# TECHNICAL INFO

DIFFERENTIAL PRESSURE / PRESSURE TRANSMITTER

## DELTA-P 3351 DPT Series - Differential Pressure
## CAPBAR 3351 PT Series - Pressure

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### Application

Monitoring gaseous, non-aggressive media. Possible areas of application are:

- Flow, Level and Differential Pressure Measurement in Liquids and Gases
- Environmental protection
- Building automation
- Filter and blower monitoring
- Suitable for Hazardous Area of Application also

# Index

## INTRODUCTION

3351DPT Series Digital. Intelligent pressure/Differential pressure Transmitter is a multipurpose digitalized intelligent instrument developed by our company, including capacitance pressure / differential pressure transmitter and direct-coupled pressure/fluid level transmitter. It is made on the basis of the mature and dependable sensing technology, combining exchange technology.

16-bit single chip is adopted as its core element, with its powerful function and high-speed calculation capacity ensuring the excellent quality of the transmitter. The whole design frame focuses on its dependability, stability and high precision and intelligentization, meeting the growing demand in on-site industrial use. To get this goal, digitalized signal processing technology is used in the software to ensure its disturbance capacity and zero point stability. Meanwhile, it has the zero stability capacity (ZSC) and Temperature supplementing capacity (TSC).

The powerful interface functions guarantees an excellent interactivity with no need of manual operator. Its digitalized meter head can display 3 physical parameter including pressure, temperature and current, and 0-100% analogue indications. Keystroke operation can finish the basic settings of zero transfer, range setting, damping setting under the circumstance of no standard pressure, greatly convenient for the onsite debugging.

S-PORT serial communication port can communicate with the computer through the special purposed interconnection module, while the upper computer interface can finish more functions than the keystroke operation. By connection with module RS485, it can realize the remote transmission of digital signal, or in the building up of RS485 industrial LAN.

3351DPT series digitalized intelligent pressure /Different Pressures Transmitter has the
optional HART module. After the transmitter is added the HART module, it has HART communication capacity, with the conventional operation being controlled with the general manual operator. The special communication equipment and software provided by our company can operator the marking and temperature supplementation actions.

3351DPT series digitalized intelligent pressure /Different Pressures Transmitter can be widely used in the sectors such as petroleum, chemical, iron& steel, power supply, light industry and environmental protection, capable of realizing the measurement of various pressures, differential pressure, flows and fluids, adaptable for all kinds of harsh and hazardous environment and corrosive agents.

## Principle of Operation:

The pressure transducer converts the mechanical measured variable of pressure into an electrical measuring signal. The piezoresistive pressure transducer integrated in the differential pressure transmitter is designed so that the pressure to be measured is applied to a thin membrane made of monosilicon. The membrane is deflected by this. The semiconductor resistors on the membrane detect this mechanical deflection and generate an electrical output signal. The arrangement of the resistors simultaneously

compensates for the temperature response. The signal of the pressure transducer is converted into the output signal by high-gain operation amplifiers. The electrical output signal changes within the specified error limits proportionally to the applied pressure.

## Introduction to working principle

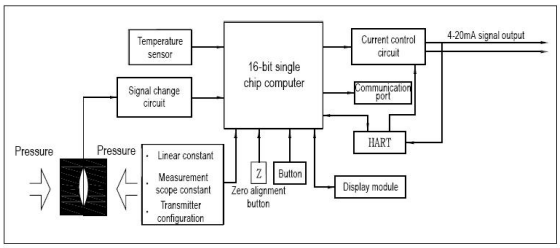


Fig. 1.1

As indicated in the working principle diagram fig 1-3, the outside pressure or differential pressure will cause some change in the sensor capacitance value. Through the digital signal conversion, it will change into the frequency signal, which is sent to the microprocessor. After the calculation by microprocessor, a current control signal will be output to the current control circuit, converted into analogue 4-20 mA current output. Meanwhile, the microprocessor is responsible for the interactive and other actions (display and setting). The communication port used for digital communication needs the special port of our company. HART module will realize the transmitter HART communication.

## Functional Indices

Technical indices of 3351DPT series digital. Intelligent pressure/differential pressure transmitter

**Functional specifications**

(Reference conditions: no-transfer state, silicone oil fill fluid, 316L isolating diaphragm).

Output signal :

1. 4-20mA DC/RS485 digital communication
2. 4-20mA DC/HART protocol digital communications (optional)
3. Transmission mode: 2-wire

**Load characteristic chart:**

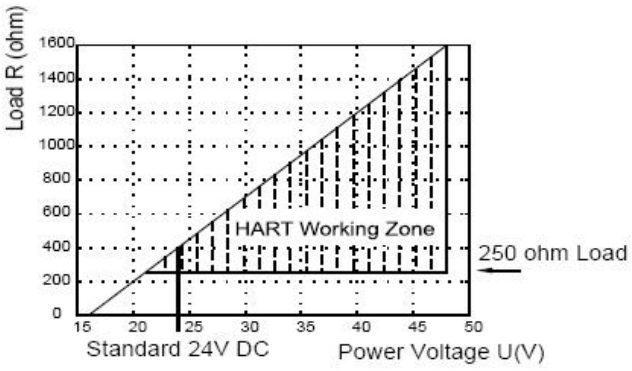


Fig : 1.2

## Precision

**Linear output:** ±0.075% (range ability is 1:1), including the linear, differential and repeated errors)

**Square root output:** at the output pressure of 4-100%, the value is ±(0.2% marked range + the upper limit of 0.05%)

**Stability:** for DP code 3, 4 and5, it is ± 0.15% of the maximum range, for other codes, ± 0.15% of the maximum range.

**Humidity:** relative humidity 0-100%

**Startup time:** at the minimum damping, within 2 sec.

**Cubage absorbing amount:** less than 0.16cm3.

**Damping:** electrical damping is 0-30 sec.

In addition, the sensor has an extra invariable damping time (0.4 sec for range 3)

Static pressure effect (DP transmitter)

**Zero error:** as for 14 Mpa, it is ±0.25% in the maximum; for the range code 3, 0.5% of the maximum. It can be calibrated through zero point adjustment.

**Range error:** it can be calibrated to ± 0.15% of the input reading for each 6Mpa; or for range code 3, it is ±0.3% . This error can be eliminated before amounting.
Static pressure effect (HP transmitter)
**Zero error:** as for 32Mpa, it is ±1.0% in the maximum; it can be calibrated through zero point adjustment.
Temperature effect
**Zero point error at the maximum range:**
For each 28 degC it is ±0.3% of the range.The overall effect includes range error and zero point error: for each 28 degC , it is ±0.3% of the range.
For range No.3, the effect is doubled.

point error: for each 56 C, it is 3.5%of the range.
For range No.3, the effect is doubled.
**Vibration effect:** at a frequency of 0-200 Hz, each g on any directions is the upper limit value of ±0.5%
**Power effect:** less than 0.005%/V of marked range
**Mounting position effect:** zero point excursions not more than (0.25kPa),
This error can be eliminated with no influence on the range. Electromagnetic disturbance/radioactive frequency effect: test is done according to SAMA PMC33.1 in the range of 20 1000 MHz, the magnetic strength can be high as 30V/m.

## Structural specifications

### Materials touching Agents

- **Isolation diaphragm:**
  - 316L stainless steel,
  - Hastelloy C-276,
  - Monel alloy or tantalum (optional)
- **Vent/drain valve:**
  - 316 stainless steel,
  - Hastelloy C-276,
  - Monel alloy or tantalum
- **Technic flange and connector:**
  - 316 stainless steel,
  - Hastelloy C-276,
  - Monel alloy or tantalum
- **O-ring touching agents:**
  - Fluorine rubber,
  - Buna-N rubber (optional)
- **Fill fluid** : Slicone oil
- **Bolt**: Carbon steel plated with cadium
- **O-ring sealing :** Buma –N rubber(optional)
- **Painting:** polyurethane

**Power supply**
16V- 48V DC intrinsically safety type explosion-proof products are required to get a power supply from the corresponding safe barrier (standard 24 VDC)

## Environmental Specification of Product

Using temperature:-20 C - +80 C
Storage:-40 C- +104 C
Humidity: 0-90%
Using environment conditions for explosion-proof product:
Humidity:-20 C- +40 C
Relative humidity: 5%-95%
Atmosphere pressure: 86—106kPa
Parameters for intrinsically safety type outsourcing safe barrier:
Uo 28V DC ; Io 30mA ; Po 0.84W

**Measuring Range for 3351DPT Series Digital Intelligent Direct Coupled Pressure/Fluid Level Transmitter**
**For 3351DPT 2001**

| S. N | Code | Minimum Measuring Range | Maximum Measuring Range | Precision Rating |
|---|---|---|---|---|
| 1 | 01 | 0-3 kPa | 0-10 kPa | ±0.1% |
| 2 | 02 | 0-10 kPa | 0-35 kPa | ±0.1% |
| 3 | 03 | 0-35 kPa | 0-100 kPa | ±0.1% |
| 4 | 04 | 0-100 kPa | 0-200 kPa | ±0.1% |
| 5 | 05 | 0-200 kPa | 0-700 kPa | ±0.1% |
| 6 | 06 | 0-700 kPa | 0-1.7 MPa | ±0.1% |
| 7 | 07 | 0-1.7 MPa | 0-3.5 MPa | ±0.1% |

| | | | | |
|---|---|---|---|---|
| **8** | **08** | **0-3.5 MPa** | **0- 7 MPa** | ±0.1% |
| **9** | **09** | **0-7 MPa** | **0-35 MPa** | ±0.1% |
| **10** | **10** | **0-35 MPa** | **0-60 MPa** | ±0.1% |

**For 3351DPT 2318**

| S.N | Code | Minimum Measuring Range | Maximum Measuring Range | Precision Rating |
|---|---|---|---|---|
| **1** | 03 | 0-3.5m | 0-10m | ±0.1% |
| **2** | 04 | 0-10m | 0-15m | ±0.1% |

**Table 1.1**

Note :

1. Maximum overload: 2 times of the upper limit value of the maximum measurement scope
2. Where: for the product with the code No.10, the maximum overload is 70 Mpa

## Technical Specification

Over –pressure effect: less than 0.25% of the maximum range

Measurement agent: all kinds of agents matched with stainless steel 316

Output: 4-20m ADC (2-wire)

Working voltage: 14-36VDC, standard 24VDC 5% with ripple less than 1%

Environment temperature:-20-85 C

Agent temperature: -25-100 C

Storage temperature: -40-125 C

**Insulating resistance:** 200M Ù/50VDC

**Zero point transfer:** 0%+100 % (3351DPT2318 is 80%) of the maximum range

**Negative Transfer (3351DPT 2001):**

0%-100 %( 3351DPT2318 is 80% of the maximum range (no more than-100kPa, absolute pressure has no negative transfer)

**Power change effect:** less than 0.01%/V of output range

**Load change effect:** can be ignored with the minimum voltage guaranteed

**Zero temperature coefficient:** ±1.5%FS

**Sensitivity temperature coefficient:** ±1.5%FS

**Indicator:** 0-100% linear marks/digital display meter head

**Stability:** ±0.15%FS/Year

Relative temperature: 0-100%

Diaphragm material: stainless steel 316

Probe/connector material: 1Cr 18 Ni9Ti

Electronic housing: aluminum alloy (spay painting with plastic)

Process port: M20×1.5 or NPT1/2 outer screw (3351DPT2001)

Electrical port: NPT1/2 load resistance of cable sealed connector (4-20mA):

$$R = \frac{U-14}{0.02} - Rd$$

Where: U is power voltage, Rd is cable internal resistance

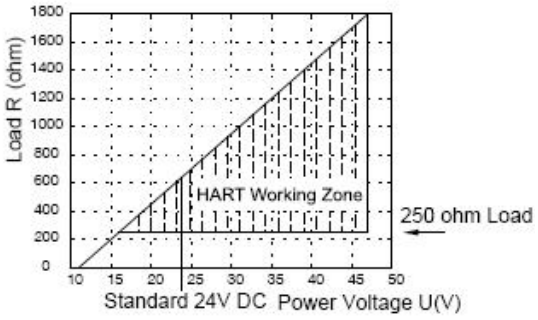


Fig : 1.3

Load Resistance (0-10mA): 1KÙ

Load resistance (0-5V): 300Ù

Explosion sign of intrinsically safety type product: Ex ia ll CT5

**Weight:** about 0.75kg (varies with different types)

## Measuring of Fluid Interface

If the fluid has a stronger viscosity in the lower part of container, and liable to crystallize, whereas upper fluid doesn't get crystallized and have no sediments, it is recommended to use single-flat flange fluid level transmitter for the measurement of interface.

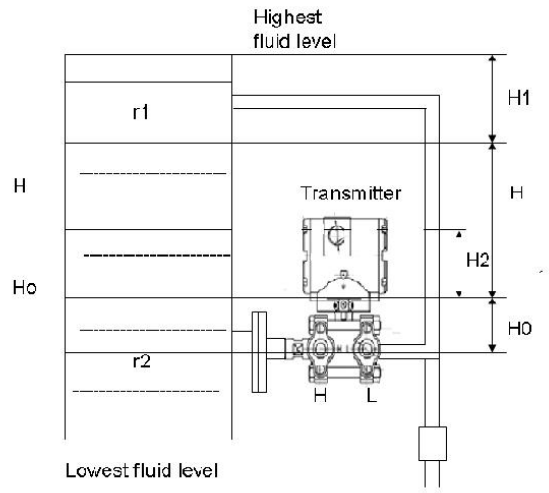


Fig : 1.4

**Formula**
**Pressure to positive side**

PH=r1 (H1+H-H2) +r2 (H2+H0)

**Pressure to negative side**

PL=r1 (H1+H+H0)

**Differential pressure**

△P = PH-PL+ (r2-r1) H0+ (r2-r1) H2

**Positive transfer amount**

A= (r2-r1) H0

Some agents would get crystallized as inducted with a constant temperature pressure conduit. In such a case, it is recommended to use a double-flange differential pressure transmitter to do the measurement. Depending on the crystallized degrees of different agents, the following method can be adopted respectively:

a. Double-flat flange transmitter
b. One-flat& one-in-line flange transmitter
c. Double-in-line flange transmitter, as indicated in fig. 1.4

**Fluid Interface Measurement**
**Pressure to positive side**
PH = r1 (H0+H1+H-H2) +r2 (H2+H0)
**Pressure to negative side**
PL = r1H0+ro (H1+H+H0)
**Differential pressure**
P = PH-PL
**Transfer amount**
B = r1(H1+H) +r2H0-r0 (H1+H+H0)
**Range**
P = (r2-r1) H

Where: r0 –silicone oil proportion H-height of the highest interface.

**Use Double Flange Differential pressure Transmitter to Measure flow**

For the agents unable to induct with pressure conduit, the double-flange differential pressure transmitter can be used to measure the flow, as indicated in fig.5-10. In measuring horizontal conduit, both flange at the same horizontal have no fluid level difference without the transfer being involved. In measuring vertical conduit, it will bear all the time the fluid pressure different of (r-r0) H. so the instrument should have the positive transfer amount of (r-ro) H

## Issues Relating to Measurement Ways

**Fluid level measurement**

In the measuring of fluid flow, the pressure tabs should be breached on the side of the process conduit to avoid the sediment of dregs. Meanwhile, the transmitter should be mounted beside or under the pressure tabs, to prevent the air bubbles from being discharged into the process conduit.

**Gas Measurement**

In the measurement of gas flow, the pressure tabs should be opened breached at the top or side of the process conduit. And the

transmitter should be mounted beside or on the process conduit, to make the collected fluids flow easily into the process conduit.

**Steam Measurement:**

In the measurement of steam flow, the pressure taps should be opened breached on the side of the process conduit. And the transmitter should be mounted under the process conduit, to make the cooled collected fluid flow into the process conduit

To be noted, in the measurement of steam or other high temperature agents, its temperature should not exceed the limited level for the use of transmitter.

As for the measured agents like steam, the conduit is required to be filled with water to prevent the steam from being direct contact with the transmitter. Thus when the transmitter is in working state, its capacitance variation would be ignored with no need of mounting cooling pot.

The differential pressure transmitter used for measuring the fluid level is a de facto static pressure head for the measurement of fluid bar. This pressure depends on the fluid level and the fluid proportion, with its value equal to the fluid height of the upper part of the pressure taps multiplying the fluid proportion, and irrelevant to the container's volume or form.

**Fluid Level Measurement of Breached Container**

In this kind measurement, the transmitter is mounted at the bottom near the container so as to measure the corresponding pressure of the upper part of fluid level.

The pressure of the container fluid level acts on the high-pressure side of the transmitter, while it's low-pressure side open to the atmosphere. If the lowest value in the range of the tested fluids level is at the upper position of the transmitter mounting location, the transmitter must undergo the positive transfer.

**Fluid Level Measurement of Sealed Container**

In the sealed container, the pressure Po of the upper fluid container affects the tested pressure of the container bottom. So the pressure of the container bottom is equal to that the fluid level height multiples the fluid proportion then plus the pressure Po of the sealed container.

To test the real value of fluid level, it is right to minus the pressure Po of the container from the tested pressure of the container bottom. For this, a pressure taps should be breached at the container top, and have it connected to the low-pressure side of transmitter. Thus, the pressure inside the container will act on both high and low sides of the transmitter. The result obtained is a direct proportion to the product of the fluid level height multiplying with fluid proportion.

**Pressure Impulse Connection Ways**

1. **Dry pressure impulse connection**
   In the case of the gas on the fluid refuse to condensate, the connection conduit at the low side of transmitter will keep dry. This is so called Dry pressure impulse connection. The way determining the measure range of transmitter is the same to that of breached container fluid level.

2. **Wet pressure impulse connection**
   In the case of the gas on the fluid getting condensate, there will be a gradual fluid accumulation inside the pressure conduit at the low-pressure side of transmitter, leading to an error on measurement. To avoid this error, certain fluid is filled into the low-pressure side of transmitter beforehand; this is called wet pressure impulse connection.
   The above situation will make the transmitter be with a head at the low-pressure side, so a negative transfer is needed.

**Decrease Error**

Pressure conduit makes transmitter connect with process technic conduit, and transfer the pressure at the pressure taps along the technic conduit to the transmitter. In the process of pressure transmission, the following reasons may cause the errors:

**Leakiness:**

1) Abrasion loss (particularly in the use of detergent);
2) Some gas existing in the fluid conduit (resulting in pressure head error);
3) Accumulated fluid in the gas conduit (resulting in pressure head error );
4) Density difference caused by the time difference between conduits (resulting in pressure head error);

**The following ways can be used to decrease the errors:**

1) Pressure conduit should be as short as possible;
2) When measuring fluids or steam, the pressure conduit should be connected up to the process technic conduit, with its rake less than 1/12;
3) For the measurement of gas, the pressure conduit should be connected down to the process technic conduit, with its rake not less than 1/12;
4) The layout of fluid pressure conduit should avoid an extruded point in the middle part, while the gas pressure conduit avoids the sunken part;
5) Both pressure conduit should keep in the same temperature;
6) To avoid the friction, the diameter of pressure conduit should be wide enough;
7) No gas is found in the pressure conduit filled with fluid;
8) When using isolating fluid, the fluids in both pressure conduits should be the same;
9) When using detergents, the connection part of detergent should be near to the pressure taps of technic pipe; the conduit way passed through by the detergent should be the same in length and diameter. Try to avoid detergent passing through the transmitter.
10) The wiring orifice on the housing body of transmitter should be sealed or inserted in a plug smeared with seal glue to prevent the humidity being accumulated in the housing. In the case of the wiring not being sealed, the transmitter should be mounted with the wiring orifice upside down to discharge the moisture.

The signal line may ignore the grounding (hanging) or get to ground at any point on the loop line. The transmitter housing can have grounding or not, and the power has no need of being stabilized, even if the power ripples has a peak-to–peak value of 1V. And the output ripples of transmitter can also be ignored.

Since the transmitter gets grounding by way of capacitance coupling, it is not appropriate to use a high-voltage mega-ohm meter to check the insulation resistance. The voltage used for checking the line should be no more than 100V. The transmitter circuitry is designed as intrinsic safe circuitry, limiting the output current below 30mA DC (35mA DC under the condition of high temperature or high voltage).

## Mounting position

Flange fluid transmitter is directly mounted onto the box body or pot wall in flange form. As the pressure diaphragm is in the vertical position, the possible zero change occurred is the maximum 28mmH2O. As the diaphragm is in horizontal position, the zero point change is less than 100 mmH2O (an additional length variation is needed for the inline flange) with no influence on the range through. This error can be eliminating through calibration.

## Remote Flange Differential Pressure/Pressure Transmitter

**Range of measurement:**
Differential pressure: 0-1.2kPa-2.5Mpa (0-120mmh2O-250000mmh2O)
Pressure: 0-6kPa-10Mpa (0-600mmH2O-1000000mmH2O)

Working pressure (static pressure) 0.1-4Mpa
See table 1.2 for the models of the remote flange differential transmitter
Remote capillary length: 1.5m -13m

Table : 1.2

## Mounting size

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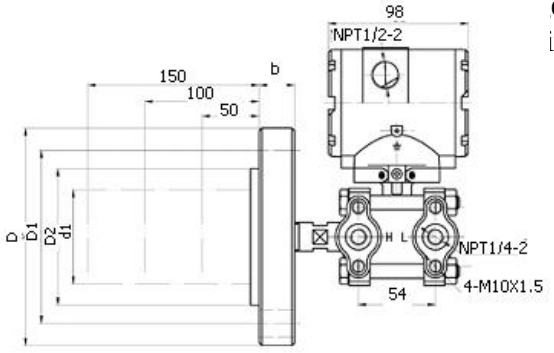



Fig : 1.5

| PN | DN | d1 | D | D1 | D2 | b |
|---|---|---|---|---|---|---|
| 4.0 | 80 | 78 | 200 | 160 | 120 | 24 |
| 4.0 | 100 | 96 | 235 | 190 | 149 | 26 |
| 10 | 65 | 62 | 220 | 170 | 138 | 32 |

Table1.3a

| Screw hole | | | Inserting depth |
|---|---|---|---|
| Diameter | Quantity | Bolt | |
| 18 | 8 | M16 | 50 100 150 |
| 22 | 8 | M20 | 50 100 150 |
| 26 | 8 | M24 | 50 100 150 |

Table 1.3b

## Mounting position

In mounting the remote flange transmitter, there are some limitations in the height different between the pressure transmitter and the flange, and the height difference between two flanges of differential pressure transmitter. See tab.1.4 for details.

| Range No | Allowed Deviation of Height (M) | |
|---|---|---|
| | Silicone oil | Fluorine oil |
| 4 | 3.84 | 1.89 |
| 5 | 19.2 | 9.48 |
| 6.7.8 | Not applicable for this limitation | |

Table : 1.4

| NO | Name | Model 3351DP TCC- | Range | Rating working pressure (MPa) |
|---|---|---|---|---|
| 1 | Double-flat flange differential pressure transmitter | 4422 | 0-6-40KPa | 4 |
| 2 | | 4522 | 0-30-180KPa | 4 |
| 3 | | 4622 | 0-0,16-1MPa | 4 |
| 4 | | 4722 | 0-0,4-2.5MPa | 4 |
| 5 | Double-in-line flange differential pressure transmitter | 4442 | 0-6-40KPa | 4 |
| 6 | | 4542 | 0-30-180KPa | 4 |
| 7 | | 4642 | 0-0,16-1MPa | 4 |
| 8 | | 4742 | 0-0,4-2.5MPa | 4 |

As the pressure transmitter and flange or the 2 flanges of differential pressure transmitter are not at the same height, zero point changes may occur resulting from the fluid bar action inside the remote capillary. So zero point calibration should be done again after mounting.

Changes in the tested agent temperature and environment will result in the zero point excursion of transmitter, which can be diminished by the use of the following mounting method:

1. Avoid the sunshine directly reflecting on the transmitter and remote devices;
2. Regulate the zero point along with the change of seasons;
3. Maintain a constant temperature of remote capillary.

## Calibration of Instrument

The calibration of flange transmitter is basically same to the general transmitter, except the device needed for the sealed linkage with flange. This consequently determines the tested standard pressure.

## Usage of Instrument

**Flange Fluid Level Transmitter**

In the use of flange fluid level transmitter, it should be noted that a flat-flange fluid level transmitter is for the general viscid agent; and for the agent with a strong viscosity, it is required to use the in-line flange fluid level transmitter. In mounting, the measurement diaphragm must be deep inside the internal wall of the tower, at least tangent to the inside wall. If the tested agent has a larger flowing speed and a stronger grinding capacity, it is likely to wear the isolation diaphragm. So the corresponding measures need to be adopted before use. Single-flat and single-in-flange fluid level transmitter have the same method of calculation in measurement.

## Instructions for order

**Corrosion-proof option**

Depending on the different corrosion agents, the isolation diaphragm and pressure transmission diaphragm of the transmitter can be made of the materials such as 316L, Hastelloy C-276, Monel K-500, Hastelloy D-2 and 3YC25: diaphragm board, connector, vent/drain valve and inserting canister as well as other structural materials touching the agents the models are listed as pre the material combination regulated and the corresponding corrosion-proof footnoted code. See table 1.5

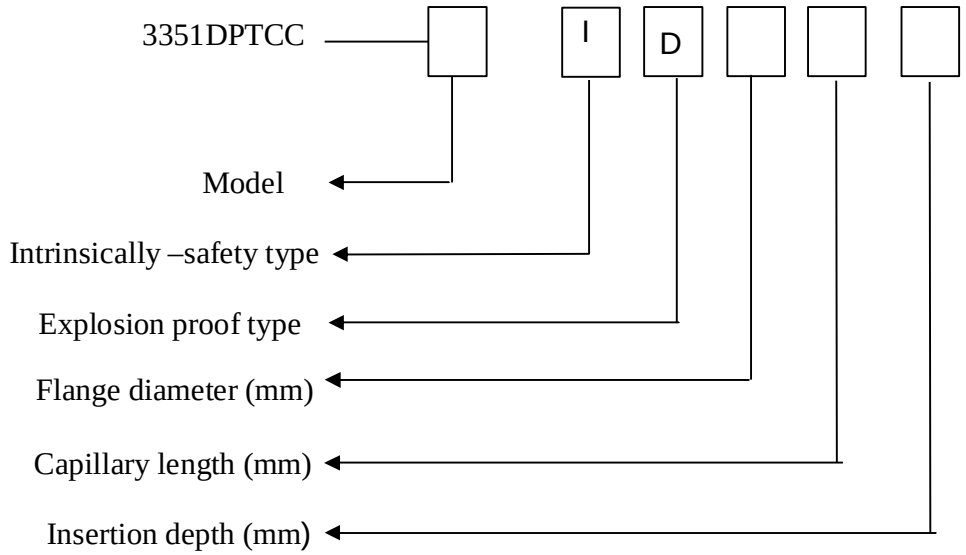
## Material Structure

| Corrosion proof Footnoted code | Structural material | | | |
|---|---|---|---|---|
| | Structural pieces touching agent | Pressure transmission diaphragm | Isolating seat | Assembly flange |
| No footnoted | Mo2Ti(316) | Mo2Ti(316) | Mo2Ti(316) | 1Cr18Ni9Ti |
| F13 | 316L | Hastelloy c-276 | Mo2Ti(316) | 1Cr18Ni9Ti |
| F14 | 316L | MonelK-500 | Mo2Ti(316) | 1Cr18Ni9Ti |
| F15 | 316L | Tantalum(Ta) | Mo2Ti(316) | 1Cr18Ni9Ti |
| F22 | 316L | 316L | Mo2Ti(316) | 1Cr18Ni9Ti |
| F23 | 316L | Hastelloyc-276 | Mo2Ti(316) | 1Cr18Ni9Ti |
| F25 | 316L | Tantalum(Ta) | Mo2Ti(316) | 1Cr18Ni9Ti |
| F24 | 316L | MonelK-500 | Mo2Ti(316) | 1Cr18Ni9Ti |
| F33 | Hastelloy C | Hastelloyc-276 | Mo2Ti(316) | 1Cr18Ni9Ti |
| F26 | 316L | Hastelloy B-2 | Mo2Ti(316) | 1Cr18Ni9Ti |
| F35 | Hastelloy C | Tantalum(Ta) | Mo2Ti(316) | 1Cr18Ni9Ti |
| F44 | Monel | MonelK-500 | Mo2Ti(316) | 1Cr18Ni9Ti |
| F47 | Monel | 3YC25 | Mo2Ti(316) | 1Cr18Ni9Ti |

Table : 1.5

## Selection Chart for Differential Pressure Transmitter with Capillary

### Complete Flange Transmitter Model




The transmitter produced by our company includes the full series range and special structure, with the model composition as the following diagram:

## Ordering Information for Pressure / Differential Pressure Transmitter

High -grade intelligent type (full-digital sensor, self-equipped communications keyboard)

**3351DPT/3351P☐ - ☐ ☐ ☐ ☐**

| | | |
|---|---|---|
| Y | – | Pressure |
| C | – | Differential Pressure |

**Priniciple**

| | | |
|---|---|---|
| C | - | Capacitance |

**Pressure Type**

| | | |
|---|---|---|
| 0 | - | Negative Pressure |
| 1 | - | Gauge Pressure |
| 2 | - | Absolute Pressure |
| 3 | - | Differential pressure static pressure 2.5 Mpa |
| 4 | - | Differential pressure static pressure 4Mpa |
| 5 | - | Differential pressure static pressure 6.4Mpa |
| 6 | - | Differential pressure static pressure 16Mpa |
| 7 | - | Differential pressure static pressure 25Mpa |
| 8 | - | Differential pressure static pressure 32Mpa |
| 9 | - | Differential pressure static pressure 40Mpa |

**Range :**

| | | |
|---|---|---|
| 1 | - | 0-0.06-3kPa/0-0.03 Bar |
| 2 | - | 0-0.25-1kPa/0-0.01Bar |
| 3 | - | 0-1.2-10kPa/0-0.1Bar |
| 4 | - | 0-6-40kPa/0-.04 Bar |
| 5 | - | 0-30-180kPa/0-1.8Bar |
| 6 | - | 0-160-1000kPa/0-10 Bar |
| 7 | - | 0-400-2500kPa/0-25 Bar |
| 8 | - | 0-1600-8000kPa/0-80 Bar |
| 9 | - | 0-4000-25000kPa/0-250Bar |
| 0 | - | 0-7000-40000kPa/0-400 Bar |
| S | - | Special Version to be Specified |

**Type :**

| | | |
|---|---|---|
| 0 | - | Standard Type |
| 1 | - | Single – flat Flange type |
| 2 | - | Double - Flat Flange Type |
| 3 | - | Single In-Line Flange Type |
| 4 | - | Double In-Line Flange type |
| 5 | - | One Flat & One In-line Flange type |

**Accessories and material code**

| Code | Meaning | | | |
|---|---|---|---|---|
| M3 | Digital LCD meter head | | | |
| E1 | Common cable connector | | | |
| E2 | Explosion-proof cable connector | | | |
| B1 | Conduit assembly curve bracket | | | |
| B2 | Plate assembly curve bracket | | | |
| B3 | conduit assembly curve bracket | | | |
| G1 | Joint flange | | | |
| G2 | Welding pipe connector | | | |
| G3 | Integral 3- valve group | | | |
| I | Intrinsically safety type | | | |
| D | Isolating explosion | | | |
| H | 4-20 m A DC/HART Protocol digital communications | | | |
| G | 200 C(high temperature silicone oil) | | | |
| F | 398 C (high temperature fluorine oil) | | | |
| Standard Type | Corrosion – proof material | Structural material | | |
| | | Flange connector | Vent/drain valve | Isolating diaphragm |
| | F12 | Carbon steel | 316 | 316L |
| | F13 | Carbon steel | Hastelloy C | Hastelloy C-276 |
| | F14 | Carbon steel | Monel | Monel K-500 |
| | F15 | Carbon steel | 316L | Ta |
| | F22 | 316L | 316L | 316L |
| | F23 | 316L | 316L | Hastelloy C-276 |
| | F24 | 316L | 316L | Monel K-500 |
| | F25 | 316L | 316L | Ta |
| | F26 | 316L | 316L | B-2 |
| | F33 | Hastelloy C | Hastelloy C | Hastelloy C-276 |
| | F35 | Hastelloy C | Hastelloy C | Ta |
| | F44 | Monel | Monel | Monel K-500 |
| | F47 | Monel | Monel | 3YC25 |

Note: M3, F22, 4-20mA and DC/RS 485 digital communication are the standardized configuration

**Note:** The users are recommended to use in the above range, and adopt 100:1 in the extreme state. The compressed range adopts the following formula to calculate its precision:

$$0.05 + \left(0.05 \times \frac{\text{Rating range}}{\text{Setting range-zero point transfer Amount}}\right) \% \text{ F.S}$$

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