

3151 Smart Pressure/Differential Pressure Transmitter

Our company's 3151 series of smart pressure transmitters use metal capacitive or Monocrystalline silicon pressure sensors, one of the world's most proven pressure sensor principles, as the pressure sensing element. Combined with our newly developed next-generation intelligent programmable processing electronic circuit as the signal conversion unit, it forms a mainstream product in China's pressure transmitter market with independent intellectual property rights.



Key features and advantages:

- The flexibility has increased and functionality has improved due to the adoption of microprocessors.
- It has strong self-diagnostic capabilities.
- Wide range coverage: 0—100 Pa to 41 MPa
- Improve the basic measurement accuracy to better than 0.1 grade/0.2 grade, with a range ratio of 10:1.
- Zero point and range adjustment do not affect each other.
- Both comprehensive remote and local setup and calibration functions.
- Two-wire system, compliant with HART protocol, can communicate with HART protocol terminals without interrupting the output.
- Use digital compensation technology to compensate for temperature and static pressure errors.
- Stable performance, high precision, adjustable damping, strong resistance to unidirectional overload.
- No mechanical transmission components, minimal maintenance workload, robust and vibration-resistant.
- All universal parts, easy to maintain.
- The diaphragm material for contacting the medium can be selected, it is safe and explosion-proof, and can be used in all weather conditions.
- Proven excellent performance in various operating conditions across all industrial sectors.
- Over twenty years of experience in transmitter manufacturing and service.

Working principle

The 3151 series smart transmitter consists of two parts: a sensor and an intelligent programmable processing electronic circuit board. The sensor part includes a sensor, a measurement diaphragm detection circuit, a temperature sensor, and a temperature compensation circuit. The intelligent programmable processing electronic circuit board part includes a microcomputer controller and peripheral circuits, which complete the conversion of pressure signals to 4-20mA DC and the implementation of HART communication functions. Below is a simple explanation of its principle.

Technical data

Measurement parameters: gauge pressure, differential pressure, absolute pressure, liquid level

Measurement range: see selection specification table

Output signal: 4-20 mA DC, optional HART protocol digital signal (two-wire system)

Power supply: 24VDC, 12V~45V

Load characteristics (see figure)

Explosion-proof: ExdII BT5; Installation in hazardous areas: explosion-proof type ExdII BT5
ExiaII CT5; Intrinsically safe ExiaII CT5; (see explosion-proof manual)

Migration characteristics: At the minimum range, the maximum positive migration zero point is 9/10 of the upper limit value of the range, and the maximum negative migration zero point can be the lower limit value of the range. Absolute pressure transmitters have no negative migration. (Regardless of the output form, after positive or negative migration, the upper and lower limits of the range must not exceed the range limits.)

Temperature range: Electronic circuit boards operate at -40 to 85°C;
sensitive components function at -40 to 104°C;
storage temperature -40 to 85°C;
digital display range -20 to 65°C (normal operation); -40 to 85°C
(non-damaging).

Relative humidity: 0~95% Relative Humidity: 0~95%

Overpressure limit: The 3151DP, 3151AP, and 3151GP pressure transmitters with ranges 3 to 8, with an absolute pressure of 0 to 13.8 MPa, will not be damaged;

For the 3151GP range 9, the pressure does not exceed 31 MPa;

For the 3151GP range 0, the pressure does not exceed 51 MPa;

The lower limit of normal operating pressure is from absolute pressure to the upper limit of the range.

For the 315LT, it complies with its pressure rating.

Volume change: less than 0.16 cm³

Damping: The time constant can be adjusted between 0.2 and 32.0s.

Startup time: 3s, no preheating required.

Performance metrics

(Under conditions of no migration, 316 stainless steel isolation diaphragm, and other standard test conditions.)

Range ratio: 10:1 (3151 intelligent type)

Accuracy: For the 3151 intelligent model (ranges 3, 4, 5), the accuracy under standard conditions is $\pm 0.2\%$, $\pm 0.1\%$. For the 3151 intelligent model (ranges 6, 7, 8, 9, 0), the accuracy under standard conditions is $\pm 0.25\%$, $\pm 0.15\%$.

Stability: $\pm 0.25\%$ of full scale range per 6 months (for 3151 intelligent type, excluding other influencing factors)

Temperature effect: Zero-point temperature error is $\pm 0.25\%$ of the full scale per 55°C . The total temperature error including zero point and full scale is $\pm 0.25\%$ of the full scale per 55°C . Note: For range 3, the temperature influence error doubles; the above applies to smart products, and the error for analog types is double that of smart ones.

Static pressure effect: (For DP type online output) Zero point error: After applying static pressure of 140 kgf/m^2 , the zero point error for ranges 4 and 5 is $\pm 0.25\%$ of the full-scale range, and for ranges 3, 6, 7, and 8, it is $\pm 0.5\%$ of the full-scale range. This is a systematic error that can be eliminated by calibrating the transmitter zero point according to the actual static pressure before installation.

Power supply influence: less than 0.005% of the output range per volt.

Vibration influence: On any axis, at a frequency of 200 Hz , the error caused is $\pm 0.05\%/g$ of full scale.

Load impact: As long as the input voltage of the transmitter exceeds 12V , there is no load impact within the operating range of the load.

Installation position impact: It can cause a zero-point error of up to 0.25 KPa at most, which can be eliminated by zero-point calibration; it has no effect on the measurement range; rotating the instrument body relative to the flange has no impact.

Structural parameters

Liquid contact materials: Isolation diaphragm: 316 stainless steel, Hastelloy C, Monel alloy, and tantalum;

Exhaust/drain valve: 316 stainless steel, Hastelloy C, Monel alloy;

Flanges and connectors: 316 stainless steel, Hastelloy C, Monel alloy;

'O' rings: Fluororubber, Nitrile rubber;

Non-contacting parts materials: Filling fluid: Silicone oil;

Bolts: Galvanized carbon steel;

Electrical housing: Low copper aluminum alloy;

'O' rings: Nitrile rubber;

Coating: Polyester epoxy resin.

Pressure-tapping connector: Flange pressure tapping $1/4\text{ NPT-18F}$;

Connector pressure tapping $1/2\text{ NPT-14F}$;

Other pressure tapping forms can be requested.

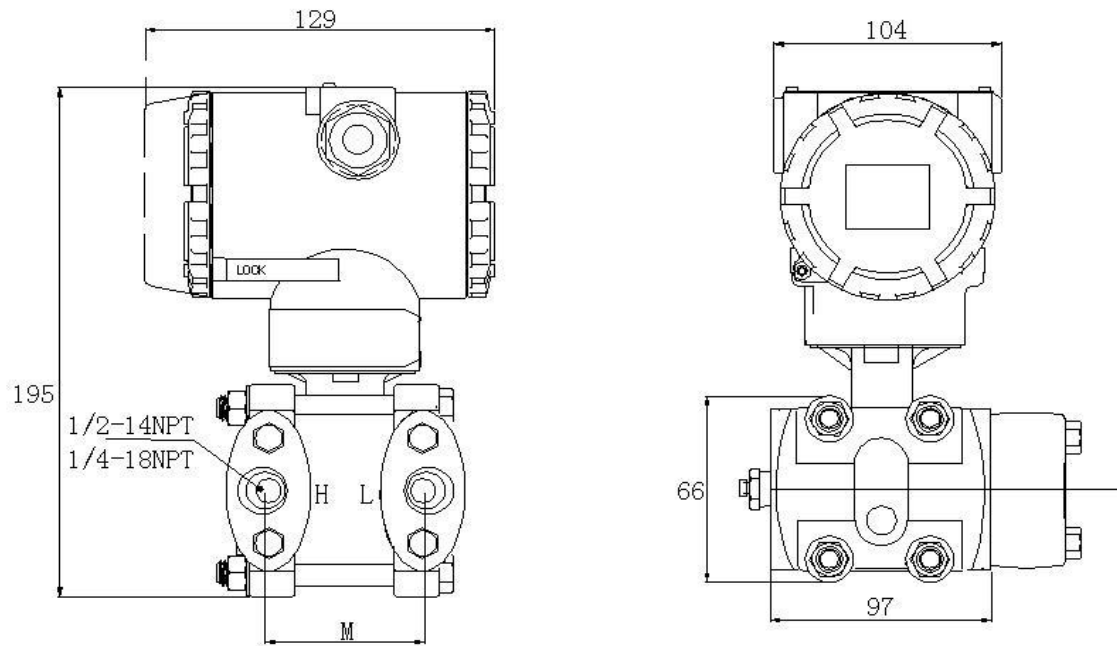
Electron shell: aluminum alloy

Protection class: IP65

Electrical connection: standard $M20 \times 1.5$ internal thread, others can be requested.

Weight: 3.5 kg (base unit, excluding other optional components)

Product exterior dimensions diagram



On-site installation of products and external connections

Mounting bracket dimensions and diagrams of three installation methods, utilizing various structural mounting brackets for independent installation outside the measurement object. Applicable to DP, GP, HP, DR, AP types, as shown divided into three categories.

- a. Tubular bent bracket, order number B1
- b. Plate-mounted bent bracket, order number B2
- c. Tubular flat bracket, order number B3

3151 Smart Transmitter Selection Specification Table

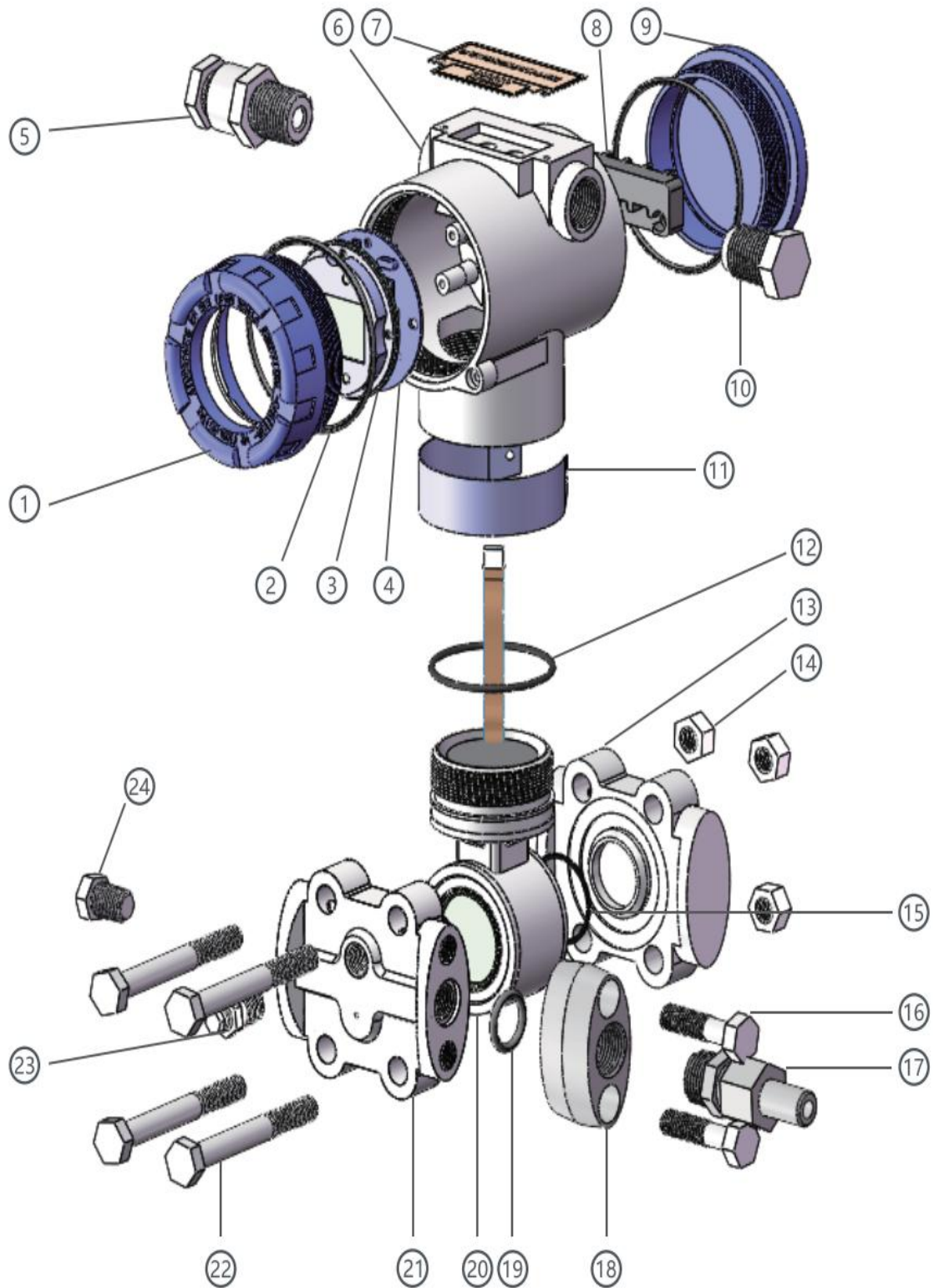
MODLE	Transmitter type				GP	AP	DP	HP
3151GP	Gauge pressure transmitter				●	○	○	○
3151AP	Absolute pressure transmitter				○	●	○	○
3151DP	Differential pressure transmitter				○	○	●	○
3151HP	High static differential pressure transmitter				○	○	○	●
Code	Measuring range				GP	AP	DP	HP
2	0-0.10~3.5kpa (0-10~350mmH ₂ O)				●	○	●	○
3	0-0.8~8.0kpa (0-80~800mmH ₂ O)				●	○	●	○
4	0-4.0~40kpa (0-400~4000mmH ₂ O)				●	●	●	●
5	0-20~200kpa (0-2000~20000mmH ₂ O)				●	●	●	●
6	0-70~700kpa (0-0.7~7kgf/cm ²)				●	●	●	●
7	0-210~2100kpa (0-2.1~21 kgf/cm ²)				●	●	●	●
8	0-700~7000kpa (0-7.0~70 kgf/cm ²)				●	●	●	●
9	0-2.1~21Mpa (0-21~210kgf/cm ²)				●	○	●	○
0	0-4.1~41Mpa (0-41~4100 kgf/cm ²)				●	○	●	○
Code	Output signal				GP	AP	DP	HP
E	4-20mADC				●	●	●	●
S	4-20mADC+HART+With button regulation				●	●	●	●
F	Modbus RS485				●	●	●	●
J	4-20mADC+HART				○	○	●	●
Code	Materials of sensor section				GP	AP	DP	HP
	Flange joint	Vent / Drain valve	Isolation diaphragm	Filling fluid				
12	304SS	304SS	316SS	Silicone oil	●	○	●	●
22*	316SS	316SS	316SS		●	●	●	●
23	316SS	316SS	Hastelloy C		●	●	●	●
24	316SS	316SS	Monel		●	●	●	●
25	316SS	316SS	Tantalum		●	●	●	●
33	Hastelloy C	Hastelloy C	Hastelloy C		●	●	●	●
35	Hastelloy C	Hastelloy C	Tantalum		●	●	●	●
44	Monel	Monel	Monel		●	●	●	●
Code	Pressure connection method				GP	AP	DP	HP
L1*	1/4NPT-18F (without waist-shaped joint , standard)				●	●	●	●
L2	1/2NPT-14F (with waist-shaped joint)				●	●	●	●
L3	M20x1.5M (end face seal)				●	●	●	●
Code	Housing material							
A*	Low-copper aluminum alloy				●	●	●	●
B	316 stainless steel				●	●	●	●
Code	Housing electrical connection				GP	AP	DP	HP
1*	M20×1.5F				●	●	●	●
2	1/2NPT-14F				●	●	●	●

Code	Optional parts				
M4	LCD Multi-function Digital Display Meter	●	●	●	●
B1	Tube-mounted curved bracket	●	●	●	●
B2	Plate-mounted curved bracket	●	●	●	●
B3	Tube-mounted flat bracket	●	●	●	●
D0	The discharge valve is located at the end.	●	○	●	●
D1	The side discharge valve is located at the upper part.	●	○	●	●
D2	The side discharge valve is located at the lower part.	●	○	●	●
X1	Oil-free treatment	●	●	●	●
Da	Exd Explosion-proof isolation type	●	●	●	●
Fa	Exia Intrinsically Safe Explosion-proof Type	●	●	●	●

Selection examples: 3151DP4S22L1A1M4B3D0 0-20KPa

Attachment Selection

Code	Pressure connection accessory	GP	A P	D P	H P
F3	Three-valve manifold	○	○	●	●
F5	Five-valve manifold	○	○	●	●
C02	M20x1.5F Live connector φ14 outlet pipe with L3	●	●	●	●
C12	1/4NPT-18M Live connector φ14 outlet pipe with L1	●	●	●	●
C22	1/2NPT-14M Live connector φ14 outlet pipe with L2	●	●	●	●
Code	Pressure connection accessory materials	GP	A P	D P	H P
4	304SS	●	●	●	●
6	316L	●	●	●	●
M	Monel	●	●	●	●
H	Hastelloy C	●	●	●	●



3151 flanged Pressure/Level Transmitter

Based on $P = \rho gh$, we derive $h = P / (\rho g)$, so pressure or differential pressure transmitters can be used to measure the level of liquid in a container.

For the following operating conditions, a flanged level transmitter should be selected:

When the medium under test is led out using impulse tubing, it tends to solidify or crystallize.

The medium under test contains solid suspensions, which are prone to settling or becoming overly viscous, making it easy for the pressure lead pipe to become clogged.

The temperature of the medium being tested is too high or it is corrosive, making direct measurement unfavorable.

The tested medium is pharmaceuticals, food, or other substances that require sanitary conditions and must not be contaminated.

Measurement parameters: pressure, differential pressure, liquid level



3151 Flanged Pressure/Level Transmitter**Selection Specification Table**

MODLE	TYPE
3151LT	Flange-type pressure/level transmitter
Accuracy	$\pm 0.25\%$ 、 $\pm 0.2\%$
Code	Range
4	0-4.0~40Kpa(0-400~4000mmH ₂ O)
5	0-20~200Kpa(0-2000~20000mmH ₂ O)
6	0-70~700Kpa(0-0.7~7kgf/cm ²)
7	0-210~2100Kpa(0-2.1~21kgf/cm ²)
Code	Output signal
E	4-20mAdc
S	4-20mAdc+HART+With button regulation
F	Modbus-485
Code	Process connection flange specifications
D1	DN50
D2	DN80
D3	DN100
A1	ANSI 2 "
A2	ANSI 3 "
A3	ANSI 4 "
Code	Process connection flange specifications
P01	PN16/PN25
P04	PN40
P06	PN64
P10	PN100
P16	PN160
C1	CLASS150
C3	CLASS300
C6	CLASS600
C9	CLASS900
Code	Process connection flange sealing surface
R*	RF
T	T
G	G
M	M
F	FM
J	RJ
Code	Insertion tube material
A*	316SS
B	Hastelloy C
C	Monel
E	Titanium
Code	High-pressure side diaphragm
A	316SS

B	Hastelloy C			
C	Monel			
D	Tantalum			
E	Titanium			
F	Others			
Code	The length of the high-pressure side insertion cylinder			
A	0mm DN50/DN80/DN100; 2 " 、 3 " 、 4 "			
B	50mm DN80/DN100; 3 " 、 4 "			
C	100mm DN80/DN100; 3 " 、 4 "			
D	150mm DN80/DN100; 3 " 、 4 "			
O	Others (mm)			
Code	High-pressure side filling fluid			
D	(-40~149℃) Ordinary silicone oil			
F	(15~305℃) High-temperature silicone oil			
S	(-45~205℃) Inert liquid (fluorinated oil)			
Code	Materials of Low-pressure side			
	Flange joint	Vent/Drain Valve	Isolation diaphragm	Filling fluid
22*	316SS	316SS	316SS	Silicone oil
23	316SS	316SS	Hastelloy C	
24	316SS	316SS	Monel	
25	316SS	316SS	Tantalum	
33	Hastelloy C	Hastelloy C	Hastelloy C	
35	Hastelloy C	Hastelloy C	Tantalum	
44	Monel	Monel	Monel	
Code	Low-pressure side pressure tapping method			
L1	1/4NPT-18F (without waist-shaped joint , standard)			
L2	1/2NPT-14F (including waist-shaped joint)			
L3	M20x1.5M (end face seal)			
Code	Housing material			
A	Low-copper aluminum alloy			
B	316SS			
Code	Housing electrical connection			
1	M20×1.5F			
2	1/2NPT-14F			
Code	Optional parts			
M4	LCD Multi-function Digital Display Meter			
D0	Low-pressure side discharge valve at the end face			
D1	The low-pressure side Emission valve at the upper part.			
D2	The low-pressure side Emission valve at the lower part			
Da	Exd Explosion-proof isolation type			
Fa	Exia Intrinsically safe explosion-proof type			

Selection examples: 3151LT4SD2P01RAABD22M4D0Da 0-30kpa

Selection of Low-Pressure Side Accessories

Code	Pressure connection accessory
C02	M20x1.5F Live connector $\phi 14$ outlet pipe with L3
C12	1/4NPT-18M Live connector $\phi 14$ outlet pipe with L1
C22	1/2NPT-14M Live connector $\phi 14$ outlet pipe with L2
Code	Pressure connection accessory materials
4	304SS
6	316L
M	Monel
H	Hastelloy C

Diffused Silicon Pressure Transmitter

The diffused silicon principle pressure sensor is one of the most commonly used pressure sensors on the market. Our company's excellent design in overload resistance, interference immunity, and high stability for the silicon principle series pressure transmitters makes this transmitter a high-precision pressure transmitter product with reliable quality and low cost.

This series of pressure transmitters includes

Intelligent and digital circuit board analog output type.

According to different types of Broussonetia papyrifera, it can be further divided into: Model 2688, BP200, and BPH200, with the input level type (hydrostatic level).

Working principle

The circuit principle of the analog diffusion silicon pressure transmitter consists of two parts: the diffusion silicon sensor section and the digital electronic board section, ultimately converting the pressure signal into a standard (4~20) mA DC signal output.

The circuit principle of the intelligent diffused silicon pressure transmitter consists of: the diffused silicon sensor section and the intelligent electronic board section, ultimately converting the pressure signal into a standard (4~20) mADC + HART protocol signal output.

Technical Performance and Indicators

Medium used: liquid, gas, or steam

Measurement parameters: Gauge pressure, liquid level

Power Supply:

Model 2688: 24VDC power supply, voltage range 12.5V~48VDC, two-wire system power supply

Model BP200: 24VDC±20% power supply, two-wire system power supply

Output signal: Analog type: 4mA~20mA two-wire system

Intelligent type: 4mA~20mA+HART two-wire system

Digital type: Modbus RS485

Measuring range: Gauge pressure: Maximum 0~100MPa, Minimum 0~3.5KPa

Absolute pressure: Maximum 0~30MPaA Minimum 0~20KPaA

Overload capacity: 3~5 times for small-range general type; 1.5~3 times for large-range type

Range ratio: Intelligent type 10:1; Analog type 3:1

Accuracy: Intelligent type ±0.2% (±0.1%), Analog type ±0.25%

Temperature influence: 0.15%FS/10°C

Stability: Better than 0.2%FS/year

Position impact: The influence of installation position on zero point is less than 20Pa (intelligent type can be reset by button)

Ambient temperature: -20°C~80°C (with LCD temperature -20°C~60°C)

Medium temperature: -20°C~80°C, high-temperature type: 120°C

Storage temperature: -20~80°C

Damping: Time constant adjustable between 0.2~32.0s (intelligent type)

Relative humidity: 0~95%RH

Protection level: Model 2688 IP65; Model BP200 IP54;

Process connection fittings: 304SS, 316L

Sealed Components: Fluororubber, Nitrile Rubber, Polytetrafluoroethylene (Determined by the manufacturer based on the medium)

Electrical connection: Model 2688 comes standard with M20x1.5 internal thread, others available upon request.

2688 Pressure Transmitter Selection Specification Table

Model	Type		
2688GP	Pressure transmitter (direct-mounted 80℃)		
2688GPH	High-temperature type (with heat sink, direct installation up to 120℃)		
Code	Measuring range		
1	0-3.5~35kpa		
2	0-10~100kpa		
3	0-35~350kpa		
4	0-0.1~1.0Mpa		
5	0-0.35~3.5Mpa		
6	0-1.0~10Mpa		
7	0-2.0~20Mpa		
8	0-4.0~40Mpa		
9	0-6.0~60Mpa		
0	0-10~100Mpa		
Code	Signal output		
E	4-20mA _{dc} 24V _{dc} loop		
S	4-20mA _{dc} +HART 24V _{dc} loop		
F	Modbus RS485		
Code	Construct material		
	Pressure connection	Isolation diaphragm	Filling fluid
21	304SS	316SS	Silicone oil
22	316SS	316SS	
Code	Housing material		
A	Low-copper aluminum alloy		
B	Stainless steel		
Code	Housing electrical connection		
1	M20×1.5F		
2	1/2NPT-14F		
Code	Process connection specifications		
A	M20x1.5M		
B	1/2NPT-14FM		
C	G1/2M		
W	(Ø50.5) Sanitary chuck connection		
X	Others		
Code	Optional parts		
M1	LED display meter		
M4	LCD Multi-function Digital Display Meter		
Da	Exd Explosion-proof isolation type		
Fa	Exia Intrinsically safe type		

Selection examples: 2688GP4S22A1AM4 0-1.0MPa

BP200 Miniature Diffused Silicon Pressure Transmitter Selection Specification Table

Model	Type		
BP200GP	Gauge pressure transmitter（80℃）		
BPH200GP	High-temperature pressure transmitter (with heat sink 120℃)		
Code	Range		
1	0-3.5~35kpa		
2	0-10~100kpa		
3	0-35~350kpa		
4	0-0.1~1.0Mpa		
5	0-0.35~3.5Mpa		
6	0-1.0~10Mpa		
7	0-2.0~20Mpa		
8	0-4.0~40Mpa		
9	0-6.0~60Mpa		
			
Code	Process connection specifications		
E	Linear output 4-20mA DC signal		
F	Modbus 485		
Code	Construct material		
	Pressure fitting	Isolation diaphragm	Filling fluid
21	304SS	316SS	Silicone oil
22	316SS	316SS	
Code	Process connection specifications		
A	M20x1.5M		
B	1/2NPT-14F		
C	G1/2-M		
W	(Ø50.5) Sanitary chuck connection		
X	Others		

Selection examples: BP200GP4E22A 0-1.0MPa

UHF Series Hydrostatic (Submersible) Level Transmitter

The hydrostatic level transmitter operates on the principle that the measured liquid static pressure is proportional to the liquid level height $P=\rho gh$. It utilizes a diffusion silicon-based pressure-sensitive element to convert the static pressure P into a 4-20mA DC standard current signal output after temperature compensation and linear correction.

The sensor part of the hydrostatic level transmitter can be directly immersed into the liquid, while the transmitter part can be fixed using flanges, threads, or brackets, making installation and usage convenient.

It is mainly used for water level measurement in urban water supply and drainage, reservoirs, rivers, oceans, oil storage tanks, as well as in petroleum, chemical, power plants, water treatment sectors, and other open atmospheric pressure containers. It is an ideal liquid level instrument for industrial process detection and control systems.

Product Features:

- Cost-effective;

- Directly immersed into the medium being measured, featuring convenient installation and usage;

- Electronic principle, no moving parts, high reliability, long service life;

- Wide-range temperature compensation, featuring reverse polarity protection and overload current limiting protection;

- For atmospheric open-top storage tanks only.

Technical parameters:

- Measuring range: Cable type 0-200 meters; Rod type 0-4 meters; Armored type 0-15 meters (user-selectable)

- Operating temperature: $-20\sim 80^{\circ}\text{C}$

- Output signal: Two-wire system 4~20mA d.c. (HART optional)

- Power supply : Standard 24VDC (12~36VDC)

- Load capacity: $0\sim 600\Omega$

- Instrument casing: cast aluminum

- Protection level: IP65

- Electrical interface: Standard M20×1.5F, others available upon request.



Static Pressure (Submersible) Level Transmitter Specification Table

Model	Type
UHF-LT	Cable type (explosion-proof not optional, Max. 4 m)
	Rod type (standard configuration 2688 housing; Max. 4 m)
2688GPLT	Stainless steel armored flexible rod, Max. 15 m
2688GPKLT	(Standard 2688 housing, 4-20mA DC + HART signal)
Code	Housing material
-01	Aluminum alloy housing (2688 housing)
-02	without housing
Code	Signal output
-E	4-20mADC
-S	4-20mADC+HART
M	Modbus RS485
Code	Housing material (only applicable for code 01)
A	Low-copper aluminum alloy
B	Stainless steel
Code	Electrical connection
1	M20×1.5F
2	1/2NPT-14F
Code	Sensor
-01	Diffusion silicon (standard)
-02	Ceramic capacitor(Special)
Code	Wetted part
-04	304SS
-06	316LSS
Code	Installation method
-A	No mounting bracket or flange
-B	Mounting bracket
-C	Flange installation (specify flange specifications, min. DN32)
Code	Optional parts (not selected unless required)
-M1	LED display
-M4	LCD Multi-function Digital Display
-Da	Exd Explosion-proof isolation type
-Fa	Exia Intrinsically safe type
Code	Measuring range
	XX m

Medium density	The medium density must remain stable and unchanged; otherwise, errors will arise due to density variations.
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Cable-style submersible type exceeding 50 meters is a special custom order.

Selection Example: UHF-LT-01-E-01-A1-01-04-M1 0~1m 0.95