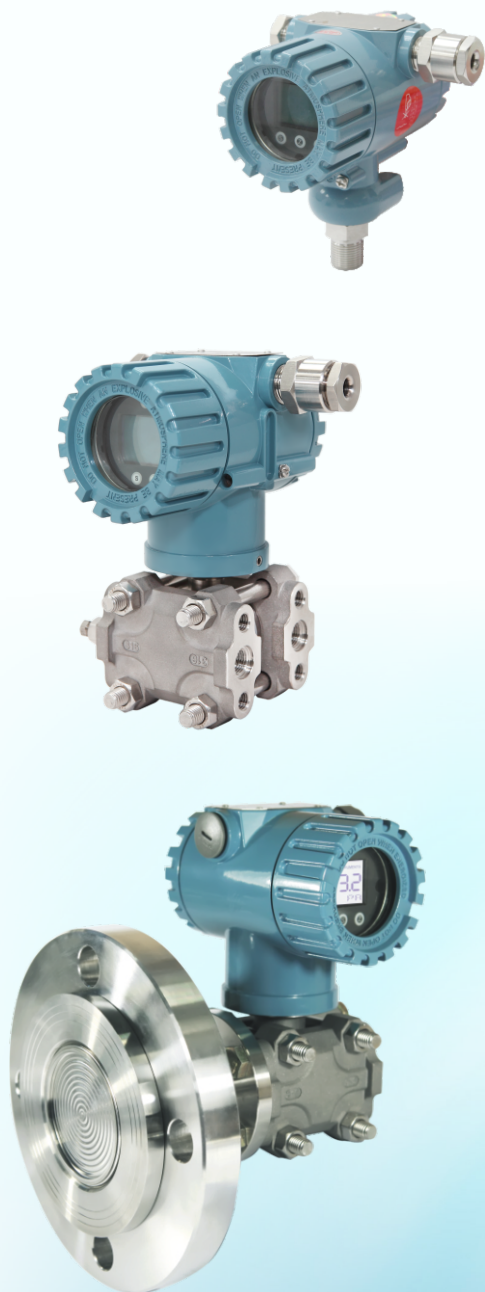




Intelligent pressure/differential pressure transmitter

产品选型手册





CONTENTS

WP361D monocrystalline silicon differential pressure transmitter	01
WP361R monocrystalline silicon micro differential pressure transmitter	10
WP361H monocrystalline silicon high static pressure differential pressure transmitter	19
WP361A monocrystalline silicon absolute pressure transmitter	28
WP361G monocrystalline silicon pressure transmitter	37
WP361P monocrystalline silicon high pressure transmitter	46
WP362A monocrystalline silicon absolute pressure transmitter	55
WP362G monocrystalline silicon pressure transmitter	62
WP363L monocrystalline silicon single flange liquid level transmitter	69
WP363G monocrystalline silicon single flange remote transmitter	77
WP363D monocrystal silicon double flange remote transmitter	87
WP series remote-transmission diaphragm system	97
Transmitter instrument valves manifold series	105
Instrument protection box	108
Appendix	112

WP361D monocrystalline silicon differential pressure transmitter

Apply to the measurement of flow, liquid level and pressure
Adopt HART fieldbus technology, which can provide more field information
to improve the performance of the factories.

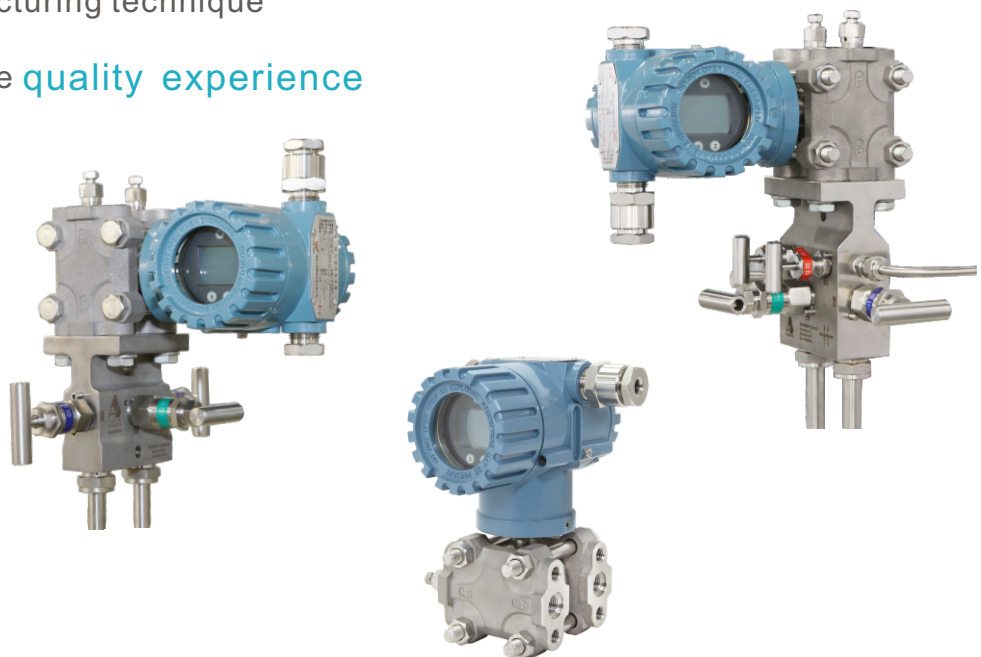
Product instruction

WP361D monocrystalline silicon differential pressure transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.075%FS
- The max. range ratio can reach to 100:1
- Adopt double overload protection technology
- With strong overload capability, the unidirectional pressure can reach to 10MPa
- The max. static pressure can reach to 10MPa
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable **quality experience**



Product Introduction

Sensor membrane head

While working, the isolation diaphragms on the high/low-pressure sides and the filling liquids will transmit the process pressure to the membrane head of sensor and then converted into the corresponding current, voltage or digital HART® (high-speed addressable remote transmitter data highway) output signal.

WP361 series sensor can conduct temperature measurement to compensate the temperature effects.

In the characterization process of factory, all the sensors have gone through the pressure and temperature cycle test within the whole working range. The correction factors will be generated from these obtained data. Then the coefficients will be stored in the memory of intelligent board so as to ensure that the signal correction can be conducted precisely during the operational process of transmitter.

Electronic circuit board

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

The liquid crystal header can display the pressure value, current value or the percentage of range.

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Digital/analog conversion and signal transmission

The process variable is stored in the form of digital data, which can be corrected accurately and conducted the conversion of engineering units. After correcting the signal, the data will be converted into analog output signal. HART manipulator can directly access to the reading of sensor in the way of data signal so as to get higher accuracy without digital/analog conversion.

Communication format

WP361 series transmitter adopts HART protocol to conduct communication. This protocol adopts industrial standard Bell202 frequency shift keying (FSK) technology. The telecommunication can be conducted by overlaying high-frequency signal on the analog output. By using this technology, the communication and output can be realized simultaneously without influencing the integrity of loop. WP361 series transmitter can communicate with the host machine, which uses HART protocol.

Software function

The users of HART protocol can easily use the functions of WP361 series, such as menu configuration, test and specific settings.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP361 series menu, including:

- Zero and extreme point setting
- Engineering units selection
- Linear or square root output
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specific settings

In the initialization phase of transmitter and while maintaining the digital electronic board, specific settings should be conducted. It allows to conduct fine tuning on the sensor and analog output to accord with the pressure standard of the factory.

Options

Liquid crystal header

Digital header, 2-line 5-digit liquid crystal display

- Directly display the digital data, with higher accuracy
- Display the pressure, current or range percentage according to the requirements of users
- Can rotate by 360° , which is easy to install

Transient voltage resistance protection

- Integrative transient voltage resistance protection terminal
- 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

Specification

Performance index

The overall performance is the composition error based on the reference accuracy, ambient temperature effects and range static-pressure effects.

Accuracy index

$\pm 0.075\%FS$ range (conventional)

Stability

$\leq \pm 0.2\%FS/5$ years

Concrete performance index

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

Accuracy

(The reference accuracy includes hysteresis, linear, setting ability and repeatability, which are based on terminal.)

$\pm 0.075\%$ range

If the range is less than X

$\pm [0.02 + 0.06 \frac{X}{\text{range}}]\%$

X value:

Diaphragm capsule	XKPa
M	4
H	50
V	100

Influence of static pressure

$\pm 0.15\%/10MPa$ range upper limit

Influence of zero point

Can correct the zero position again or conduct pressure zero position transference according to the field installation position etc.

Damping time constant

The total damping time constant is equal to the sum of the damping time constants of amplifier unit and diaphragm capsule. The damping time constant of amplifier unit is adjustable within the range of 0~100s.

Diaphragm capsule (silicone oil)

Time constant (s) (The time constant can be set according to the actual situation of field and is recommended 1S)

Influence of installation position

The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm 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 $\pm 0.005\%$ range/v

Functional parameter

The limit value of range and sensor

Table 1: Range of WP361D transmitter and limit value of sensor

Range	Min. range	Limit value of range and sensor	
		Upper limit of range (URL)	Lower limit of range (LRL)
M	1KPa	40KPa	-40KPa
H	2.5KPa	250KPa	-250KPa
V	10KPa	1000KPa	-1000KPa
A	0.03MPa	3MPa	-3MPa
G	0.1MPa	10MPa	-10MPa

Zero point and range adjustment requirements

- The zero point and range can be adjusted arbitrarily within the range limit value indicated in Table 1.
- The range should be larger than or equal to the min. range indicated in Table 1.

Applications

Measurement of liquid, gas and steam

Output

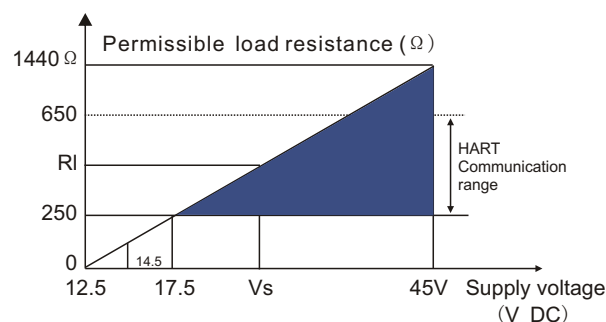
Two-wire 4~20mA, linear output or square root output is selectable for users. Digital process variable overlays on the 4-20mA signal, which can be applied to the host machines according with HART protocol.

Power supply

Need external power supply. While standard transmitter (4-20mA) has no load, work at 14.5-45V DC.

Loop load limit

The max. loop resistance is decided by the voltage of external power supply, the relations are as follows:



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while HART communication should be larger than 17.5V.

Limit of static pressure and max. overpressure

Unidirectional overpressure and max. static pressure is 10MPa

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 transmitter:

Linear output: $3.8 < I < 20.8$

C4: $I = 20.8\text{mA}$ high fault

CN: $I = 3.8\text{mA}$ low fault

Temperature limit

Environment

$-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$

Storage

$-46^{\circ}\text{C} \sim 110^{\circ}\text{C}$

With header: $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$

Process

Larger than or equal to the atmosphere, please see the following table

Table 2: Process temperature limit of WP361D transmitter

Silicone oil filled sensor	-40 to 121°C
Inertia liquid filled sensor	-30 to 121°C

Temperature drift

$\leq 0.075\% \text{FS} / 10^{\circ}\text{C}$

Humidity limit

0-100% relative humidity

Starting time

Reach to the performance index within 2s after the transmitter is power up.

Mechanical performance index

Electrical interface

ANSI(American-Standard) NPT1/2(F) internal thread

ISO (Chinese standard) M20 $\times$ 1.5 internal thread

Process interface

No process interface (NPT1/4 internal thread on the chamber flange)

With waist-shaped interface: NPT1/2 taper pipe internal thread

With T-shaped interface: M20 $\times$ 1.5 external thread and back welding connecting pipe (stainless steel)

With waist-shaped interface matching used with NPT1/2 pressure-leading transition head and back welding connecting pipe (stainless steel)

Process liquid-contacting piece

Process isolation diaphragm: 316 stainless steel, hastelloy C

Drain/vent valve

316 stainless steel

Process flange and interface

Carbon steel cadmium plate, 316 stainless steel

Non-liquid-contacting piece

Shell

Aluminium die casting IP65

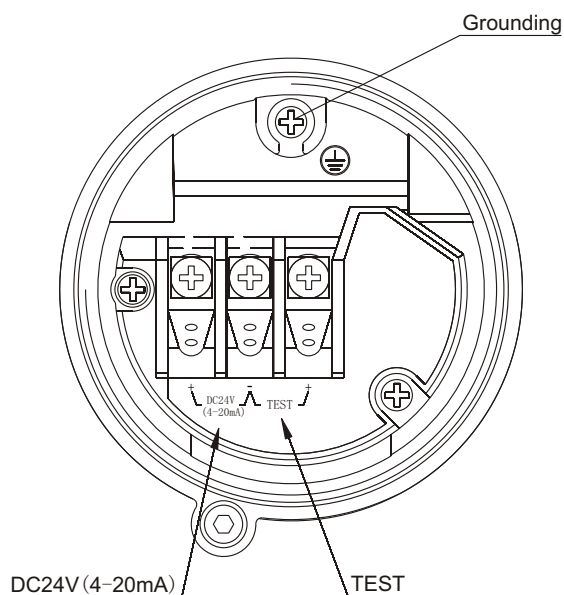
Coating

Spraying plastics

Meter cap O-ring

Nitrile rubber

Wiring diagram of terminal side



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

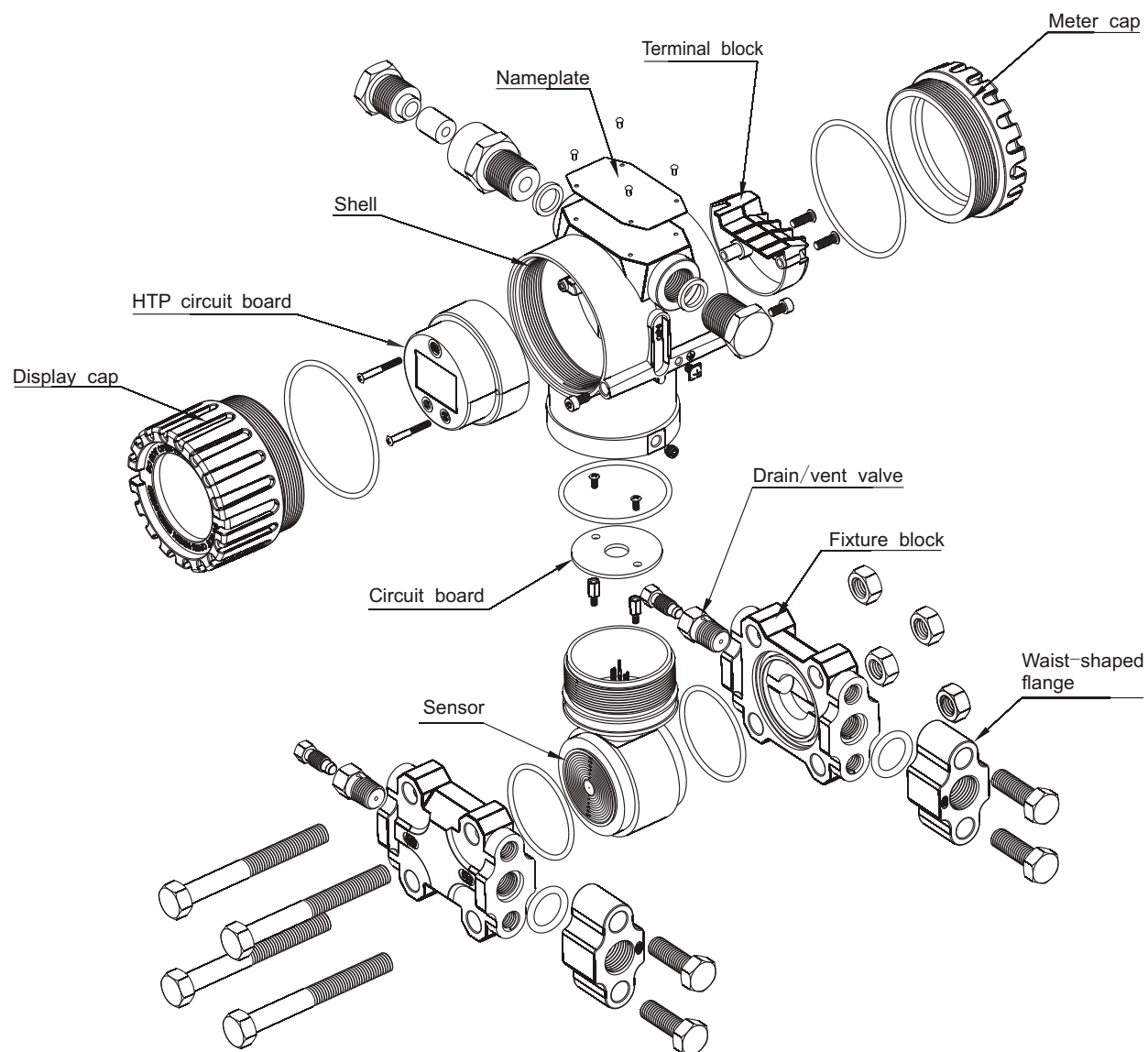
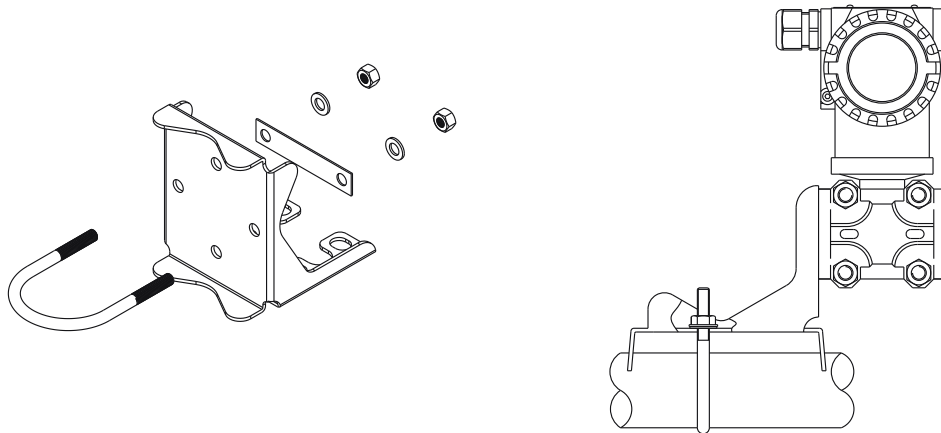
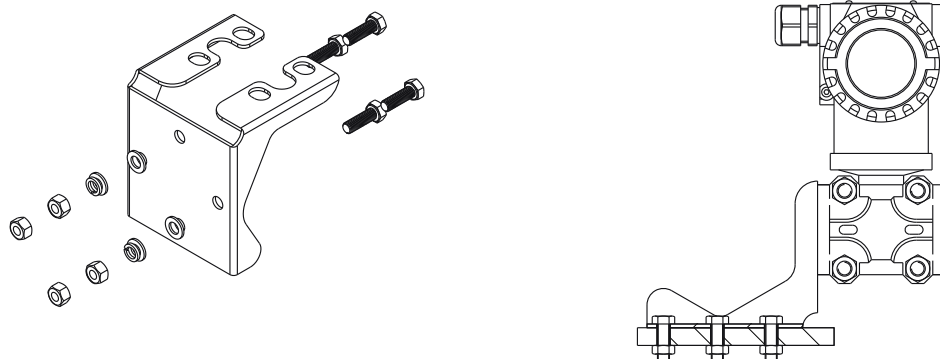


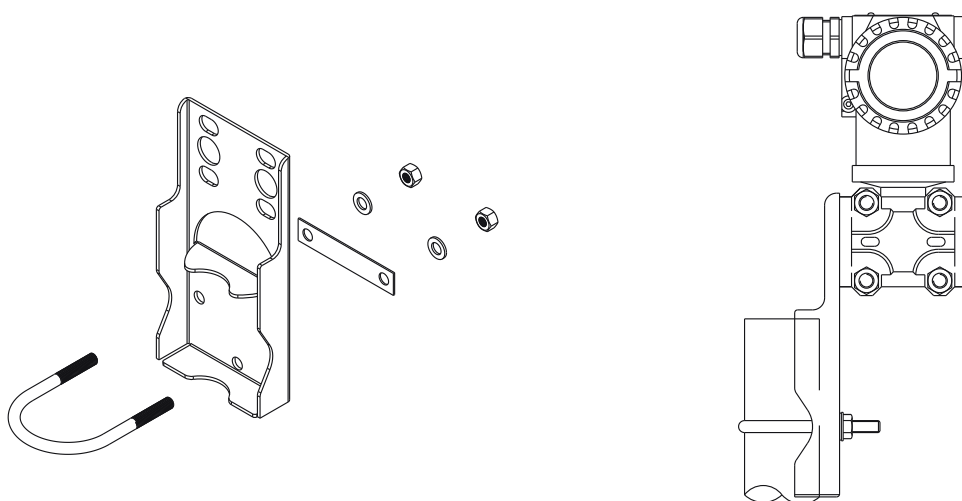
Fig. 3 Parts breakdown drawing of WP361D
monocrystalline silicon differential pressure transmitter



Pipe installation (Code of this option: B1)

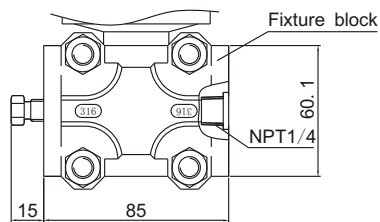


Panel mounting (Code of this option: B2)

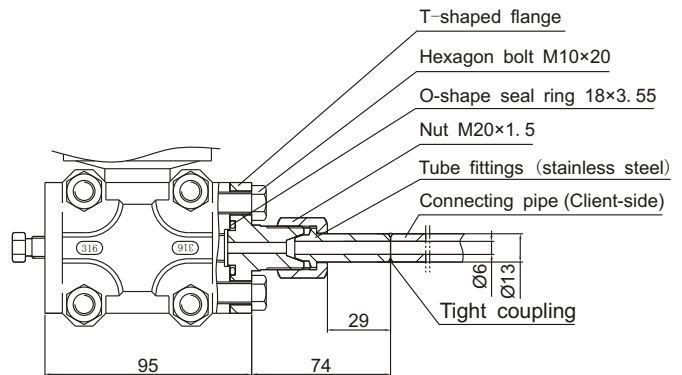


Pipe installation (Code of this option: B3)

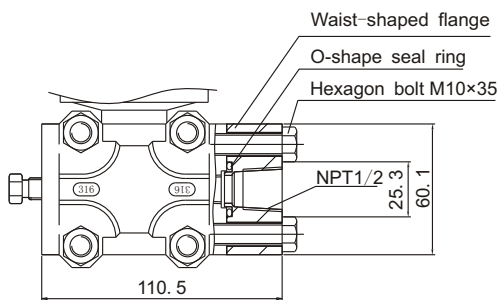
Fig. 4: Installation structure, with optional bracket, applied to 2 inch pipe or panel installation



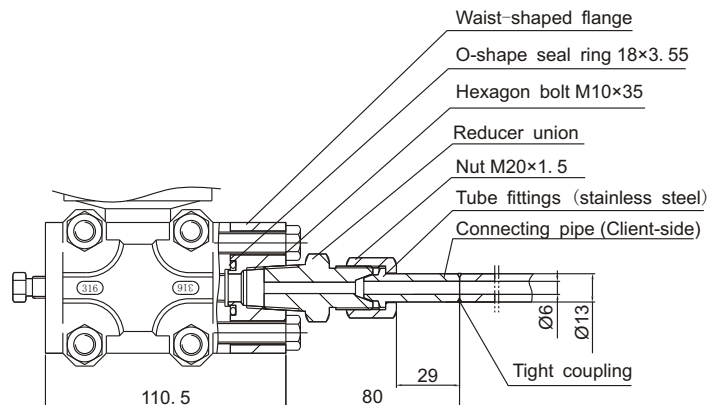
P-No process interface (chamber flange)
NPT1/4 internal thread)



J-with T-shaped interface: M20×1.5 external thread
and back welding connecting pipe (stainless steel)

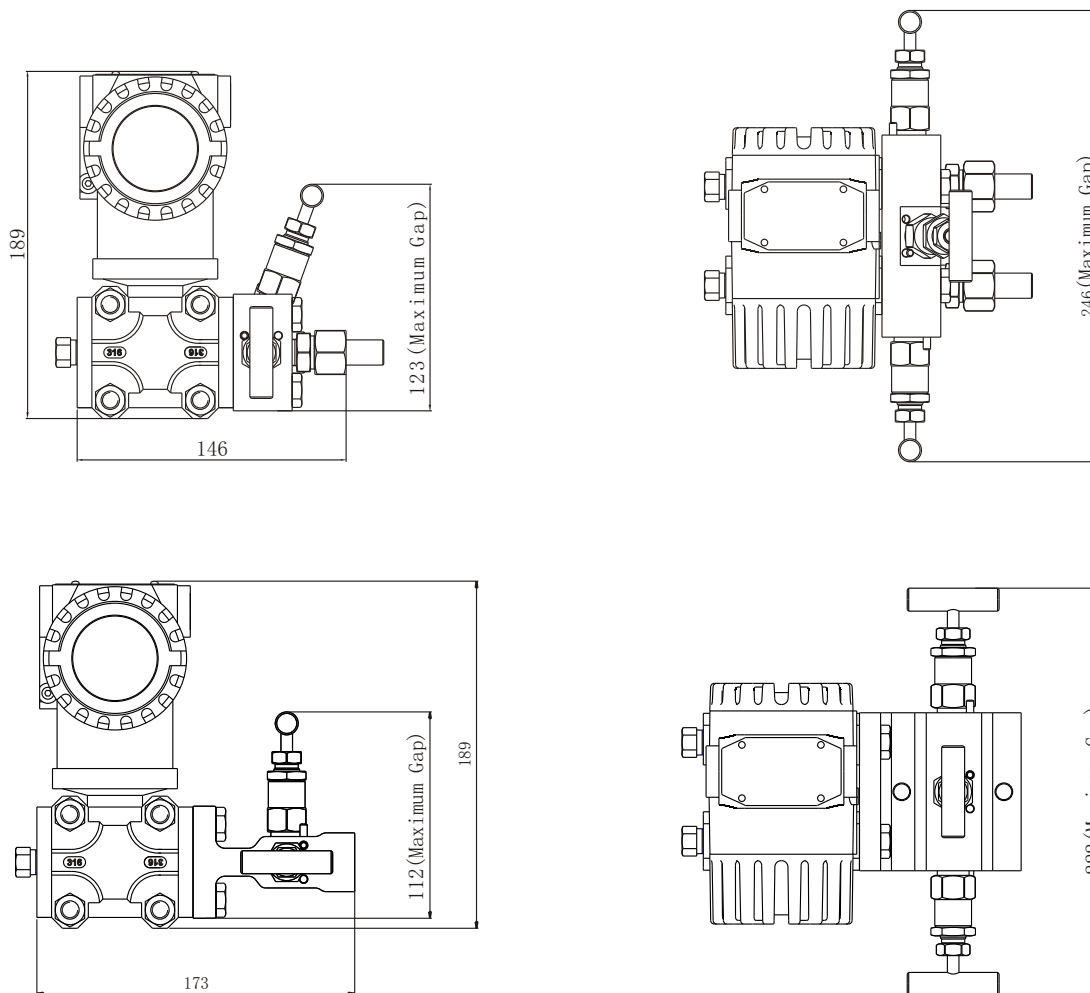


N-with waist-shaped interface: NPT1/2
taper pipe internal thread

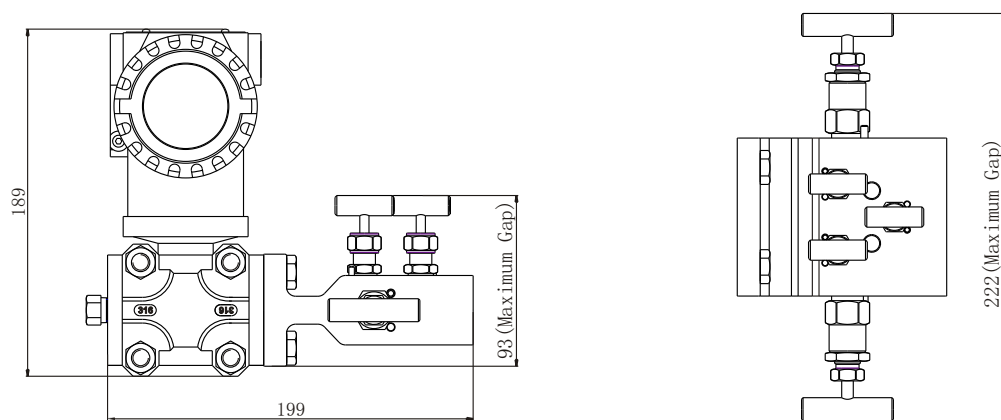


C-with waist-shaped interface: NPT1/2 pressure-leading
transition head and back welding connecting pipe (stainless steel)

Fig. 5: Process connecting type



Component dimension figure of three valve group



Component dimension figure of five valve group

Fig. 6: Component dimension figure of integrated valve group (unit: mm)

Table 3: WP361D monocrystal silicon differential pressure transmitter

Model	Transmitter type	
WP361D-	Monocrystalline silicon differential pressure transmitter	
Code	Measurement range of pressure	Static pressure
M	0-1~40Kpa	10MPa
H	0-2.5~250Kpa	10MPa
V	0-10~1000KPa	10MPa
A	0-0.03~3MPa	10MPa
G	0-0.1~10MPa	16MPa
Code	Transmitter output	
S	Standard intelligent (4 ~ 20) mA DC with HART protocol	
J	Standard intelligent (4 ~ 20) mA DC output is HART+v△?	
Code	Filling liquid	Diaphragm material
1	Silicone oil	316L stainless steel
2	Fluorocarbon oil	316L stainless steel
3	Silicone oil	Hastelloy C
4	Fluorocarbon oil	Hastelloy C
5	Silicone oil	Ta diaphragm
6	Fluorocarbon oil	Ta diaphragm
Code	Electrical interface	
A	NPT1/2 internal thread	
M	M20×1.5 internal thread	
Code	Header	
-M	LCD display	
-N	No header	
Code	Options for the hazardous occasion certification	
N	Ordinary type (no anti-explosion)	
D	Flame-proof Exd II CT6	
I	Intrinsic-safety type Exia II CT6	
Code	Mounting bracket	
B3	Pipe-mounted flat bracket (2" pipe)	
B1	Pipe-mounted bent bracket (2" pipe)	
B2	Plate-mounted bent bracket	
B4	Pipe bracket (2" pipe) - pressure taps down special	
Code	Process connection type	
P	No process joint (NPT1/4 internal thread on chamber flange)	
J	With "T" shaped joint: M20×1.5 external thread and rear welded pressure tube	
N	With "Waist" shaped joint: NPT1/2 conical internal thread	
C	With "Waist" shaped joint with NPT1/2 pressure transition head and rear welded pressure tube	
Code	Integrated valve assembly option(optional)	
T3	Three valves manifold	
V3	Three valves manifold	
V5	Five valves manifold	
Code	Other option	
H	The measurement accuracy is 0.075%FS	
S	The liquid material is 316 stainless steel	
D0	The discharge valve is at the rear end face of the clamp block	
D1	Clamp block side drain valve in upper	
D2	Clamp block side drain valve in lower part	
D3	Pressure taps down	
Q4	Verification certificate(Contact Wide Plus)	
C4	High alarm	
CN	Low alarm (The default setting is low alarm)	
Y	Special requirements	
Example	WP361D-MS1A-MDB3ND0	

Note: 1,"Valve group integrated installation option" can be selected or not, the standard is provided for 316 material, if you have other requirements can contact our company.

When "Valve Group Integrated Installation Option" is selected, the process connection type can only be P: no process connection.

2,The default contact liquid material is 304 stainless steel.

WP361R monocrystal silicon micro differential pressure transmitter

Apply to the measurement of flow, liquid level and pressure

Adopt HART fieldbus technology, which can provide more field information to improve the performance of the factories.

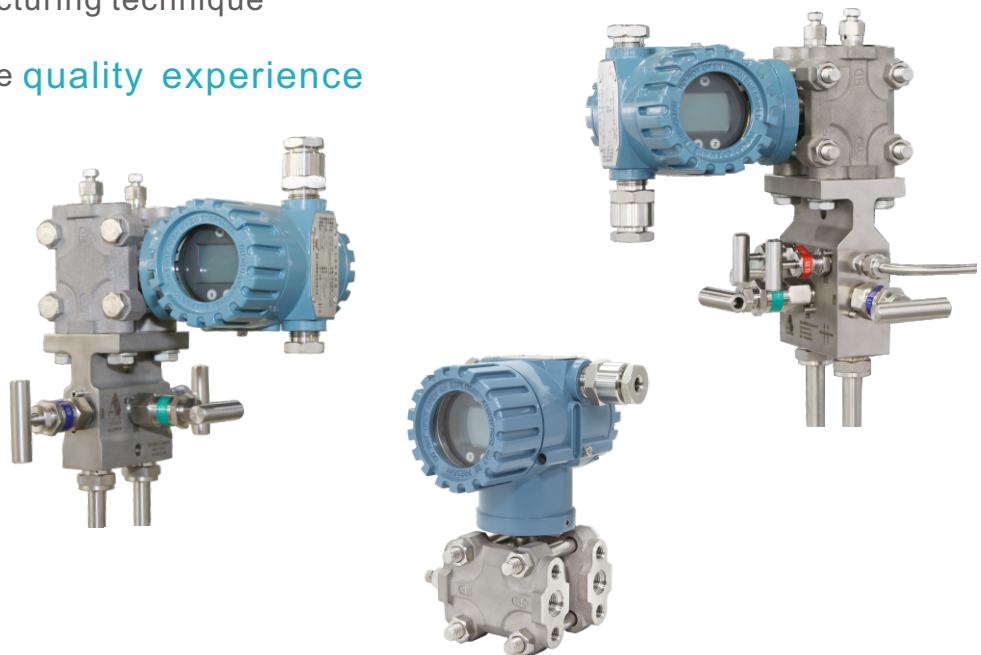
Product instruction

WP361R monocrystalline silicon micro differential pressure transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.25%FS
- The max. range ratio can reach to 20:1
- Adopt double overload protection technology
- With strong overload capability, the unidirectional pressure can reach to 4MPa
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable **quality experience**



Product Introduction

Sensor membrane head

While working, the isolation diaphragms on the high/low-pressure sides and the filling liquids will transmit the process pressure to the membrane head of sensor and then converted into the corresponding current, voltage or digital HART® (high-speed addressable remote transmitter data highway) output signal.

WP361 series sensor can conduct temperature measurement to compensate the temperature effects.

In the characterization process of factory, all the sensors have gone through the pressure and temperature cycle test within the whole working range. The correction factors will be generated from these obtained data. Then the coefficients will be stored in the memory of intelligent board so as to ensure that the signal correction can be conducted precisely during the operational process of transmitter.

Electronic circuit board

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

The liquid crystal header can display the pressure value, current value or the percentage of range.

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Digital/analog conversion and signal transmission

The process variable is stored in the form of digital data, which can be corrected accurately and conducted the conversion of engineering units. After correcting the signal, the data will be converted into analog output signal. HART manipulator can directly access to the reading of sensor in the way of data signal so as to get higher accuracy without digital/analog conversion.

Communication format

WP361 series transmitter adopts HART protocol to conduct communication. This protocol adopts industrial standard Bell202 frequency shift keying (FSK) technology. The telecommunication can be conducted by overlaying high-frequency signal on the analog output. By using this technology, the communication and output can be realized simultaneously without influencing the integrity of loop. WP361 series transmitter can communicate with the host machine, which uses HART protocol.

Software function

The users of HART protocol can easily use the functions of WP361 series, such as menu configuration, test and specific settings.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP361 series menu, including:

- Zero and extreme point setting
- Engineering units selection
- Linear or square root output
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specific settings

In the initialization phase of transmitter and while maintaining the digital electronic board, specific settings should be conducted. It allows to conduct fine tuning on the sensor and analog output to accord with the pressure standard of the factory.

Options

Liquid crystal header

Digital header, 2-line 5-digit liquid crystal display

- Directly display the digital data, with higher accuracy
- Display the pressure, current or range percentage according to the requirements of users
- Can rotate by 360° , which is easy to install

Transient voltage resistance protection

- Integrative transient voltage resistance protection terminal
- 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

Specification

Performance index

The overall performance is the composition error based on the reference accuracy, ambient temperature effects and range static-pressure effects.

Accuracy index

$\pm 0.25\%FS$ range (conventional)

Stability

$\leq \pm 0.5\%FS/5$ years

Concrete performance index

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

Accuracy

(The reference accuracy includes hysteresis, linear, setting ability and repeatability, which are based on terminal.)

$\pm 0.25\%$ range

If the range is less than 0.4KPa

$\pm [0.2 + 0.1 \times \frac{0.4KPa}{range}] \%$

Influence of static pressure

0.3%FS/4MPa (only 6KPa range)

Influence of zero point

Can correct the zero position again or conduct pressure zero position transference according to the field installation position etc.

Damping time constant

The total damping time constant is equal to the sum of the damping time constants of amplifier unit and diaphragm capsule. The damping time constant of amplifier unit is adjustable within the range of 0~100s.

Diaphragm capsule (silicone oil)

Time constant (s) (The time constant can be set according to the actual situation of field and is recommended 1KPa 2S/6KPa 1S)

Influence of installation position

The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm 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 $\pm 0.005\%$ range/v

Functional parameter

The limit value of range and sensor

Table 1: Range of WP361R transmitter and limit value of sensor

Range	Min. range	Limit value of range and sensor	
		Upper limit of range (URL)	Lower limit of range (LRL)
E	100Pa	1KPa	-1KPa
L	300Pa	6KPa	-6KPa

Zero point and range adjustment requirements

- The zero point and range can be adjusted arbitrarily within the range limit value indicated in Table 1.
- The range should be larger than or equal to the min. range indicated in Table 1.

Applications

Measurement of liquid, gas and steam

Output

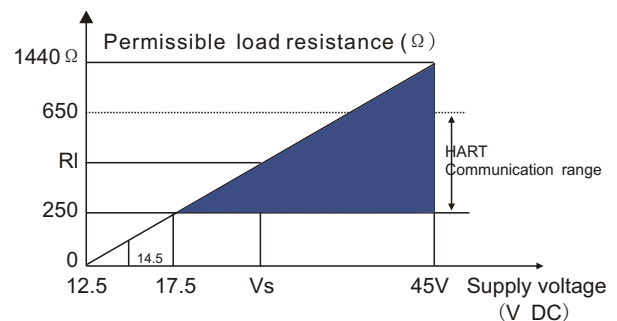
Two-wire 4~20mA, linear output or square root output is selectable for users. Digital process variable overlays on the 4~20mA signal, which can be applied to the host machines according with HART protocol.

Power supply

Need external power supply. While standard transmitter (4~20mA) has no load, work at 14.5~45V DC.

Loop load limit

The max. loop resistance is decided by the voltage of external power supply, the relations are as follows:



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while HART communication should be larger than 17.5V.

Limit of static pressure and max. overpressure

Range E: Unidirectional overpressure 200KPa
Range L: Unidirectional overpressure 4MPa

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 transmitter:

Linear output: $3.8 < I < 20.8$

C4: $I = 20.8\text{mA}$ high fault

CN: $I = 3.8\text{mA}$ low fault

Temperature limit

Environment

$-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$

Storage

$-46^{\circ}\text{C} \sim 110^{\circ}\text{C}$

With header: $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$

Process

Larger than or equal to the atmosphere, please see the following table

Table 2: Process temperature limit of WP361R transmitter

Silicone oil filled sensor	-40 to 121°C
Inertia liquid filled sensor	-30 to 121°C

Temperature drift

$\leq 0.15\% \text{FS} / 10^{\circ}\text{C}$

Humidity limit

0–100% relative humidity

Starting time

Reach to the performance index within 2s after the transmitter is power up.

Mechanical performance index

Electrical interface

ANSI(American-Standard) NPT1/2(F) internal thread

ISO (Chinese standard) M20×1.5 internal thread

Process interface

No process interface (NPT1/4 internal thread on the chamber flange)

With waist-shaped interface: NPT1/2 taper pipe internal thread

With T-shaped interface: M20×1.5 external thread and back welding connecting pipe (stainless steel)

With waist-shaped interface matching used with NPT1/2 pressure-leading transition head and back welding connecting pipe (stainless steel)

Process liquid-contacting piece

Process isolation diaphragm: 316 stainless steel, hastelloy C

Drain/vent valve

316 stainless steel

Process flange and interface

Carbon steel cadmium plate, 316 stainless steel

Non-liquid-contacting piece

Shell

Aluminium die casting IP65

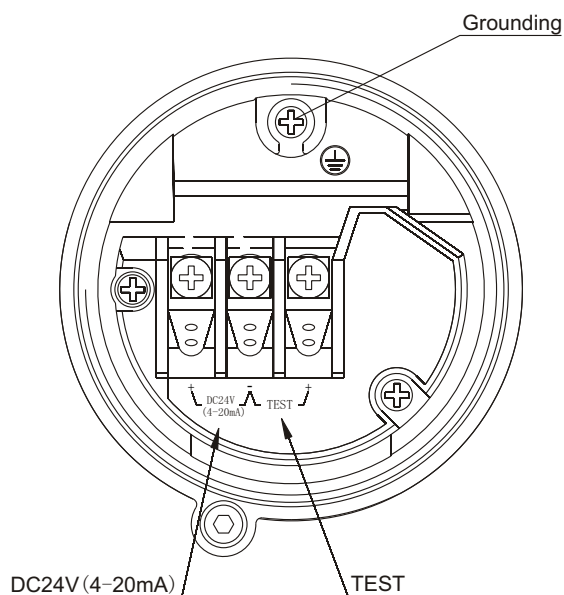
Coating

Spraying plastics

Meter cap O-ring

Nitrile rubber

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 10 Ω)
---	Ground terminal

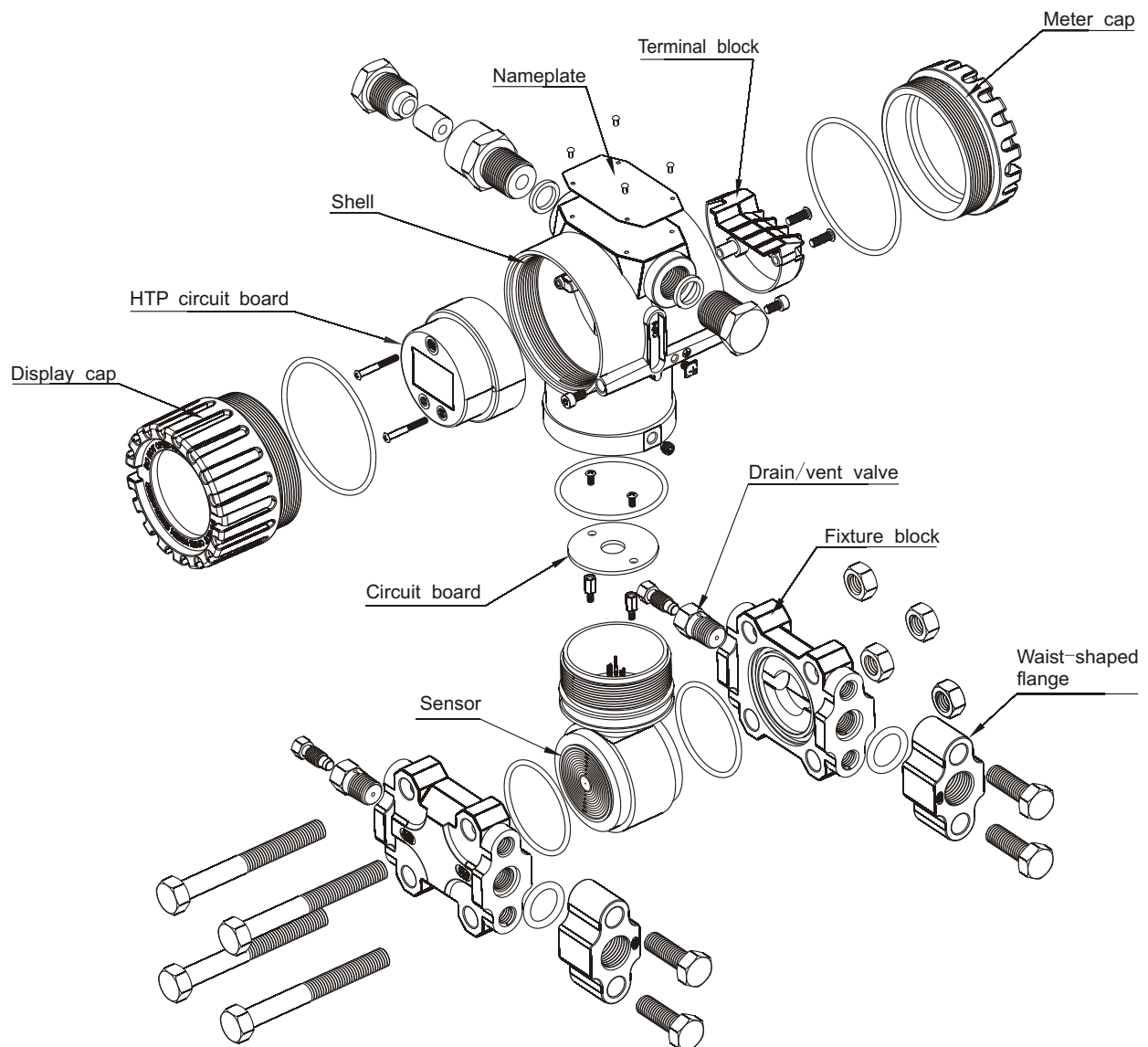
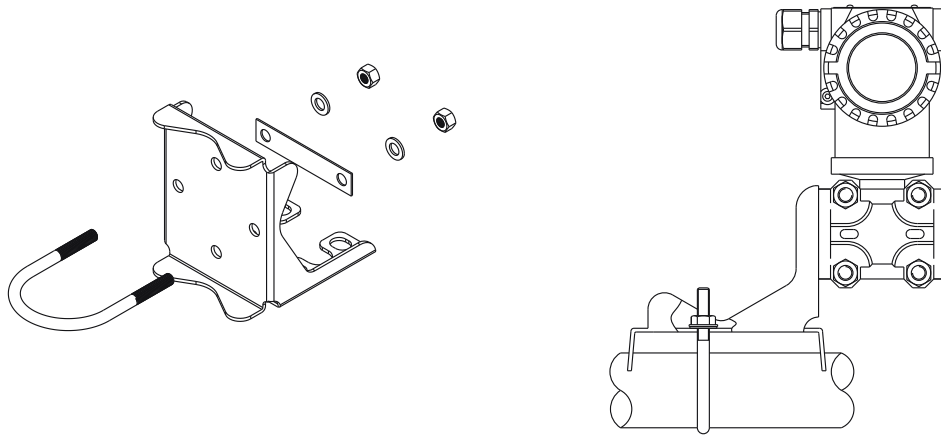
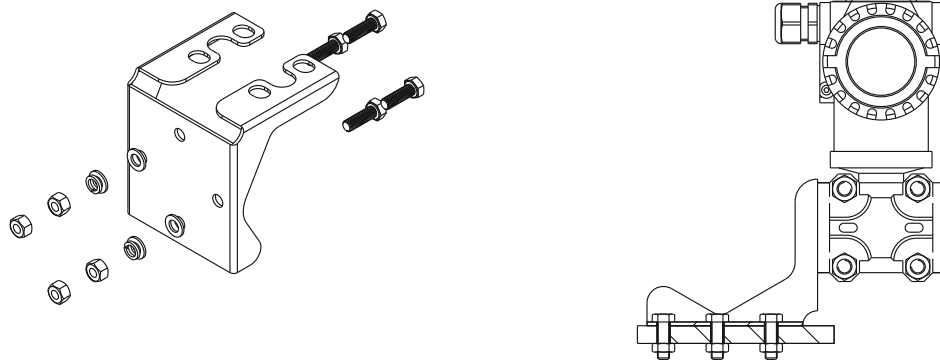


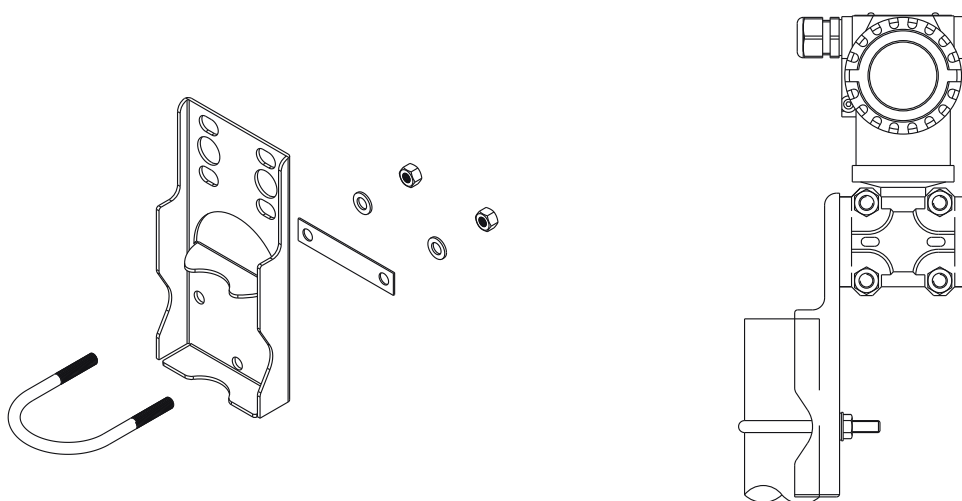
Fig. 3 Parts breakdown drawing of WP361R
monocrystalline silicon micro differential pressure transmitter



Pipe installation (Code of this option: B1)

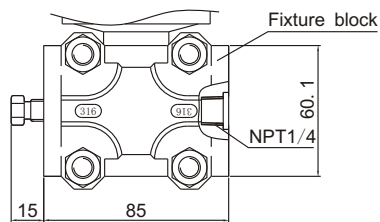


Panel mounting (Code of this option: B2)

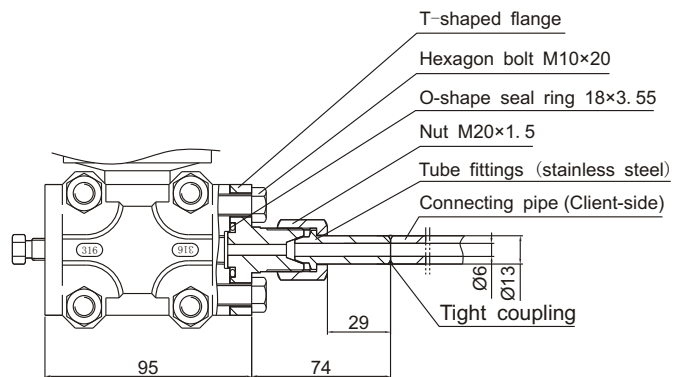


Pipe installation (Code of this option: B3)

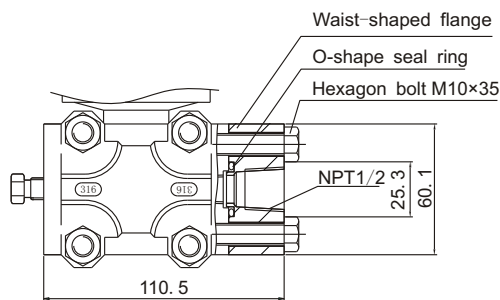
Fig. 4: Installation structure, with optional bracket, applied to 2 inch pipe or panel installation



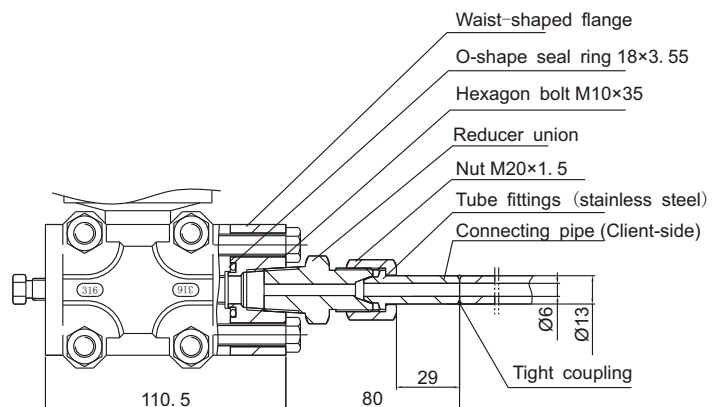
P-No process interface (chamber flange)
NPT1/4 internal thread)



J-with T-shaped interface: M20×1.5 external thread
and back welding connecting pipe (stainless steel)

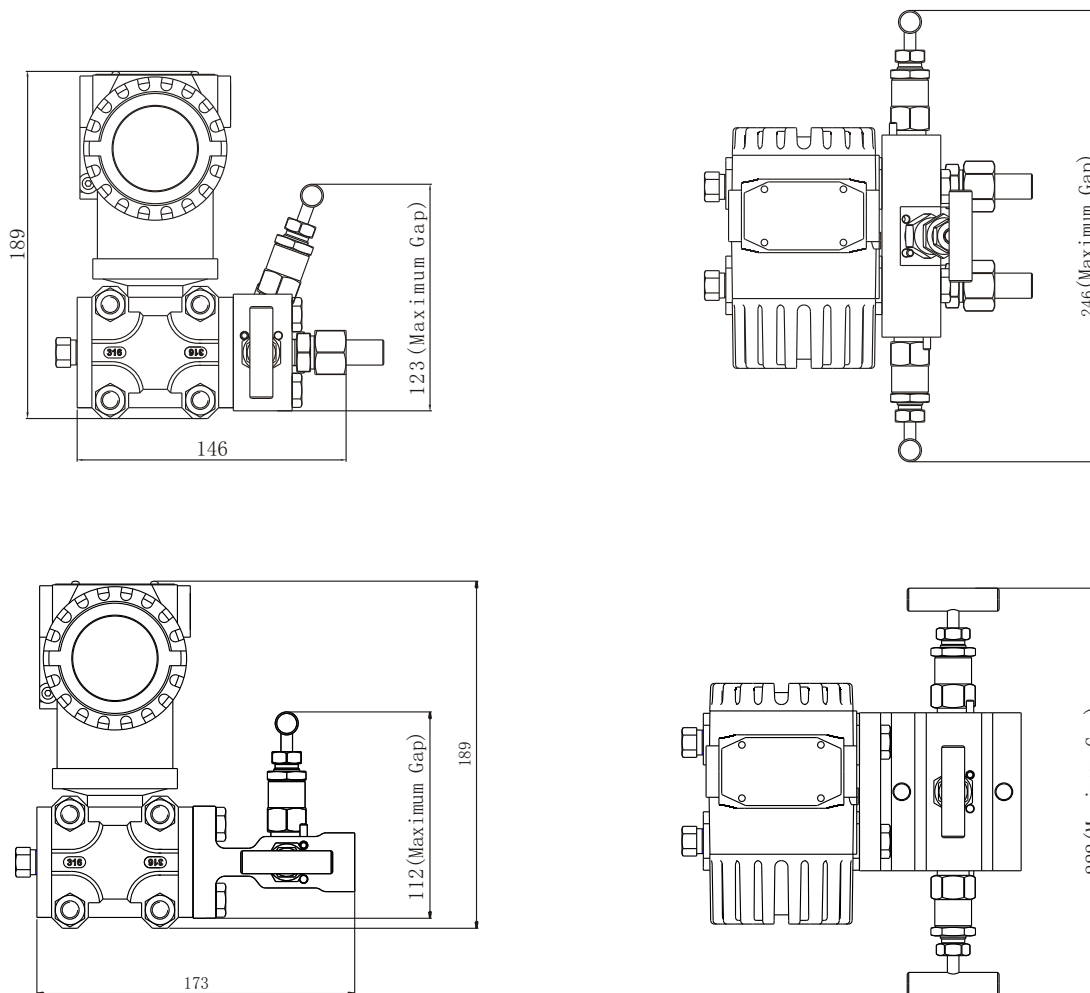


N-with waist-shaped interface: NPT1/2
taper pipe internal thread

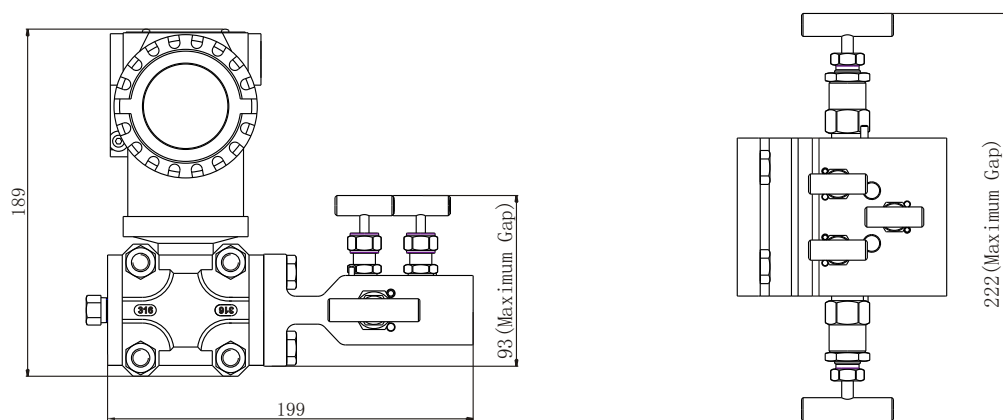


C-with waist-shaped interface: NPT1/2 pressure-leading
transition head and back welding connecting pipe (stainless steel)

Fig. 5: Process connecting type



Component dimension figure of three valve group



Component dimension figure of five valve group

Fig. 6: Component dimension figure of integrated valve group (unit: mm)

Table 3: WP361R monocrystalline silicon micro differential pressure transmitter

Model	Transmitter type	
WP361R-	Monocrystalline silicon micro differential pressure transmitter	
Code	Measurement range of pressure	Static pressure
E	0-0.1~1Kpa	200Kpa
L	0-0.6~6Kpa	4MPa
Code	Transmitter output	
S	Standard intelligent (4 ~ 20) mA DC with HART protocol	
J	Standard intelligent (4 ~ 20) mA DC output is HART+v Δ ?	
Code	Filling liquid	Diaphragm material
1	Silicone oil	316L stainless steel
2	Fluorocarbon oil	316L stainless steel
3	Silicone oil	Hastelloy C
4	Fluorocarbon oil	Hastelloy C
5	Silicone oil	Ta diaphragm
6	Fluorocarbon oil	Ta diaphragm
Code	Electrical interface	
A	NPT1/2 internal thread	
M	M20×1.5 internal thread	
Code	Header	
-M	LCD display	
-N	No header	
Code	Options for the hazardous occasion certification	
N	Ordinary type (no anti-explosion)	
D	Flame-proof Exd II CT6	
I	Intrinsic-safety type Exia II CT6	
Code	Mounting bracket	
B3	Pipe-mounted flat bracket (2" pipe)	
B1	Pipe-mounted bent bracket (2" pipe)	
B2	Plate-mounted bent bracket	
B4	Pipe bracket (2" pipe) - pressure taps down special	
Code	Process connection type	
P	No process joint (NPT1/4 internal thread on chamber flange)	
J	With "T" shaped joint: M20×1.5 external thread and rear welded pressure tube	
N	With "Waist" shaped joint: NPT1/2 conical internal thread	
C	With "Waist" shaped joint with NPT1/2 pressure transition head and rear welded pressure tube	
Code	Integrated valve assembly option(optional)	
T3	Three valves manifold	
V3	Three valves manifold	
V5	Five valves manifold	
Code	Other option	
H	The measurement accuracy is 0.075%FS	
S	The liquid material is 316 stainless steel	
D0	The discharge valve is at the rear end face of the clamp block	
D1	Clamp block side drain valve in upper	
D2	Clamp block side drain valve in lower part	
D3	Pressure taps down	
Q4	Verification certificate(Contact Wide Plus)	
C4	High alarm	
CN	Low alarm (The default setting is low alarm)	
Y	Special requirements	
Example	WP361R-ES1A-MDB3ND0	

Note: 1,"Valve group integrated installation option" can be selected or not, the standard is provided for 316 material, if you have other requirements can contact our company.

When "Valve Group Integrated Installation Option" is selected, the process connection type can only be P: no process connection.

2,The default contact liquid material is 304 stainless steel.

WP361H monocrystalline silicon high static pressure differential pressure transmitter

Apply to the measurement of flow, liquid level and pressure

Adopt HART fieldbus technology, which can provide more field information to improve the performance of the factories.

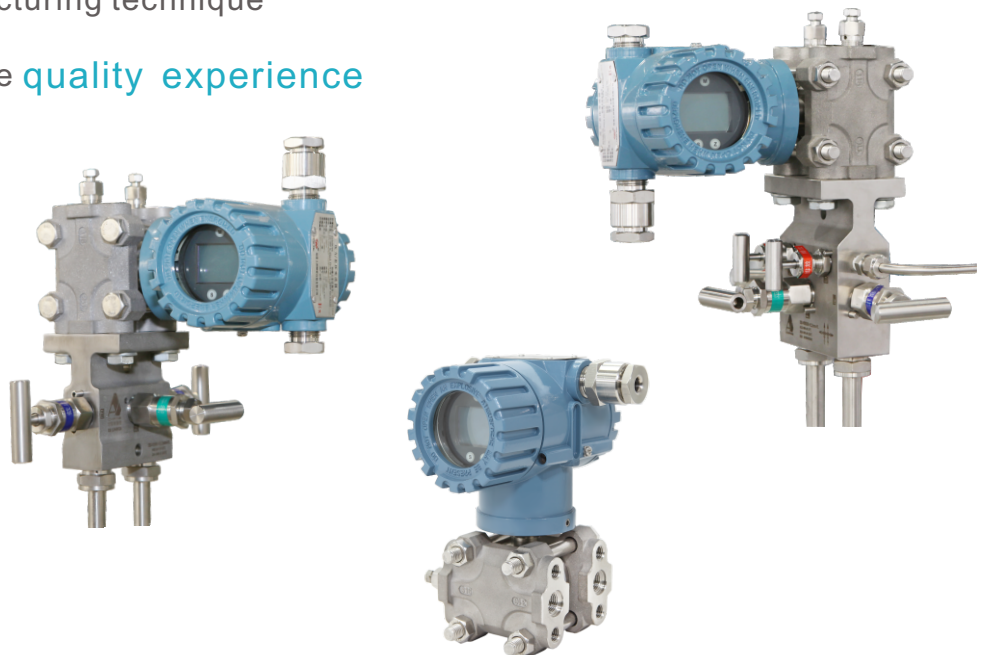
Product instruction

WP361H monocrystalline silicon high static pressure differential pressure transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.075%FS
- The max. range ratio can reach to 100:1
- Adopt double overload protection technology
- With strong overload capability, the unidirectional pressure can reach to 25MPa
- The max. static pressure can reach to 25MPa
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable **quality experience**



Product Introduction

Sensor membrane head

While working, the isolation diaphragms on the high/low-pressure sides and the filling liquids will transmit the process pressure to the membrane head of sensor and then converted into the corresponding current, voltage or digital HART® (high-speed addressable remote transmitter data highway) output signal.

WP361 series sensor can conduct temperature measurement to compensate the temperature effects.

In the characterization process of factory, all the sensors have gone through the pressure and temperature cycle test within the whole working range. The correction factors will be generated from these obtained data. Then the coefficients will be stored in the memory of intelligent board so as to ensure that the signal correction can be conducted precisely during the operational process of transmitter.

Electronic circuit board

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

The liquid crystal header can display the pressure value, current value or the percentage of range.

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Digital/analog conversion and signal transmission

The process variable is stored in the form of digital data, which can be corrected accurately and conducted the conversion of engineering units. After correcting the signal, the data will be converted into analog output signal. HART manipulator can directly access to the reading of sensor in the way of data signal so as to get higher accuracy without digital/analog conversion.

Communication format

WP361 series transmitter adopts HART protocol to conduct communication. This protocol adopts industrial standard Bell202 frequency shift keying (FSK) technology. The telecommunication can be conducted by overlaying high-frequency signal on the analog output. By using this technology, the communication and output can be realized simultaneously without influencing the integrity of loop. WP361 series transmitter can communicate with the host machine, which uses HART protocol.

Software function

The users of HART protocol can easily use the functions of WP361 series, such as menu configuration, test and specific settings.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP361 series menu, including:

- Zero and extreme point setting
- Engineering units selection
- Linear or square root output
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specific settings

In the initialization phase of transmitter and while maintaining the digital electronic board, specific settings should be conducted. It allows to conduct fine tuning on the sensor and analog output to accord with the pressure standard of the factory.

Options

Liquid crystal header

Digital header, 2-line 5-digit liquid crystal display

- Directly display the digital data, with higher accuracy
- Display the pressure, current or range percentage according to the requirements of users
- Can rotate by 360° , which is easy to install

Transient voltage resistance protection

- Integrative transient voltage resistance protection terminal
- 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

Specification

Performance index

The overall performance is the composition error based on the reference accuracy, ambient temperature effects and range static-pressure effects.

Accuracy index

$\pm 0.075\%$ FS range (conventional)

Stability

$\leq \pm 0.2\%$ FS/5 years

Concrete performance index

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

Accuracy

(The reference accuracy includes hysteresis, linear, setting ability and repeatability, which are based on terminal.)

$\pm 0.075\%$ range

If the range is less than X

$\pm [0.02 + 0.06 \frac{X}{\text{range}}]\%$

X value:

Diaphragm capsule	XKPa
M	4
H	50
V	100

Influence of static pressure

$\pm 0.15\%/10\text{MPa}$

Influence of zero point

Can correct the zero position again or conduct pressure zero position transference according to the field installation position etc.

Damping time constant

The total damping time constant is equal to the sum of the damping time constants of amplifier unit and diaphragm capsule. The damping time constant of amplifier unit is adjustable within the range of 0~100s.

Diaphragm capsule (silicone oil)

Time constant (s) (The time constant can be set according to the actual situation of field and is recommended 1S)

Influence of installation position

The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm 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 $\pm 0.005\%$ range/v

Functional parameter

The limit value of range and sensor

Table 1: Range of WP361H transmitter and limit value of sensor

Range	Min. range	Limit value of range and sensor	
		Upper limit of range (URL)	Lower limit of range (LRL)
M	1KPa	40KPa	-40KPa
H	2.5KPa	250KPa	-250KPa
V	10KPa	1000KPa	-1000KPa

Zero point and range adjustment requirements

- The zero point and range can be adjusted arbitrarily within the range limit value indicated in Table 1.
- The range should be larger than or equal to the min. range indicated in Table 1.

Applications

Measurement of liquid, gas and steam

Output

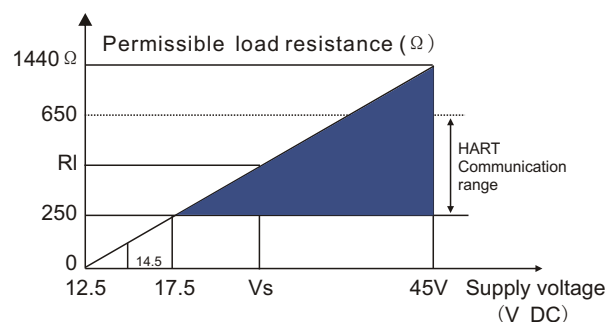
Two-wire 4-20mA, linear output or square root output is selectable for users. Digital process variable overlays on the 4-20mA signal, which can be applied to the host machines according with HART protocol.

Power supply

Need external power supply. While standard transmitter (4-20mA) has no load, work at 14.5-45V DC.

Loop load limit

The max. loop resistance is decided by the voltage of external power supply, the relations are as follows:



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while HART communication should be larger than 17.5V.

Limit of static pressure and max. overpressure

Unidirectional overpressure 25MPa, the max. static pressure 25MPa (ordinary), 40MPa (the highest)

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 transmitter:

Linear output: $3.8 < I < 20.8$

C4: $I = 20.8\text{mA}$ high fault

CN: $I = 3.8\text{mA}$ low fault

Temperature limit

Environment

$-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$

Storage

$-46^{\circ}\text{C} \sim 110^{\circ}\text{C}$

With header: $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$

Process

Larger than or equal to the atmosphere, please see the following table

Table 2: Process temperature limit of WP361H transmitter

Silicone oil filled sensor	-40 to 121°C
Inertia liquid filled sensor	-30 to 121°C

Temperature drift

$\leq 0.065\% \text{FS} / 10^{\circ}\text{C}$

Humidity limit

0–100% relative humidity

Starting time

Reach to the performance index within 2s after the transmitter is power up.

Mechanical performance index

Electrical interface

ANSI(American-Standard) NPT1/2(F) internal thread

ISO (Chinese standard) M20×1.5 internal thread

Process interface

No process interface (NPT1/4 internal thread on the chamber flange)

With waist-shaped interface: NPT1/2 taper pipe internal thread

With T-shaped interface: M20×1.5 external thread and back welding connecting pipe (stainless steel)

With waist-shaped interface matching used with NPT1/2 pressure-leading transition head and back welding connecting pipe (stainless steel)

Process liquid-contacting piece

Process isolation diaphragm: 316 stainless steel, hastelloy C

Drain/vent valve

316 stainless steel

Process flange and interface

Carbon steel cadmium plate, 316 stainless steel

Non-liquid-contacting piece

Shell

Aluminium die casting IP65

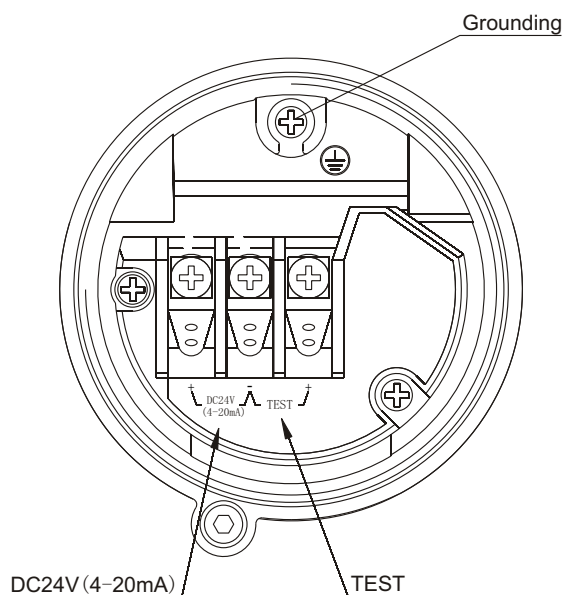
Coating

Spraying plastics

Meter cap O-ring

Nitrile rubber

Wiring diagram of terminal side



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

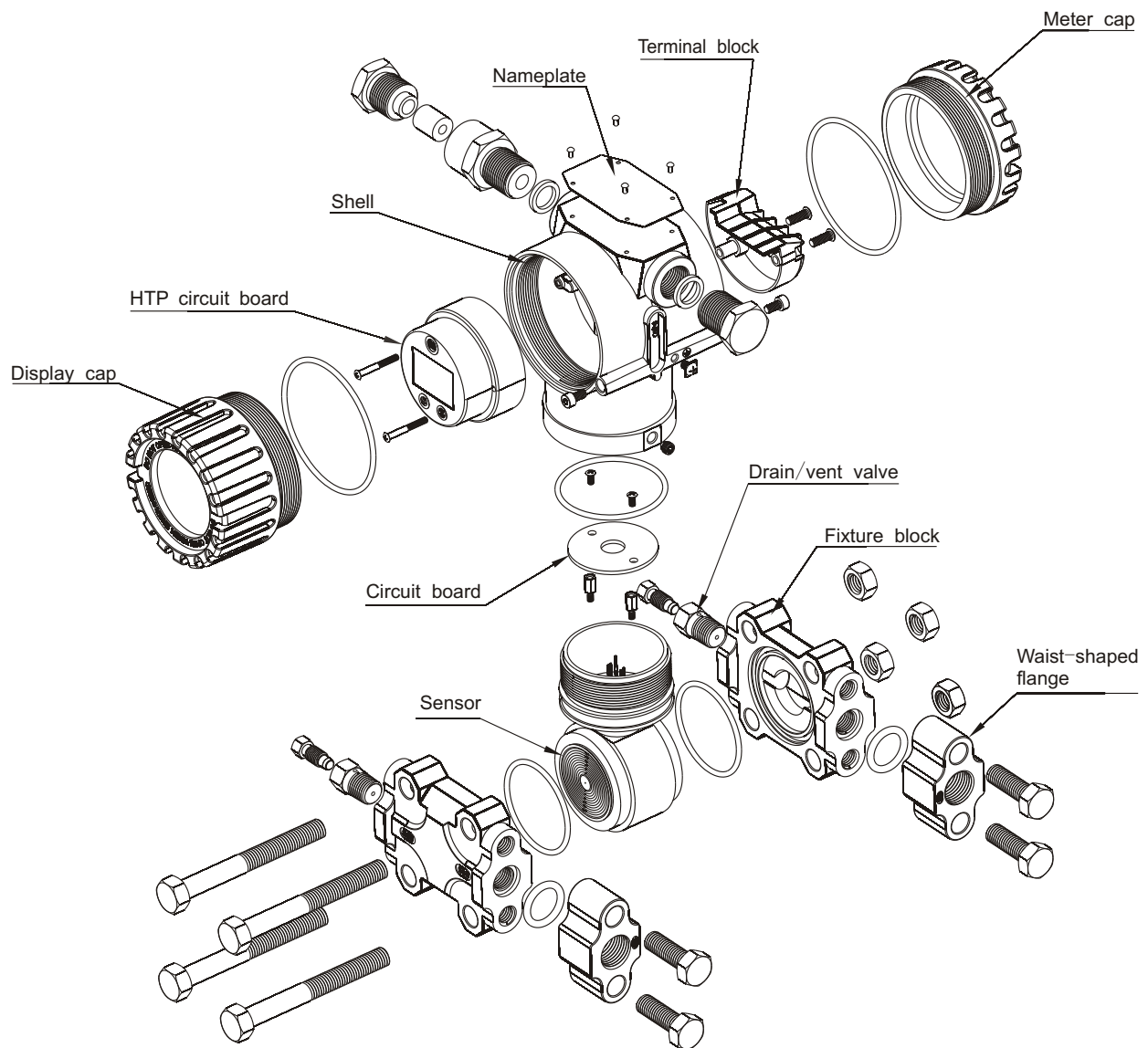
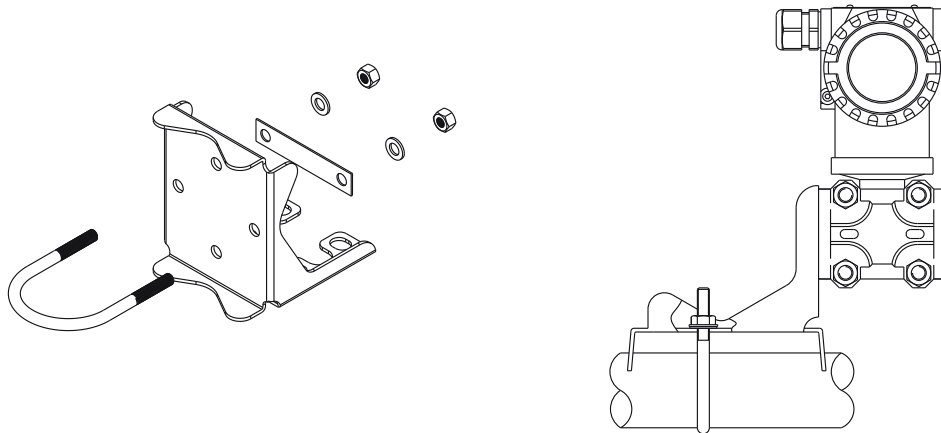
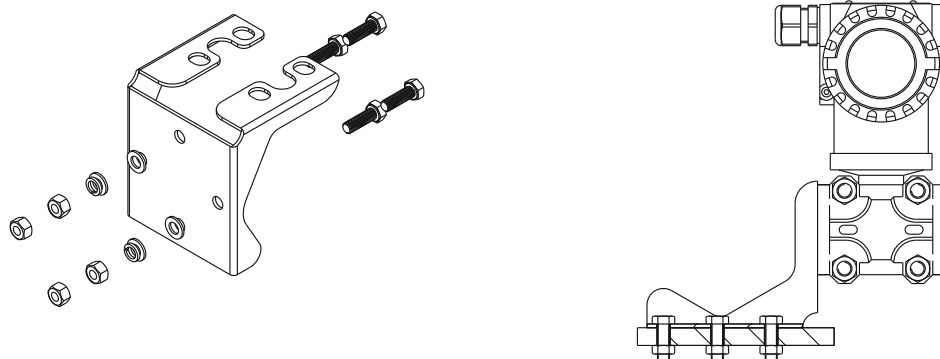


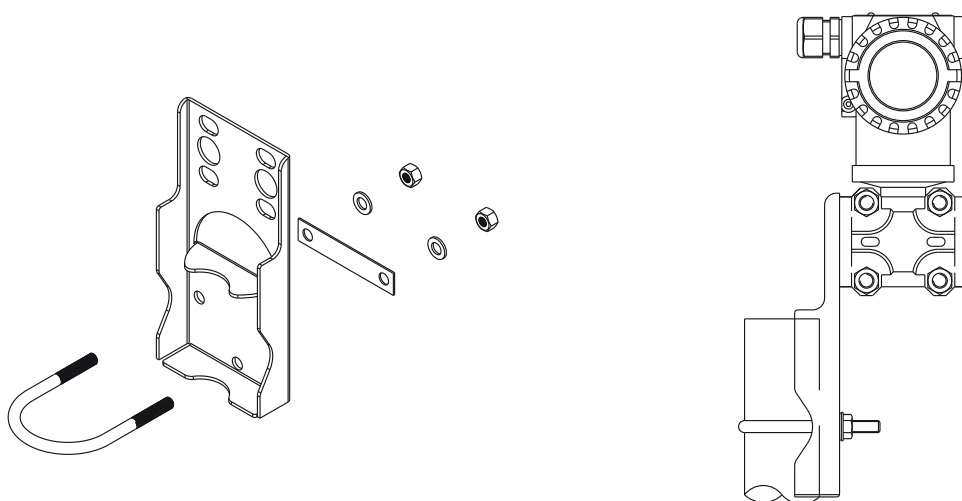
Fig. 3 Parts breakdown drawing of WP361H monocrystalline silicon high static pressure differential pressure transmitter



Pipe installation (Code of this option: B1)

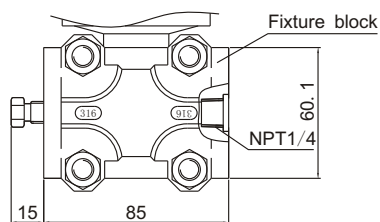


Panel mounting (Code of this option: B2)

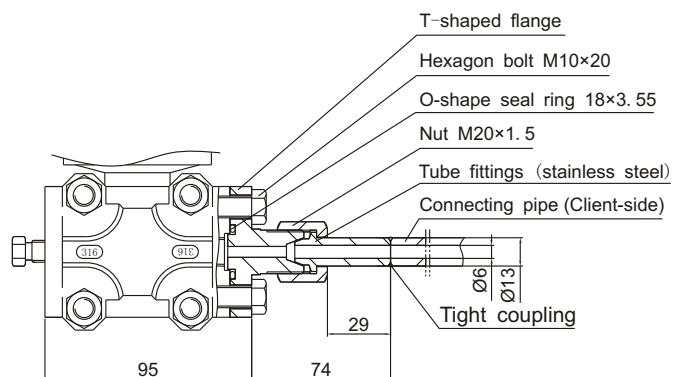


Pipe installation (Code of this option: B3)

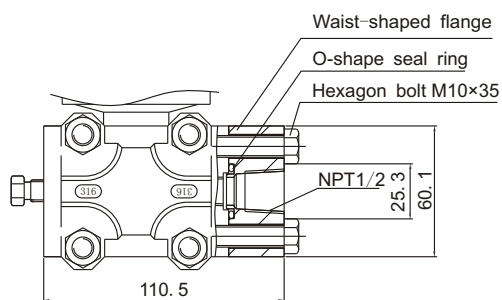
Fig. 4: Installation structure, with optional bracket, applied to 2 inch pipe or panel installation



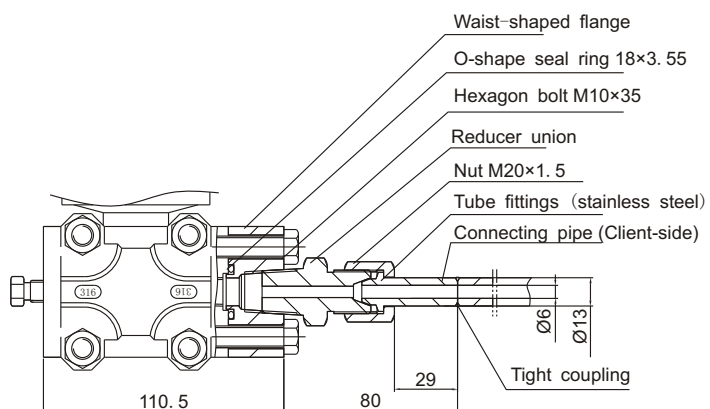
P-No process interface (chamber flange)
NPT1/4 internal thread)



J-with T-shaped interface: M20×1.5 external thread
and back welding connecting pipe (stainless steel)

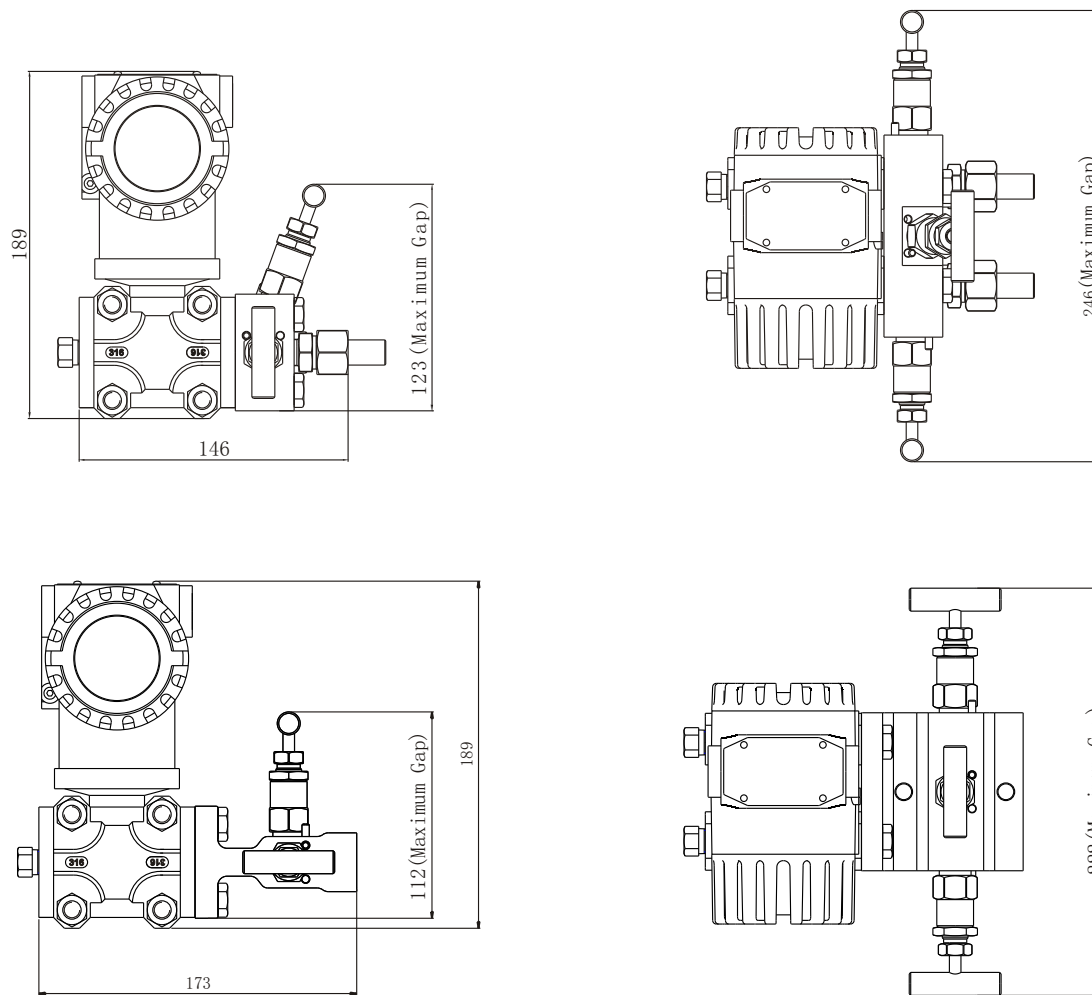


N-with waist-shaped interface: NPT1/2
taper pipe internal thread

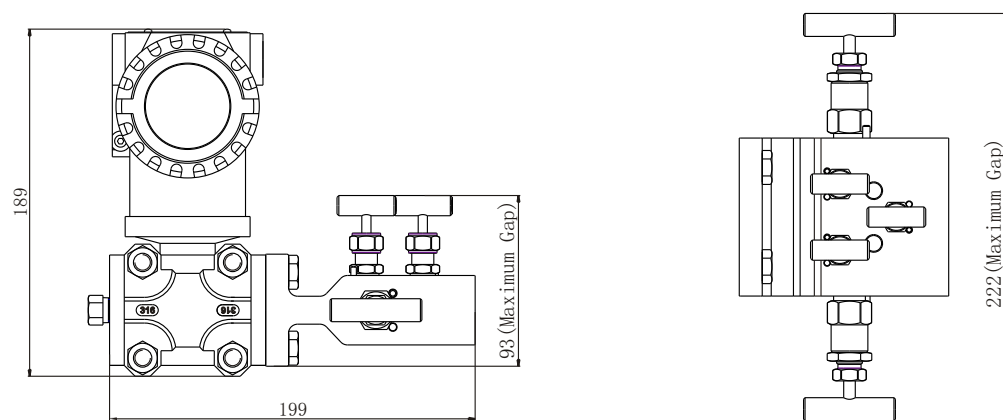


C-with waist-shaped interface: NPT1/2 pressure-leading
transition head and back welding connecting pipe (stainless steel)

Fig. 5: Process connecting type



Component dimension figure of three valve group



Component dimension figure of five valve group

Fig. 6: Component dimension figure of integrated valve group (unit: mm)

Table 3: WP361H Monocrystalline silicon high static pressure differential pressure transmitter

Model	Transmitter type	
WP361H-	Monocrystalline silicon high static pressure differential pressure transmitter	
Code	Measurement range of pressure	Static pressure
M	0-1~40KPa	25MPa
H	0-2.5~250KPa	25MPa
V	0-0.01~1MPa	25MPa
Code	Transmitter output	
S	Standard intelligent (4 ~ 20) mA DC with HART protocol	
J	Standard intelligent (4 ~ 20) mA DC output is HART+v △?	
Code	Static pressure value	
1	25MPa	
2	40MPa	
Code	Filling liquid	Diaphragm material
1	Silicone oil	316L stainless steel
2	Fluorocarbon oil	316L stainless steel
3	Silicone oil	Hastelloy C
4	Fluorocarbon oil	Hastelloy C
5	Silicone oil	Ta diaphragm
6	Fluorocarbon oil	Ta diaphragm
Code	Electrical interface	
A	NPT1/2 internal thread	
M	M20×1.5 internal thread	
Code	Header	
-M	LCD display	
-N	No header	
Code	Options for the hazardous occasion certification	
N	Ordinary type (no anti-explosion)	
D	Flame-proof Exd II CT6	
I	Intrinsic-safety type Exia II CT6	
Code	Mounting bracket	
B3	Pipe-mounted flat bracket (2" pipe)	
B1	Pipe-mounted bent bracket (2" pipe)	
B2	Plate-mounted bent bracket	
B4	Pipe bracket (2" pipe) - pressure taps down special	
Code	Process connection type	
P	No process joint (NPT1/4 internal thread on chamber flange)	
J	With "T" shaped joint: M20×1.5 external thread and rear welded pressure tube	
N	With "Waist" shaped joint: NPT1/2 conical internal thread	
C	With "Waist" shaped joint with NPT1/2 pressure transition head and rear welded pressure tube	
Code	Integrated valve assembly option(optional)	
T3	Three valves manifold	
V3	Three valves manifold	
V5	Five valves manifold	
Code	Other option	
H	The measurement accuracy is 0.075%FS	
S	The liquid material is 316 stainless steel	
D0	The discharge valve is at the rear end face of the clamp block	
D1	Clamp block side drain valve in upper	
D2	Clamp block side drain valve in lower part	
D3	Pressure taps down	
Q4	Verification certificate(Contact Wide Plus)	
C4	High alarm	
CN	Low alarm (The default setting is low alarm)	
Y	Special requirements	
Example	WP361H-MS11A-MDB3ND0	

Note: 1, "Valve group integrated installation option" can be selected or not, the standard is provided for 316 material, if you have other requirements can contact our company
When "Valve Group Integrated Installation Option" is selected, the process connection type can only be P: no process connection
2, The default contact liquid material is 304 stainless steel.

WP361A monocrystalline silicon absolute pressure transmitter

Adopt HART fieldbus technology, which can provide more field information to improve the performance of the factories.

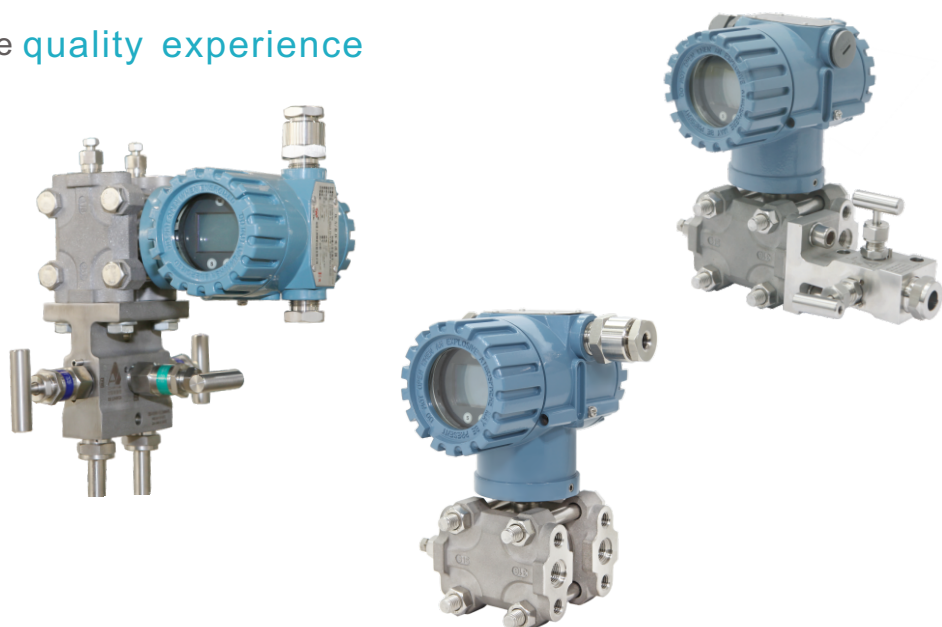
Product instruction

WP361A monocrystalline silicon absolute pressure transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.075%FS
- The max. range ratio can reach to 100:1
- Adopt double overload protection technology
- With strong overload capability, the unidirectional pressure can reach to 20MPa
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable **quality experience**



Product Introduction

Sensor membrane head

While working, the isolation diaphragms on the high/low-pressure sides and the filling liquids will transmit the process pressure to the membrane head of sensor and then converted into the corresponding current, voltage or digital HART® (high-speed addressable remote transmitter data highway) output signal.

WP361 series sensor can conduct temperature measurement to compensate the temperature effects.

In the characterization process of factory, all the sensors have gone through the pressure and temperature cycle test within the whole working range. The correction factors will be generated from these obtained data. Then the coefficients will be stored in the memory of intelligent board so as to ensure that the signal correction can be conducted precisely during the operational process of transmitter.

Electronic circuit board

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

The liquid crystal header can display the pressure value, current value or the percentage of range.

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Digital/analog conversion and signal transmission

The process variable is stored in the form of digital data, which can be corrected accurately and conducted the conversion of engineering units. After correcting the signal, the data will be converted into analog output signal. HART manipulator can directly access to the reading of sensor in the way of data signal so as to get higher accuracy without digital/analog conversion.

Communication format

WP361 series transmitter adopts HART protocol to conduct communication. This protocol adopts industrial standard Bell202 frequency shift keying (FSK) technology. The telecommunication can be conducted by overlaying high-frequency signal on the analog output. By using this technology, the communication and output can be realized simultaneously without influencing the integrity of loop. WP361 series transmitter can communicate with the host machine, which uses HART protocol.

Software function

The users of HART protocol can easily use the functions of WP361 series, such as menu configuration, test and specific settings.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP361 series menu, including:

- Zero and extreme point setting
- Engineering units selection
- Linear
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specific settings

In the initialization phase of transmitter and while maintaining the digital electronic board, specific settings should be conducted. It allows to conduct fine tuning on the sensor and analog output to accord with the pressure standard of the factory.

Options

Liquid crystal header

Digital header, 2-line 5-digit liquid crystal display

- Directly display the digital data, with higher accuracy
- Display the pressure, current or range percentage according to the requirements of users
- Can rotate by 360° , which is easy to install

Transient voltage resistance protection

- Integrative transient voltage resistance protection terminal
- 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

Specification

Performance index

The overall performance is the composition error based on the reference accuracy, ambient temperature effects and range static-pressure effects.

Accuracy index

$\pm 0.075\%$ FS range (conventional)

Stability

$\leq \pm 0.2\%$ FS/5 years

Concrete performance index

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

Accuracy

(The reference accuracy includes hysteresis, linear, setting ability and repeatability, which are based on terminal.)

$\pm 0.075\%$ range

If the range is less than X

$\pm [0.03 + 0.06 \frac{X}{\text{range}}]\%$

X value:

Diaphragm capsule	XKPa
D	20.8
F	1000

Damping time constant

The total damping time constant is equal to the sum of the damping time constants of amplifier unit and diaphragm capsule. The damping time constant of amplifier unit is adjustable within the range of 0~100s.

Diaphragm capsule (silicone oil)

Time constant (s) (The time constant can be set according to the actual situation of field and is recommended 1S)

Influence of installation position

The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm 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 $\pm 0.005\%$ range/v

Functional parameter

The limit value of range and sensor

Table 1: Range of WP361A transmitter and limit value of sensor

Range	Min. range	Limit value of range and sensor
D	2.5KPa	250KPa
J	100KPa	1MPa
F	1MPa	10MPa

Zero point and range adjustment requirements

- The zero point and range can be adjusted arbitrarily within the range limit value indicated in Table 1.
- The range should be larger than or equal to the min. range indicated in Table 1.

Applications

Measurement of liquid, gas and steam

Output

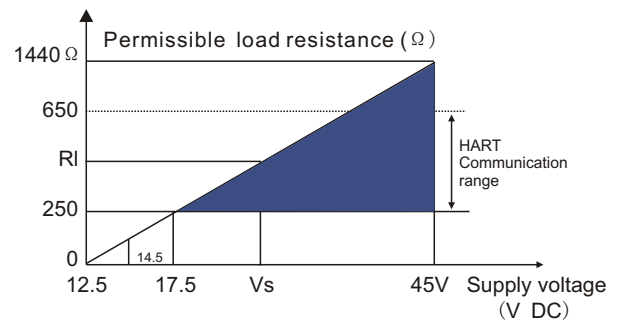
Two-wire 4~20mA, linear output is selectable for users. Digital process variable overlays on the 4~20mA signal, which can be applied to the host machines according with HART protocol.

Power supply

Need external power supply. While standard transmitter (4~20mA) has no load, work at 14.5~45V DC.

Loop load limit

The max. loop resistance is decided by the voltage of external power supply, the relations are as follows:



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while HART communication should be larger than 17.5V.

Max. overpressure

D: 10MPa

F: 20MPa

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 transmitter:

Linear output: $3.8 < I < 20.8$

C4: $I = 20.8\text{mA}$ high fault

CN: $I = 3.8\text{mA}$ low fault

Temperature limit

Environment

$-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$

Storage

$-46^{\circ}\text{C} \sim 110^{\circ}\text{C}$

With header: $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$

Process

Larger than or equal to the atmosphere, please see the following table

Table 2: Process temperature limit of WP361A transmitter

Silicone oil filled sensor	-40 to 121°C
Inertia liquid filled sensor	-30 to 121°C

Temperature drift

$\leq 0.075\% \text{FS} / 10^{\circ}\text{C}$

Humidity limit

0–100% relative humidity

Starting time

Reach to the performance index within 2s after the transmitter is power up.

Mechanical performance index

Electrical interface

ANSI(American-Standard) NPT1/2(F) internal thread

ISO (Chinese standard) M20×1.5 internal thread

Process interface

No process interface (NPT1/4 internal thread on the chamber flange)

With waist-shaped interface: NPT1/2 taper pipe internal thread

With T-shaped interface: M20×1.5 external thread and back welding connecting pipe (stainless steel)

With waist-shaped interface matching used with NPT1/2 pressure-leading transition head and back welding connecting pipe (stainless steel)

Process liquid-contacting piece

Process isolation diaphragm: 316 stainless steel, hastelloy C

Drain/vent valve

316 stainless steel

Process flange and interface

Carbon steel cadmium plate, 316 stainless steel

Non-liquid-contacting piece

Shell

Aluminium die casting IP65

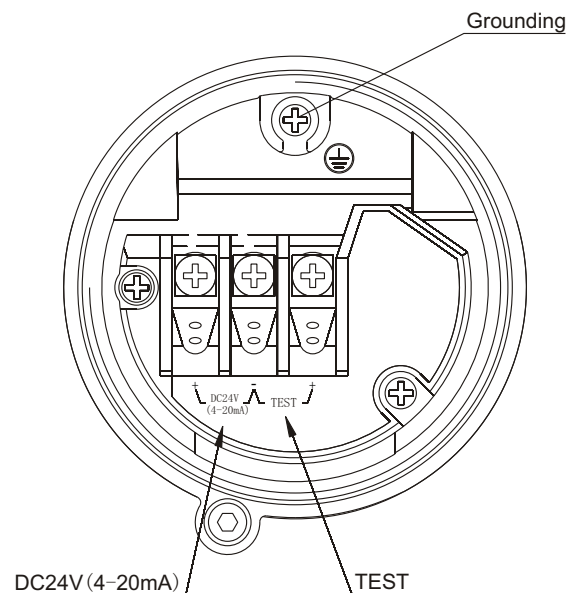
Coating

Spraying plastics

Meter cap O-ring

Nitrile rubber

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 10 Ω)
$\frac{+}{-}$	Ground terminal

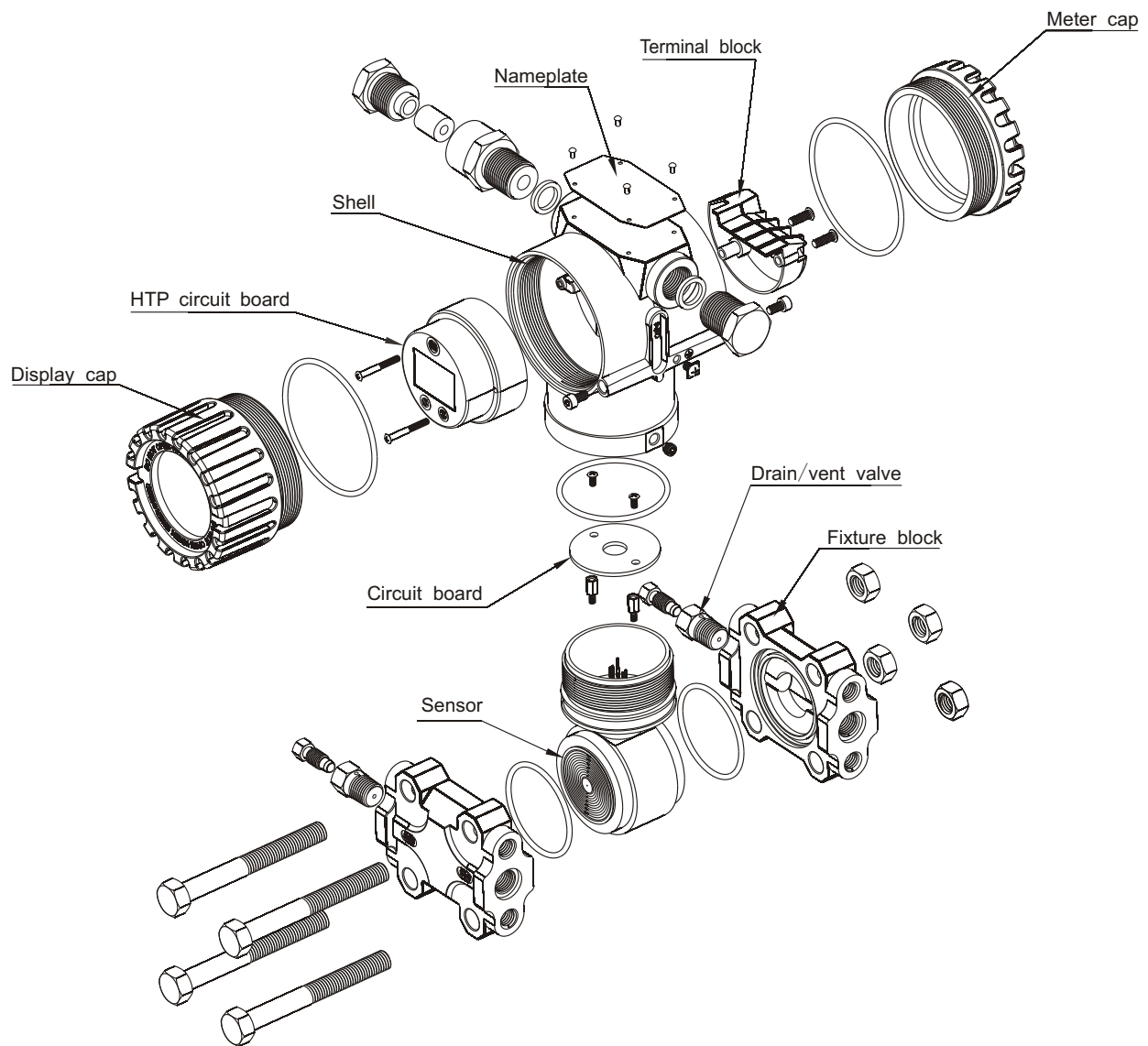
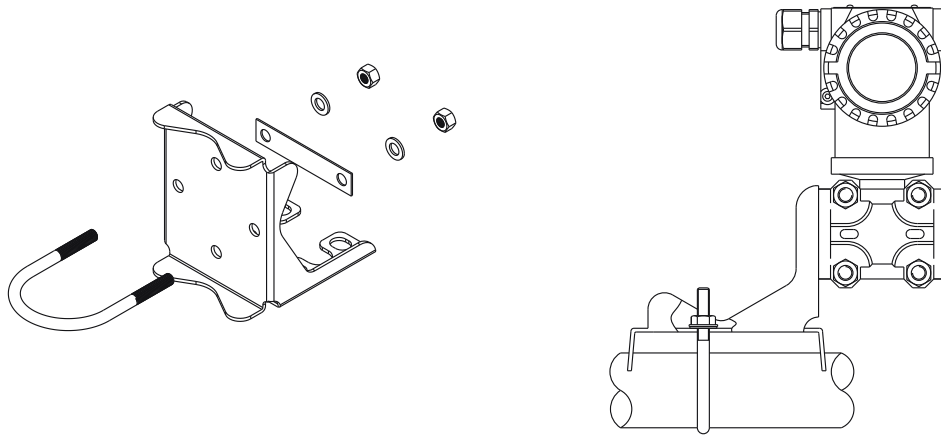
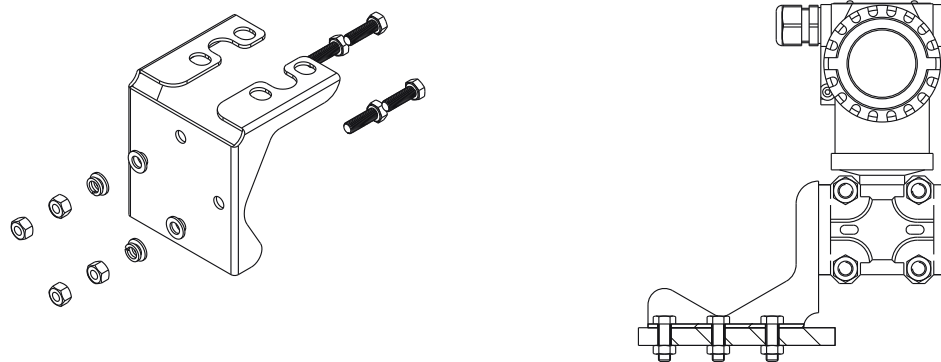


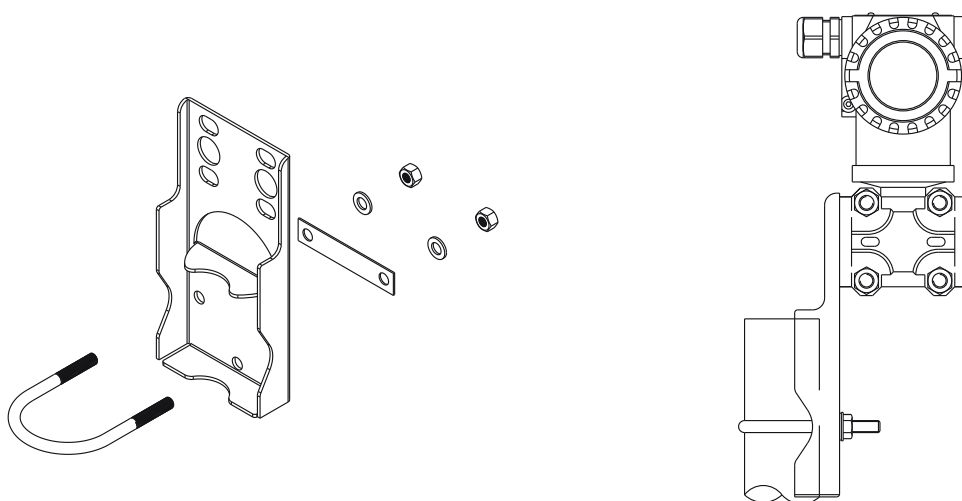
Fig. 3 Parts breakdown drawing of WP361A monocrystalline silicon absolute pressure transmitter



Pipe installation (Code of this option: B1)

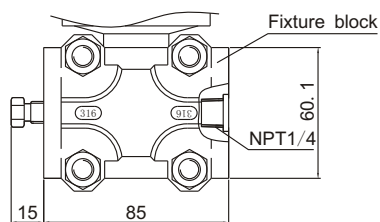


Panel mounting (Code of this option: B2)

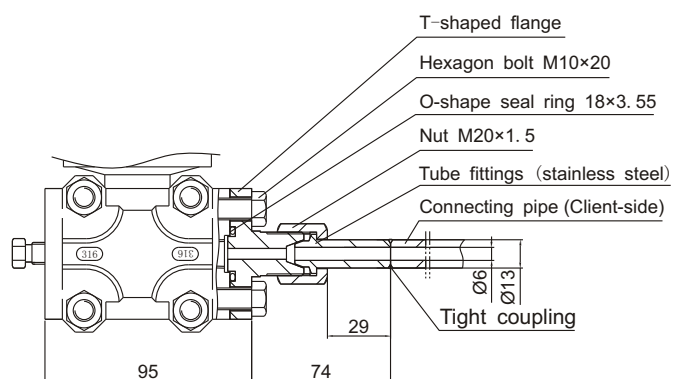


Pipe installation (Code of this option: B3)

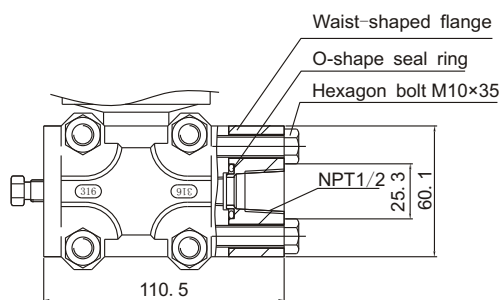
Fig. 4: Installation structure, with optional bracket, applied to 2 inch pipe or panel installation



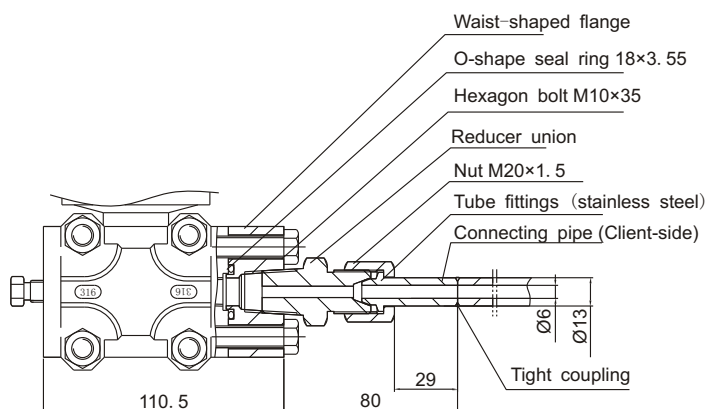
P-No process interface (chamber flange)
NPT1/4 internal thread)



J-with T-shaped interface: M20×1.5 external thread
and back welding connecting pipe (stainless steel)

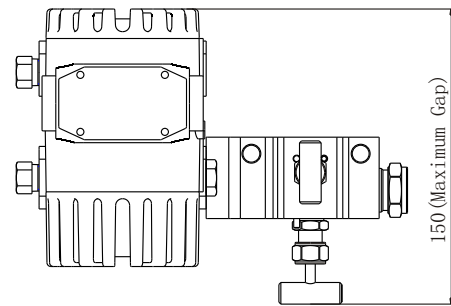
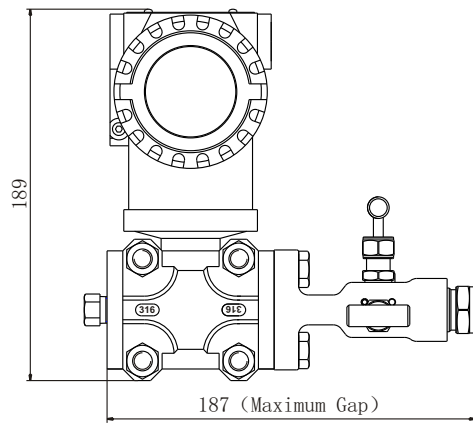


N-with waist-shaped interface: NPT1/2
taper pipe internal thread

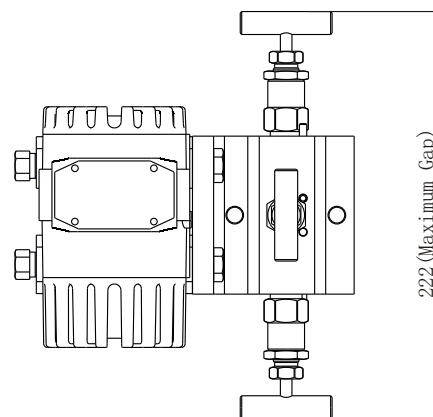
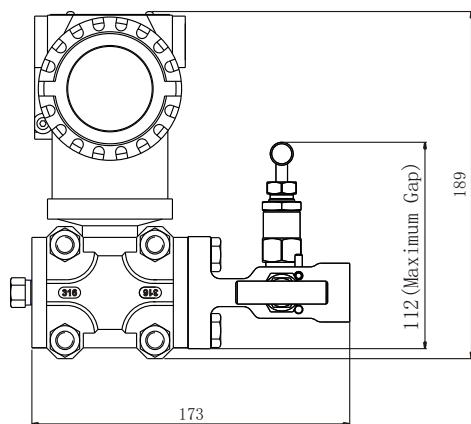
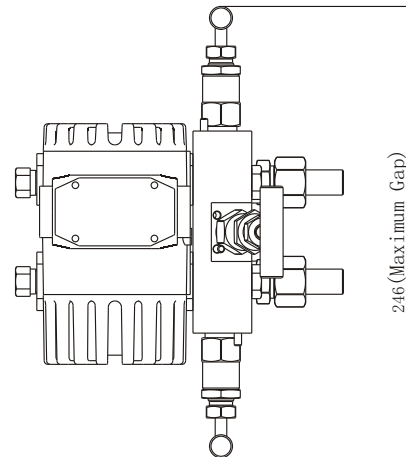
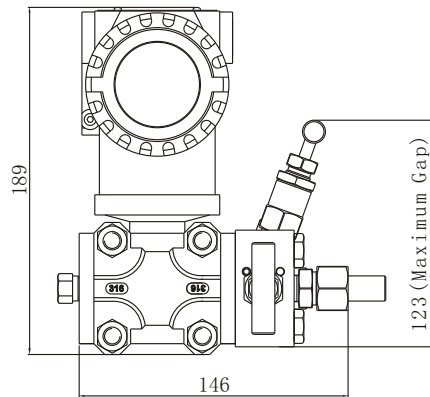


C-with waist-shaped interface: NPT1/2 pressure-leading
transition head and back welding connecting pipe (stainless steel)

Fig. 5: Process connecting type



Component dimension figure of two valve group



Component dimension figure of three valve group

Fig. 6: Component dimension figure of integrated valve group (unit: mm)

Table 3: WP361A monocrystalline silicon absolute pressure transmitter

Model	Transmitter type	
WP361A-	Monocrystalline silicon absolute pressure transmitter	
Code	Measurement range of pressure	Overload
D	0-12.5~250KPa	4MPa
J	0-0.1~1MPa	6MPa
F	0-1~10MPa	20MPa
Code	Filling liquid	Diaphragm material
1	Silicone oil	316L stainless steel
2	Fluorocarbon oil	316L stainless steel
3	Silicone oil	Hastelloy C
4	Fluorocarbon oil	Hastelloy C
5	Silicone oil	Ta diaphragm
6	Fluorocarbon oil	Ta diaphragm
Code	Electrical interface	
A	NPT1/2 internal thread	
M	M20×1.5 internal thread	
Code	Header	
-M	LCD display	
-N	No header	
Code	Options for the hazardous occasion certification	
N	Ordinary type (no anti-explosion)	
D	Flame-proof Exd II CT6	
I	Intrinsic-safety type Exia II CT6	
Code	Mounting bracket	
B3	Pipe-mounted flat bracket (2" pipe)	
B1	Pipe-mounted bent bracket (2" pipe)	
B2	Plate-mounted bent bracket	
Code	Process connection type	
P	No process joint (NPT1/4 internal thread on chamber flange)	
J	With "T" shaped joint: M20×1.5 external thread and rear welded pressure tube	
N	With "Waist" shaped joint: NPT1/2 conical internal thread	
C	With "Waist" shaped joint with NPT1/2 pressure transition head and rear welded pressure tube	
Code	Integrated valve assembly option(optional)	
V2	Two valves manifold	
Code	Other option	
H	The measurement accuracy is 0.075%FS	
S	The liquid material is 316 stainless steel	
D0	The discharge valve is at the rear end face of the clamp block	
D1	Clamp block side drain valve in upper	
D2	Clamp block side drain valve in lower part	
Q4	Verification certificate(Contact Wide Plus)	
C4	High alarm	
CN	Low alarm (The default setting is low alarm)	
Y	Special requirements	
Example	WP361A-D1A-MDB3ND0	

Note: 1, "Valve group integrated installation option" can be selected or not, the standard is provided for 316 material, if you have other requirements can contact our company
When "Valve Group Integrated Installation Option" is selected, the process connection type can only be P: no process connection
2, The default contact liquid material is 304 stainless steel.

WP361G monocrystalline silicon pressure transmitter

Apply to the measurement of flow, liquid level and pressure

Adopt HART fieldbus technology, which can provide more field information to improve the performance of the factories.

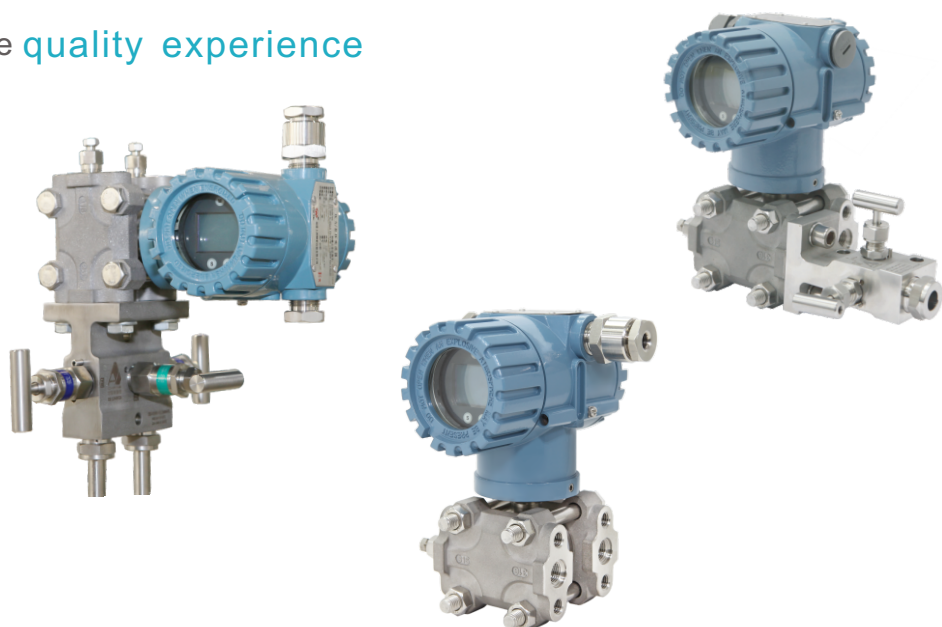
Product instruction

WP361G series monocrystal silicon gauge pressure transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.075%FS
- The max. range ratio can reach to 100:1
- Adopt double overload protection technology
- With strong overload capability, the unidirectional pressure can reach to 20MPa
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable **quality experience**



Product Introduction

Sensor membrane head

While working, the isolation diaphragms on the high/low-pressure sides and the filling liquids will transmit the process pressure to the membrane head of sensor and then converted into the corresponding current, voltage or digital HART® (high-speed addressable remote transmitter data highway) output signal.

WP361 series sensor can conduct temperature measurement to compensate the temperature effects.

In the characterization process of factory, all the sensors have gone through the pressure and temperature cycle test within the whole working range. The correction factors will be generated from these obtained data. Then the coefficients will be stored in the memory of intelligent board so as to ensure that the signal correction can be conducted precisely during the operational process of transmitter.

Electronic circuit board

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

The liquid crystal header can display the pressure value, current value or the percentage of range.

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Digital/analog conversion and signal transmission

The process variable is stored in the form of digital data, which can be corrected accurately and conducted the conversion of engineering units. After correcting the signal, the data will be converted into analog output signal. HART manipulator can directly access to the reading of sensor in the way of data signal so as to get higher accuracy without digital/analog conversion.

Communication format

WP361 series transmitter adopts HART protocol to conduct communication. This protocol adopts industrial standard Bell202 frequency shift keying (FSK) technology. The telecommunication can be conducted by overlaying high-frequency signal on the analog output. By using this technology, the communication and output can be realized simultaneously without influencing the integrity of loop. WP361 series transmitter can communicate with the host machine, which uses HART protocol.

Software function

The users of HART protocol can easily use the functions of WP361 series, such as menu configuration, test and specific settings.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP361 series menu, including:

- Zero and extreme point setting
- Engineering units selection
- Linear
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specific settings

In the initialization phase of transmitter and while maintaining the digital electronic board, specific settings should be conducted. It allows to conduct fine tuning on the sensor and analog output to accord with the pressure standard of the factory.

Options

Liquid crystal header

Digital header, 2-line 5-digit liquid crystal display

- Directly display the digital data, with higher accuracy
- Display the pressure, current or range percentage according to the requirements of users
- Can rotate by 360° , which is easy to install

Transient voltage resistance protection

- Integrative transient voltage resistance protection terminal
- 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

Specification

Performance index

The overall performance is the composition error based on the reference accuracy, ambient temperature effects and range static-pressure effects.

Accuracy index

$\pm 0.075\%$ FS range

Stability

$\leq \pm 0.15\%$ FS/5 years

Concrete performance index

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

Accuracy

(The reference accuracy includes hysteresis, linear, setting ability and repeatability, which are based on terminal.)

$\pm 0.075\%$ range

If the range is less than X

$\pm [0.02 + 0.06 \frac{X}{\text{range}}]\%$

X value:

Diaphragm capsule	XKPa
H	50
A	300
G	1000

Damping time constant

The total damping time constant is equal to the sum of the damping time constants of amplifier unit and diaphragm capsule. The damping time constant of amplifier unit is adjustable within the range of 0~100s.

Diaphragm capsule (silicone oil)

Time constant (s) (The time constant can be set according to the actual situation of field and is recommended 1S)

Influence of installation position

The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm 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 $\pm 0.005\%$ range/v

Functional parameter

The limit value of range and sensor

Table 1: Range of WP361G transmitter and limit value of sensor

Range	Min. range	Upper limit of range (URL)
M	6KPa	40KPa
H	2.5KPa	250KPa
V	10KPa	1MPa
A	0.03MPa	3MPa
G	0.1MPa	10MPa

Zero point and range adjustment requirements

- The zero point and range can be adjusted arbitrarily within the range limit value indicated in Table 1.
- The range should be larger than or equal to the min. range indicated in Table 1.

Applications

Measurement of liquid, gas and steam

Output

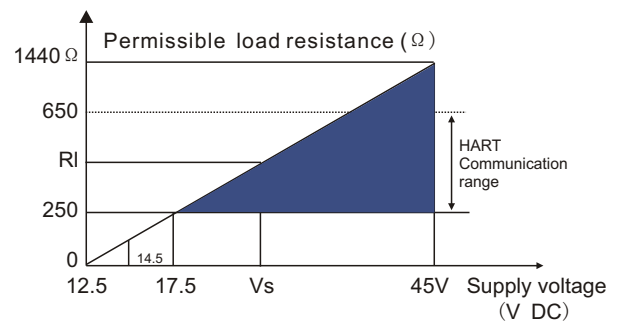
Two-wire 4~20mA, linear output is selectable for users. Digital process variable overlays on the 4~20mA signal, which can be applied to the host machines according with HART protocol.

Power supply

Need external power supply. While standard transmitter (4~20mA) has no load, work at 14.5~45V DC.

Loop load limit

The max. loop resistance is decided by the voltage of external power supply, the relations are as follows:



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while HART communication should be larger than 17.5V.

Max. overpressure

H: 10MPa
A:10MPa
G:20MPa

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 transmitter:

Linear output: $3.8 < I < 20.8$
C4: I=20.8mA high fault
CN: I=3.8mA low fault

Temperature limit

Environment

-20℃~+70℃

Storage

-46℃~110℃

With header: -40℃~85℃

Process

Larger than or equal to the atmosphere, please see the following table

Table 2: Process temperature limit of WP361G transmitter

Silicone oil filled sensor	-40 to 121℃
Inertia liquid filled sensor	-30 to 121℃

Temperature drift

≤0.075%FS/10℃

Humidity limit

0~100% relative humidity

Starting time

Reach to the performance index within 2s after the transmitter is power up.

Mechanical performance index

Electrical interface

ANSI(American-Standard) NPT1/2(F) internal thread
ISO (Chinese standard) M20×1.5 internal thread

Process interface

No process interface (NPT1/4 internal thread on the chamber flange)

With waist-shaped interface: NPT1/2 taper pipe internal thread

With T-shaped interface: M20×1.5 external thread and back welding connecting pipe (stainless steel)

With waist-shaped interface matching used with NPT1/2

pressure-leading transition head and back welding connecting pipe (stainless steel)

Process liquid-contacting piece

Process isolation diaphragm: 316 stainless steel, hastelloy C

Drain/vent valve

316 stainless steel

Process flange and interface

Carbon steel cadmium plate, 316 stainless steel

Non-liquid-contacting piece

Shell

Aluminium die casting IP65

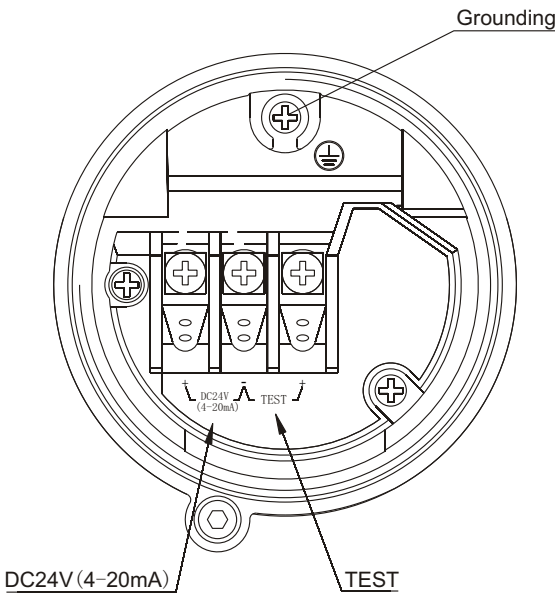
Coating

Spraying plastics

Meter cap O-ring

Nitrile rubber

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 10 Ω)
	Ground terminal

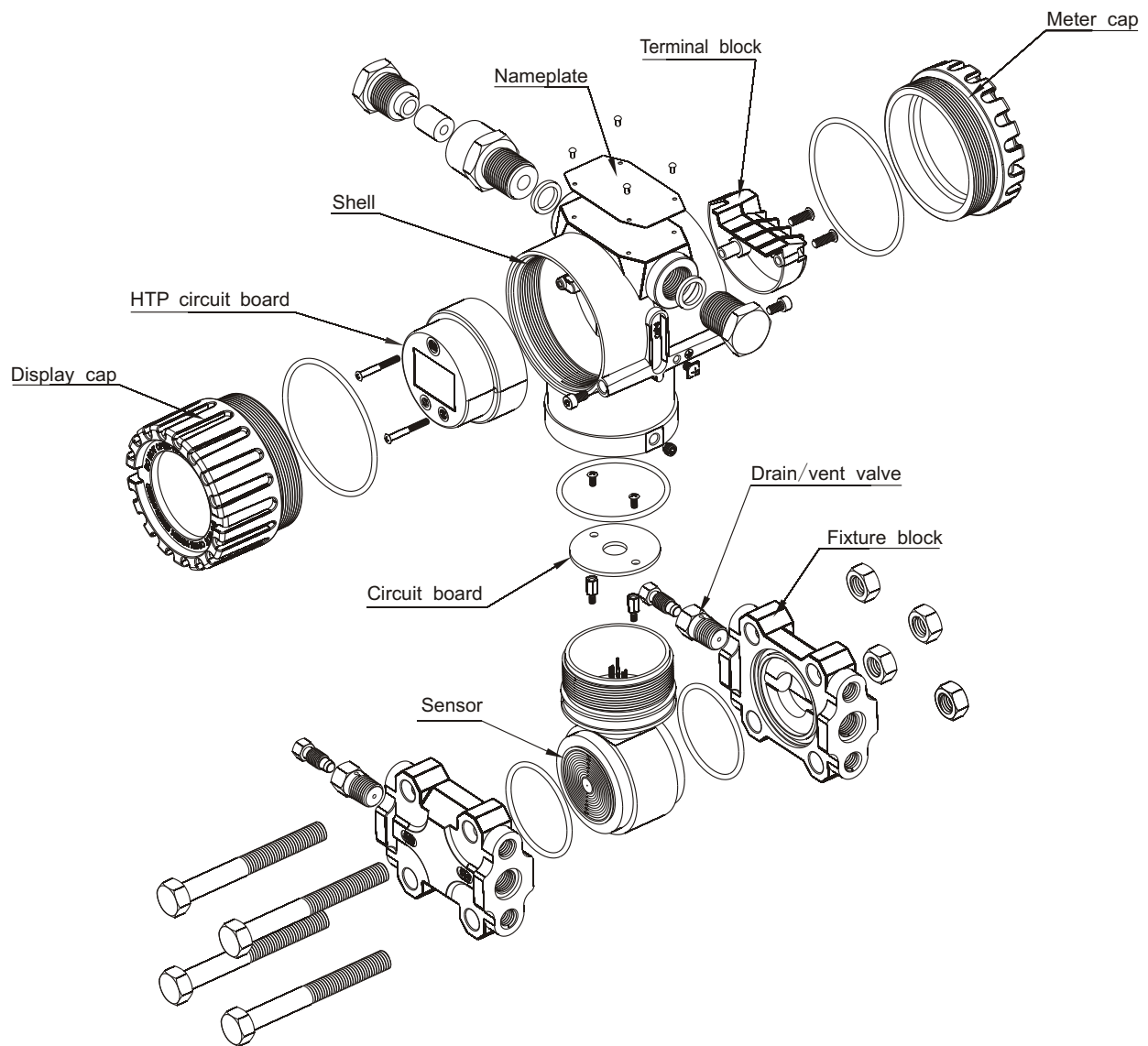
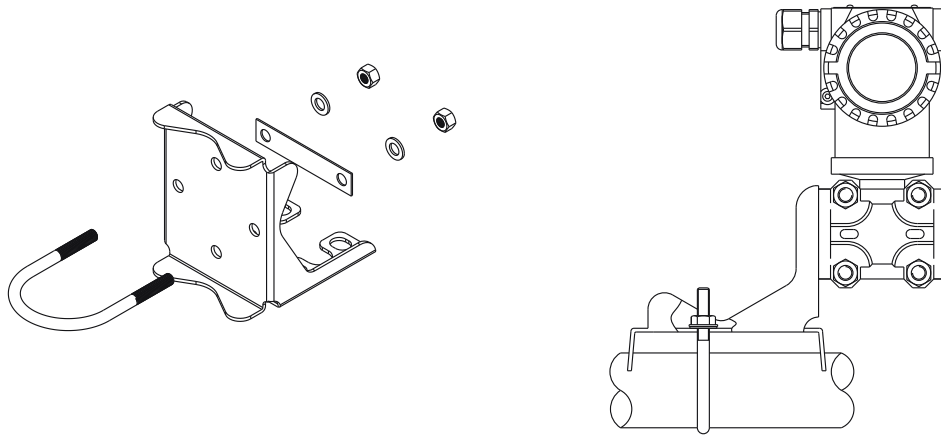
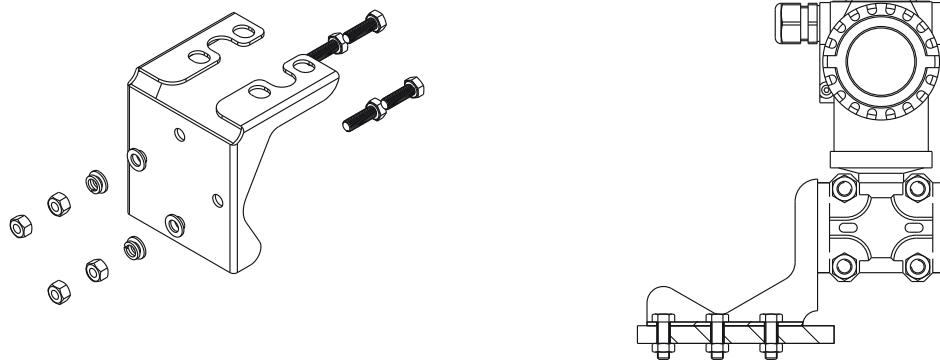


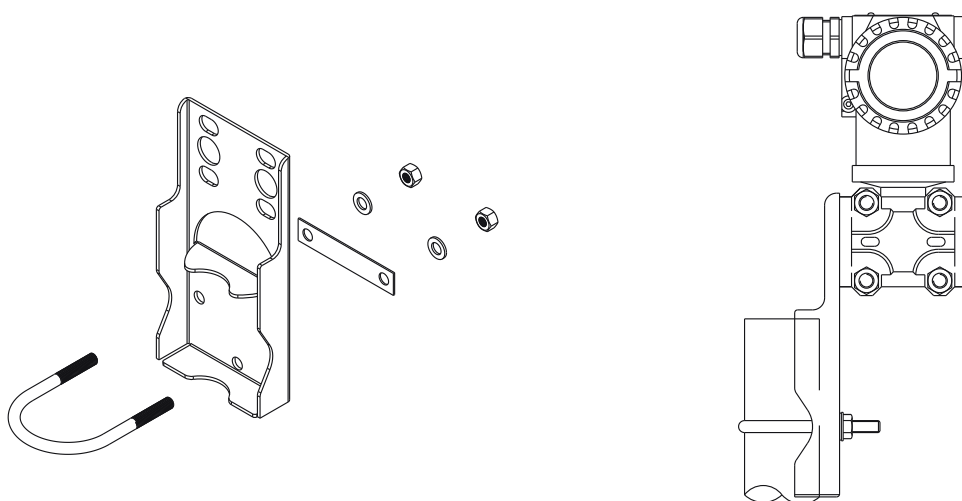
Fig. 3 Parts breakdown drawing of WP361G monocrystalline silicon pressure transmitter



Pipe installation (Code of this option: B1)

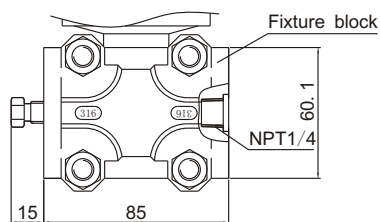


Panel mounting (Code of this option: B2)

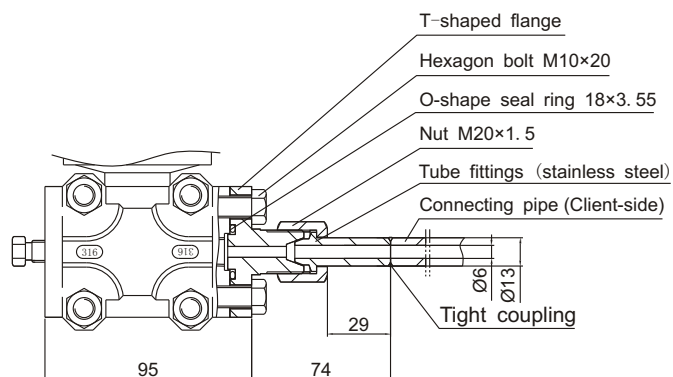


Pipe installation (Code of this option: B3)

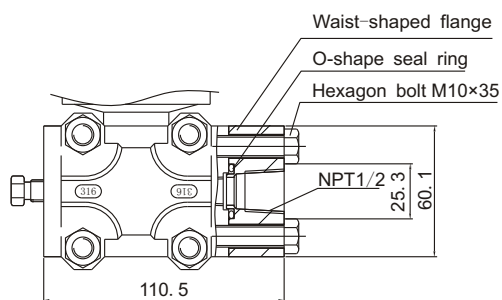
Fig. 4: Installation structure, with optional bracket, applied to 2 inch pipe or panel installation



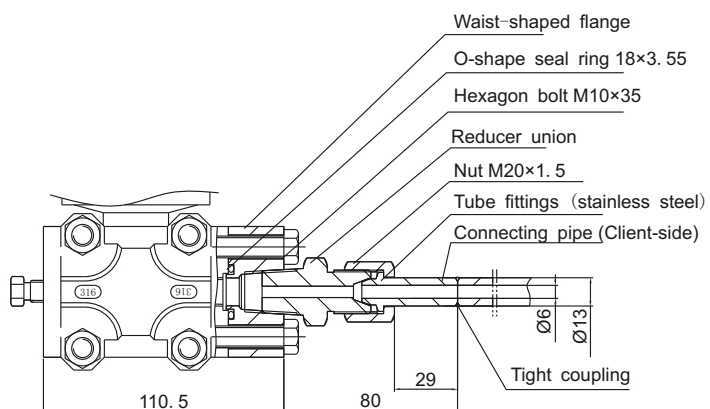
P-No process interface (chamber flange)
NPT1/4 internal thread)



J-with T-shaped interface: M20×1.5 external thread
and back welding connecting pipe (stainless steel)

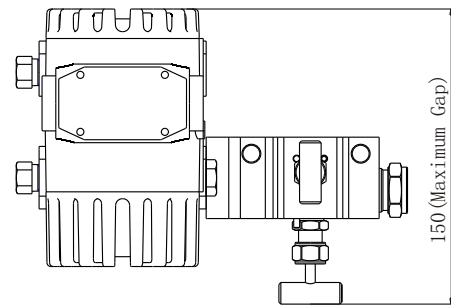
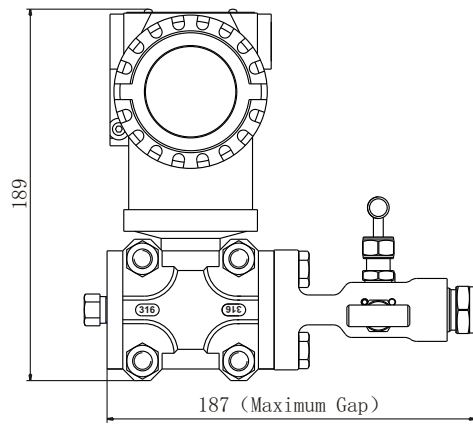


N-with waist-shaped interface: NPT1/2
taper pipe internal thread

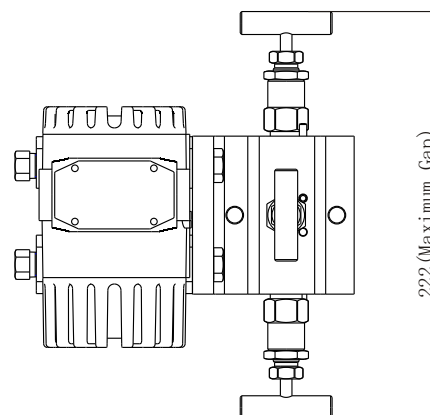
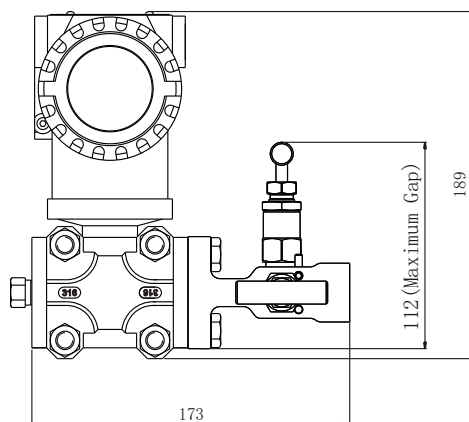
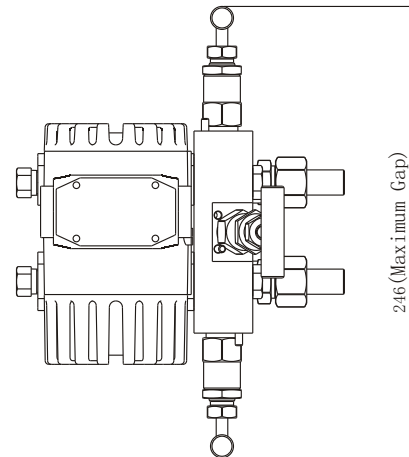
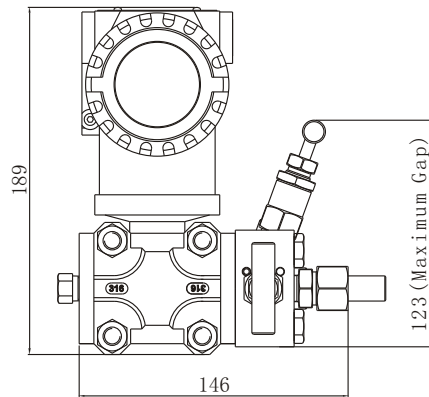


C-with waist-shaped interface: NPT1/2 pressure-leading
transition head and back welding connecting pipe (stainless steel)

Fig. 5: Process connecting type



Component dimension figure of two valve group



Component dimension figure of three valve group

Fig. 6: Component dimension figure of integrated valve group (unit: mm)

Table 3: WP361G monocrystalline silicon pressure transmitter

Model	Transmitter type	
WP361G-	Monocrystalline silicon pressure transmitter	
Code	Measurement range of pressure	Overload
M	0-6~40Kpa	10MPa
H	0-2.5~250KPa	10MPa
V	0-0-10~1000KPa	10MPa
A	0-0.03~3MPa	15MPa
G	0-0.1~10MPa	20MPa
Code	Filling liquid	Diaphragm material
1	Silicone oil	316L stainless steel
2	Fluorocarbon oil	316L stainless steel
3	Silicone oil	Hastelloy C
4	Fluorocarbon oil	Hastelloy C
5	Silicone oil	Ta diaphragm
6	Fluorocarbon oil	Ta diaphragm
Code	Electrical interface	
A	NPT1/2 internal thread	
M	M20×1.5 internal thread	
Code	Header	
-M	LCD display	
-N	No header	
Code	Options for the hazardous occasion certification	
N	Ordinary type (no anti-explosion)	
D	Flame-proof Exd II CT6	
I	Intrinsic-safety type Exia II CT6	
Code	Mounting bracket	
B3	Pipe-mounted flat bracket (2" pipe)	
B1	Pipe-mounted bent bracket (2" pipe)	
B2	Plate-mounted bent bracket	
Code	Process connection type	
P	No process joint (NPT1/4 internal thread on chamber flange)	
J	With "T" shaped joint: M20×1.5 external thread and rear welded pressure tube	
N	With "Waist" shaped joint: NPT1/2 conical internal thread	
C	With "Waist" shaped joint with NPT1/2 pressure transition head and rear welded pressure tube	
Code	Integrated valve assembly option(optional)	
V2	Two valves manifold	
Code	Other option	
H	The measurement accuracy is 0.075%FS	
S	The liquid material is 316 stainless steel	
D0	The discharge valve is at the rear end face of the clamp block	
D1	Clamp block side drain valve in upper	
D2	Clamp block side drain valve in lower part	
Q4	Verification certificate(Contact Wide Plus)	
C4	High alarm	
CN	Low alarm (The default setting is low alarm)	
Y	Special requirements	
Example	WP361G-H1A-MDB3ND0	

Note: 1,"Valve group integrated installation option" can be selected or not, the standard is provided for 316 material, if you have other requirements can contact our company

When "Valve Group Integrated Installation Option" is selected, the process connection type can only be P: no process connection
2,The default contact liquid material is 304 stainless steel.

WP361P monocrystalline silicon high pressure transmitter

Apply to the measurement of flow, liquid level and pressure
Adopt HART fieldbus technology, which can provide more field information
to improve the performance of the factories.

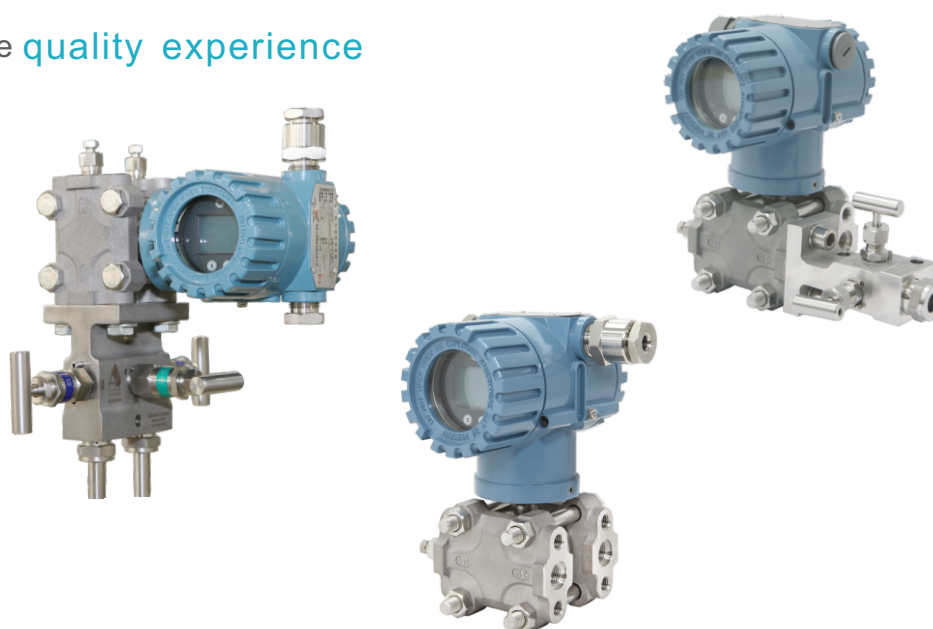
Product instruction

WP361P monocrystalline silicon high pressure transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.075%FS
- The max. range ratio can reach to 10:1
- Adopt double overload protection technology
- With strong overload capability, the unidirectional pressure can reach to 80MPa
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable **quality experience**



Product Introduction

Sensor membrane head

While working, the isolation diaphragms on the high/low-pressure sides and the filling liquids will transmit the process pressure to the membrane head of sensor and then converted into the corresponding current, voltage or digital HART® (high-speed addressable remote transmitter data highway) output signal.

WP361 series sensor can conduct temperature measurement to compensate the temperature effects.

In the characterization process of factory, all the sensors have gone through the pressure and temperature cycle test within the whole working range. The correction factors will be generated from these obtained data. Then the coefficients will be stored in the memory of intelligent board so as to ensure that the signal correction can be conducted precisely during the operational process of transmitter.

Electronic circuit board

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

The liquid crystal header can display the pressure value, current value or the percentage of range.

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Digital/analog conversion and signal transmission

The process variable is stored in the form of digital data, which can be corrected accurately and conducted the conversion of engineering units. After correcting the signal, the data will be converted into analog output signal. HART manipulator can directly access to the reading of sensor in the way of data signal so as to get higher accuracy without digital/analog conversion.

Communication format

WP361 series transmitter adopts HART protocol to conduct communication. This protocol adopts industrial standard Bell202 frequency shift keying (FSK) technology. The telecommunication can be conducted by overlaying high-frequency signal on the analog output. By using this technology, the communication and output can be realized simultaneously without influencing the integrity of loop. WP361 series transmitter can communicate with the host machine, which uses HART protocol.

Software function

The users of HART protocol can easily use the functions of WP361 series, such as menu configuration, test and specific settings.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP361 series menu, including:

- Zero and extreme point setting
- Engineering units selection
- Linear
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specific settings

In the initialization phase of transmitter and while maintaining the digital electronic board, specific settings should be conducted. It allows to conduct fine tuning on the sensor and analog output to accord with the pressure standard of the factory.

Options

Liquid crystal header

Digital header, 2-line 5-digit liquid crystal display

- Directly display the digital data, with higher accuracy
- Display the pressure, current or range percentage according to the requirements of users
- Can rotate by 360° , which is easy to install

Transient voltage resistance protection

- Integrative transient voltage resistance protection terminal
- 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

Specification

Performance index

The overall performance is the composition error based on the reference accuracy, ambient temperature effects and range static-pressure effects.

Accuracy index

$\pm 0.075\%$ FS range (conventional)

Stability

$\leq \pm 0.2\%$ FS/5 years

Concrete performance index

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

Accuracy

(The reference accuracy includes hysteresis, linear, setting ability and repeatability, which are based on terminal.)

$\pm 0.075\%$ range

If the range is less than 8MPa

$\pm [0.03 + 0.09 \frac{8\text{MPa}}{\text{range}}]\%$

Damping time constant

The total damping time constant is equal to the sum of the damping time constants of amplifier unit and diaphragm capsule. The damping time constant of amplifier unit is adjustable within the range of 0~100s.

Diaphragm capsule (silicone oil)

Time constant (s) (The time constant can be set according to the actual situation of field and is recommended 1S)

Influence of installation position

The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm 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 $\pm 0.005\%$ range/v

Functional parameter

The limit value of range and sensor

Table 1: Range of WP361P transmitter and limit value of sensor

Range	Min. range	Upper limit of range (URL)
B	2MPa	20MPa
C	5MPa	40MPa

Zero point and range adjustment requirements

- The zero point and range can be adjusted arbitrarily within the range limit value indicated in Table 1.
- The range should be larger than or equal to the min. range indicated in Table 1.

Applications

Measurement of liquid, gas and steam

Output

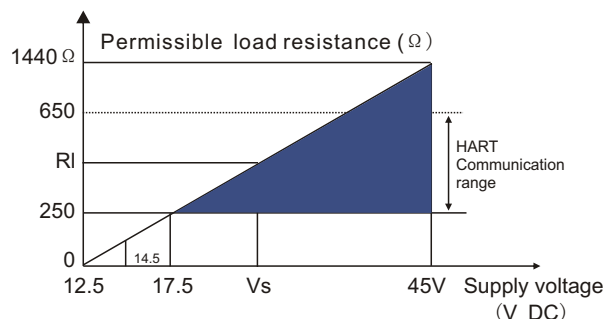
Two-wire 4~20mA, linear output is selectable for users. Digital process variable overlays on the 4~20mA signal, which can be applied to the host machines according with HART protocol.

Power supply

Need external power supply. While standard transmitter (4~20mA) has no load, work at 14.5~45V DC.

Loop load limit

The max. loop resistance is decided by the voltage of external power supply, the relations are as follows:



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while 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 transmitter:

Linear output: $3.8 < I < 20.8$

C4: $I = 20.8\text{mA}$ high fault

CN: $I = 3.8\text{mA}$ low fault

Temperature limit

Environment

$-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$

Storage

$-46^{\circ}\text{C} \sim 110^{\circ}\text{C}$

With header: $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$

Process

Larger than or equal to the atmosphere, please see the following table

Table 2: Process temperature limit of WP361P transmitter

Silicone oil filled sensor	-40 to 121°C
Inertia liquid filled sensor	-30 to 121°C

Temperature drift

$\leq 0.075\% \text{FS} / 10^{\circ}\text{C}$

Humidity limit

0–100% relative humidity

Starting time

Reach to the performance index within 2s after the transmitter is power up.

Mechanical performance index

Electrical interface

ANSI(American-Standard) NPT1/2(F) internal thread

ISO (Chinese standard) M20×1.5 internal thread

Process interface

No process interface (NPT1/4 internal thread on the chamber flange)

With waist-shaped interface: NPT1/2 taper pipe internal thread

With T-shaped interface: M20×1.5 external thread and back welding connecting pipe (stainless steel)

With waist-shaped interface matching used with NPT1/2 pressure-leading transition head and back welding connecting pipe (stainless steel)

Process liquid-contacting piece

Process isolation diaphragm: 316 stainless steel, hastelloy C

Drain/vent valve

316 stainless steel

Process flange and interface

Carbon steel cadmium plate, 316 stainless steel

Non-liquid-contacting piece

Shell

Aluminium die casting IP65

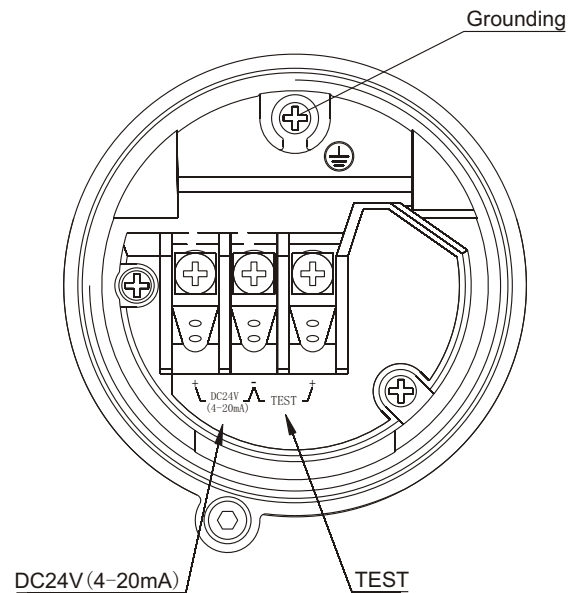
Coating

Spraying plastics

Meter cap O-ring

Nitrile rubber

Wiring diagram of terminal side



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

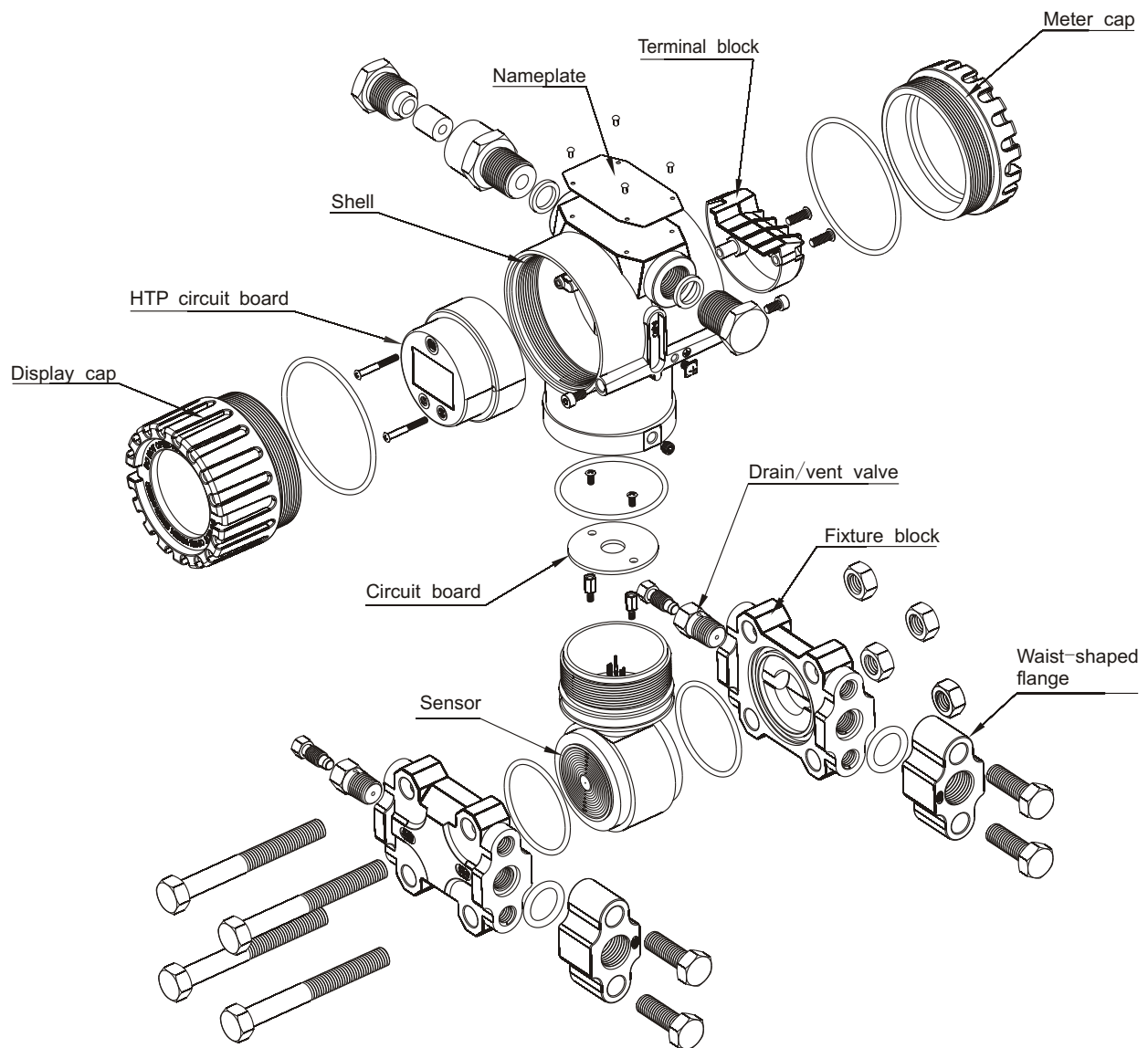
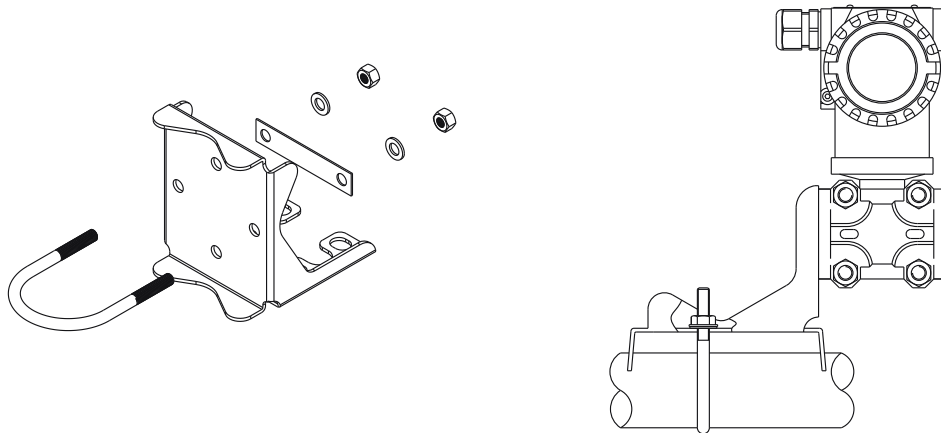
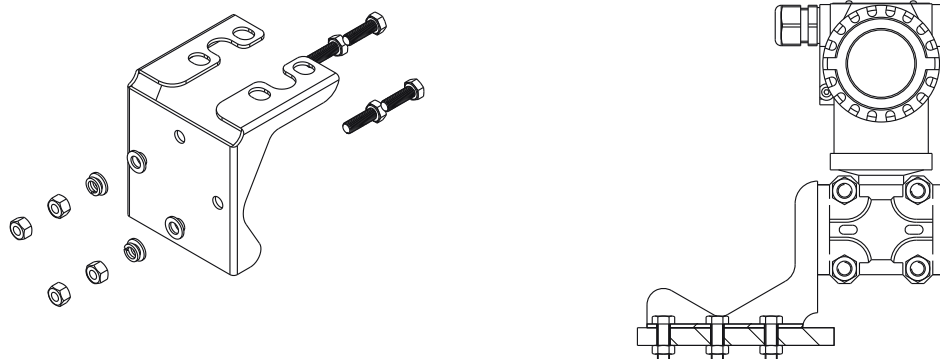


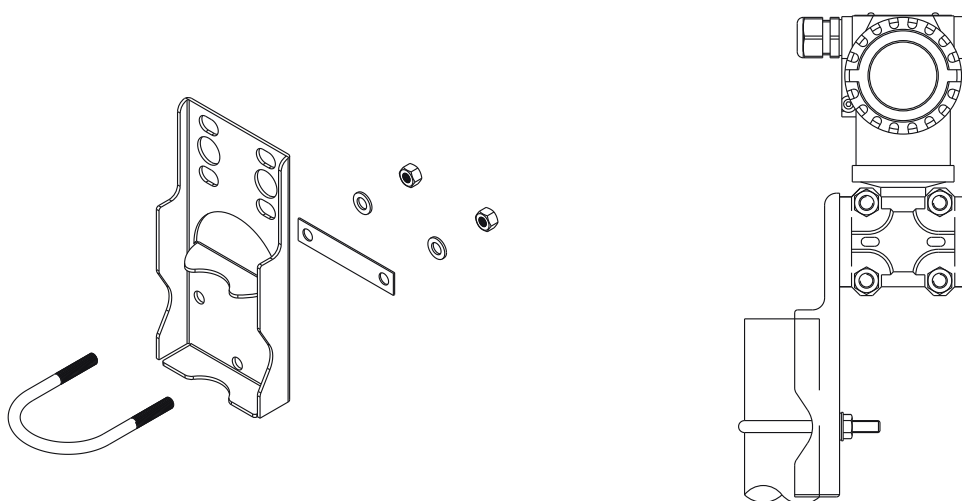
Fig. 3 Parts breakdown drawing of WP361P monocrystalline silicon high pressure transmitter



Pipe installation (Code of this option: B1)

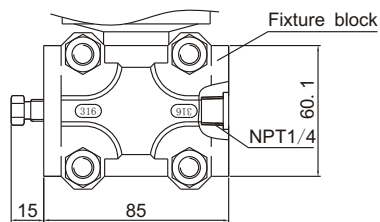


Panel mounting (Code of this option: B2)

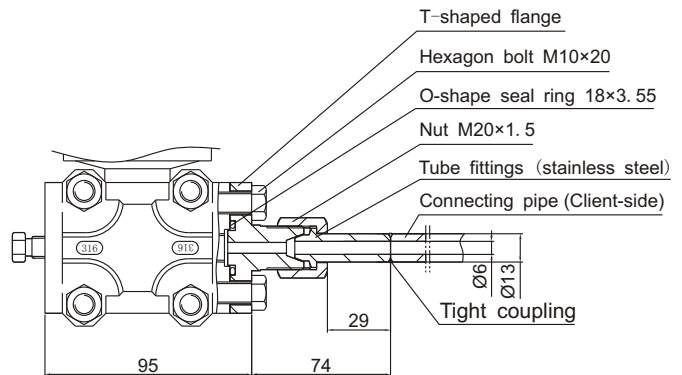


Pipe installation (Code of this option: B3)

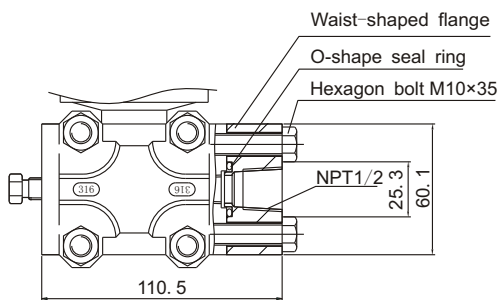
Fig. 4: Installation structure, with optional bracket, applied to 2 inch pipe or panel installation



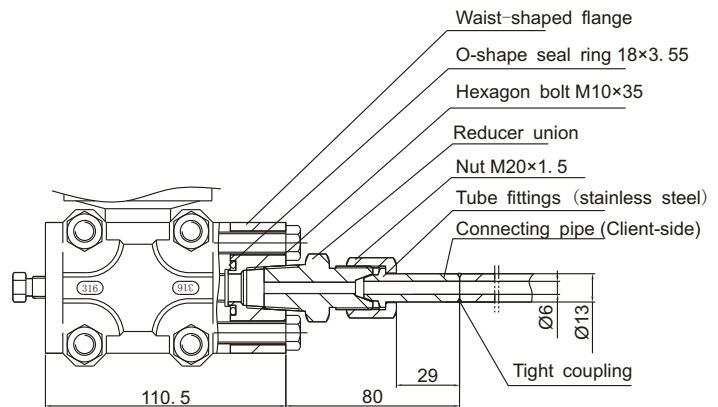
P-No process interface (chamber flange)
NPT1/4 internal thread)



J-with T-shaped interface: M20×1.5 external thread
and back welding connecting pipe (stainless steel)

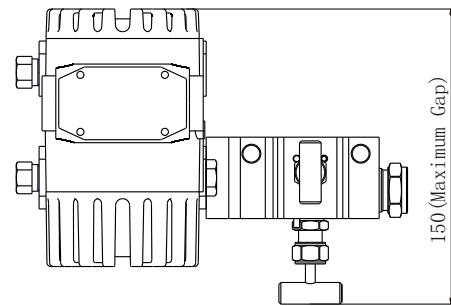
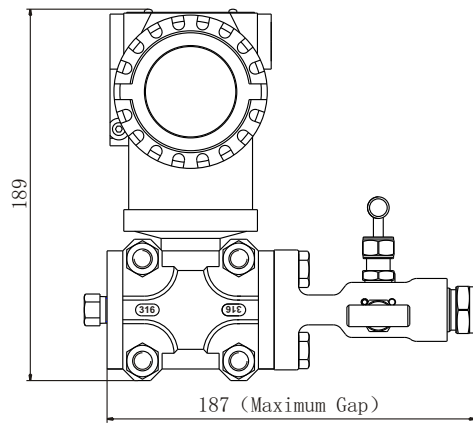


N-with waist-shaped interface: NPT1/2
taper pipe internal thread

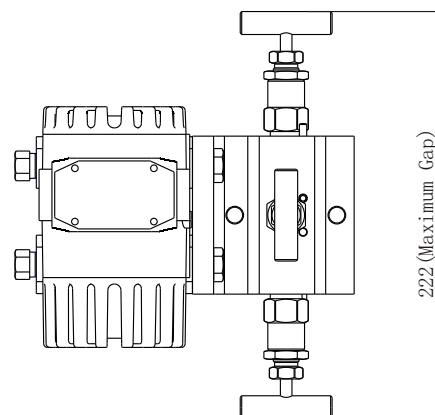
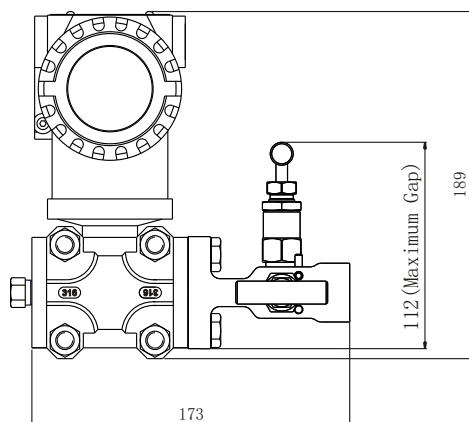
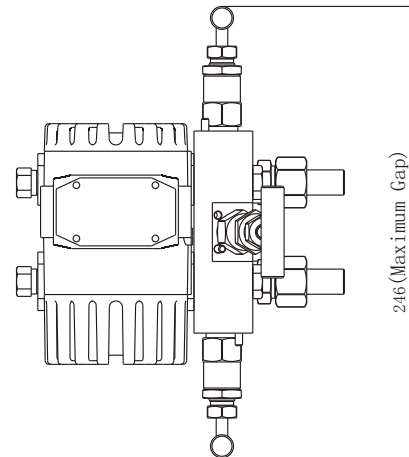
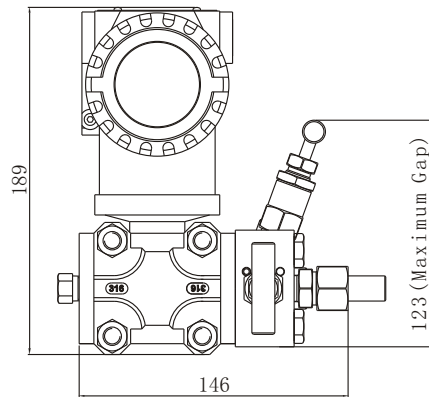


C-with waist-shaped interface: NPT1/2 pressure-leading
transition head and back welding connecting pipe (stainless steel)

Fig. 5: Process connecting type



Component dimension figure of two valve group



Component dimension figure of three valve group

Fig. 6: Component dimension figure of integrated valve group (unit: mm)

Table 3: WP361P monocrystalline silicon high pressure transmitter

Model	Transmitter type	
WP361P-	Monocrystalline silicon high pressure transmitter	
Code	Measurement range of pressure	Overload
B	0-2~20MPa	40MPa
C	0-5~40MPa	80MPa
Code	Filling liquid	Diaphragm material
1	Silicone oil	316L stainless steel
2	Fluorocarbon oil	316L stainless steel
3	Silicone oil	Hastelloy C
4	Fluorocarbon oil	Hastelloy C
5	Silicone oil	Ta diaphragm
6	Fluorocarbon oil	Ta diaphragm
Code	Electrical interface	
A	NPT1/2 internal thread	
M	M20×1.5 internal thread	
Code	Header	
-M	LCD display	
-N	No header	
Code	Options for the hazardous occasion certification	
N	Ordinary type (no anti-explosion)	
D	Flame-proof Exd II CT6	
I	Intrinsic-safety type Exia II CT6	
Code	Mounting bracket	
B3	Pipe-mounted flat bracket (2" pipe)	
B1	Pipe-mounted bent bracket (2" pipe)	
B2	Plate-mounted bent bracket	
Code	Process connection type	
P	No process joint (NPT1/4 internal thread on chamber flange)	
J	With "T" shaped joint: M20×1.5 external thread and rear welded pressure tube	
N	With "Waist" shaped joint: NPT1/2 conical internal thread	
C	With "Waist" shaped joint with NPT1/2 pressure transition head and rear welded pressure tube	
Code	Integrated valve assembly option(optional)	
V2	Two valves manifold	
Code	Other option	
H	The measurement accuracy is 0.075%FS	
S	The liquid material is 316 stainless steel	
D0	The discharge valve is at the rear end face of the clamp block	
D1	Clamp block side drain valve in upper	
D2	Clamp block side drain valve in lower part	
Q4	Verification certificate(Contact Wide Plus)	
C4	High alarm	
CN	Low alarm (The default setting is low alarm)	
Y	Special requirements	
Example	WP361P-B1A-MDB3ND0	

Note: 1, "Valve group integrated installation option" can be selected or not, the standard is provided for 316 material, if you have other requirements can contact our company
When "Valve Group Integrated Installation Option" is selected, the process connection type can only be P: no process connection
2, The default contact liquid material is 304 stainless steel.

WP362A monocrystalline silicon absolute pressure transmitter

WP362A type monocrystal silicon absolute pressure transmitter has high quality, high reliability and extensive select range, which can provide kinds of process control system with high-quality and high-additional-value pressure measurement schemes.

Product introduction

WP362A monocrystalline silicon absolute pressure transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.075%FS
- The max. range ratio can reach to 20:1
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable quality experience



Introduction

WP362 type monocrystal silicon pressure transmitter is one of the pressure transmitter series products developed by Fujian Wide Plus Corporation. It has the characteristics of high reliability, long-term stability and easy maintenance.

With safe, reliable and durable structure

Process connection

The design of WP362 type can ensure that the circuit board of transmitter can work safely when the sensor diaphragm is broken or has faults. There are two levels of sealing and process isolation on the side (chamber) of electronic circuit. The third-level sealing realizes the isolation between the field connecting terminal and the inlet of wire conduit. The design of process sealing and its position make the shell of transmitter have stronger pressure-proof performance and avoid the process impurities entering from the connecting terminal side by wire conduit.

The shell of double-chamber structure

WP362 type carries forward the design tradition of WP361 type. It adopts double-chamber shell design, which isolates the electronic circuit from the external environment so as to prevent from damaging the transmitter (due to humid environment or the condensation of wire conduit). It is generally not required to seal the wire conduit. In addition, even when the sensor membrane head is broken completely, the double-chamber structure can also guarantee the isolation of connecting terminal and wire conduit and process.

Sensor membrane head

The isolation diaphragm will transmit the pressure to MEMS monocrystal silicon sensor and the sensor is filled with silicone oil or inert liquid. With respect to the gage pressure transmitter, the reference pressure of sensor is atmosphere; with respect to the absolute pressure transmitter, the reference pressure of sensor is a sealed vacuum reference source.

The process pressure is added on the sensing diaphragm of sensor and makes the diaphragm have a tiny deformation, which will apply a stress on the Wheatstone bridge in the sensor. Then the Wheatstone bridge will generate corresponding resistance change. The resistance change will be measured and converted into a digital signal, which will be handled by the microprocessor.

Electronic circuit board module

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

Optional liquid crystal header can display the digital output in the form of pressure, current or analog range value percentage.

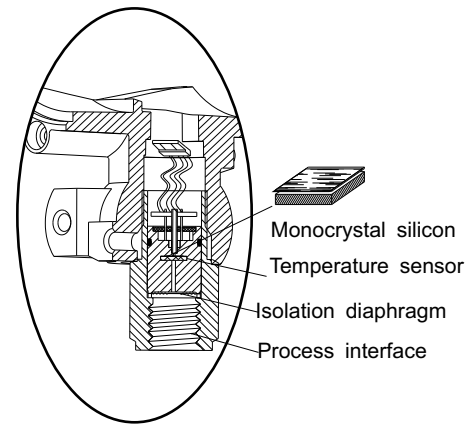


Fig. 1 WP362 type MEMS monocrystal silicon sensor

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Functions of WP362 intelligent type software

By using HART communication protocol, the WP362 intelligent type configuration can be tested and set specifically.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP362 intelligent type. The setting of transmitter's parameter configuration includes:

- Zero and extreme point setting
- Engineering units selection
- Linearity
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specification

Functional parameter

Applications

Measurement of liquid, gas and steam

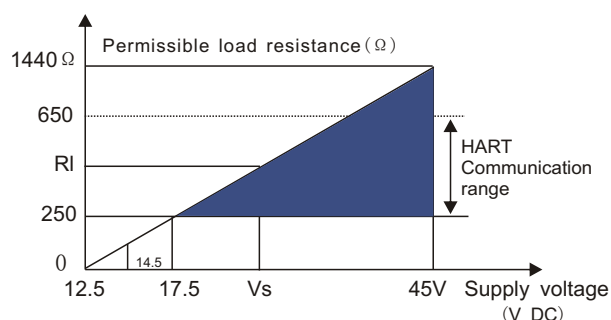
Range

Range	Min. range	Max. range	Overpressure
1	12.5KPa	250KPa	4MPa
2	0.25MPa	1MPa	6MPa
3	0.5MPa	10MPa	20MPa
4	2MPa	20MPa	40MPa
5	5MPa	40MPa	80MPa
6	16MPa	80MPa	120MPa

Range ratio

Max. 20:1

Load limit



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while HART communication should be larger

Power supply

Need external power supply. While the transmitter has no load, working voltage is 14.5-36V.

Positive and negative transference of zero point

The zero point can transfer between the barometric pressure and range upper limit or 0KPa and 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.)

Temperature limit

Process

Silicon oil sensor: -40℃ to 121℃

Inert liquid sensor: -30℃ to 121℃

Environment

-20℃ ~ +70℃

Storage

-46℃ to 110℃

-40℃ to 85℃ (liquid crystal header)

Humidity limit

0-100% relative humidity

Starting time

Output range

2s, doesn't need preheat.

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 transmitter:

Linear output: $3.8 < I < 20.8$

C4: $I = 20.8\text{mA}$ high fault

CN: $I = 3.8\text{mA}$ low fault

Performance index

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

Accuracy index

0.075%FS (Standard provided option), including the influence of linearity, hysteresis and repeatability

0.1%FS (above 20MPa)

Damping time

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

Temperature drift
≤0.075%FS/10℃

Long-term stability
≤0.02%FS/5 years

Influence of vibrations
Less than 0.075%URL, condition of vibration test: 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
The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm does not exceed 90°, the null shift within 0.4KPa can be corrected by zero setting without influencing the range.

- Limit of transient voltage protection
- Electromagnetic compatibility accords with the national standard:
- IEC6100-4-2 Electrostatic discharge immunity test III B
 - IEC6100-4-4 Electrical fast transient pulse clusters antinterference test III B
 - IEC6100-4-5 Surge (shock) immunity test III B

General index
Test according to IEC801-3

Mechanical perfomance index

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

Process interface
NPT1/2(F)internal thread, NPT1/2(M)external thread, M20×1.5 external thread/inner bore Φ 3 (standard), M20×1.5 external thread/inner bore Φ 10 (viscous medium)

Material of process connecting piece
Isolation diaphragm
316 stainless steel, hastelloy C

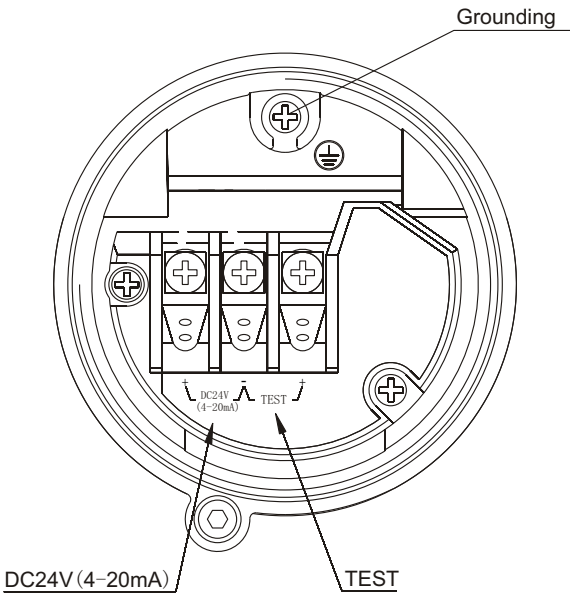
Process interface
316L stainless steel CF-3M

Non-connecting piece
Shell
Aluminium die casting IP65
Coating
Spraying plastics
Meter cap O-ring
Nitrile rubber

Filling liquid
Silicone oil or inert liquid

Weight
About 1.11kg

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 10 Ω)
⏏	Ground terminal

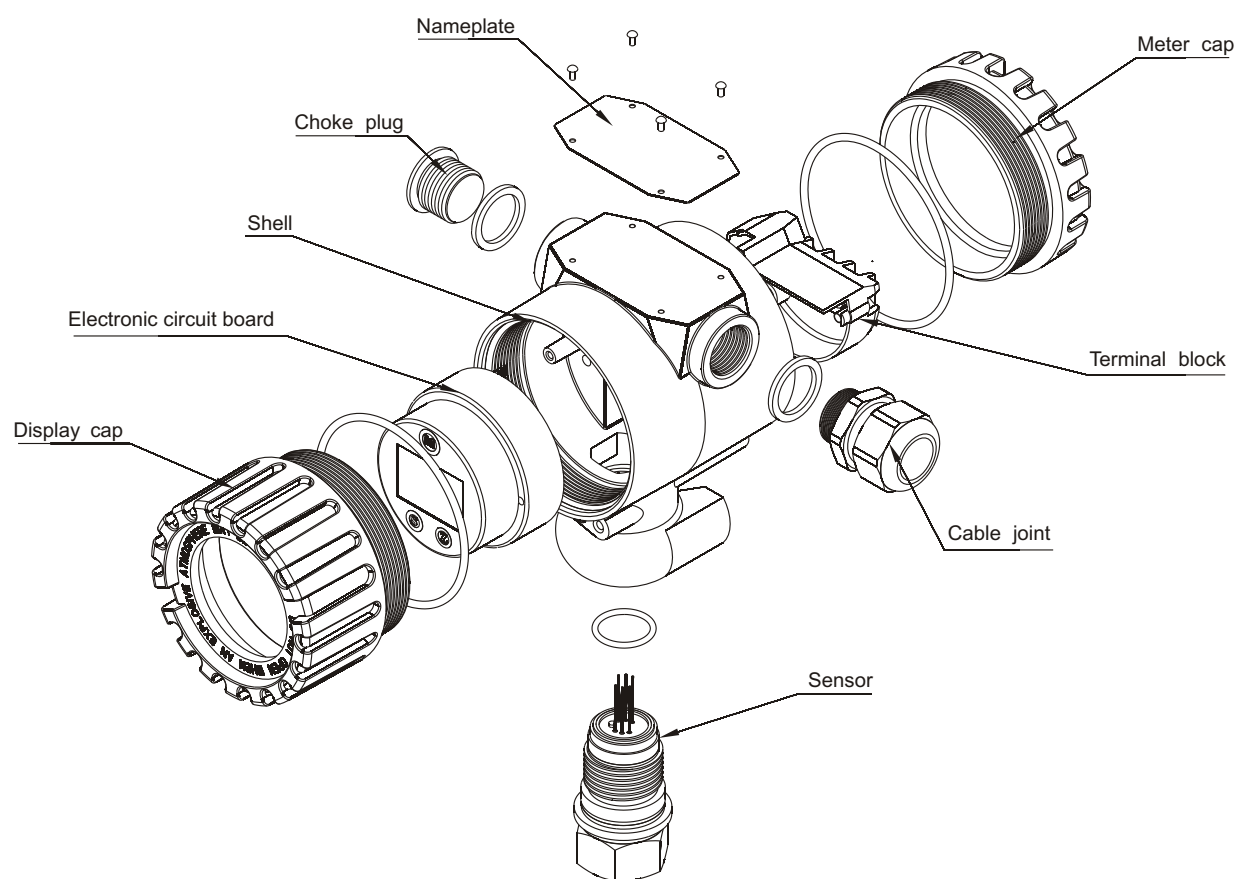


Fig. 2 Parts breakdown drawing of WP362A
monocrystalline silicon absolute pressure transmitter

WP362A series monocrystal silicon absolute pressure transmitter

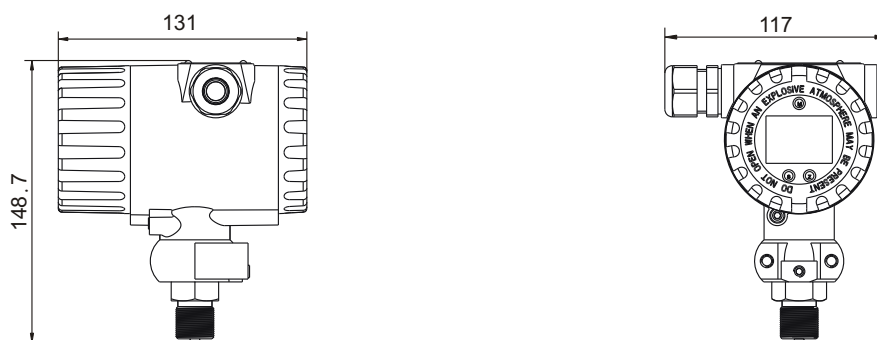
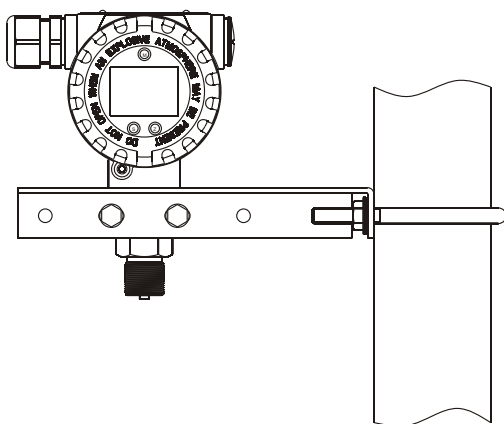
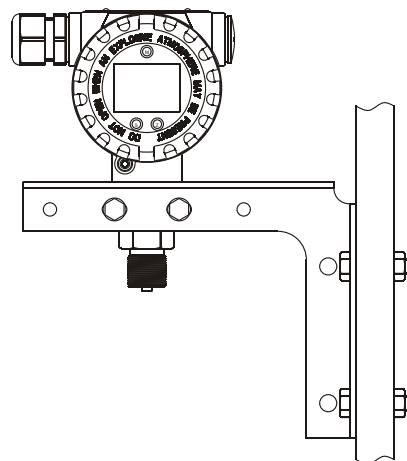


Fig. 3 Dimensional drawing for transmitter



Piping rack installation mode (Code of this option: B4)



Flat bracket installation mode (Code of this option: B5)

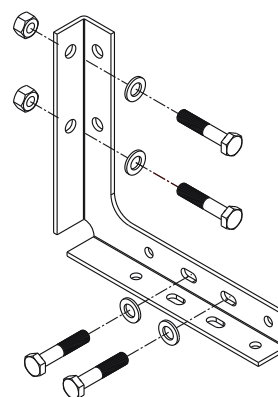
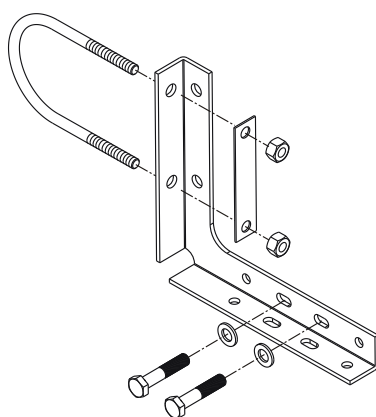
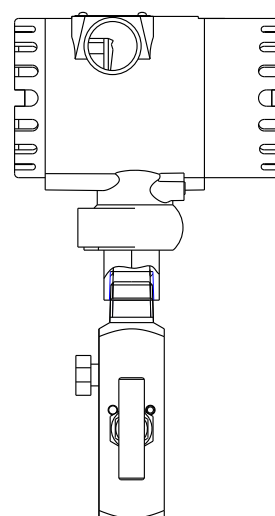
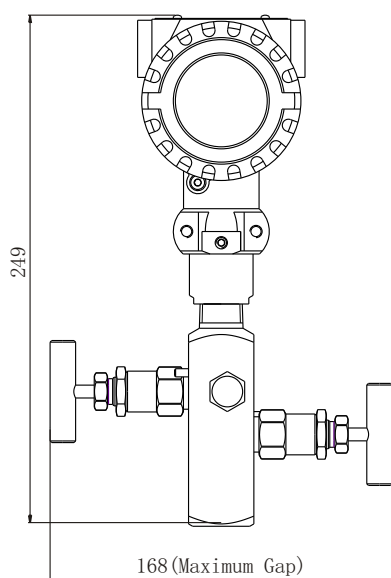


Fig. 4: Installation structure of transmitter, with optional mounting bracket



Component dimension figure of two valve group(unit: mm)

Table 1: WP362A monocrystalline silicon absolute pressure transmitter

Model	Transmitter type	
WP362A-	Monocrystalline silicon absolute pressure transmitter	
Code	Measurement range of pressure	Overload
1	0-12.5~250KPa	4MPa
2	0-0.25~1MPa	6MPa
3	0-0.5~10MPa	20MPa
4	0-2~20MPa	40MPa
5	0-5~40MPa	80MPa
6	0-16~80MPa	120MPa
Code	Filling liquid	Diaphragm material
1	Silicone oil	316L stainless steel
2	Fluorocarbon oil	316L stainless steel
3	Silicone oil	Hastelloy C
4	Fluorocarbon oil	Hastelloy C
5	Silicone oil	Ta diaphragm
6	Fluorocarbon oil	Ta diaphragm
Code	Procedural interface	
F	NPT1/2 internal thread	
M	NPT1/2 external thread	
R	G1/2 external thread	
A	M20×1.5 external thread/inner boreF3 (standard)	
B	M20×1.5 external thread/inner boreF10 (viscous medium)	
P1	Clamp-on design (1.5 inches) F50.5mm	
P2	Clamp-on design (2 inches) F64mm	
Y	Special requirements	
Code	Electrical interface	
A	NPT1/2 internal thread	
M	M20×1.5 internal thread	
Code	Header	
-M	LCD display	
-N	No header	
Code	Options for the hazardous occasion certification	
N	Ordinary type (no anti-explosion)	
D	Flame-proof Exd II CT6	
I	Intrinsic-safety type Exia II CT6	
Code	Mounting bracket	
N	No bracket	
B4	Pipe bracket (2"pipe)	
B5	Tablet bracket	
Code	Integrated valve assembly option(optional)	
V2	Two valves manifold	
Code	Other option	
H	The measurement accuracy is 0.075%FS	
S	The liquid material is 316 stainless steel	
R	With heat sink	
Q4	Verification certificate(Contact Wide Plus)	
C4	High alarm	
CN	Low alarm (The default setting is low alarm)	
Y	Special requirements	
Example	WP362A-11FA-MDB4	

Note: 1,"Valve group integrated installation option" can be selected or not, the standard is provided for 316 material, if you have other requirements can contact our company

2,The default contact liquid material is 304 stainless steel

WP362G monocrystalline silicon pressure transmitter

WP362G type monocrystal silicon pressure transmitter has high quality, high reliability and extensive select range, which can provide kinds of process control system with high-quality and high-additional-value pressure measurement schemes.

Product introduction

WP362G monocrystalline silicon pressure transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.065%FS, max. 0.04%FS
- The max. range ratio can reach to 20:1
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable quality experience



Introduction

WP362 type monocrystal silicon pressure transmitter is one of the pressure transmitter series products developed by Fujian Wide Plus Corporation. It has the characteristics of high reliability, long-term stability and easy maintenance.

With safe, reliable and durable structure

Process connection

The design of WP362 type can ensure that the circuit board of transmitter can work safely when the sensor diaphragm is broken or has faults. There are two levels of sealing and process isolation on the side (chamber) of electronic circuit. The third-level sealing realizes the isolation between the field connecting terminal and the inlet of wire conduit. The design of process sealing and its position make the shell of transmitter have stronger pressure-proof performance and avoid the process impurities entering from the connecting terminal side by wire conduit.

The shell of double-chamber structure

WP362 type carries forward the design tradition of WP361 type. It adopts double-chamber shell design, which isolates the electronic circuit from the external environment so as to prevent from damaging the transmitter (due to humid environment or the condensation of wire conduit). It is generally not required to seal the wire conduit. In addition, even when the sensor membrane head is broken completely, the double-chamber structure can also guarantee the isolation of connecting terminal and wire conduit and process.

Sensor membrane head

The isolation diaphragm will transmit the pressure to MEMS monocrystal silicon sensor and the sensor is filled with silicone oil or inert liquid. With respect to the gage pressure transmitter, the reference pressure of sensor is atmosphere; with respect to the absolute pressure transmitter, the reference pressure of sensor is a sealed vacuum reference source.

The process pressure is added on the sensing diaphragm of sensor and makes the diaphragm have a tiny deformation, which will apply a stress on the Wheatstone bridge in the sensor. Then the Wheatstone bridge will generate corresponding resistance change. The resistance change will be measured and converted into a digital signal, which will be handled by the microprocessor.

Electronic circuit board module

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

Optional liquid crystal header can display the digital output in the form of pressure, current or analog range value percentage.

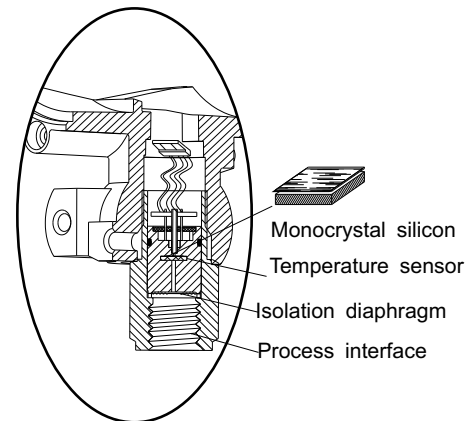


Fig. 1 WP362 type MEMS monocrystal silicon sensor

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Functions of WP362 intelligent type software

By using HART communication protocol, the WP362 intelligent type configuration can be tested and set specifically.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP362 intelligent type. The setting of transmitter's parameter configuration includes:

- Zero and extreme point setting
- Engineering units selection
- Linearity
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specification

Functional parameter

Applications

Measurement of liquid, gas and steam

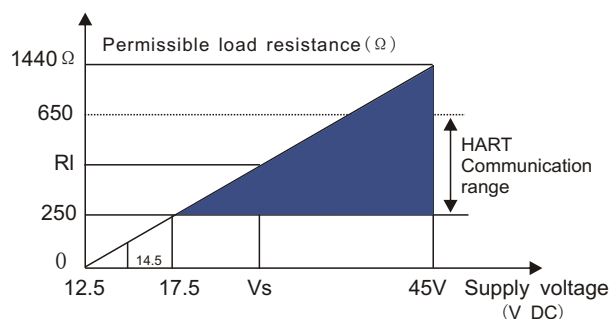
Range

Range	Min. range	Max. range	Overpressure
B	1KPa	6KPa	400KPa
0	6KPa	40KPa	1MPa
1	12.5KPa	250KPa	4MPa
2	0.15MPa	3MPa	15MPa
3	0.5MPa	10MPa	20MPa
4	2MPa	20MPa	40MPa
5	5MPa	40MPa	80MPa
6	16MPa	80MPa	120MPa

Range ratio

Max. 20:1

Load limit



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while HART communication should be larger than 17.5V.

Power supply

Need external power supply. While the transmitter has no load, working voltage is 14.5-36V.

Positive and negative transference of zero point

The zero point can transfer between the barometric pressure and range upper limit or 0KPa and 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.)

Temperature limit

Process

Silicon oil sensor: -40℃ to 121℃

Inert liquid sensor: -30℃ to 121℃

Environment

-20℃ ~ +70℃

Storage

-46℃ to 110℃

-40℃ to 85℃ (liquid crystal header)

Humidity limit

0-100% relative humidity

Starting time

Output range

2s, doesn't need preheat.

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 transmitter:

Linear output: $3.8 < I < 20.8$

C4: $I = 20.8\text{mA}$ high fault

CN: $I = 3.8\text{mA}$ low fault

Performance index

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

Accuracy index

0.075%FS (Standard provided option), including the influence of linearity, hysteresis and repeatability

0.1%FS (above 20MPa)

Damping time

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

Influence of ambient temperature

General impacts per 56℃
0.3%URL+0.3% range

Temperature drift

≤0.075%FS/10℃

Long-term stability

≤0.15%FS/5 years

Influence of vibrations

Less than 0.075%URL, condition of vibration test: 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

The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm does not exceed 90°, the null shift within 0.4KPa can be corrected by zero setting without influencing the range.

Limit of transient voltage protection

Electromagnetic compatibility accords with the national standard:

《IEC6100-4-2》	Electrostatic discharge immunity test	IIIB
《IEC6100-4-4》	Electrical fast transient pulse clusters antinterference test	IIIB
《IEC6100-4-5》	Surge (shock) immunity test	IIIB

General index

Test according to IEC801-3

Mechanical performance index

Electrical interface

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

Process interface

NPT1/2(F)internal thread, NPT1/2(M)external thread, M20×1.5 external thread/inner bore Φ 3 (standard), M20×1.5 external thread/inner bore Φ 10 (viscous medium)

Material of process connecting piece

Isolation diaphragm

316 stainless steel, hastelloy C

Process interface

316L stainless steel CF-3M

Non-connecting piece

Shell

Aluminium die casting IP65

Coating

Spraying plastics

Meter cap O-ring

Nitrile rubber

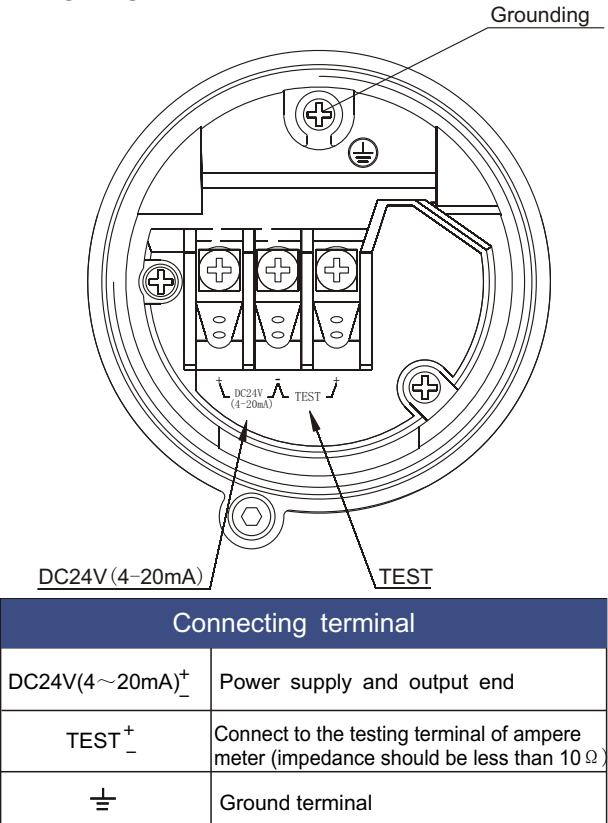
Filling liquid

Silicone oil or inert liquid

Weight

About 1.11kg

Wiring diagram of terminal side



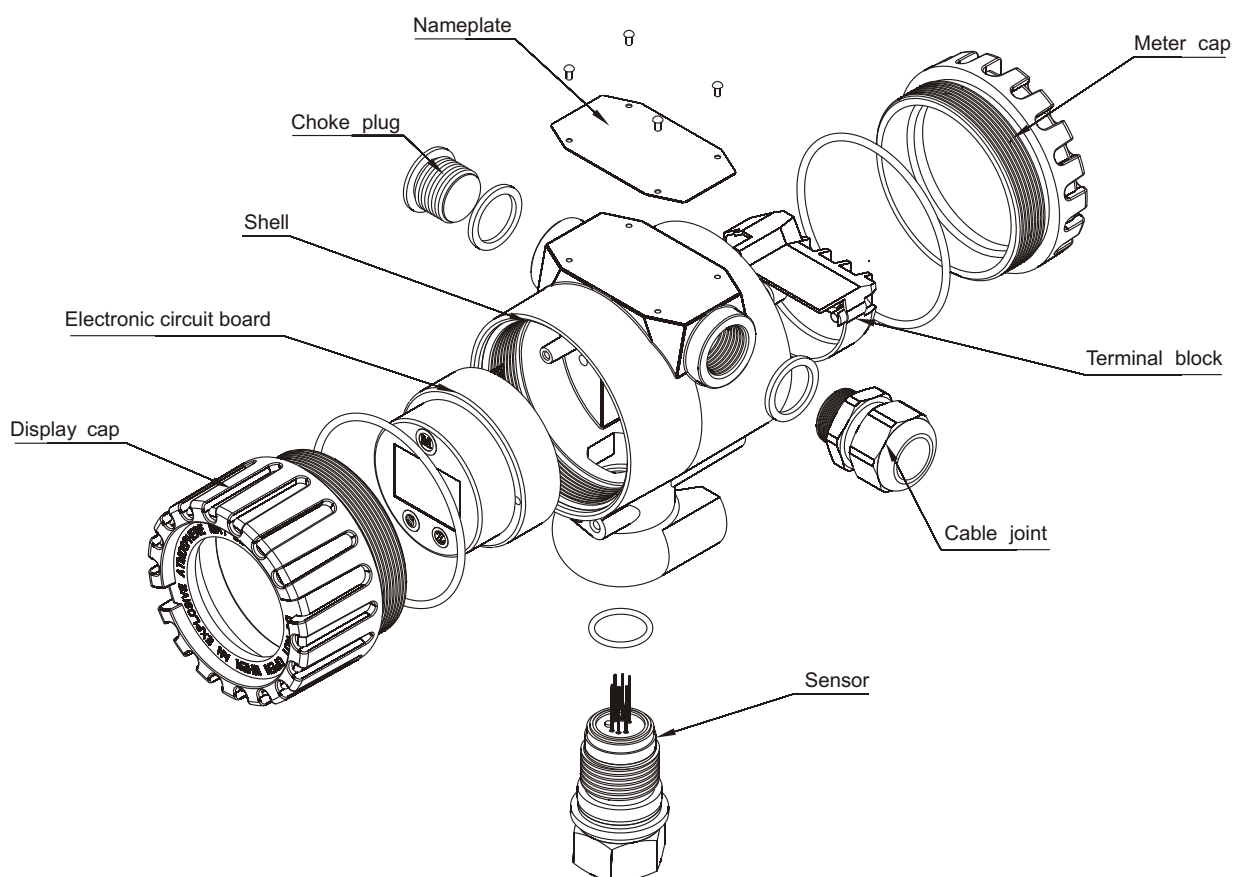


Fig. 2 Parts breakdown drawing of WP362G monocrystalline silicon pressure transmitter

WP362G series monocrystal silicon pressure transmitter

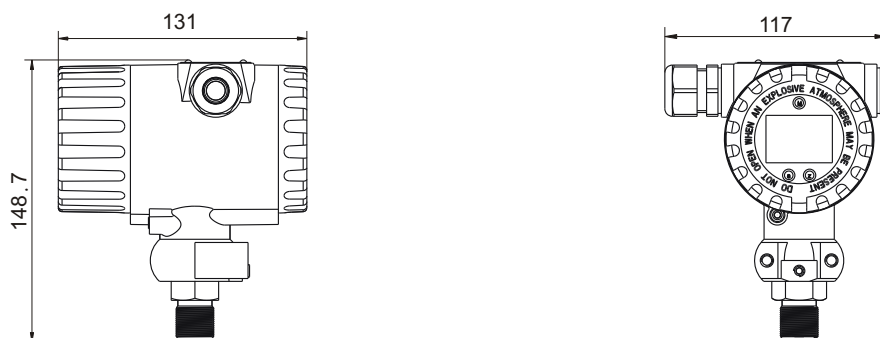
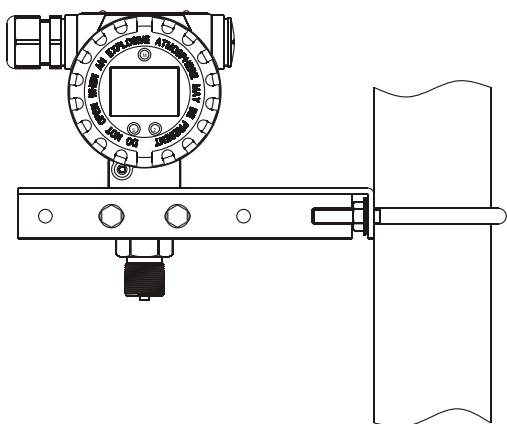
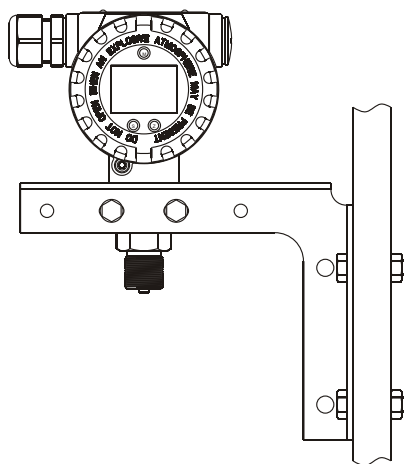


Fig. 3 Dimensional drawing for transmitter



Piping rack installation mode (Code of this option: B4)



Flat bracket installation mode (Code of this option: B5)

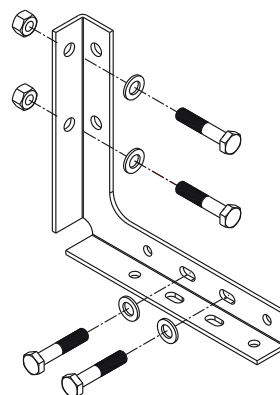
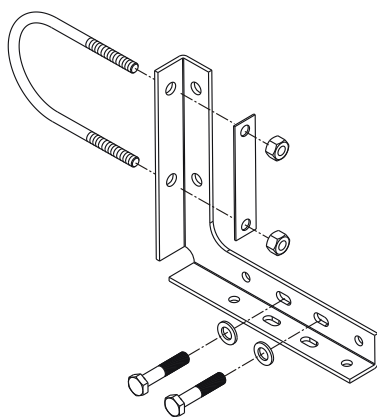
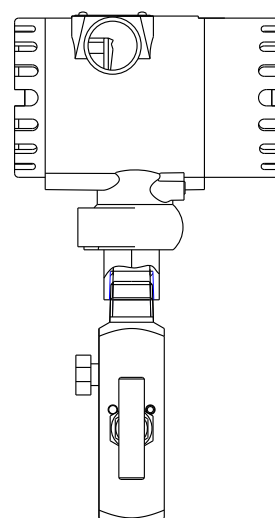
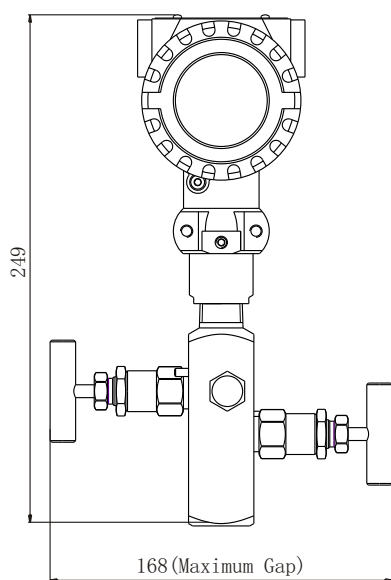


Fig. 4: Installation structure of transmitter, with optional mounting bracket



Component dimension figure of two valve group(unit: mm)

Table 1: WP362G monocrystalline silicon pressure transmitter

Model	Transmitter type	
WP362G-	Monocrystalline silicon pressure transmitter	
Code	Measurement range of pressure	Overload
B	0-1~6KPa	400KPa
0	0-6~40KPa	1MPa
1	0-12.5~250KPa	4MPa
2	0-0.15~3MPa	15MPa
3	0-0.5~10MPa	20MPa
4	0-2~20MPa	40MPa
5	0-5~40MPa	80MPa
6	0-16~80MPa	120MPa
Code	Filling liquid	Diaphragm material
1	Silicone oil	316L stainless steel
2	Fluorocarbon oil	316L stainless steel
3	Silicone oil	Hastelloy C
4	Fluorocarbon oil	Hastelloy C
5	Silicone oil	Ta diaphragm
6	Fluorocarbon oil	Ta diaphragm
Code	Procedural interface	
F	NPT1/2 internal thread	
M	NPT1/2 external thread	
R	G1/2 external thread	
A	M20×1.5 external thread/inner boreF3 (standard)	
B	M20×1.5 external thread/inner boreF10 (viscous medium)	
P1	Clamp-on design (1.5 inches) F50.5mm	
P2	Clamp-on design (2 inches) F64mm	
Y	Special requirements	
Code	Electrical interface	
A	NPT1/2 internal thread	
M	M20×1.5 internal thread	
Code	Header	
-M	LCD display	
-N	No header	
Code	Options for the hazardous occasion certification	
N	Ordinary type (no anti-explosion)	
D	Flame-proof Exd II CT6	
I	Intrinsic-safety type Exia II CT6	
Code	Mounting bracket	
N	No bracket	
B4	Pipe bracket (2"pipe)	
B5	Tablet bracket	
Code	Integrated valve assembly option(optional)	
V2	Two valves manifold	
Code	Other option	
H	The measurement accuracy is 0.075%FS	
S	The liquid material is 316 stainless steel	
R	With heat sink	
Q4	Verification certificate(Contact Wide Plus)	
C4	High alarm	
CN	Low alarm (The default setting is low alarm)	
Y	Special requirements	
Example	WP362G-11FA-MDB4	

Note: 1, "Valve group integrated installation option" can be selected or not, the standard is provided for 316 material, if you have other requirements can contact our company

2, The default contact liquid material is 304 stainless steel

WP363L monocrystalline silicon single flange liquid level transmitter

Apply to the measurement of liquid level and pressure

Adopt HART fieldbus technology, which can provide more field information to improve the performance of the factories.

Product instruction

WP363L monocrystalline silicon single flange liquid level transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.075%FS
- The max. range ratio can reach to 50:1
- Adopt double overload protection technology
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable quality experience



Product Introduction

Sensor membrane head

While working, the isolation diaphragms on the high/low-pressure sides and the filling liquids will transmit the process pressure to the membrane head of sensor and then converted into the corresponding current, voltage or digital HART® (high-speed addressable remote transmitter data highway) output signal.

WP363 series sensor can conduct temperature measurement to compensate the temperature effects.

In the characterization process of factory, all the sensors have gone through the pressure and temperature cycle test within the whole working range. The correction factors will be generated from these obtained data. Then the coefficients will be stored in the memory of intelligent board so as to ensure that the signal correction can be conducted precisely during the operational process of transmitter.

Electronic circuit board

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

The liquid crystal header can display the pressure value, current value or the percentage of range.

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Digital/analog conversion and signal transmission

The process variable is stored in the form of digital data, which can be corrected accurately and conducted the conversion of engineering units. After correcting the signal, the data will be converted into analog output signal. HART manipulator can directly access to the reading of sensor in the way of data signal so as to get higher accuracy without digital/analog conversion.

Communication format

WP363 series transmitter adopts HART protocol to conduct communication. This protocol adopts industrial standard Bell202 frequency shift keying (FSK) technology. The telecommunication can be conducted by overlaying high-frequency signal on the analog output. By using this technology, the communication and output can be realized simultaneously without influencing the integrity of loop. WP363 series transmitter can communicate with the host machine, which uses HART protocol.

Software function

The users of HART protocol can easily use the functions of WP363 series, such as menu configuration, test and specific settings.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP363 series menu, including:

- Zero and extreme point setting
- Engineering units selection
- Linear or square root output
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specific settings

In the initialization phase of transmitter and while maintaining the digital electronic board, specific settings should be conducted. It allows to conduct fine tuning on the sensor and analog output to accord with the pressure standard of the factory.

Options

Liquid crystal header

Digital header, 2-line 5-digit liquid crystal display

- Directly display the digital data, with higher accuracy
- Display the pressure, current or range percentage according to the requirements of users
- Can rotate by 360°, which is easy to install

Transient voltage resistance protection

- Integrative transient voltage resistance protection terminal
- 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

Specification

Performance index

The overall performance is the composition error based on the reference accuracy, ambient temperature effects and range static-pressure effects.

Accuracy index

$\pm 0.075\%FS$ (conventional)

Concrete performance index

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

Accuracy

(The reference accuracy includes hysteresis, linear, setting ability and repeatability, which are based on terminal.)

$\pm 0.075\%$ range

If the range is less than X

$\pm [0.03 + 0.06 \frac{X}{\text{range}}]\%$

X value:

Diaphragm capsule	XKPa
M	4
H	50
V	100

Damping time constant

The total damping time constant is equal to the sum of the damping time constants of amplifier unit and diaphragm capsule. The damping time constant of amplifier unit is adjustable within the range of 0~100s.

Diaphragm capsule (silicone oil)

Time constant (s) (The time constant can be set according to the actual situation of field and is recommended 1S)

Influence of installation position

The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm 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 $\pm 0.005\%$ range/v

Functional parameter

The limit value of range and sensor

Table 1: Range of WP363L transmitter and limit value of sensor

Range	Min. range WP363L type	Limit value of range and sensor Upper limit of range (URL)	Lower limit of range (LRL)	
			differential pressure	gauge pressure
M	1KPa	40KPa	-40KPa	-40KPa
H	5KPa	250KPa	-250KPa	3.5KPa abs
V	20KPa	1000KPa	-500KPa	3.5KPa abs

Zero point and range adjustment requirements

- The zero point and range can be adjusted arbitrarily within the range limit value indicated in Table 1.
- The range should be larger than or equal to the min. range indicated in Table 1.

Applications

Measurement of liquid, gas and steam

Output

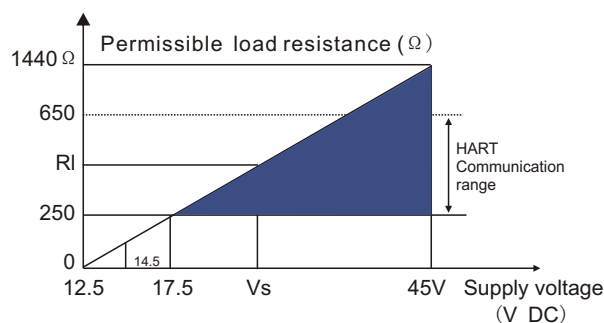
Two-wire 4~20mA, linear output is selectable for users. Digital process variable overlays on the 4-20mA signal, which can be applied to the host machines according with HART protocol.

Power supply

Need external power supply. While standard transmitter (4-20mA) has no load, work at 14.5-45V DC.

Loop load limit

The max. loop resistance is decided by the voltage of external power supply, the relations are as follows:



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while HART communication should be larger than 17.5V.

Limit of static pressure and max. overpressure

For WP363L type, the limit value is from Opsia to flange rated value or the smaller one in the rated pressure values of sensor.

Table 2. Pressure rated value of WP363L type flange

Standard	Type	Rated value of carbon steel	Rated value of stainless steel
ANSI/ASME	Class150	285psig	275psig
ANSI/ASME	Class300	740psig	720psig
ANSI/ASME	Class600	1480psig	1440psig
<i>For the measured value under 38℃, the rated value will decrease with the increasing of temperature.</i>			
DIN	PN 10-40	40bar	40bar
DIN	PN 10/16	16bar	16bar
DIN	PN 25/40	40bar	40bar
<i>Under 120℃, the rated value will decrease with the increasing of temperature.</i>			

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 transmitter:

Linear output: $3.8 < I < 20.8$

C4: I=20.8mA high fault

CN: I=3.8mA low fault

Temperature limit

Environment

-20℃~+70℃

Storage

-46℃~110℃

With header: -40℃~85℃

Process

Less than or equal to atmosphere, see the following table:

Table 3. Limit of WP363L process temperature

DC silicone oil 200	-45 to 205℃
DC silicone oil 704	-10 to 315℃
Fluorocarbon oil	-18 to 204℃

Humidity limit

0~100% relative humidity

Starting time

Reach to the performance index within 2s after the transmitter is power up.

Mechanical performance index

Electrical interface

ANSI (American-Standard) NPT1/2(F) internal thread

ISO (Chinese standard) M20×1.5 internal thread

Process interface

High-pressure side: flange size (execute national and chemical industry standard)

NP series: DN25 DN40 DN50 DN80 DN100

PN2.5 PN6 PN10 PN16 PN25 PN40

Class series: 1 inch, 1½ inches, 2inches, 3inches, 4 inches, 150lb, 300lb

Low-pressure side: 1/4-18NPT taper pipe internal thread

T-shaped interface: M20×1.5 external thread and back welding connecting pipe

Waist-shaped interface: 1/2-14NPT taper pipe internal thread, 1/2-14NPT pressure-leading transition head and back welding connecting pipe

Process liquid-contacting piece

Process isolation diaphragm: 316L stainless steel, hastelloy C (Plug-in cartridge doesn't have this option.), Ta (Plug-in cartridge doesn't have this option.).

Drain/vent valve

316 stainless steel

Process flange and interface

316 stainless steel

WP363L type process liquid-contacting piece

Flange type process interface (the high-pressure side of transmitter)

Process diaphragm, including process gasket contacting surface

316L stainless steel, hastelloy C or Ta

Extension part

316 stainless steel

Mounting flange

Carbon steel galvanization or stainless steel

Process connection on the low-pressure side (the low-pressure side of transmitter)

Isolation diaphragm

316L stainless steel

Flange and interface on the low-pressure side

316 stainless steel

Non-liquid-contacting piece

Shell

Aluminium die casting IP65

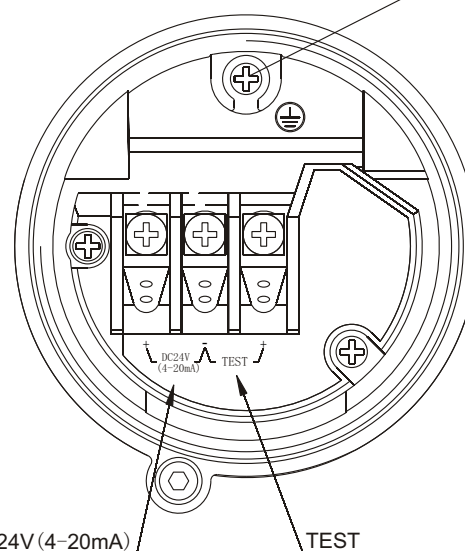
Coating

Spraying plastics

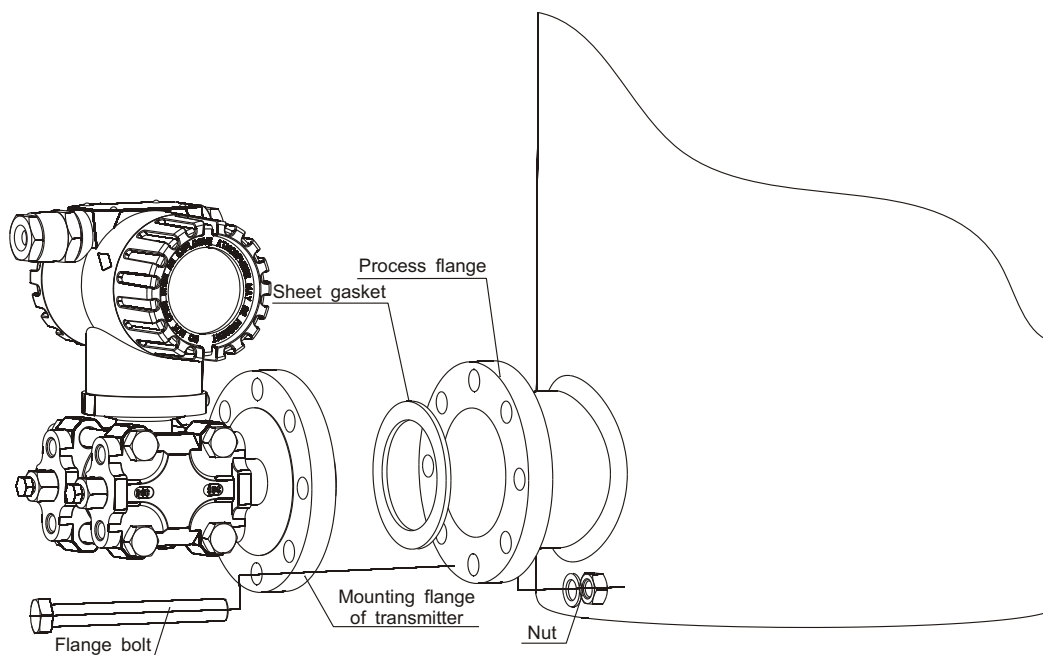
Meter cap O-ring

Nitrile rubber

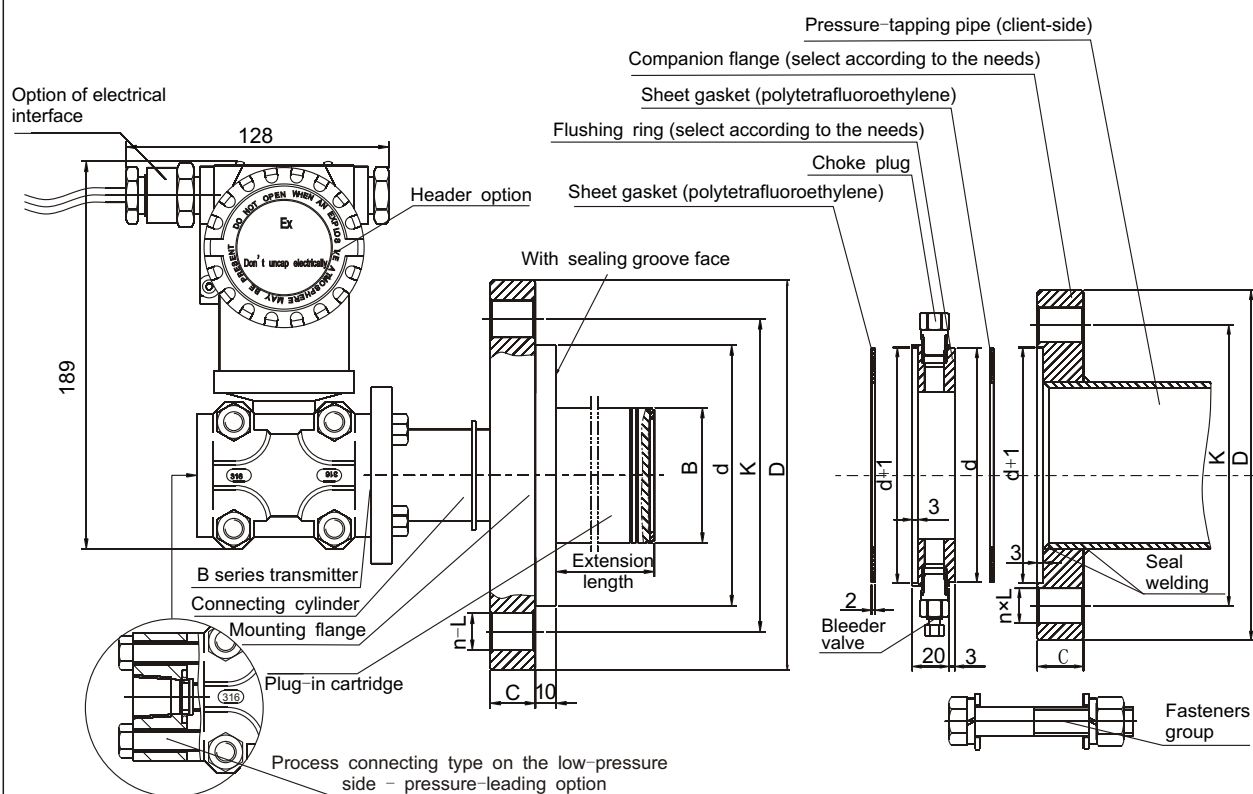
Grounding



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



WP363L field installation figure

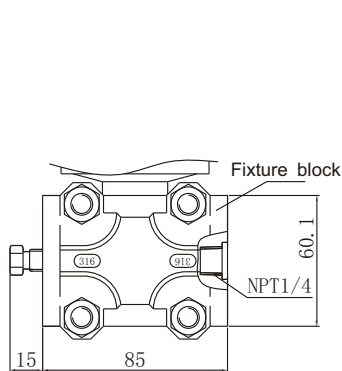


WP363L dimensional drawing

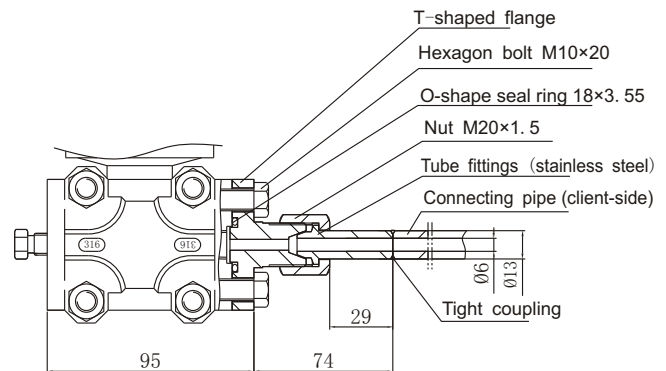
Table 4 Specification of WP363L direct-mounted flange

Flange size		Extensional diameter of corrugated surface G(mm)		Plug-in cartridge (mm)		Connection dimension (mm)				
		Diaphragm material		Diameter B	Depth H	Flange OD D	Diameter of sealing face d	Flange thickness C	Bolt pitch K	Bolt hole quantity-diameter n-L
Aperture	Pressure grade	316L	Ta, hastelloy C							
DN25	PN 6, 10, 1, 25, 40 Bar	56	50			Refer to chemical industry standard HG/T20592-2009 (RF raised face flange)				
DN40		56	62							
DN50		80	78	49	50, 100, 150, 200					
DN80		80	78	66						
DN100		80	78	89						
1"	Class 150, 300	56	56			Refer to chemical industry standard HG/T20615-2009 (RF raised face flange)				
1.5"		62	62							
2"		80	76	49	50, 100, 150, 200					
3"		80	78	66						
4"		80	78	89						

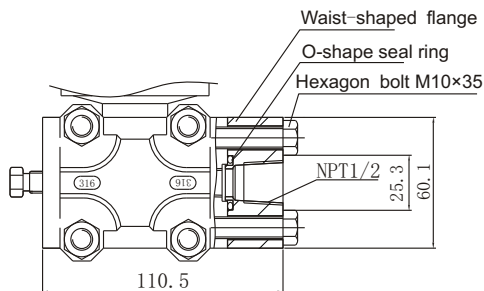
Note: The flanges of other specifications and standards can be determined by special contract review. Please refer to the attached flange dimension reference table for the connection dimension.



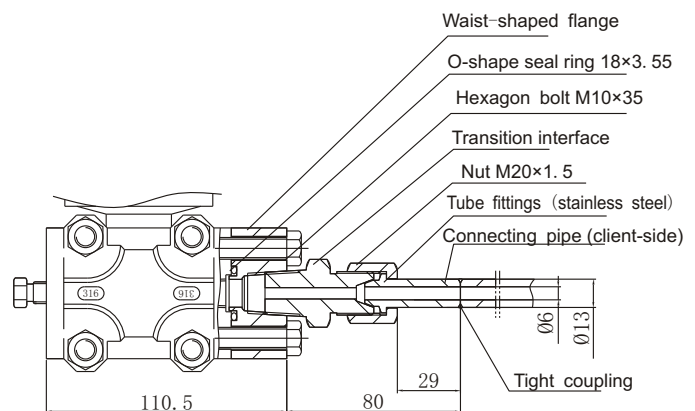
Process connecting type - leading pressure optional figure (P)
- 1/4-18NPT taper pipe female thread



Process connecting type - leading pressure optional figure (J)
- T-shaped interface, with connecting pipe interface on the back



Process connecting type - leading pressure optional figure (N)
- Waist-shaped interface



Process connecting type - leading pressure optional figure
- NPT1/2-14 pressure-leading transition head,
with connecting pipe interface on the back

Table 5. WP363L monocrystalline silicon single flange liquid level transmitter

Model	Transmitter type		
WP363L-	Monocrystalline silicon single flange liquid level transmitter		
Code	Measurement range of pressure		
M	0-1~40KPa		
H	0-5~250KPa		
V	0-0.02~1MPa		
Code	Flange standard		
P	Chemical industry standard HG/T20592-2009 (steel tube flange PN series - RF raised face flange) (adduce European system)		
C	Chemical industry standard HG/T20615-2009 (steel tube flange Class series - RF raised face flange) (adduce American system)		
Y	Other flange standard		
Code	Nominal aperture of flange		
	PN series (Eropean system)	Class series (American system)	
1	DN25	1 inch	
2	DN40	1½ inches	
3	DN50	2 inches	
4	DN80	3 inches	
5	DN100	4 inches	
Y	Special requirements		
Code	Aperture pressure grade		
	PN series (Eropean system)	Class series (American system)	
1	PN2.5、PN6(bar)		
2	PN10、PN16(bar)	Class150(lb)	
3	PN25、PN40(bar)	Class300(lb)	
Y	Special requirements		
Code	Plug-in cartridge extension length		
0	0 (Without Plug-in cartridge)		
2	50mm		
4	100mm		
6	150mm		
8	200mm		
Y	Special requirements		
Code	Diaphragm material		
-A	316L stainless steel		
-B	Hastelloy C (Plug-in cartridge type doesn't have this option.)		
-C	Ta (Plug-in cartridge type doesn't have this option.)		
-Y	Special requirements		
Code	Process filling liquid - high-pressure side	Temperature limit	Contact temperature
D	Normal-temperature silicone oil	-45 to 205℃	-40 to 120℃
C	High-temperature silicone oil	0 to 315℃	0 to 120 ℃
H	Fluorocarbon oil	0 to 315℃	-18to 120 ℃
Code	Electrical interface		
A	NPT1/2 internal thread		
M	M20×1.5 internal thread		
Code	Options for the hazardous occasion certification		
N	Ordinary type (no anti-explosion)		
D	Flame-proof Exd II CT6		
I	Intrinsic-safety type Exia II CT6		

Table 5 (continued). WP363L type monocrystal silicon liquid level transmitter

Code	Other option
H	The measurement accuracy is 0.1%FS
S	The material of flange is 316 stainless steel
G	The isolation diaphragm is gold-plated
F	Diaphragm sticking with polytetrafluoroethylene
T	Diaphragm coating with teflon
Q4	Verification certificate(Contact Wide Plus)
C4	High alarm
CN	Low alarm (The default setting is low alarm)
R	With heat sink
F1	Stainless steel flushing adapter ring (Plug-in cartridge type doesn't have this option.)
P	NPT1/4 Taper internal thread (low pressure side)
J	Connector with "T" shape: M20×1.5 external thread and rear welded pressure tube (low pressure side)
N	Connector with "Waist" shape: NPT1/2 conical pipe thread (low pressure side)
C	NPT1/2 primer and rear welded primer tube (low pressure side) with "Waist" connector
Y	Special requirements

Note: 1,Choose plug-in, as the elongation length increases, the accuracy will decrease.

2,if needing higher precision, please contact the marketing representatives of the corporation.

3,The default flange material is 304 stainless steel

WP363G monocrystalline silicon single flange remote transmitter

Apply to the measurement of liquid level and pressure

Adopt HART fieldbus technology, which can provide more field information to improve the performance of the factories.

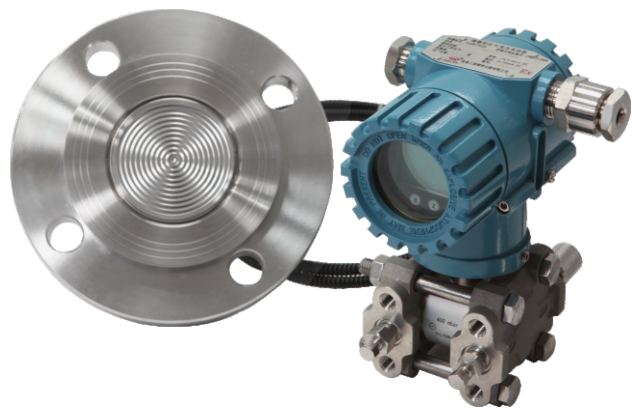
Product instruction

WP363G monocrystalline silicon single flange remote transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.25%FS
- The max. range ratio can reach to 10:1
- Adopt double overload protection technology
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable quality experience



Product Introduction

Sensor membrane head

While working, the isolation diaphragms on the high/low-pressure sides and the filling liquids will transmit the process pressure to the membrane head of sensor and then converted into the corresponding current, voltage or digital HART® (high-speed addressable remote transmitter data highway) output signal.

WP363 series sensor can conduct temperature measurement to compensate the temperature effects.

In the characterization process of factory, all the sensors have gone through the pressure and temperature cycle test within the whole working range. The correction factors will be generated from these obtained data. Then the coefficients will be stored in the memory of intelligent board so as to ensure that the signal correction can be conducted precisely during the operational process of transmitter.

Electronic circuit board

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

The liquid crystal header can display the pressure value, current value or the percentage of range.

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Digital/analog conversion and signal transmission

The process variable is stored in the form of digital data, which can be corrected accurately and conducted the conversion of engineering units. After correcting the signal, the data will be converted into analog output signal. HART manipulator can directly access to the reading of sensor in the way of data signal so as to get higher accuracy without digital/analog conversion.

Communication format

WP363 series transmitter adopts HART protocol to conduct communication. This protocol adopts industrial standard Bell202 frequency shift keying (FSK) technology. The telecommunication can be conducted by overlaying high-frequency signal on the analog output. By using this technology, the communication and output can be realized simultaneously without influencing the integrity of loop. WP363 series transmitter can communicate with the host machine, which uses HART protocol.

Software function

The users of HART protocol can easily use the functions of WP363 series, such as menu configuration, test and specific settings.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP363 series menu, including:

- Zero and extreme point setting
- Engineering units selection
- Linear or square root output
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specific settings

In the initialization phase of transmitter and while maintaining the digital electronic board, specific settings should be conducted. It allows to conduct fine tuning on the sensor and analog output to accord with the pressure standard of the factory.

Options

Liquid crystal header

Digital header, 2-line 5-digit liquid crystal display

- Directly display the digital data, with higher accuracy
- Display the pressure, current or range percentage according to the requirements of users
- Can rotate by 360° , which is easy to install

Transient voltage resistance protection

- Integrative transient voltage resistance protection terminal
- 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

Specification

Performance index

The overall performance is the composition error based on the reference accuracy, ambient temperature effects and range static-pressure effects.

Accuracy index

$\pm 0.025\%FS$ (conventional)

Concrete performance index

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

Accuracy

(The reference accuracy includes hysteresis, linear, setting ability and repeatability, which are based on terminal.)

$\pm 0.25\%range$

If the range is less than X

$\pm [0.3 + 0.075 \frac{X}{range}] \%$

X value:

Diaphragm capsule	XKPa
V	100
A	300
G	1000

Damping time constant

The total damping time constant is equal to the sum of the damping time constants of amplifier unit and diaphragm capsule. The damping time constant of amplifier unit is adjustable within the range of 0~100s.

Diaphragm capsule (silicone oil)

Time constant (s) (The time constant can be set according to the actual situation of field and is recommended 1S)

Influence of installation position

The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm 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 $\pm 0.005\%$ range/v

Functional parameter

The limit value of range and sensor

Table 1: Range of WP363L transmitter and limit value of sensor

Range	Min. range	Limit value of range and sensor	
	WP363G type	Upper limit of range (URL)	Lower limit of range (LRL)
M	10KPa	40KPa	-40KPa
H	50KPa	250KPa	-250Pa
V	100KPa	1MPa	-1MPa
A	300KPa	3MPa	-3MPa
G	1MPa	10MPa	-10MPa

Zero point and range adjustment requirements

- The zero point and range can be adjusted arbitrarily within the range limit value indicated in Table 1.
- The range should be larger than or equal to the min. range indicated in Table 1.

Applications

Measurement of liquid, gas and steam

Output

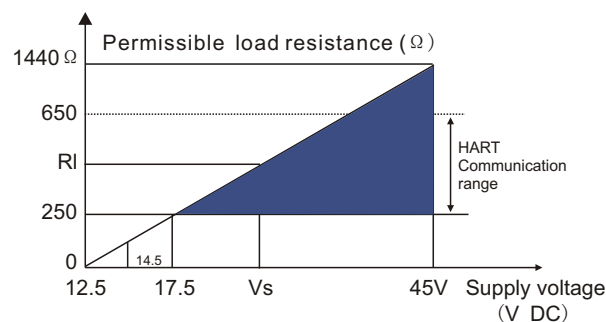
Two-wire 4~20mA, linear output or square root output is selectable for users. Digital process variable overlays on the 4-20mA signal, which can be applied to the host machines according with HART protocol.

Power supply

Need external power supply. While standard transmitter (4-20mA) has no load, work at 14.5-45V DC.

Loop load limit

The max. loop resistance is decided by the voltage of external power supply, the relations are as follows:



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while HART communication should be larger than 17.5V.

Limit of static pressure and max. overpressure

For WP363G type, the limit value is from 0psia to flange rated value or the smaller one in the rated pressure values of sensor.

Table 2. Pressure rated value of WP363G type flange

Standard	Type	Rated value of carbon steel	Rated value of stainless steel
ANSI/ASME	Class150	285psig	275psig
ANSI/ASME	Class300	740psig	720psig
ANSI/ASME	Class600	1480psig	1440psig
<i>For the measured value under 38℃, the rated value will decrease with the increasing of temperature.</i>			
DIN	PN 10-40	40bar	40bar
DIN	PN 10/16	16bar	16bar
DIN	PN 25/40	40bar	40bar
<i>Under 120℃, the rated value will decrease with the increasing of temperature.</i>			

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 transmitter:

Linear output: $3.8 < I < 20.8$

C4: I=20.8mA high fault

CN: I=3.8mA low fault

Temperature limit

Environment

-20℃~+70℃

Storage

-46℃~110℃

With header: -40℃~85℃

Process

Less than or equal to atmosphere, see the following table:

Table 3. Limit of WP363G process temperature

DC silicone oil 200	-45 to 205℃
DC silicone oil 704	-10 to 315℃
Fluorocarbon oil	-18 to 204℃

Humidity limit

0~100% relative humidity

Starting time

Reach to the performance index within 2s after the transmitter is power up.

Mechanical performance index

Electrical interface

ANSI (American-Standard) NPT1/2(F) internal thread

ISO (Chinese standard) M20×1.5 internal thread

Process interface

High-pressure side: flange size (execute national and chemical industry standard)

NP series: DN25 DN40 DN50 DN80 DN100

PN2.5 PN6 PN10 PN16 PN25 PN40

Class series: 1 inch, 1½ inches, 2inches, 3inches, 4 inches, 150lb、300lb

Low-pressure side: 1/4-18NPT taper pipe internal thread

T-shaped interface: M20×1.5 external thread and back welding connecting pipe

Waist-shaped interface: 1/2-14NPT taper pipe internal thread, 1/2-14NPT pressure-leading transition head and back welding connecting pipe

Process liquid-contacting piece

Process isolation diaphragm: 316L stainless steel, hastelloy C (Plug-in cartridge doesn't have this option.), Ta (Plug-in cartridge doesn't have this option.).

Drain/vent valve

316 stainless steel

Process flange and interface

316 stainless steel

WP363G type process liquid-contacting piece

Flange type process interface (the high-pressure side of transmitter)

Process diaphragm, including process gasket contacting surface

316L stainless steel, hastelloy C or Ta

Extension part

316 stainless steel

Mounting flange

Carbon steel galvanization or stainless steel

Process connection on the low-pressure side (the low-pressure side of transmitter)

Isolation diaphragm

316L stainless steel

Flange and interface on the low-pressure side

316 stainless steel

Non-liquid-contacting piece

Shell

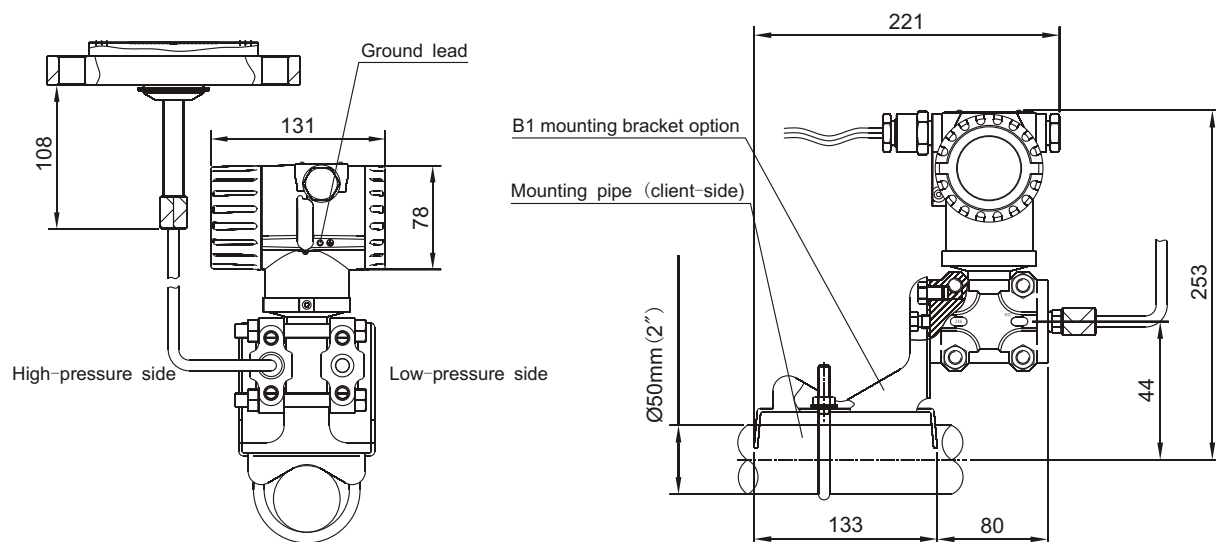
Aluminium die casting IP65

Coating

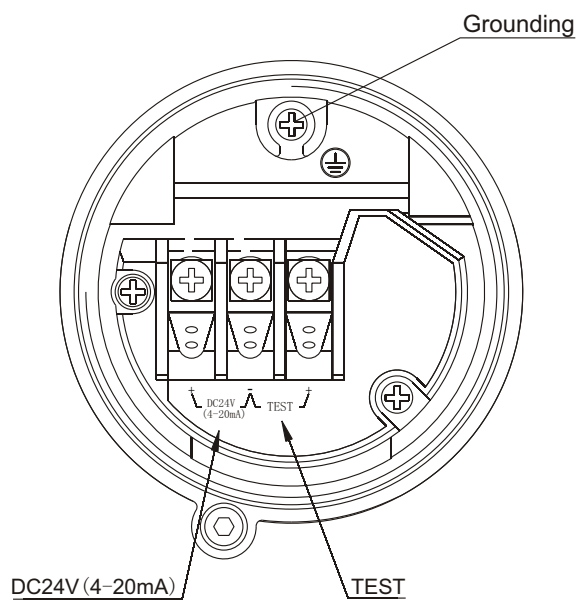
Spraying plastics

Meter cap O-ring

Nitrile rubber

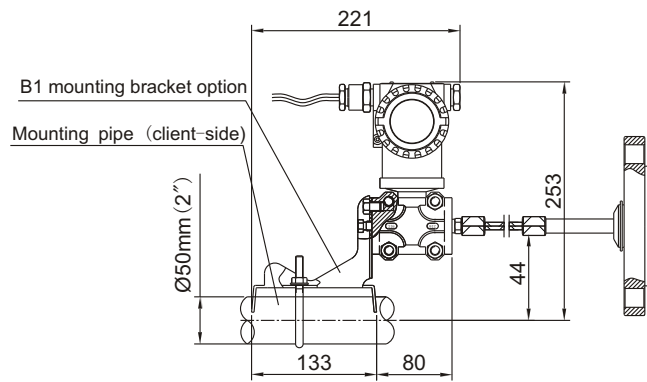


Outside drawing of single-flange installation

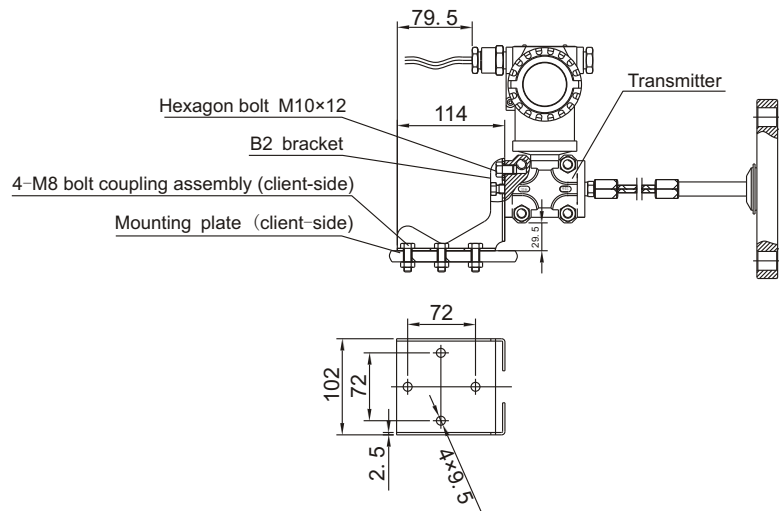


Connecting terminal	
DC24V(4~20mA) ⁺ ₋	Power supply and output end
TEST ⁺ ₋	Connect to the testing terminal of ampere meter (impedance should be less than 10 Ω)
$\equiv$	Ground terminal

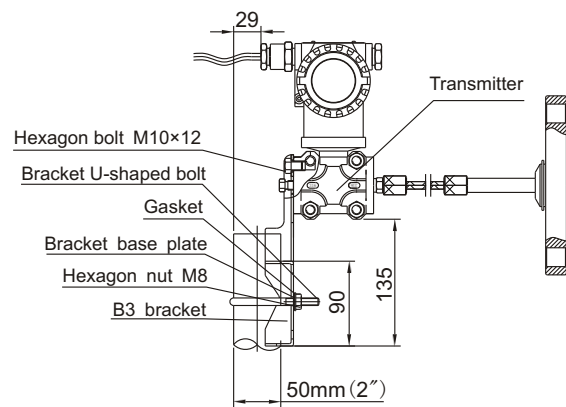
Wiring diagram of terminal side



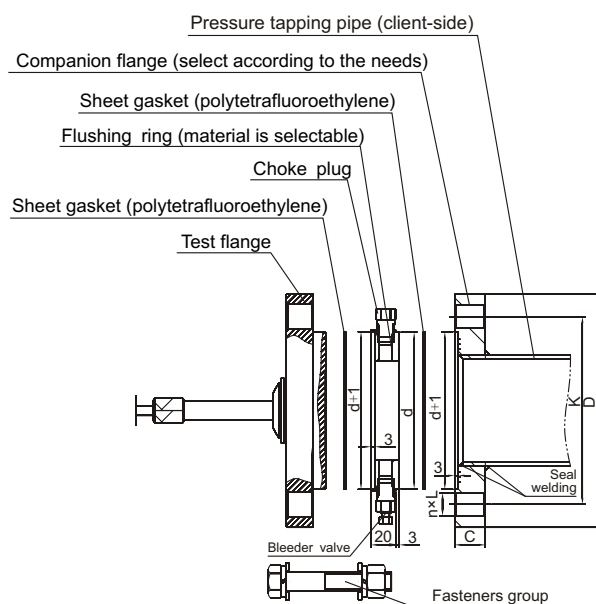
Subassembly of B1 mounting bracket



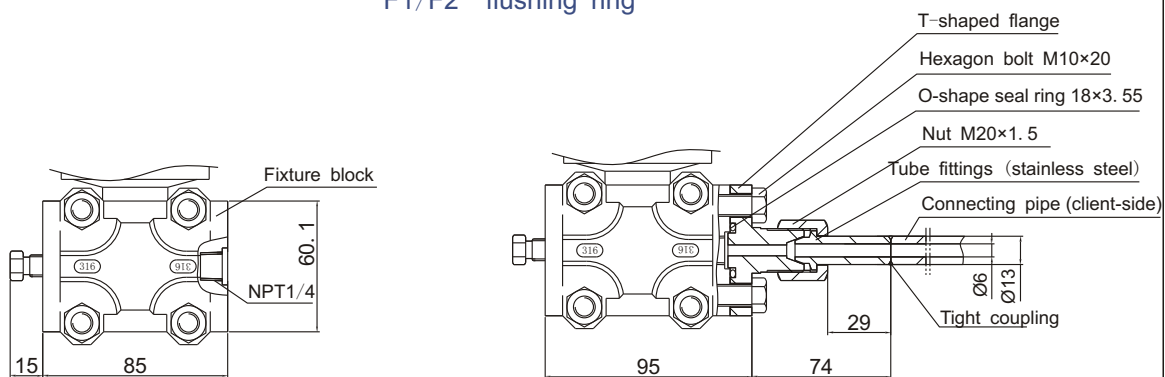
Subassembly of B2 mounting bracket



Subassembly of B3 mounting bracket

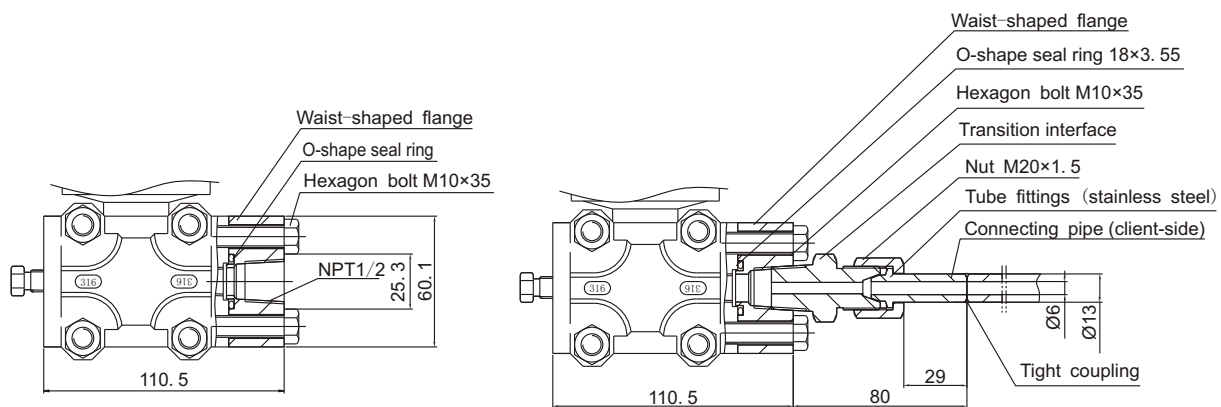


F1/F2 flushing ring



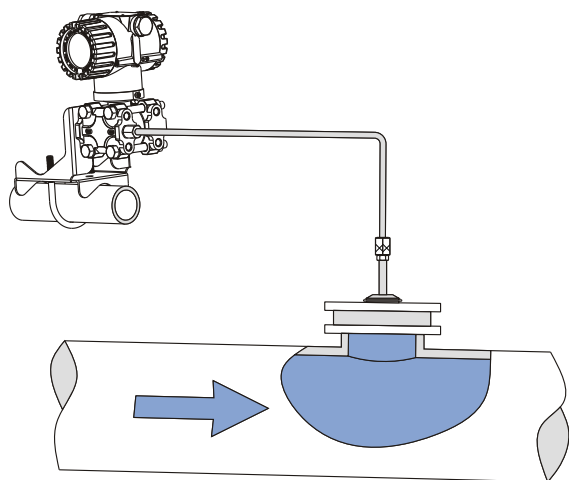
Process connecting type – leading pressure optional figure (P)
– 1/4-18NPT taper pipe female thread

Process connecting type – leading pressure optional figure (J)
– T-shaped interface, with connecting pipe interface on the back

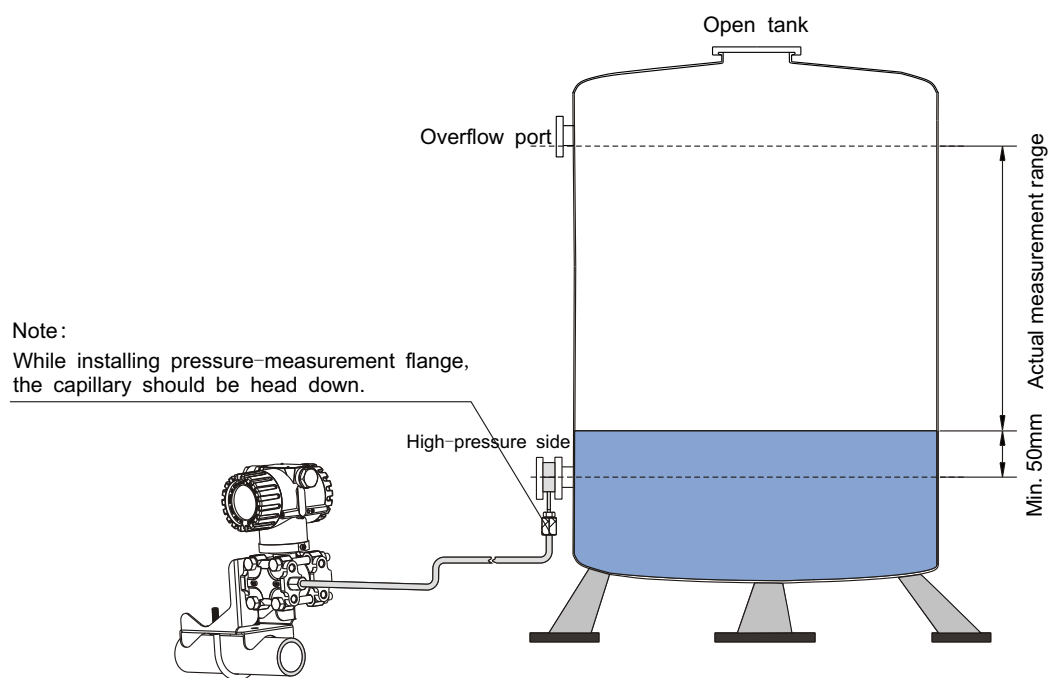


Process connecting type – leading pressure optional figure (N)
– Waist-shaped interface

Process connecting type – leading pressure optional figure
– NPT1/2-14 pressure-leading transition head,
with connecting pipe interface on the back



The flange installation mode of pipeline pressure



Flange installation mode of open tank liquid level

Field installation figure for single remote-transmission diaphragm system

Table 5. WP363G monocrystalline silicon single flange remote transmitter

Model	Transmitter type		
WP363G-	Monocrystalline silicon single flange remote transmitter		
Code	Measurement range of pressure		
M	0-10~40KPa		
H	0-50~250KPa		
V	0-0.1~1MPa		
A	0-0.3~3MPa		
G	0-1~10MPa		
Code	Flange standard		
P	Chemical industry standard HG/T20592-2009 (steel tube flange PN series - RF raised face flange) (adduce European system)		
C	Chemical industry standard HG/T20615-2009 (steel tube flange Class series - RF raised face flange) (adduce American system)		
Y	Other flange standard		
Code	Type of sealing element		
P	Flat trpe		
R	Flange type		
E	Plug-in cartridge type (not offer DN25, DN40, 1 inch and 1 1/2 inches)		
T	Thread type		
Code	Nominal aperture of flange		
	PN series (Eropean system)	Class series (American system)	Thread type spec.
1	DN25	1 inch	NPT1/2
2	DN40	1½ inches	NPT1/4
3	DN50	2 inches	NPT3/8
4	DN80	3 inches	NPT1
5	DN100	4 inches	NPT 1½ (without
Y	Special requirements	flushing hole)	
Code	Aperture pressure grade		
	PN series (Eropean system)	Class series (American system)	
1	PN2.5、PN6(bar)		
2	PN10、PN16(bar)	Class150(lb)	
3	PN25、PN40(bar)	Class300(lb)	
Y	Special requirements		
Code	Plug-in cartridge extension length		
0	0 (Without Plug-in cartridge)		
2	50mm		
4	100mm		
6	150mm		
8	200mm		
Y	Special requirements		
Code	High pressure H-terminal capillary length		
??	The length of capillary is from 1~10m, indicated by ?? (for instance: 2m:02)		
Code	Diaphragm material		
-A	316L stainless steel		
-B	Hastelloy C (Plug-in cartridge type doesn't have this option.)		
-C	Ta (Plug-in cartridge type doesn't have this option.)		
-Y	Special requirements		

Table 5 (continued). WP363G monocrystalline silicon single flange remote transmitter

Code	Process filling liquid - high-pressure side	Temperature limit	Contact temperature
D	Normal-temperature silicone oil	-45 to 205℃	-40 to 120℃
C	High-temperature silicone oil	0 to 315℃	0 to 120 ℃
H	Fluorocarbon oil	0 to 315℃	-18to 120 ℃
Code	Electrical interface		
A	NPT1/2 internal thread		
M	M20×1.5 internal thread		
Code	Options for the hazardous occasion certification		
N	Ordinary type (no anti-explosion)		
D	Flame-proof Exd II CT6		
I	Intrinsic-safety type Exia II CT6		
Code	Mounting bracket		
B3	Pipe-mounted flat bracket (2" pipe)		
B1	Pipe-mounted bent bracket (2" pipe)		
B2	Plate-mounted bent bracket		
Code	Other option		
H	The measurement accuracy is 0.1%FS		
S	The material of flange is 316 stainless steel		
G	The isolation diaphragm is gold-plated		
F	Diaphragm sticking with polytetrafluoroethylene		
T	Diaphragm coating with teflon		
Q4	Verification certificate(Contact Wide Plus)		
C4	High alarm		
CN	Low alarm (The default setting is low alarm)		
F1	Stainless steel flushing adapter ring (Plug-in cartridge type doesn't have this option.)		
P	NPT1/4 Taper internal thread (low pressure side)		
J	Connector with "T" shape: M20×1.5 external thread and rear welded pressure tube (low pressure side)		
N	Connector with "Waist" shape: NPT1/2 conical pipe thread (low pressure side)		
C	NPT1/2 primer and rear welded primer tube (low pressure side) with "Waist" connector		
Y	Special requirements		

Note: 1, When the length of capillary increased, the accuracy is reduced.

2.if needing higher precision, please contact the marketing representatives of the corporation.

3,The default flange material is 304 stainless steel

WP363D monocrystal silicon double flange remote transmitter

Apply to the measurement of liquid level and pressure

Adopt HART fieldbus technology, which can provide more field information to improve the performance of the factories.

Product instruction

WP363D monocrystal silicon double flange remote transmitter

- Adopt MEMS monocrystal silicon high-precision pressure sensor
- With high response speed and stability
- Measurement accuracy 0.25%FS
- The max. range ratio can reach to 10:1
- Adopt double overload protection technology
- Provide standard HART bus communication mode
- Sophisticated self-diagnosis and telecommunication function
- Highlighted LCD with backlight
- Local display screen which can rotate by 360°
- Convenient local zero clearing function
- Convenient local zero point, extreme point setting and calibration function
- Convenient local current loop calibration function

Advanced manufacturing technique

The most reliable **quality experience**



Product Introduction

Sensor membrane head

While working, the isolation diaphragms on the high/low-pressure sides and the filling liquids will transmit the process pressure to the membrane head of sensor and then converted into the corresponding current, voltage or digital HART® (high-speed addressable remote transmitter data highway) output signal.

WP363 series sensor can conduct temperature measurement to compensate the temperature effects.

In the characterization process of factory, all the sensors have gone through the pressure and temperature cycle test within the whole working range. The correction factors will be generated from these obtained data. Then the coefficients will be stored in the memory of intelligent board so as to ensure that the signal correction can be conducted precisely during the operational process of transmitter.

Electronic circuit board

The electronic board adopts high-performance integrated circuit and surface packaging technology. This board will correct the input signal of sensor and then conduct linear treatment. The output part of electronic board module will convert the digital signal into analog output and conduct communication with the manipulator.

The liquid crystal header can display the pressure value, current value or the percentage of range.

Data storage

The configuration data will be stored in the permanent EPROM storage of transmitter electronic board module. After the transmitter is power down, the data will be stored permanently. So after power on, the transmitter can work immediately.

Digital/analog conversion and signal transmission

The process variable is stored in the form of digital data, which can be corrected accurately and conducted the conversion of engineering units. After correcting the signal, the data will be converted into analog output signal. HART manipulator can directly access to the reading of sensor in the way of data signal so as to get higher accuracy without digital/analog conversion.

Communication format

WP363 series transmitter adopts HART protocol to conduct communication. This protocol adopts industrial standard Bell202 frequency shift keying (FSK) technology. The telecommunication can be conducted by overlaying high-frequency signal on the analog output. By using this technology, the communication and output can be realized simultaneously without influencing the integrity of loop. WP363 series transmitter can communicate with the host machine, which uses HART protocol.

Software function

The users of HART protocol can easily use the functions of WP363 series, such as menu configuration, test and specific settings.

Configuration

By using HART manipulator, users can conveniently conduct current regulation, parameter configuration, HART information, two-point fine tuning and graphical monitoring on WP363 series menu, including:

- Zero and extreme point setting
- Engineering units selection
- Linear or square root output
- Damping time
- Display mode
- Display accuracy

HART information can input the informational data into the transmitter to identify and physically describe the transmitter, including:

- Date
- Station identification: within 8 characters
- Station description: within 16 characters
- Information: within 32 characters

Test

When the system goes wrong, if the operator confirms that the loop has faults, can let the transmitter provide specific output for loop tests.

Specific settings

In the initialization phase of transmitter and while maintaining the digital electronic board, specific settings should be conducted. It allows to conduct fine tuning on the sensor and analog output to accord with the pressure standard of the factory.

Options

Liquid crystal header

Digital header, 2-line 5-digit liquid crystal display

- Directly display the digital data, with higher accuracy
- Display the pressure, current or range percentage according to the requirements of users
- Can rotate by 360° , which is easy to install

Transient voltage resistance protection

- Integrative transient voltage resistance protection terminal
- 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

Specification

Performance index

The overall performance is the composition error based on the reference accuracy, ambient temperature effects and range static-pressure effects.

Accuracy index

$\pm 0.25\%FS$ (conventional)

Concrete performance index

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

Accuracy

(The reference accuracy includes hysteresis, linear, setting ability and repeatability, which are based on terminal.)

$\pm 0.25\%range$

If the range is less than X

$\pm [0.3 + 0.075 \frac{X}{range}] \%$

X value:

Diaphragm capsule	XKPa
M	4
H	50
V	100

Damping time constant

The total damping time constant is equal to the sum of the damping time constants of amplifier unit and diaphragm capsule. The damping time constant of amplifier unit is adjustable within the range of 0~100s.

Diaphragm capsule (silicone oil)

Time constant (s) (The time constant can be set according to the actual situation of field and is recommended 1S)

Influence of installation position

The changing of installation position, which is parallel to the surface of diaphragm, will not cause the effect of null shift. If the change between the installation position and the surface of diaphragm 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 $\pm 0.005\%$ range/v

Functional parameter

The limit value of range and sensor

Table 1: Range of WP363L transmitter and limit value of sensor

Range	Min. range	Limit value of range and sensor	
	WP363D type	Upper limit of range (URL)	Lower limit of range (LRL)
M	10KPa	40KPa	-40KPa
H	50KPa	250KPa	-250KPa
V	100KPa	1MPa	-1MPa

Zero point and range adjustment requirements

- The zero point and range can be adjusted arbitrarily within the range limit value indicated in Table 1.
- The range should be larger than or equal to the min. range indicated in Table 1.

Applications

Measurement of liquid, gas and steam

Output

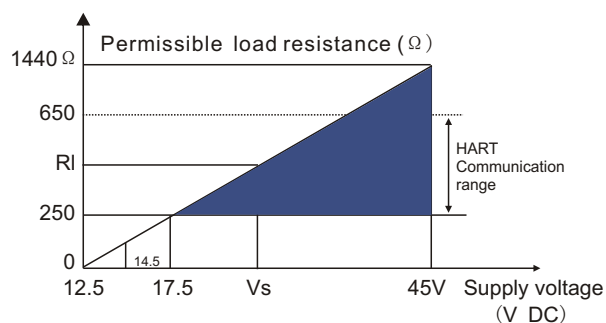
Two-wire 4~20mA, linear output or square root output is selectable for users. Digital process variable overlays on the 4~20mA signal, which can be applied to the host machines according with HART protocol.

Power supply

Need external power supply. While standard transmitter (4~20mA) has no load, work at 14.5~45V DC.

Loop load limit

The max. loop resistance is decided by the voltage of external power supply, the relations are as follows:



Supply voltage - load characteristic relation scheme

Note: The supply voltage range of transmitter with backlight display is 14.5~45V

The supply voltage range of intrinsic-safety series transmitter is 14.5~28V.

The working voltage while HART communication should be larger than 17.5V.

Limit of static pressure and max. overpressure

For WP363D type, the limit value is from 0psia to flange rated value or the smaller one in the rated pressure values of sensor.

Table 2. Pressure rated value of WP363G type flange

Standard	Type	Rated value of carbon steel	Rated value of stainless steel
ANSI/ASME	Class150	285psig	275psig
ANSI/ASME	Class300	740psig	720psig
ANSI/ASME	Class600	1480psig	1440psig
<i>For the measured value under 38℃, the rated value will decrease with the increasing of temperature.</i>			
DIN	PN 10-40	40bar	40bar
DIN	PN 10/16	16bar	16bar
DIN	PN 25/40	40bar	40bar
<i>Under 120℃, the rated value will decrease with the increasing of temperature.</i>			

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 transmitter:

Linear output: $3.8 < I < 20.8$

C4: I=20.8mA high fault

CN: I=3.8mA low fault

Temperature limit

Environment

-20℃~+70℃ (Ordinary)

-40℃~+85℃ (The highest)

Storage

-46℃~110℃

With header: -40℃~85℃

Process

Less than or equal to atmosphere, see the following table:

Table 3. Limit of WP363D process temperature

DC silicone oil 200	-45 to 205℃
DC silicone oil 704	-10 to 315℃
Fluorocarbon oil	-18 to 204℃

Humidity limit

0~100% relative humidity

Starting time

Reach to the performance index within 2s after the transmitter is power up.

Mechanical performance index

Electrical interface

ANSI (American-Standard) NPT1/2(F) internal thread

ISO (Chinese standard) M20×1.5 internal thread

Process interface

High-pressure side: flange size (execute national and chemical industry standard)

NP series: DN25 DN40 DN50 DN80 DN100

PN2.5 PN6 PN10 PN16 PN25 PN40

Class series: 1 inch, 1½ inches, 2inches, 3inches, 4 inches, 150lb、300lb

Low-pressure side: flange size (execute national and chemical industry standard)

NP series: DN25 DN40 DN50 DN80 DN100

PN2.5 PN6 PN10 PN16 PN25 PN40

Class series: 1 inch, 1½ inches, 2inches, 3inches, 4 inches, 150lb、300lb

Process liquid-contacting piece

Process isolation diaphragm: 316L stainless steel, hastelloy C (Plug-in cartridge doesn't have this option.), Ta (Plug-in cartridge doesn't have this option.).

Drain/vent valve

316 stainless steel

Process flange and interface

316 stainless steel

WP363G type process liquid-contacting piece

Flange type process interface (the high-pressure side of transmitter)

Process diaphragm, including process gasket contacting surface

316L stainless steel, hastelloy C or Ta

Extension part

316 stainless steel

Mounting flange

Carbon steel galvanization or stainless steel

Process connection on the low-pressure side (the low-pressure side of transmitter)

Isolation diaphragm

316L stainless steel

Flange and interface on the low-pressure side

316 stainless steel

Non-liquid-contacting piece

Shell

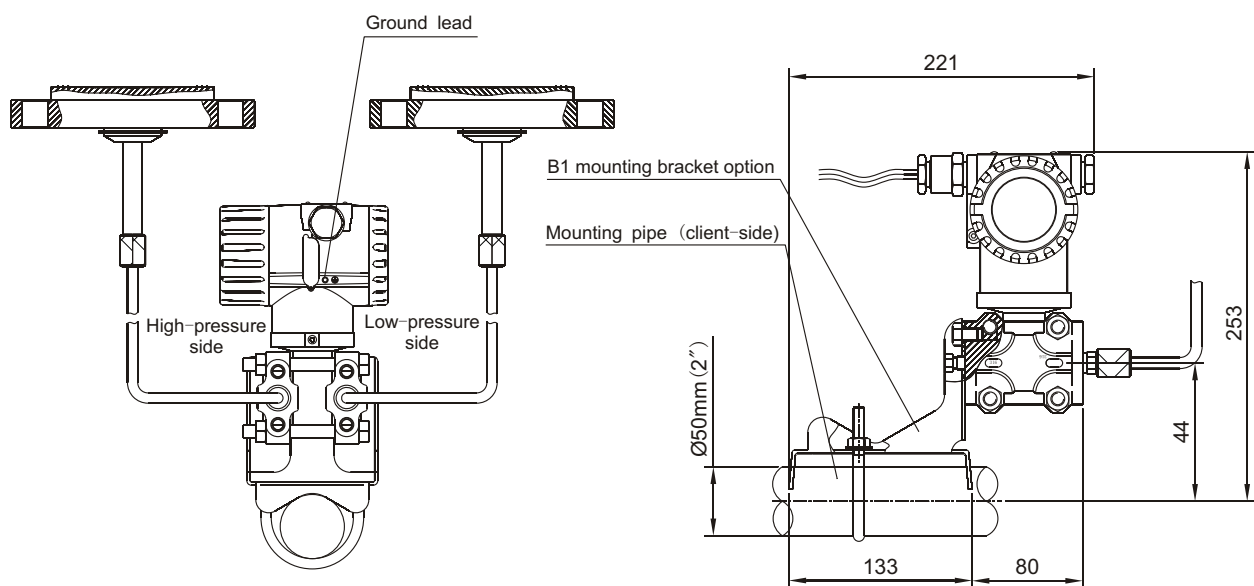
Aluminium die casting IP65

Coating

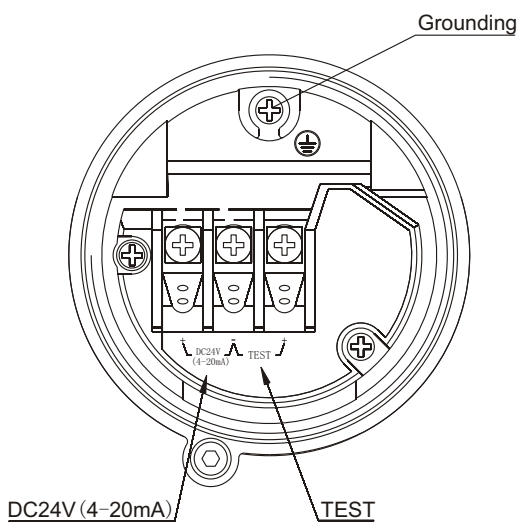
Spraying plastics

Meter cap O-ring

Nitrile rubber

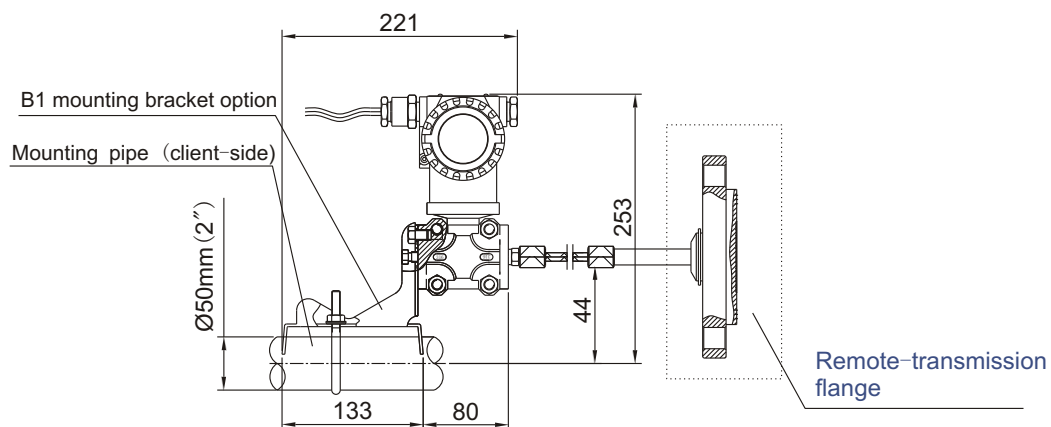


Outside drawing of double-flange installation

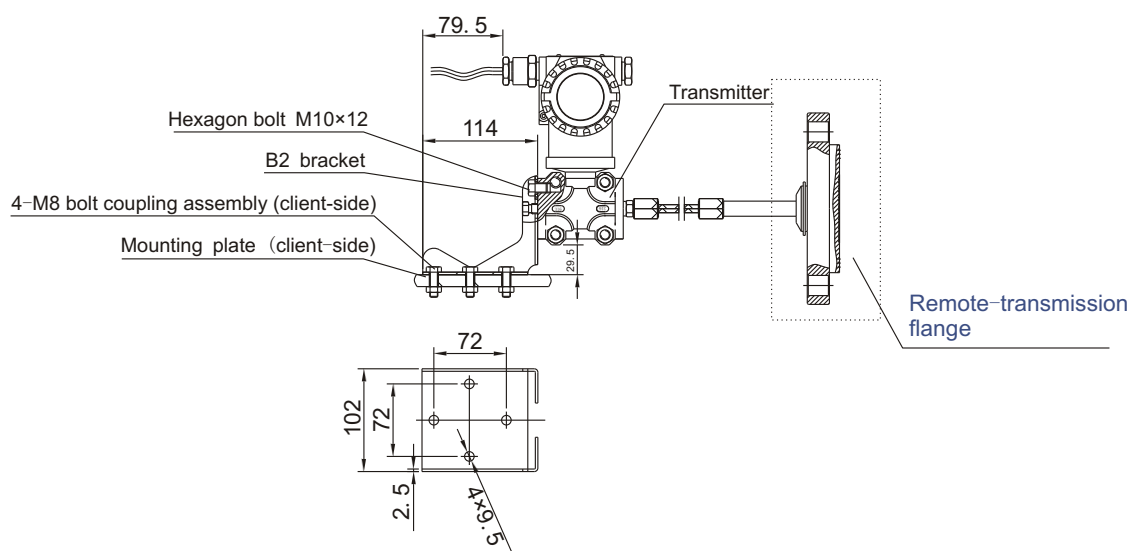


Connecting terminal	
DC24V(4~20mA) ⁺ ₋	Power supply and output end
TEST ⁺ ₋	Connect to the testing terminal of ampere meter (impedance should be less than 10 Ω)
⏏	Ground terminal

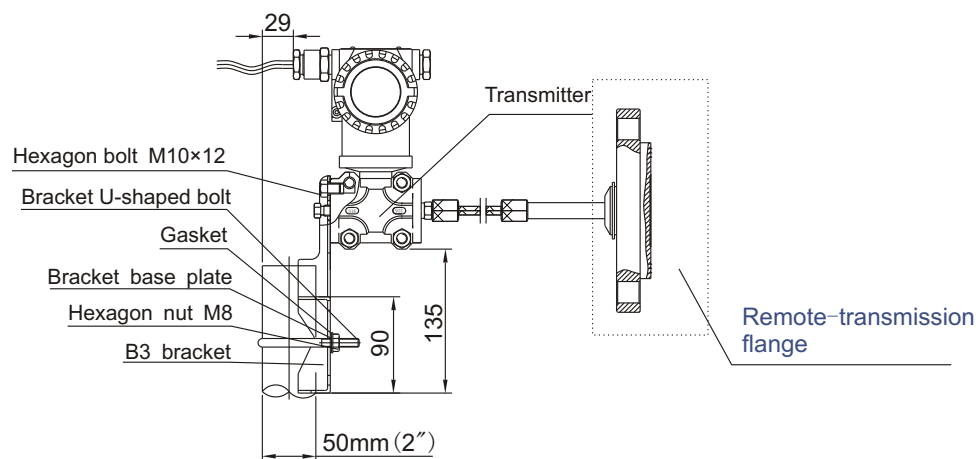
Wiring diagram of terminal side



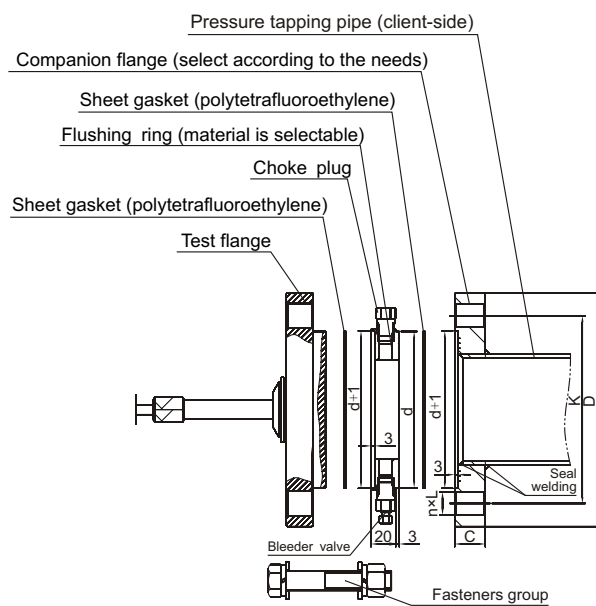
Subassembly of B1 mounting bracket



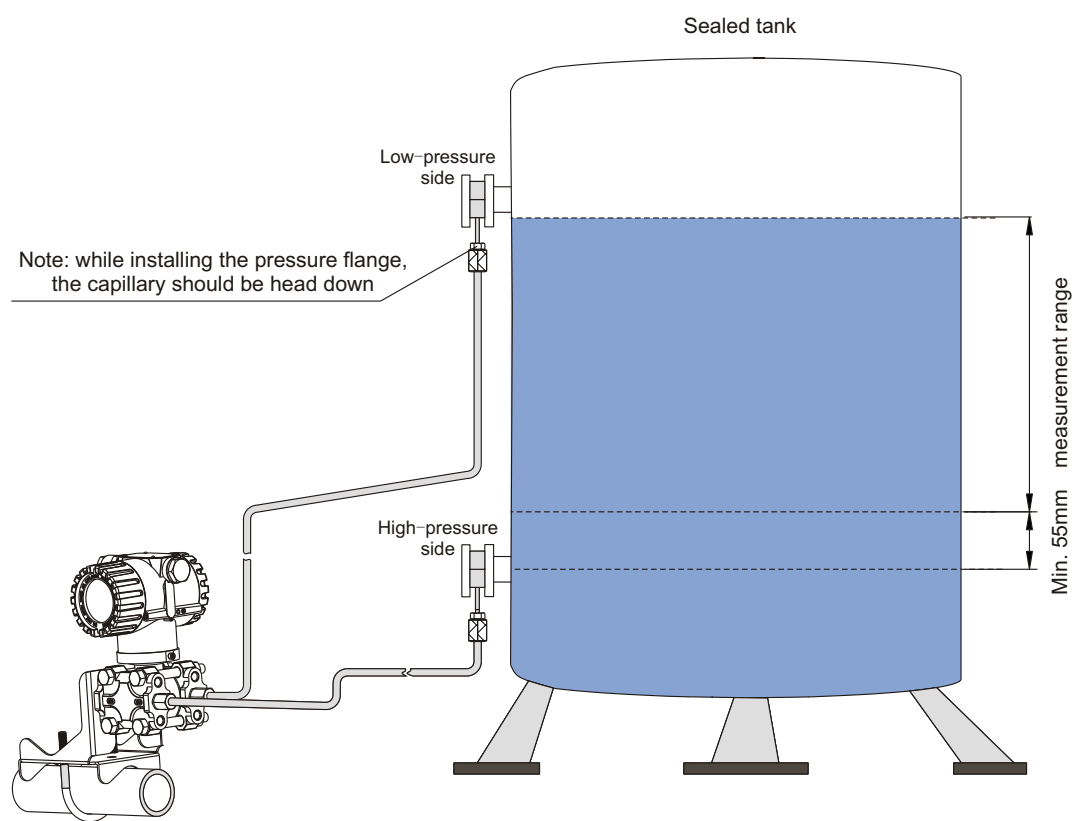
Subassembly of B2 mounting bracket



Subassembly of B3 mounting bracket



F1/F2 flushing ring



Field installation figure for double remote-transmission diaphragm system

Table 5. WP363D monocrystal silicon double flange remote transmitter

Model	Transmitter type		
WP363D-	Monocrystal silicon double flange remote transmitter		
Code	Measurement range of pressure		
M	0-10~40KPa		
H	0-50~250KPa		
V	0-0.1~1MPa		
Code	Flange standard		
P	Chemical industry standard HG/T20592-2009 (steel tube flange PN series - RF raised face flange) (adduce European system)		
C	Chemical industry standard HG/T20615-2009 (steel tube flange Class series - RF raised face flange) (adduce American system)		
Y	Other flange standard		
Code	Type of sealing element		
P	Flat trpe		
R	Flange type		
E	Plug-in cartridge type (not offer DN25, DN40, 1 inch and 1 1/2 inches)		
T	Thread type		
Code	Nominal aperture of flange		
	PN series (Eropean system)	Class series (American system)	Thread type spec.
1	DN25	1 inch	NPT1/2
2	DN40	1½ inches	NPT1/4
3	DN50	2 inches	NPT3/8
4	DN80	3 inches	NPT1
5	DN100	4 inches	NPT 1½ (without
Y	Special requirements	flushing hole)	
Code	Aperture pressure grade		
	PN series (Eropean system)	Class series (American system)	
1	PN2.5PN6(bar)		
2	PN10PN16(bar)	Class150(lb)	
3	PN25PN40(bar)	Class300(lb)	
Y	Special requirements		
Code	Plug-in cartridge extension length		
0	0 (Without Plug-in cartridge)		
2	50mm		
4	100mm		
6	150mm		
8	200mm		
Y	Special requirements		
Code	High pressure H-terminal capillary length		
??	The length of capillary is from 1~10m, indicated by ?? (for instance: 2m:02)		
Code	Low pressure L-terminal capillary length		
??	The length of capillary is from 1~10m, indicated by?? (for instance: 2m:02)		
Code	Diaphragm material		
-A	316L stainless steel		
-B	Hastelloy C (Plug-in cartridge type doesn't have this option.)		
-C	Ta(Plug-in cartridge type doesn't have this option.)		
-Y	Special requirements		

Table 5 (continued). WP363D monocrystal silicon double flange remote transmitter

Code	Process filling liquid - high-pressure side	Temperature limit	Contact temperature
D	Normal-temperature silicone oil	-45 to 205℃	-40 to 120℃
C	High-temperature silicone oil	0 to 315℃	0 to 120 ℃
H	Fluorocarbon oil	0 to 315℃	-18to 120 ℃
Code	Electrical interface		
A	NPT1/2 internal thread		
M	M20×1.5 internal thread		
Code	Options for the hazardous occasion certification		
N	Ordinary type (no anti-explosion)		
D	Flame-proof Exd II CT6		
I	Intrinsic-safety type Exia II CT6		
Code	Mounting bracket		
B3	Pipe-mounted flat bracket (2" pipe)		
B1	Pipe-mounted bent bracket (2" pipe)		
B2	Plate-mounted bent bracket		
Code	Other option		
H	The measurement accuracy is 0.1%FS		
S	The material of flange is 316 stainless steel		
G	The isolation diaphragm is gold-plated		
F	Diaphragm sticking with polytetrafluoroethylene (Not available for threaded type)		
T	Diaphragm coating with teflon (Not available for threaded type and wearproof type)		
Q4	Verification certificate(Contact Wide Plus)		
C4	High alarm		
CN	Low alarm (The default setting is low alarm)		
F1	Stainless steel flushing adapter ring (Plug-in cartridge type doesn't have this option.)		
Y	Special function(Contact Wide Plus)		

Note: 1.When the length of capillary increased, the accuracy is reduced.
2.if needing higher precision, please contact the marketing representatives of the corporation.
3. The default flange material is 304 stainless steel

WP series remote-transmission diaphragm system

Apply to WP36 type monocrystal silicon transmitter

Extend the applied range of pressure transmitter

- Blistering and gelid temperature
- Corrosive measurement occasions
- Process easy to block
- Occasions needing sanitation and hygiene

Applications

- Measurement of liquid level, flow, pressure, interface and density.



Technical specification

Table 1 Specification of filling liquid

Filling liquid	Temperature limit ⁽¹⁾		Specific gravity	Coefficient of thermal expansion cc/cc/°C	Viscosity at 25°C CST
	P _{absolute pressure} <1 bar Absolute pressure	P _{Absolute pressure} >1 Bar Absolute pressure			
D. C. 200 silicone oil	-45 to 100°C (-49 to 212°F)	-45 to 205°C	0.93	0.00108	9.5
D. C. 704 silicone oil ⁽²⁾	0 to 200°C (32 to 392°F)	-10 to 315°C	1.07	0.00095	44
Inert filling liquid (Halogenated hydrocarbon)	-50 to 80°C (-49 to 176°F)	-50 to 160°C	1.85	0.000864	6.5

(1) Under the occasion of vacuum measurement, the temperature limit reduces and probably be limited by the selected diaphragm sealing element. Please contact Fujian Wide Plus Corporation.

(2) The upper limit value of temperature applies to the capillary sealing element system, which is far away from the transmitter installation. For the situation that the temperature limit value is higher than 315°C, please contact Fujian Wide Plus Corporation.

Mounting flange

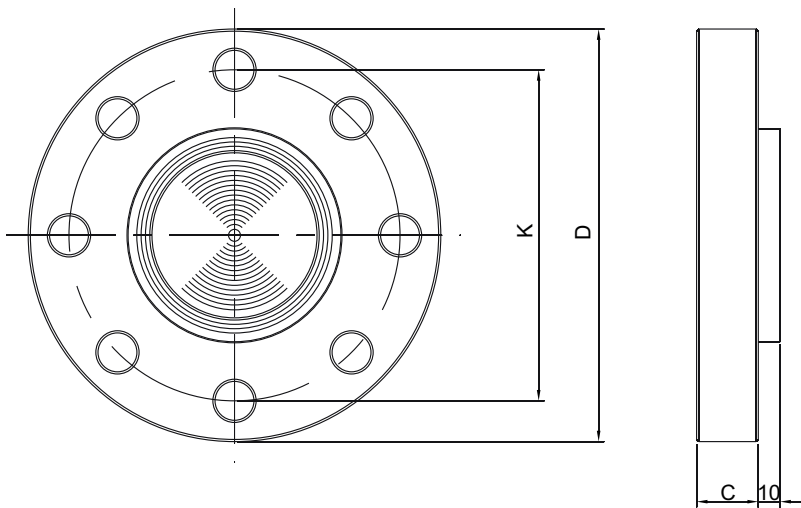


Table 2. The max. pressure rated value of flange

Standard	Grade/rated performance	Carbon steel	Stainless steel
ANSI	150	285 pounds/inch ² absolute pressure ⁽¹⁾	275 pounds/inch ² absolute pressure ⁽¹⁾
ANSI	300	740 pounds/inch ² absolute pressure ⁽¹⁾	720 pounds/inch ² absolute pressure ⁽¹⁾
ANSI	600	1480 pounds/inch ² absolute pressure ⁽¹⁾	1440 pounds/inch ² absolute pressure ⁽¹⁾
DIN	PN2.5/6	6 bar ⁽²⁾	6 bar ⁽²⁾
DIN	PN10/16	16 bar ⁽²⁾	16 bar ⁽²⁾
DIN	PN25/40	40 bar ⁽²⁾	40 bar ⁽²⁾
DIN	PN64	64 bar ⁽²⁾	64 bar ⁽²⁾
DIN	PN100	100 bar ⁽²⁾	100 bar ⁽²⁾

(1) Under 100°F (38°C), the rated value will decrease with the increasing of temperature.

(2) Under 248°F (120°C), the rated value will decrease with the increasing of temperature.

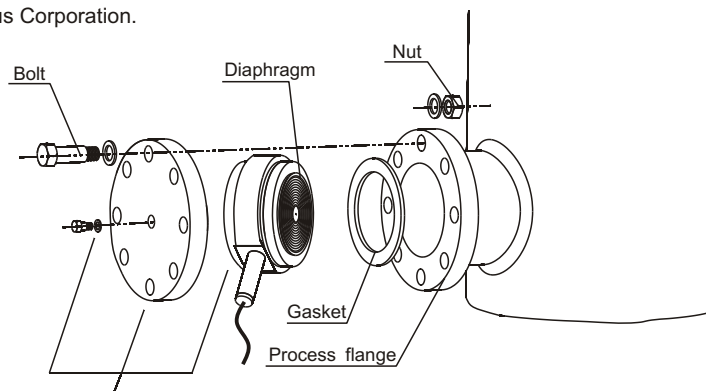
Guide for the selection of diaphragm sealing element

Guide for the selection of diaphragm sealing				
	Type of sealing element Flat type (Ring joint face connection)	Flange remote-transmission type sealing element (Ring joint face connection)	Extension-flange type sealing element	Thread type remote transmission sealing element
General application and service type	General application	General application Smaller process connection	Technical process of heat preservation	High-temperature applications Thread type connection
Process connection size	1 inch DN25 1½ inches DN40 2 inches DN50 3 inches DN80 4 inches DN100	1 inch DN25 1½ inches DN40 2 inches DN50 3 inches DN80 4 inches DN100	1 inch DN25 1½ inches DN40 2 inches DN50 3 inches DN80 4 inches DN100	NPT 1/4 NPT 3/8 NPT 1/2 NPT 1 NPT 1½ (without flushing hole)
Flange pressure rated value or max. limit working pressure	Grade 150 Grade 300 Grade 600 PN 40 PN 64(63) PN 100 No flange (max. limit working pressure 2000pounds/inch ²)	Grade 150 Grade 300 Grade 600 PN 16 PN 40 PN 64 PN 100	Grade 150 Grade 300 Grade 600 PN 10/16 PN 40 PN 64 PN 100	2500pounds/inch ²
Material of diaphragm and wet-contacting parts	316L stainless steel Hastelloy C Ta 304L stainless steel	316L stainless steel Hastelloy C Ta 304L stainless steel	316L stainless steel 304L stainless steel	316L stainless steel Hastelloy C Ta
Casing material	316L stainless steel Hastelloy C Carbon steel 304L stainless steel	316L stainless steel Hastelloy C Carbon steel 304L stainless steel	Not applicable	316L stainless steel Hastelloy C Carbon steel 304L stainless steel
Options	Diaphragm sticking with polytetrafluoroethylene Diaphragm coating with teflon	Diaphragm sticking with polytetrafluoroethylene Diaphragm coating with teflon	Diaphragm sticking with polytetrafluoroethylene Diaphragm coating with teflon	Diaphragm sticking with polytetrafluoroethylene Diaphragm coating with teflon

Sealing element subassembly of general-purpose diaphragm

Flat type diaphragm sealing element

Tips: The illustrations indicate the standard supply products. If needing the dimensional drawing of the special order configuration, please contact Fujian Wide Plus Corporation.



Before delivery, the product has been assembled.

Field installation figure for flat type diaphragm

3 inches flat type sealing element with optional flushing connection structure

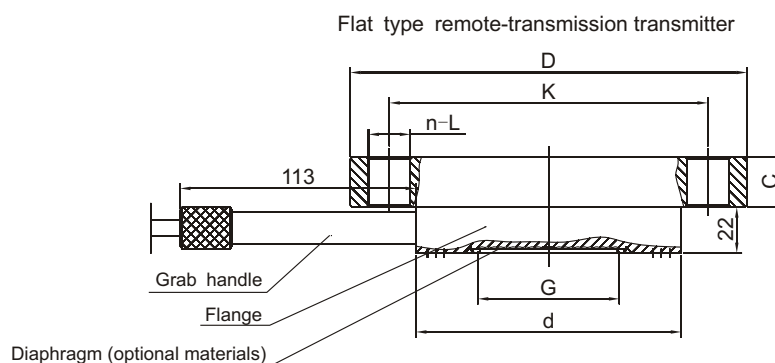


Table 5. Size of flat diaphragm sealing element

Flange specification		Extensional diameter of corrugated surface G(mm)		Connection dimension (mm)				
		Diaphragm material		Flange OD D	Diameter of sealing face d	Flange thickness C	Bolt pitch K	Bolt hole quantity-diameter n-L
Aperture	Pressure grade	316L	Ta, hastelloy C					
DN25	PN 6, 10, 16, 25, 40 Bar	56	50	Refer to the chemical industry standard HG/T20592-2009 (RF raised face flange)				
DN40		56	62					
DN50		80	78					
DN80		80	78					
DN100		80	78					
1"	Class 150, 300	56	56	Refer to the chemical industry standard HG/T20615-2009 (RF raised face flange)				
1.5"		62	62					
2"		80	76					
3"		80	78					
4"		80	78					

Note: the flanges of other specifications and standards can be determined by special contract review. Please refer to Appendix 4 for the connection dimension.

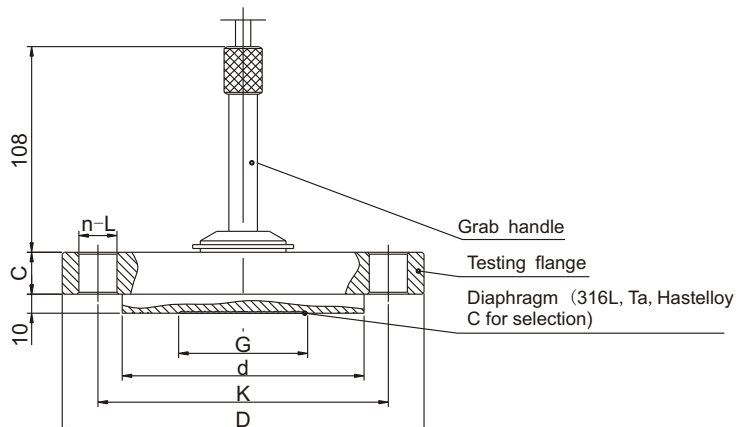
Flange remote-transmission type sealing element

(Apply to the connection of smaller process)

Tips

The illustrations indicate the standard supply products. If needing the dimensional drawing of the special order configuration, please contact Fujian Wide Plus Corporation.

1 inch flange remote-transmission type sealing element and flushing connection ring (lower shell)



Flange type remote-transmission transmitter

Table 7. Size of flange remote-transmission sealing element

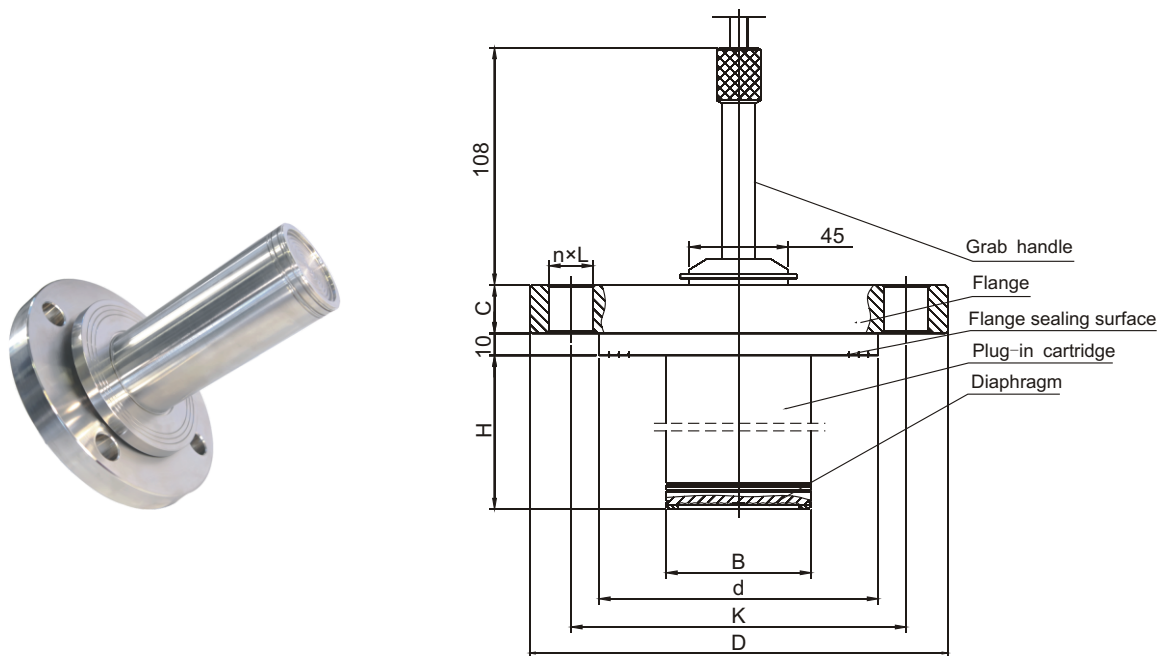
Flange specification		Extensional diameter of corrugated surface G(mm)		Connection dimension (mm)				
		Diaphragm material		Flange OD D	Diameter of sealing face d	Flange thickness C	Bolt pitch K	Bolt hole quantity-diameter n-L
Aperture	Pressure grade	316L	Ta, hastelloy C					
DN25	PN 6, 10, 16, 25, 40 Bar	56	50	Refer to the chemical industry standard HG/T20592-2009 (RF raised face flange)				
DN40		56	62					
DN50		80	78					
DN80		80	78					
DN100		80	78					
1"	Class 150, 300	56	56	Refer to the chemical industry standard HG/T20615-2009 (RF raised face flange)				
1.5"		62	62					
2"		80	76					
3"		80	78					
4"		80	78					

Note: the flanges of other specifications and standards can be determined by special contract review. Please refer to Appendix 4 for the connection dimension.

Extension flange type sealing element

Tips The illustrations indicate the standard supply products. If needing the dimensional drawing of the special order configuration, please contact Fujian Wide Plus Corporation.

Dimensional drawing for extension flange type subassembly



Extension flange type remote-transmission transmitter

Table 9. Size of extension flange type sealing element

Flange specification		Plug-in cartridge (mm)		Connection dimension (mm)				
Aperture	Pressure grade	Diameter B	Depth H	Flange OD D	Diameter of sealing face d	Flange thickness C	Bolt pitch K	Bolt hole quantity-diameter n-L
DN50	PN 6, 10, 16, 25, 40 Bar	49	50, 100, 150, 200	Refer to the chemical industry standard HG/T20592-2009 (RF raised face flange)				
DN80		66						
DN100		89						
2"	Class 150, 300	49	50, 100, 150, 200	Refer to the chemical industry standard HG/T20615-2009 (RF raised face flange)				
3"		66						
4"		89						

Note: the flanges of other specifications and standards can be determined by special contract review. Please refer to Appendix 4 for the connection dimension.

Thread remote-transmission type sealing element

Tips The illustrations indicate the standard supply products. If needing the dimensional drawing of the special order configuration, please contact Fujian Wide Plus Corporation.

Dimensional drawing for thread remote-transmission type sealing element subassembly

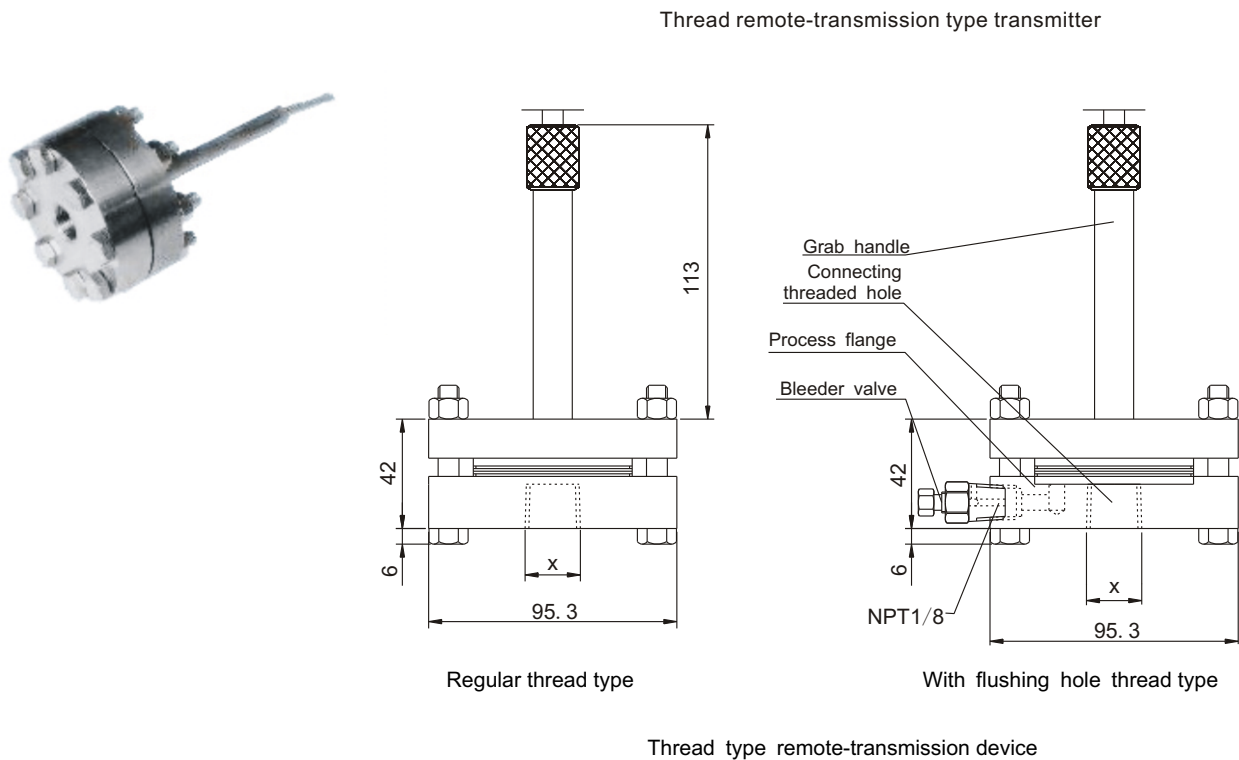


Table 11. Size of thread remote-transmission type sealing element ⁽¹⁾

Rated value	Overall diameter (A)	Overall height (B)
2500pounds/inch ² (172bar)	3. 74 (95)	2. 32 (59)

(1)The unit of size is inch (mm).

Thread specification X
NPT1/2 (GB/T 12716-2002)
NPT1/4 (GB/T 12716-2002)
NPT3/8 (GB/T 12716-2002)
NPT1 (GB/T 12716-2002)
NPT1½ (Without flushing hole)

The threads of other specification can be determined by special contract review.

Comprehensive technical data

Comprehensive technical data

The performance data of this product provide the information relevant to WP transmitter/diaphragm sealing element system.

The diaphragm sealing element can be assembled onto the WP type differential pressure, gage pressure and absolute pressure transmitters and liquid level transmitter. Please refer to the related product performance data for the specific information.

Tips:

★ The transmitters/diaphragm sealing element materials, structural configuration and filling liquids of many other special orders, which haven't been contained in this book, can also be offered. Please contact Fujian Wide Plus Corporation for more information.

What is a diaphragm sealing element system?

A diaphragm sealing element system is composed of a pressure transmitter, a diaphragm sealing element, a kind of filling liquid and a directly-mounted or capillary type connecting structure.

While working, the thin and elastic diaphragm and filling liquid will isolate the pressure sensing element of transmitter from the process medium. The channel of capillary will connect the diaphragm to the transmitter.

When the process pressure works, the diaphragm will have displacement and the measured pressure will be transmitted to the element of transmitter via filling liquid system and capillary channel. This transmitted pressure will make the detecting diaphragm, which is in the pressure sensing element of transmitter, have displacement. The displacement is in direct proportion to the process pressure and converted into the appropriate current, voltage or digital HART (Bus addressable remote transmitter) output signal via electronic circuit.

Why should the diaphragm sealing element be used?

The diaphragm sealing element system of Fujian Wide Plus Corporation not only can provide reliable process pressure measurement, but also can prevent the process medium from contacting the transmitter diaphragm.

Under the following conditions, should consider using transmitter/diaphragm sealing element system:

- The process temperature is beyond the normal operating range of transmitter and the pressure-leading pipeline cannot adjust the temperature under the temperature limit value.
- The process is corrosive, which needs to replace the transmitter frequently or use unusual structural materials.
- The process contains suspending solid particles or viscous liquid, which will probably block the pressure-leading pipeline.
- It is required to adopt sanitary connection structure.
- The process should be cleaned easier from the connection structure so as to avoid the pollution among the processing batches.
- Objectively, the filling liquid connecting pipe should be replaced to reduce the maintenance under some application occasions, such as the place that the filling liquid connecting pipe is not stable or the place in which the liquid should be filled.
- It needs density or interface measurement.
- The process will probably be frozen or solidified in the transmitter or connecting pipe.

The factors influencing the performance

Temperature effect

When the filling liquid is dilated or shrunk with the fluctuation of process and ambient temperature, the temperature effect will come into being. This kind of change (in the volume of filling liquid) will transform the internal pressure of transmitter/sealing element system.

There are two main factors influencing the temperature performance of a diaphragm sealing element system: the rigidity of diaphragm and the characteristics of filling liquid.

Diaphragm rigidity

The rigidity of diaphragm is a key parameter which will influence the temperature performance. When the filling liquid dilates and shrinks as a result of temperature changing, a elastic diaphragm will have less reverse pressure than a rigid diaphragm (if the changes of filling liquid volumes are equal). The reverse pressure will cause measurement error, for it is acting on the detecting diaphragm of transmitter. Therefore, the elastic diaphragm sealing element can tolerate the changing of filling liquid volume caused by temperature changing and greatly reduce the error caused by temperature changing.

The rigidity of diaphragm is influenced by the diaphragm diameter, structural material, thickness and volution pattern, among which, the most important one is the diameter of diaphragm sealing element. Every diaphragm has its own rigidity characteristic curve. Generally speaking, the rigidity of a diaphragm with shorter diameter is larger than that of a diaphragm with longer diameter. So its rigidity curve presents a smaller perpendicularity. The more perpendicular rigidity curve is conducive to reducing the pressure error amount, which will probably occur when the filling liquid dilates or shrinks with the changing of temperature.

The Fig. 1 on Page58 shows the diaphragm with longer diameter and less rigidity. The error caused by the changing of filling liquid volume is smaller, which is the result of more vertical rigidity curve. The diaphragm with shorter diameter has a smaller perpendicularity of rigidity curve, which will make the error bigger with the changing of temperature.

Filling liquid

The swelling properties and volume will influence the performance of sealing element.

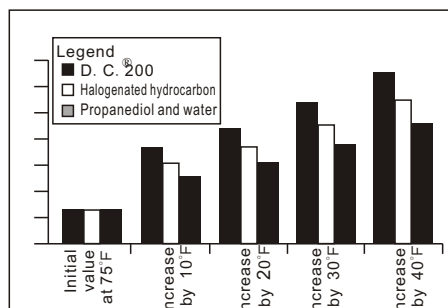
All the filling liquids will dilate and shrink with the changing of temperature. The coefficient of thermal expansion determines this variation, which is indicated by the cubic centimeter amount dilated per cubic centimeter per Fahrenheit (CC/CC/°F). Shown as in the Graph 2 in Fig.1, the swell increments of filling liquids are different. To select the filling liquid with smaller coefficient of thermal expansion will conduce to greatly reducing the temperature error. The table 1 on Page46 "Technical specification of filling liquid" offers the coefficients of thermal expansion of all the filling liquids that we can provide.

The big volume of filling liquid increases the capacity of volume expansion. The volume of filling liquid can be kept at the min. amount as far as possible by reducing the capillary length and internal diameter so as to reduce the effect of temperature.

Influence of pressure head

The influence of pressure head is the result of the density fluctuation of filling liquid in the capillary, which is caused by the fluctuation of process or ambient temperature and can be added to the error of temperature effect.

The influence of pressure head is decided by the changing of ambient temperature, internal diameter of capillary, filling liquid and the distance between the pressure-tapping nozzles of process connection (not the length of capillary).



The expansion of oil, which is in a capillary with internal diameter 0.028 inches and length 1 inch, with the increasing of temperature

Time response

Using diaphragm seal element will increase the total response time of transmitter/diaphragm sealing element system. The time response will change with the temperature, pressure, capillary length, internal diameter (ID), filling liquid, viscosity and transmitter model.

Capillary ID: If the internal diameter (ID) of capillary is smaller, it will generate stronger throttling and slow down the transmission of pressure. If the ID is larger, it will provide faster response time.

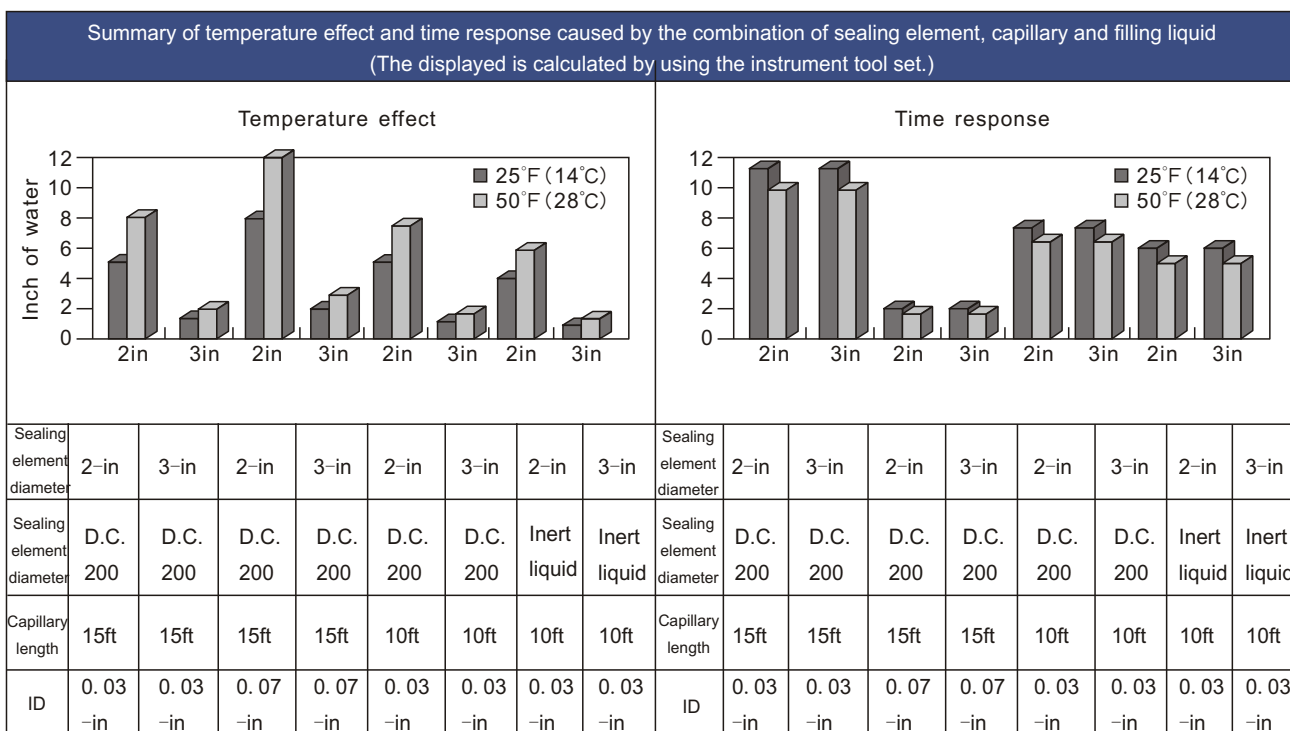
Viscosity of filling liquid: The viscosity of filling liquid is a kind of measurement of its flowability, which is related to the temperature. While selecting a kind of filling liquid with smaller viscosity, especially under the colder condition, using longer capillary will improve the response time.

Length of capillary: If the capillary is longer, the transmission distance of pressure signal will be longer, which increase the response time.

In the occasion that the big tank and liquid level changes slowly, it will probably not be hindered by the longer response time. However, if the response time is too slow, the measurement difficulties will easily occur for a small and narrow tank. For the occasions with quick change, such as flow, quicker response time is required.

Brief summary

Adding the diaphragm sealing element on the transmitter will influence the total system performance. These effects can be reduce furthest and the performance of assembling units can be strengthened by selecting the most suitable diaphragm sealing element, capillary and filling liquid. In addition, it can meet or superior to the process requirements.



While selecting a remote-transmission diaphragm system, the following points should be taken into consideration:

- Select the diaphragm with larger diameter to greatly reduce the effects of temperature.
- Select the shorter capillary to greatly reduce the effects of temperature and response time.
- Select the capillary with larger internal diameter to improve the time response or select capillary with smaller ID to improve the temperature performance.
- Select the filling liquid with the smallest viscosity and min. coefficient of thermal expansion, which can simultaneously meet the extreme process conditions.

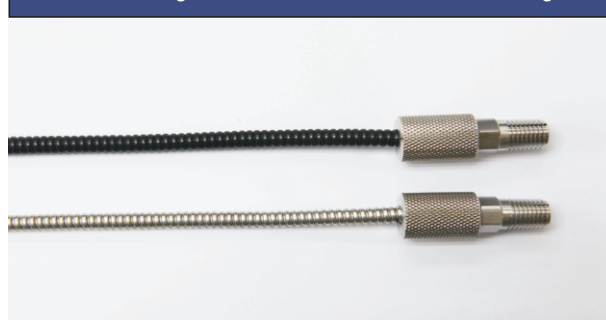
Connection type of diaphragm sealing element

Capillary type

The capillary type sealing element connects with the diameter of 1.09mm and can provide standard length (7.5m). There are two kinds of connection structure of capillary type sealing element for selection:

- PVC sheath
- 304 stainless steel armoured casing

PVC casing, 304 stainless steel armoured casing



Transmitter gauge valve series

Instrument Valves, General needle valve, Plug valve

Product introduction

Material selection

The standard structural materials of CHPAG (China High Precision) brand tube fittings are all 316SS stainless steel. The materials are screened and selected more strictly on the basis of ASTM standard. So their performance indexes, such as intergranular corrosion resistance, pitting resistance and strength etc, are superior to the common 316 stainless steel. The corporation possesses the complete inspection equipments and systems of material composition, strength, corrosion and defects etc. There are strict regulations and incoming inspections on the performance indexes of all materials

Product design and Test

The structural design of tube fittings has been analyzed and optimized by MSC.Nastran software, which is most authoritative in the international engineering field. The design safety factor is 4:1. While finalizing, all the valves have passed

the blasting test (which is 4 times higher than the normal-temperature working pressure) and 2-time static pressure test. Before leaving the factory, each valve has passed the sealing performance test with 7MPa nitrogen pressure.

High-precision manufacturing

The manufactured tube fittings are all processed by the high-precision CNC machining equipments so as to ensure the accuracy of the parts and the consistency of different batches. The sophisticated burring treatment process of parts and hardening & anti-corrosion treatment process of key positions together with the strict assembling and testing process ensure that our products have excellent quality and mass stability.

Advanced manufacturing technique

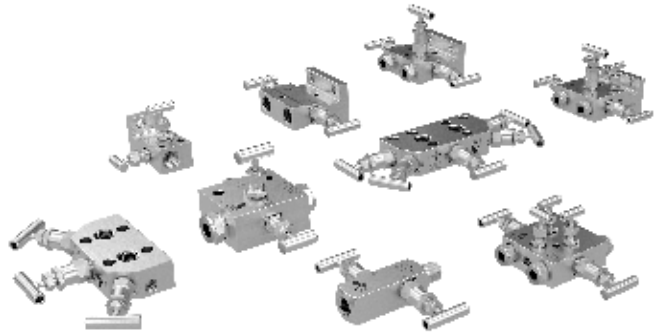
The most reliable **quality experience**



Instrument valves manifold

V, VR, VL, VT and VB series

- Two, three & five valves instrument valves manifold
- Total 316 stainless steel structure
- Max. working pressure 42 MPa (VR2 series is 70 MPa)
- The highest permissible working temperature 537°C
- Selectable gland packing



General needle valve

- Total 316 stainless steel structure
- Max. working pressure 42MPa (6090psi)
- The highest permissible temperature 343°C (650°F)
- Flow coefficient: 0.45 2.25
- Aperture: 5mm 11mm



General ball valve

- Total 316 stainless steel structure
- Max. working pressure 20.6MPa (3000psi)
- The highest permissible temperature 232°C (450°F)
- 1/4 circle on and off
- The on and off positions can be locked
- 1/8 to 1 in. and 6 to 25mm aperture
- Compensation valve seat design, elastic loaded and tapered assembled packing



Plug valve

Pt4 & Pt6 series

- Total 316 stainless steel structure
- Max. working pressure 20.6 Mpa (3000psi)
- The highest permissible temperature 204°C (400°F)
- Connector type: 1/8 to 1/2in. and 6 to 12 mm
- Bite type tube fittings or NPT threaded connector



Want to know more products information, please refer to the company sales representative for 《instrument valves(manifolds) and tube fittings》, product manual or log on to embellish website www.wideplus.com page to download.

Hat type needle valve

NIP & NI series

- Total 316 stainless steel structure
- Max. working pressure 42MPa (6090psi)
- The highest permissible temperature 315°C (600°F)
- Flow coefficient: 0.09 1.8
- Aperture: 2.0mm 9.5mm



Trunnion ball valve

BT & BTH series

- Total 316 stainless steel structure
- Max. working pressure 70 MPa (10150 psi)
- The max. permissible temperature 232°C (450°F)
- Connector type: 1/8 to 1/2in. and 6 to 12mm bite type tube fittings
- NPT internal thread connector



Bite type tube fittings

- Apply to the ferrule tube of specification from 1/4 to 1 in. and 6 to 25mm
- After the first installation, it has consistent testability
- Easy to dismantle and refasten, the dismounting times are not less than 30 times
- Multiple structural forms



Instrument protection box

Insulation (protection) box and sun shade

Product introduction

The instrument protection boxes, such as insulation (protection) box and sun shade, are the environment-friendly instrument safety protection boxes developed according to the field demands of industrial automation instruments and electric instruments by Fujian Wide Plus Precision Instruments Co., Ltd. The productive process of this device is pollution free with high degree of low carbon. The safety performance of the instrument is much higher than the previous metal and epoxy resin products and its service life is more than 20 years. It has excellent corrosion resistance, resistance to temperature difference, sealing property and adiabaticity etc. So it has higher cost performance.

Applications

It can be applied to various industries, such as chemical industry, petrochemistry, petroleum, military industry, steel and oceanographic engineering etc, especially the corrosive occasions (like petroleum, chemical engineering, natural gas and offshore platform etc), the freezing (like north pole) and extremely hot (like the Middle East and Africa) areas with formidable natural conditions, the fields, which has protection demands on the application of instrument application and the hostile environment, such as low temperature, high temperature, large temperature difference, desert, blizzard, windy and dusty, salt fog, ocean and shore etc.

Advantages of instrument protection box

- Resistance to chemical attack and offshore salt-spray corrosion;
- With high protection grade (Ip65), excellent heat preservation and insulation effects. It can also quantize the heat loss to make the tracing heat (electric heat tracing or hot water, steam heat tracing) factual;
- In light weight and high strength. The box material has inflaming retarding performance and long service life (at least 20 years);
- The design of this product is suitable to the installation characteristics and long-distance transportation of instrument integration. It is one of the optimal selections of the design, installation and application of modern industrial instruments.

Performance parameter

- Temperature of working environment: -60°C $+120^{\circ}\text{C}$
- Heat conductivity coefficient: 0.23w/mk
- Shock strength: 101 KJ/mZ
- Bending strength: 155MPa
- Protection grade: IP65
- Antiflaming: at least SE (self extinguish)
- Spcific gravity: $1.7 \sim 1.9\text{g/cm}^3$
- UV test: 500h
- Color: international gray or required by users

Advanced manufacturing technique

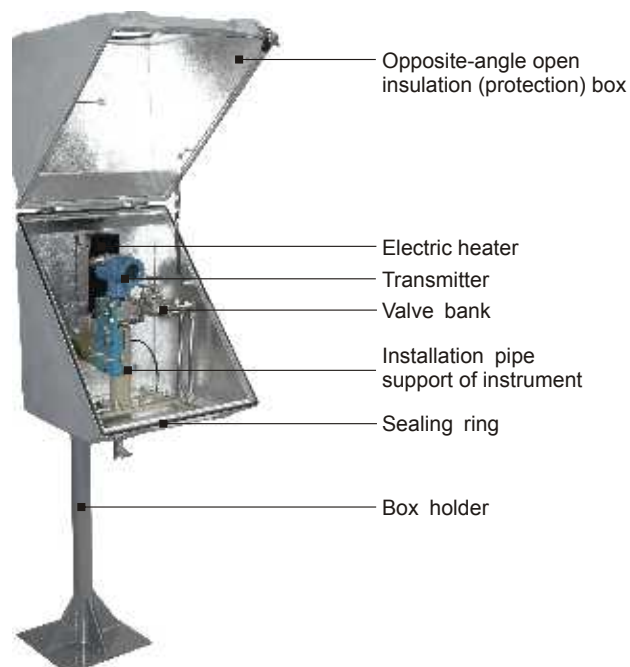
The most reliable quality experience



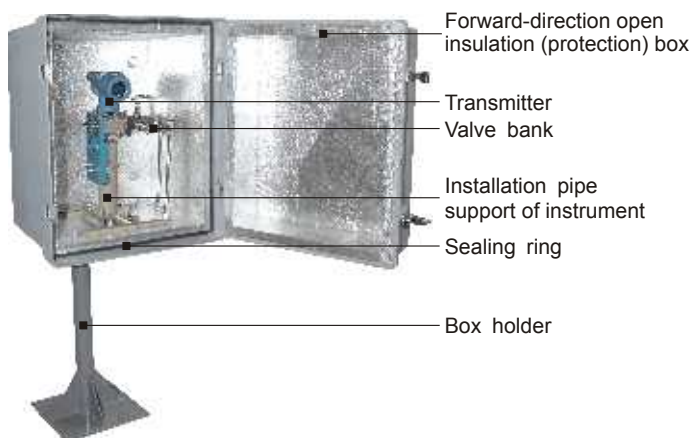
Types of instrument protection box	Opposite-angle open type	Forward-direction open type	Sun shade type
			
Installation parts of insulation (protection) box and sun shade	Name: upflow tube installation hoop of box Material: stainless steel Zinc coat Zinc coat and spraying plastics  		
	Name: box holder Material: stainless steel Zinc coat Zinc coat and spraying plastics  		
	Name: installation pipe support of instrument Material: stainless steel Zinc coat Zinc coat and spraying plastics  		
	Name: installation guide rail Material: stainless steel Zinc coat Zinc coat and spraying plastics  		
	Name: cable joint Material: polytetrafluoroethylene  		

Diagram for installation

Stack mounting diagram for opposite-angle open insulation (protection) box transmitter



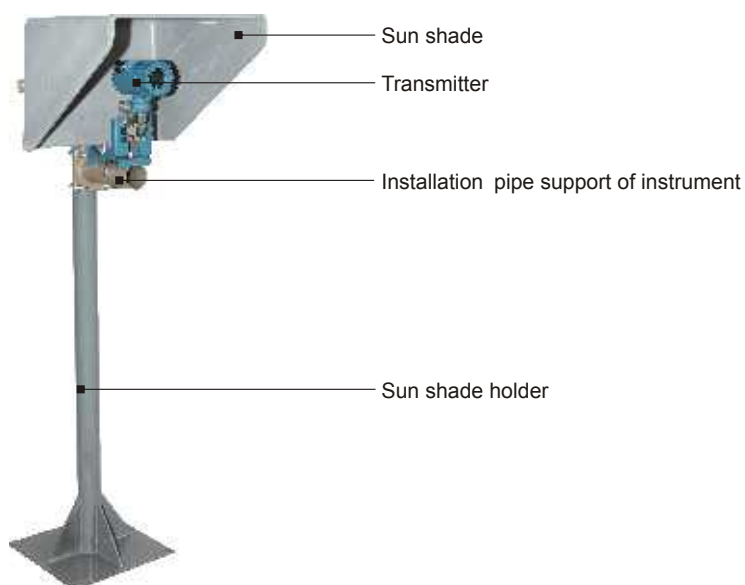
Stack mounting diagram for forward-direction open insulation (protection) box transmitter



Outline dimension of opposite-angle open/ forward-direction open insulation (protection) box

Width W	Height H	Depth D
300 (mm)	400 (mm)	400 (mm)
400 (mm)	500 (mm)	500 (mm)
500 (mm)	600 (mm)	500 (mm)

Stack mounting diagram for sun shade transmitter



Outline dimension of sun shade transmitter insulation (protection) box

Width W	Height H	Depth D
300 (mm)	200 (mm)	300 (mm)
400 (mm)	300 (mm)	400 (mm)

Model description of instrument protection box

Model	WP-G	
Box type	-A1 -A2 -B1 -B2 -C	Opposite-angle open type Opposite-angle open without windowing type Forward-direction open type Forward-direction open without windowing type Sun shade type
Type of heat preservation	-PB -NB -EB -SB	Protection box (no heat-preservation effect) Insulation box without heat tracing Insulation box with electric heat tracing Insulation box with steam heat tracing
Box width	-200 -300 -400 -500	Unit: mm Unit: mm Unit: mm Unit: mm
Box height	*200 *300 *400 *500 *600	Unit: mm Unit: mm Unit: mm Unit: mm Unit: mm
Box depth	*300 *400 *500	Unit: mm Unit: mm Unit: mm
Box holder Installation mode	-A -B	Box holder bottom installation Box holder back type installation
Instrument installation Holder type	1 2	Instrument bottom installation holder Instrument back type installation holder
Anti-explosion type	S D	Ordinary type Flame-proof type

For example: WP-G-A1-EB-200*200*300-B1S means opposite-angle open type protection box with electric heat tracing, size width×height×depth (200×200×300). The box adopts the installation mode of back type holder and the instrument adopts bottom support type.

Reference table for flange size (Chemical industry standard)

Nominal size DN HG/T20592-2009 RF raised face flange)	PN2.5, 6(bar) Connection dimension (mm)						PN10, 16(bar) Connection dimension (mm)						PN25, 40(bar) Connection dimension (mm)					
	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount	Flange thickness	Diameter of sealing surface	Diameter of plug-in cartridge	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount	Flange thickness	Diameter of sealing surface	Diameter of plug-in cartridge	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount
	D	K	L	n/pcs	C	d	B	D	K	L	n/pcs	C	d	B	D	K	L	n/pcs
25	100	75	11	4	14	60	—	115	85	14	4	16	68	—	115	85	14	4
32	120	90	14	4	16	70	—	140	100	18	4	18	78	—	140	100	18	4
40	130	100	14	4	16	80	—	150	110	18	4	18	88	—	150	110	18	4
50	140	110	14	4	16	90	46	165	125	18	4	19	102	46	165	125	18	4
65	160	130	14	4	16	110	62	185	145	18	8	20	122	62	185	145	18	8
80	190	150	18	4	18	128	74	200	160	18	8	20	138	74	200	160	18	8
100	210	170	18	4	18	148	88	220	180	18	8	22	158	88	235	190	22	8
Nominal size NPS HG/T20615-2009 (RF raised face flange)	Class 150 lb Connection dimension (mm)						Class 300 lb Connection dimension (mm)						Class 600 lb Connection dimension (mm)					
	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount	Flange thickness	Diameter of sealing surface	Diameter of plug-in cartridge	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount	Flange thickness	Diameter of sealing surface	Diameter of plug-in cartridge	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount
	D	K	L	n/pcs	C	d	B	D	K	L	n/pcs	C	d	B	D	K	L	n/pcs
1"	110	79.4	16	4	12.7	50.8	—	125	88.9	18	4	15.9	50.8	—	125	88.9	18	4
1½"	127	98.4	16	4	15.9	73	—	155	114.3	22	4	19.1	73	—	155	114.3	22	4
2"	150	120.7	18	4	17.5	92.1	49	165	127	18	8	20.7	92.1	49	165	127	18	8
3"	190	152.4	18	4	22.3	127	66	210	168.3	22	8	27	127	66	210	168.3	22	8
4"	230	190.5	18	8	22.3	157.2	89	255	200	22	8	30.2	157.2	89	275	215.9	26	8

Appendix

Comparison table for flange nominal pressure grade

Class	PN
Class150	PN20
Class300	PN50
Class600	PN110

Reference table for flange size (National standard)

Nominal size DN GB/T9115-2010 (RF raised face flange)	PN2.5, 6(bar) Connection dimension (mm)						PN10, 16(bar) Connection dimension (mm)						PN25, 40(bar) Connection dimension (mm)								
	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount	Flange thickness	Diameter of sealing surface	Diameter of plug-in cartridge	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount	Flange thickness	Diameter of sealing surface	Diameter of plug-in cartridge	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount	Flange thickness	Diameter of sealing surface	Diameter of plug-in cartridge
	D	K	L	n/pcs	C	d	B	D	K	L	n/pcs	C	d	B	D	K	L	n/pcs	C	d	B
25	100	75	11	4	14	60		115	85	14	4	18	68		115	85	14	4	18	68	
32	120	90	14	4	14	70		140	100	18	4	18	78		140	100	18	4	18	78	
40	130	100	14	4	14	80		150	110	18	4	18	88		150	110	18	4	18	88	
50	140	110	14	4	14	90	46	165	125	18	4	18	102	46	165	125	18	4	20	102	46
65	160	130	14	4	14	110	62	185	145	18	8	18	122	62	185	145	18	8	22	122	62
80	190	150	18	4	18	128	74	200	160	18	8	20	138	74	200	160	18	8	24	138	74
100	210	170	18	4	18	148	88	220	180	18	8	20	158	88	235	190	22	8	24	162	88
Nominal size NPS GB/T9115-2010 (RF raised face flange)	Class 150 lb Connection dimension (mm)						Class 300 lb Connection dimension (mm)						Class 600 lb Connection dimension (mm)								
	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount	Flange thickness	Diameter of sealing surface	Diameter of plug-in cartridge	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount	Flange thickness	Diameter of sealing surface	Diameter of plug-in cartridge	Flange OD	Center circle diameter of bolt hole	Diameter of bolt hole	Bolt amount	Flange thickness	Diameter of sealing surface	Diameter of plug-in cartridge
	D	K	L	n/pcs	C	d	B	D	K	L	n/pcs	C	d	B	D	K	L	n/pcs	C	d	B
1"	110	79.4	16	4	12.7	50.8		125	88.9	19	4	15.9	50.8		125	88.9	19	4	17.5	50.8	
1½"	125	98.4	16	4	15.9	73		155	114.3	22	4	19.1	73		155	114.3	22	4	22.3	73	
2"	150	120.7	19	4	17.5	92.1	49	165	127	19	8	20.7	92.1	49	165	127	19	8	25.4	92.1	49
3"	190	152.4	19	4	22.3	127	66	210	168.3	22	8	27	127	66	210	168.3	22	8	31.8	127	66
4"	230	190.5	19	8	22.3	157.2	89	255	200	22	8	30.2	157.2	89	275	215.9	26	8	38.1	157.2	89

Comparison table for flange nominal pressure grade

Class	PN
Class150	PN20
Class300	PN50
Class600	PN110

The anti-corrosion performance table of rubber and plastics

Process medium	Concentration	Temperature	Natural rubber	Chloroprene rubber	Butyl rubber	Nitric acid rubber	Viton	Polytef
Sulfuric acid	30%	20	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Sulfuric acid	60%	20	Good	Good	Excellent	Excellent	Excellent	Excellent
Sulfuric acid	90%	20	Bad	Bad	Good	Can	Excellent	Excellent
Sulfuric acid	98%	20	Bad	Bad	Bad	Bad	Bad	Good
Sulfuric acid	Fuming	20	Bad	Bad		Bad	Bad	Good
Nitric acid	10%	20	Bad	Good	Excellent	Excellent	Bad	Excellent
Nitric acid	25%	20	Bad	Bad	Excellent	Bad	Excellent	Excellent
Nitric acid	50%	20	Bad	Bad	Bad	Bad	Excellent	Excellent
Nitric acid	75%	20	Bad	Bad	Bad	Bad	Can	Excellent
Nitric acid	Fuming	20	Bad	Bad	Bad	Bad	Can	Excellent
Hydrochloric acid	15%	20	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Hydrochloric acid	25%	20	Can	Excellent	Excellent	Can	Excellent	Excellent
Hydrochloric acid	35%	20	Can	Bad	Good	Can	Good	Excellent
Phosphoric acid	25%	20	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Phosphoric acid	75%	20	Good	Excellent	Excellent	Good	Excellent	Excellent
Acetic acid	25%	20	Bad	Bad	Bad	Bad	Good	Excellent
Acetic acid	95%	20	Bad	Bad	Bad	Bad	Bad	Excellent
Hydrogen sulfide		20	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Hydrogen sulfide		80		Good	Excellent	Excellent	Excellent	Excellent
Ammonia		20		Excellent				Excellent
Ammonia		80		Good				Excellent
Methyl alcohol	99.5%	60		Excellent	Excellent	Can	Good	Excellent
Ethyl alcohol		80	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Acetone		20	Bad	Good	Can	Bad	Excellent	Excellent
Ethanal		20	Can	Can	Excellent	Bad	Excellent	Excellent
Benzene		20	Bad	Bad	Bad	Bad	Good	Excellent
Methylbenzene		20	Bad	Bad	Bad	Bad	Good	Excellent
Aniline		20	Bad	Can	Good	Bad	Good	Excellent
Nitrate aldehyde benzene		20	Bad	Bad	Good	Bad	Excellent	Excellent
Sulfur dioxide (wet)		20	Bad	Good	Excellent		Excellent	Excellent
Sulfur dioxide (wet)		60		Can	Excellent		Excellent	Excellent
Chlorine (wet)		20	Bad	Bad	Bad	Bad	Bad	Excellent
Natural gas		20	Good	Good		Good	Excellent	Excellent
Water		20	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Water		100			Good	Good	Excellent	Excellent
Heavy oil		20	Bad	Bad	Bad	Good	Bad	Excellent
Gasoline		20		Good	Bad	Good	Excellent	Excellent

Conversion table of pressure units

Unit	Kilopascal (KPa)	MPa Megapascal (MPa)	Kilogram force/centimeter ² (kgf/cm ²)	Millimeter of mercury (mmHg)	Millimeter of water (mmH ₂ O)	Bar	Pound/inch ² (psi)	Standard atmosphere pressure (atm)
Kilopascal (KPa)	1	10 ⁻³	0.0101972	7.5	102	0.01	0.145038	0.0098692
MPa Megapascal (MPa)	1000	1	10.2	7.50 × 10 ³	10.2 × 10 ⁴	10	1.45 × 10 ²	9.8692
Kilogram force/centimeter ² (kgf/cm ²)	98.067	0.0981	1	735.6	10 ⁴	0.981	14.22	0.9678
Millimeter of mercury (mmHg)	0.1333	1.333 × 10 ⁻⁴	1.36 × 10 ⁻³	1	13.6	1.333 × 10 ⁻³	19.34 × 10 ⁻³	1.316 × 10 ⁻³
Millimeter of water (mmH ₂ O)	9.81 × 10 ⁻³	9.81 × 10 ⁻⁶	10 ⁻⁴	73.56 × 10 ⁻³	1	98.1 × 10 ⁻⁶	1.422 × 10 ⁻³	0.9678 × 10 ⁻⁴
Bar	100	0.1	1.02	750	10.2 × 10 ³	1	14.50	0.9869
Pound/inch ² (psi)	6.89	6.89 × 10 ⁻³	70.3 × 10 ⁻³	51.72	703	68.9 × 10 ⁻³	1	68.05 × 10 ⁻³
Standard atmosphere pressure (atm)	101.33	0.1013	1.0332	760	1.0332 × 10 ⁴	1.0133	14.696	1

Reference table for the anti-corrosion performance of the transmitter material contacting the medium

Category	Medium	Concentration/%	Temperature/°C	Material						
				Carbon steel	SUS316	Hastelloy B	Hastelloy C	Monel	Ti	Ta
Inorganic acid	Hydrochloric acid HCl	5	R.T. B.P.	C	C	A	B C	C	B	A
		10	R.T. B.P.	C	C	A	B B	C	B	A
		20	R.T. B.P.	C	C	A	B C	C	B	B
		35	R.T. B.P.	C	C	A	A B	C	B	B
	Sulfuric acid H ₂ SO ₄	5	R.T. B.P.	C	A C	B	A C	A B	B	A
		10	R.T. B.P.	C	C	B	A B	A B	B	A
		60	R.T. B.P.	C	C	B	A C	A B	C	A
		80	R.T. B.P.	B C	C	B	A B	A	C	A B
		95	R.T. B.P.	B C	C	A	A C	C	C	A C
	Nitric acid HNO ₃	10	R.T. B.P.	C	A C	C	A C	C	A	A
		30	R.T. B.P.	C	A	C	B	C	A	A
		68	R.T. B.P.	C	A B	C	B C		A	A
		Fuming	R.T. B.P.	A	A B					A
	Phosphoric acid H ₃ PO ₄	30	R.T. B.P.	C	A	A	A	C	A	A
		50	R.T. B.P.	C	A B	A	A	C	A	A
		70	R.T. B.P.	C	A B	A	A B	C	A	A

Category	Medium	Concentration/%	Temperature/°C	Material						
				Carbon steel	SUS316	Hastelloy B	Hastelloy C	Monel	Ti	Ta
Inorganic acid	Phosphoric acid H_3PO_4	85	R.T. B.P.	C	A C	A	A C	C	A	A
	Sulphurous acid H_2SO_3		R.T.	C	B	C	A	C	A	A
	Hydrofluoric acid HF	5	R.T.	C	C	B	A	A	C	C
		48	R.T.	C	C	B	A	B	C	C
	Chromic acid H_2CrO_4	20	R.T.	C	B	C	A	B	A	A
	Aqua regia $3HCl$ $1HNO_3$		R.T. B.P.	C	C		A C			A
	Hydrogen cyanide HCN		R.T.	C	A	A	A	A	A	A
Organic acid	Boric acid H_3BO_3		R.T.	C	C	A	B	B		
	Acetic acid $C_2H_4O_2$	100	R.T.	C	A	A	A	A	A	A
	Formic acid HCOOH	50	R.T.	C	C	A	A	B	B	A
	Oxalic acid	10	R.T. B.P.	C	B C		B	B		A B
	Citric acid	50	R.T.	C	A		A	B		A
	Acetic acid CH_3COOH	5	R.T.	C	A	A	A	B	A	A
		25	R.T.	C	A	A	A	B	A	A
		50	R.T.	C	A	A	A	B	A	A
		100	R.T.	C	A	A	A	C	A	A
	Malic acid $C_4H_6O_6$		R.T.	C	A	A	A	A	A	A
Alkali	Caustic soda NaOH	20	R.T. B.P.	A B	A	A	A	A B		C
		40	R.T. B.P.	A B	A	A	A B	A		C
	Caustic potash KOH	50	R.T.	B	B	A	B	A	A	A
Salt	Ferric chloride $FeCl_3$	30	R.T. B.P.	C	C	C	B C	C	A	A
	Sodium chloride NaCl	20°C Saturated	R.T. B.P.	A B	B	A	A B		A	A
	Ammonium chloride NH_4Cl	25	R.T. B.P.	C	B	B	B	B	A	A
	Calcium chloride $CaCl_2$	25	R.T. B.P.	B	B	A	A	A	A	A
	Magnesium chloride $MgCl_2$	42	R.T. B.P.	C	B	A	A	B	A	A
Sulfide	Sodium sulfate Na_2SO_4	50	R.T. B.P.	B	A	A	A	A B	A	A
	Sodium sulphide Na_2S	10	R.T. B.P.	B	A	A	A	A	A	A
	Ammonium sulfate $(NH_4)_2SO_4$	20°C Saturated	R.T. B.P.	C	A	A	A B	A B	A	A
Nitrate	Ammonium nitrate NH_4NO_3	10	R.T. B.P.	A B	A	C	A	C	A	A
	Potassium nitrate KNO_3	All	R.T. B.P.	B	B	B	B	B		A

Category	Medium	Concentration/%	Temperature/°C	Material						
				Carbon steel	SUS316	Hastelloy B	Hastelloy C	Monel	Ti	Ta
Corrosive gas	Chlorine Cl ₂	Dry	R.T.	B	A	A	A	B	C	A
		Wet	R.T.	C	C	C	B	C	A	A
	Chlorine water	Saturated	R.T.	C	C	C	A	A		A
	Sulfur dioxide SO ₂	Dry	R.T. B.P.	A	A	C	A	A	A	A
	Hydrogen sulfide H ₂ S	Wet	R.T.	C	A		A	B	A	A

★Note: R. T. – room temperature; B. P. – boiling point; A– good corrosion resistance;
B–not too bad corrosion resistance; C–bad corrosion resistance

Ordering instruction

While ordering, please give clear indication of the following items:

1. Model, specification code and additional specification code.
2. Calibration range and unit
 - a. Calibration range: the numerical value of range lower limit value and upper limit value
 - b. Unit: only can select one from the (set values while leaving the factory).
3. While not designating the output and display modes (linearity or square root), the default setting is linear mode.

4. Display scale and unit (only for the transmitters with intelligent header).

Respectively designate 0~100% or actual scale. While needing the actual scale, please designate "Range and unit".

Scale range: the numerical value of range lower limit value and upper limit value.

5. Bit number (Set only when need it)

6. Medium name and temperature