SMART LEVEL TRANSMITTER BPT363L
(with HART® Protocol)

- **HART ® Protocol**
- **0.075% inaccuracy and non-linearity**
- **Rangeability 50:1**
- **100mmH20 (1kPa) to 100mH2O (1MPa)**
- **Automatic temperature compensation**
- **4 - 20mA output**
- **True non-interactive zero and span**
- **Local zero and span adjustment**
- **2 line 5 digit LCD indicator**
- **Adjustable damping**
- **Indication in engineering units**
- **AISI 316L, Tantalum or Hasteloy**
- **Capable in handling most process fluids**
- **Small and light weight**
- **Weather-proof housing IP67**
- **Intrinsically safe**
- **Explosion proof**
- **ATEX directive 94/9/EC**

GENERAL DESCRIPTIONS

BASI Model BPT363L Smart Level Transmitter. Designed for process control applications, these 2-wire transmitters generate a 4-20mA signal proportional or characterized to the applied pressure. This signal can be transmitted over a pair of twisted wires through long distances (limited only by the wire resistance and load). Remarkable features of the transmitters are its 0.075% inaccuracy and non-linearity, 100:1 rangeability, compactness and light weight. The pressures are directly applied to the isolating diaphragm that provide isolation and resistance against process fluid corrosion. Being microprocessor based, the electronic circuit is extremely versatile and accurate. Combined with the sensor precision, it provides the high accuracy and rangeability. Transmitter performance is improved by continuous monitoring of the sensor temperature and corresponding corrections.
A local display permits easy reading and writing of data

TECHNICAL SPECIFICATIONS

Functional Specifications

Process fluid	: Liquid, gas or vapor
Range	: 0–100mmH2O (1kPa) up to 100mH2O (1MPa)
Output signal	: Two-wire 4-20,20-4 mA and HART® Protocol
Power supply	: 14,5 - 45VDC
Indicator	: 2 line 5 digit LCD indicator
Hazardous area	: IP67 weather-proof, Intrinsic-safety type Exia IICT6, Flame-proof Exd IICT6
Certificate	: ATEX
Zero and span	: Non-interactive local adjustment
Ambient.temp	: -40 to 85°C
Process.temp	: -45 to 315°C
Storage.temp	: -46 to 110°C
Turn-on time	: Performs within specifications in less than 120 milliseconds after power is applied.
Humidity limits	: 0 - 100% RH
Damping adj.	: Adjustable
Configuration	: By pushbutton on the transmitter or HHT, PC using HART ® Protocol

Performance Specifications

Inaccuracy	: ±0.075%
Temperature effect	: ± 0,065%//FS/10°C
Power supply effect	: Negligible between 14,5 and 45 VDC
Mounting position effect	: Any position. No span effect.
EMC	: *IEC6100-4-2, 4-4, 4-5*

CE

Physical Specifications

Electrical connection	: ½"-14NPTF, M20x1,5
Process connection	: ANSI or DN according to order
Wetted parts	: AISI 316L, Ta or Hasteloy
Filling fluid	: Silicone oil
Electronic housing	: Injected aluminum with polyester painting (RAL 5014) NEMA 4X, IP67
Identification plate	: 304 SST
Approximate weight	: Depending on model
Mounting	: Directly supported by flange or optionally with mounting bracket for 2" pipes or with direct or remote seals.

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.

BPT363 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

BPT363 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. BPT363 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 BPT363 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 BLT363 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 overal performance is the composition error based on the reference accuracy, ambient temperature effects and range static-pressure effects.

Accuracy index

±0.075%FS range (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.)

±0.075%range

If the range is less than X

$\pm[0.025+0.05\frac{X}{range}]\%$

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 ±0.005% range/v

Functional parameter

The limit value of range and sensor

Table 1: Range of BPT363L transmitter and limit value of sensor

Range	Min. range	Limit value of range and sensor		
	BPT363L type	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

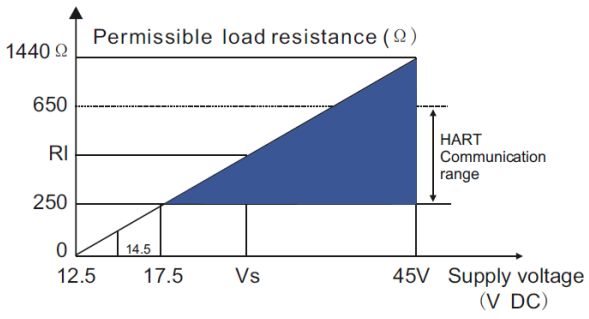
Two-wire 4-20mA, linear output or square root output is selectable for users. Digital process variable overlays on the 4-20mA signal, which can be applied to the host machines according with HART protocol.

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 BPT363L 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 BPT363L 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
For the measured value under 38℃, the rated value will decrease with the increasing of temperature.			
DIN	PN 10-40	40bar	40bar
DIN	PN 10/16	16bar	16bar
DIN	PN 25/40	40bar	40bar
Under 120℃, the rated value will decrease with the increasing of temperature.			

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 to +70C (Ordinary)

-40 to +85C (The highest)

Storage

-46 to +110C

With header: -40℃～85℃

Process

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

Table 3. Limit of BPT363L 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 NPT1/2(F) internal thread

ISO 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

BPT363L 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

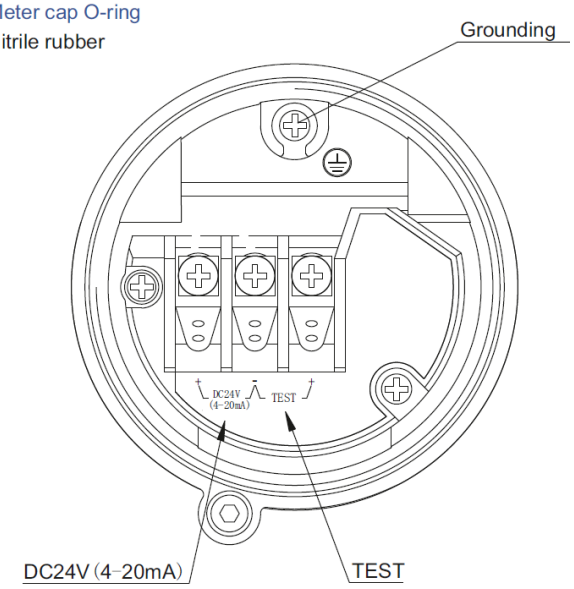
Aluminium die casting IP65

Coating

Spraying plastics

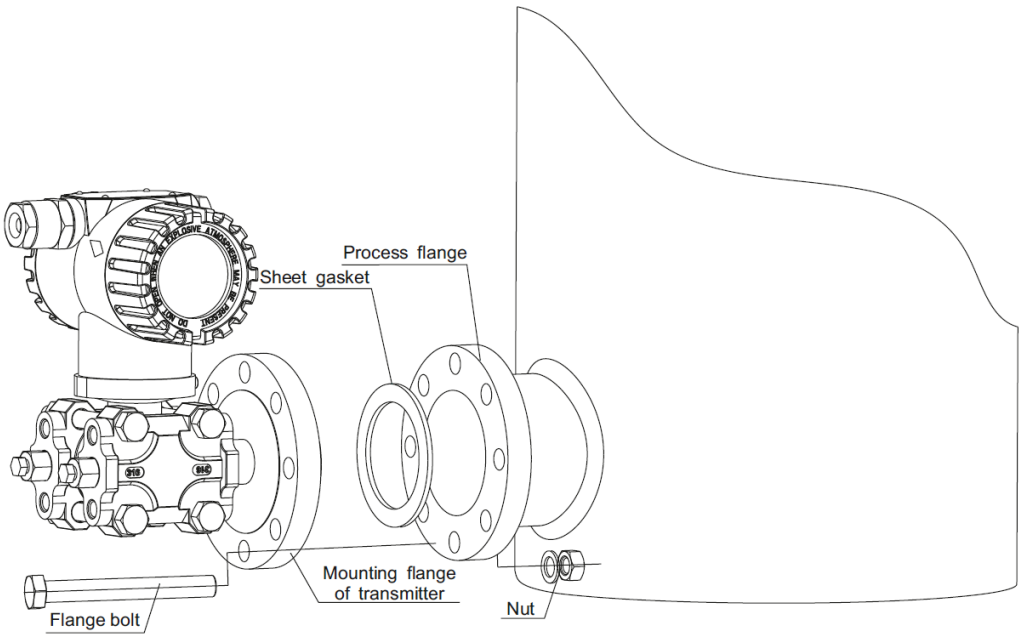
Meter cap O-ring

Nitrile rubber

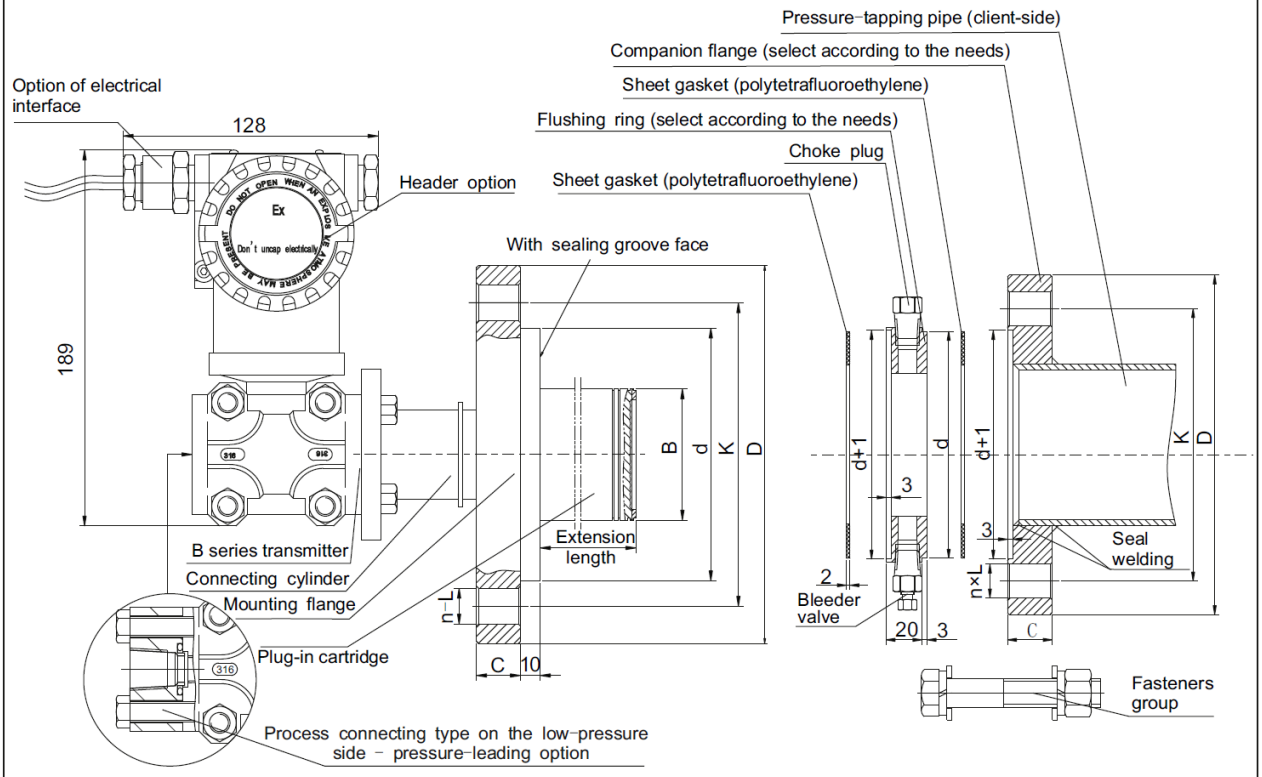


Connecting terminal	
DC24V(4～20mA)+ −	Power supply and output end
TEST + −	Connect to the testing terminal of ampere meter (impedance should be less than 10Ω)
⏚	Ground terminal

MECHANICAL SPECIFICATIONS



BPT363L field installation figure

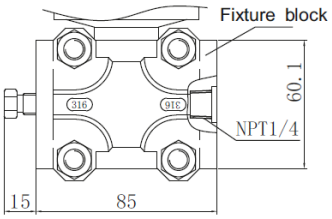


BPT363L dimensional drawing

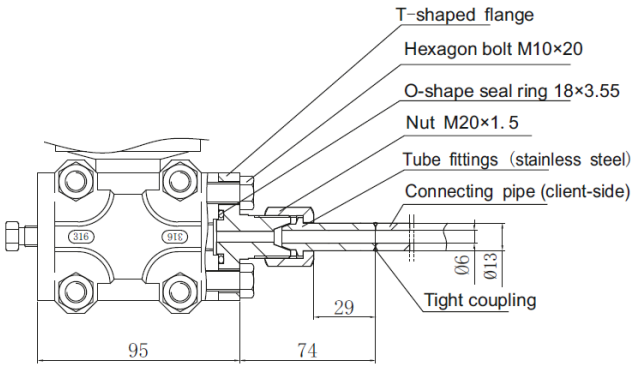
Table 4 Specification of BPT363L direct-mounted flange

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						

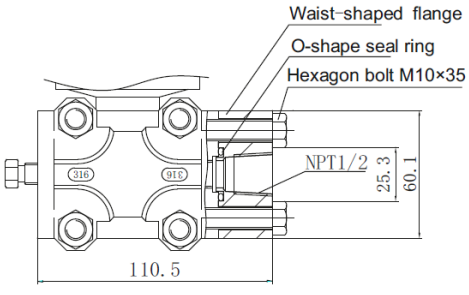
Note: The flanges of other specifications and standards can be determined by special contract review. Please refer to the attached flange dimension reference table for the connection dimension.



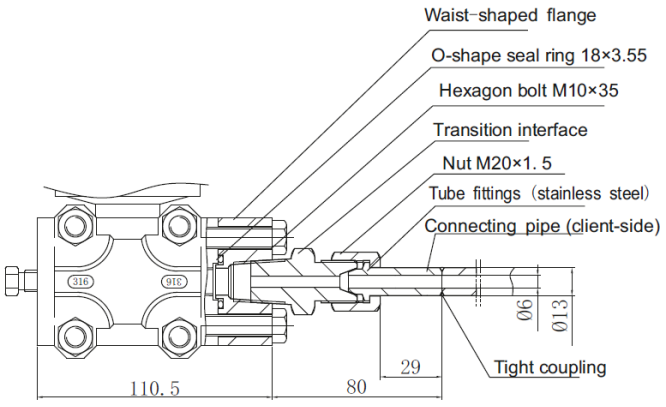
Process connecting type – leading pressure optional figure (P)
– 1/4-18NPT taper pipe female thread



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. BPT363L type monocrystal silicon flange-mounted type transmitter

Model	Transmitter type	
BPT363L-	Flange-mounted monocrystal silicon transmitter	
Code	**Measurement range of pressure**	
M	1～40KPa	
H	5～250KPa	
V	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 chemical industry standards	
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	**Extension length of plug-in cartridge**	
0	0 (with 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**
D	Normal-temperature silicone oil (D.C.200)	-45 to 205
C	High-temperature silicone oil (D.C.704)	0 to 315
H	Fluorocarbon oil	-18 to 204
Code	**Electrical interface**	
A	ANSI NPT1/2(F) internal thread	
M	ISO M20×1.5 internal thread	

Table 5（continued）. BPT363L type monocrystal silicon liquid level transmitter

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	**Configuration options**
F	Diaphragm sticking with polytetrafluoroethylene
T	Diaphragm coating with teflon
C4	High alarm
CN	Low alarm（The default setting is low alarm）
Q4	Verification certificate
F1	Stainless steel flushing adapter ring (Plug-in cartridge type doesn't have this option.)
F2	Hatelloy flushing adapter ring (Plug-in cartridge type doesn't have this option.)
P	1/4-18NPT taper pipe internal thread (low-pressure side)
N	With waist-shaped interface: 1/2-14NPT taper pipe internal thread (low-pressure side)
J	With T-shaped interface: M20×1.5 external thread and back welding connecting pipe (low-pressure side)
C	With waist-shaped interface matching used with NPT1/2-14 pressure-leading transition head and back welding connecting pipe (low-pressure side)

Note: 1. When you select insert type, the precision is reduced with the increase of elongation length.
2.if needing higher precision, please contact the marketing representatives of the corporation.