint 316L stainless steel, plug 316L stainless steel, isolation diaphragm 316L stainless steel, remote transmission device one remote transmission device, optional linear indicator (0~100% scale), pipe-mounted flat branch, standard explosion-proof grade (no explosion-proof).

Remote Transmission Device Specifications

ISEN-1199PFW Type		FlatRemote Transmitter
Code	Model	
11	Standard3" -150Lb	
	Code	RemoteTransmitterDiaphragm Material
	A	316LSST
	B	HastelloyC-276
	C	Tantalum
	D	SIDCFLON
	Code	Housing Material
	11	316SST

Selection example:ISEN-1199PFW-11-A-11, flat remote transmitter,standard3"-150Lb, remote transmitter diaphragmmaterial316LSST, housing material 316SST.

ISEN-1199RTW type		Threaded remote transmission device (maximum working pressure 10MPa)
Code	Flushing spare hole	
11	No	
21	Yes	
	Code	Remote transmission device diaphragm material
	A	316LSST
	B	Hastello y C-276
	C	Tantalum
	Code	Structuralmaterial
	11	Upper sleeveis316SST, mounting ring is galvanized steel, gasket is asbestos di-fluororubber
	31	Upper sleeveis316SST, mounting ring is 316SST, gasket is asbestos difluororubber
	Code	Lowersleevematerial
	A	316SST
	B	HastelloyC

Remote Transmission Device Specifications (Continued)

	Code	Pressure connectionhole
	13	1/2-14NPT taperedpipethread

Selection example:ISEN-1199RTW-21-A-11-A-13, threaded remotetransmissiondevice, flushing spare hole, remote transmissiondevice diaphragm material 316LSST,structuralmaterialupper sleeve 316SST, mounting ring is galvanizedreal steel, g asket is asbestos fluorinerubber,lowersleeve material 316SST, pressure connection hole1/2-14NPT tapered pipe thread.

ISEN-1199EFW Type		Insertion tube remote transmission device	
Cod	Insertiontube di ameterandwiringpartmaterial		
e	（3"） 66zn316LSST		
11	(3")66znHastell oy (specialorder)		
12	（4"） 89zn316LSST		
13	(4")89znHastelloy (specialorder)		
14	Code	Remote transmissiondevicediaphragmmaterial	
	A	316LSST Only for11and13codes	
	B	Hastello y C-276Onlyfor12and14codes	
	C	Tant alum	
	Cod e	Ins ertiontubelength	
	2	（2 "） 50zn	
	4	(4 ") 100zn	
	6	(6") 150zn	
	Code	Flangematerialandratedpressure	
	A11	Carbonsteelgalvanized,maximumworkingpressure 2.5MPa	
	A12	Carbonsteelgalvanized,maximumworkingpressure 5MPa (not recommended)	

Selection example: ISEN-1199EFW-11-A-6-A11, insert cylinder type remote transmission device, insert cylinder diameter and wiring part material (3") 66zn 316LSST, remote transmission device diaphragm material 316LSST, insert cylinder length (6") 150zn, flange material and rated pressure carbon steel galvanized, maximum working pressure 2.5MPa.