



# APT 3100

## Smart Pressure Transmitter

For Differential / Gauge / Absolute Pressure Measurement



PRESSURE



## APT 3100

### Introduction

The APT 3100 Smart Pressure Transmitter is a micro processor-based high performance transmitter, which has flexible pressure calibration and output, automatic compensation of ambient temperature and process variable configuration of multiple parameters, communication with HART protocol. The application is very various, as measuring liquid, gas or steam flow as well as pressure and liquid level by application method. All sensor data is input, modified and stored in EEPROM.



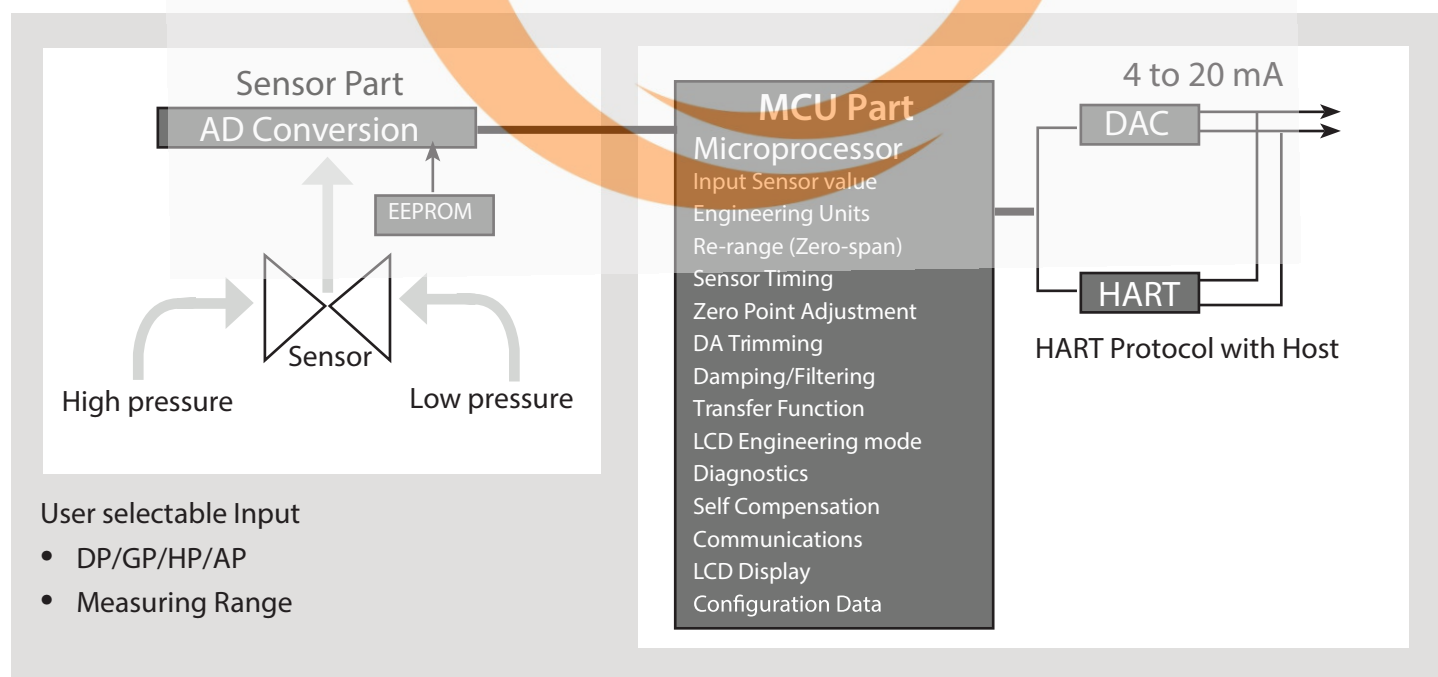
Standard

SS Housing

### Function

- Flexible Sensor Input : DP, GP, AP, HP
- Various Output : 4-20mA , Digital Signals
- Setting Various Parameters : Zero/Span, Trim, Unit, Fail-mode, etc.
- Self Diagnostic Function : Sensor, Memory A/D Converter, Power, etc.
- Digital Communication with HART protocol
- Explosion-proof Approval & Intrinsic Safety Approval : ATEX, FM, FMCanada, GOST, KOSHA, KTL, etc.
- Marine Certificate: ABS, LR, BR, DNV

### Functional Block Diagram



## Features

### Superior performance

- Long-Term Stability (0.125% URL for 3year)
- High Range ability (100 : 1)(for the range 4-0)
- Self-diagnostics and data acquisition capability
- High accuracy up to  $\pm 0.075\%$  FS

### Flexibility

- Data Configuration with HART Configurator
- Zero Point Adjustment

### Reliability

- Continuous self-diagnostic function
- Automatic ambient temperature compensation
- Fail-mode process function
- EEPROM write protection
- CE EMC conformity standards (EN50081-2, EN50082-2)

## Transmitter Description

ATP 3100 Pressure transmitter can be easily configured from any host that support the HART protocol.

### Basic setup

- Operational parameters
- 4-20mA Points (Zero/Span)
- Engineering units
- Damping time : 0.25-60 sec
- Tag : 8 Alphanumeric characters
- Descriptor : 16 characters
- Message : 32 characters.
- Date : day/month/year

### Calibration and trimming

- Lower/Upper range (zero/span)
- Sensor zero trimming
- Zero point adjustment
- DAC output trimming
- Transfer function
- Self compensation

### Self-Diagnosis and others

- CPU & analog module fault detection
- Communication error
- Fail-mode handling
- LCD indication
- Temperature measurement of sensor module

## Specifications

### Range and sensor limits

- Refer to Table 1.

### Zero and span adjustment limits

- Zero and span values can be set anywhere within the range limits stated in table 1. Span must be greater than or equal to the minimum span stated in Table 1.

### Output (Analog current and digital data)

- LCD display & ENG mode
- Two wire 4-20mA user-configurable for linear or square root out put, digital process value superimposed on 4-20mA signal, available to any host that conforms to the HART protocol

### EMC conformity standards

- EMI (Emission) – EN50081-2:1993
- EMS (Immunity) – EN50082-2:1995

### Power supply & load requirement

- External power supply required.
  - \* 250 ohm load - 17.5 Vdc
  - \* up to a 550 ohm load -24 Vdc
- Max. loop resistance =  $(E - 12) / 0.022$  (E = Power supply voltage)
- Voltage range : 12 to 45 Vdc
- Voltage rating : 24 Vdc  $\pm 30\%$
- Loop load : 1-1500 ohm - Operation  
250-550 ohm - HART Communications

### Failure Mode

- Fail High : Current  $\geq 21.1$  mA
- Fail Low : Current  $\leq 3.78$  mA



## Storage temperature

- 40°C to 85°C (without condensing)

## Process temperature limits

(Range codes and approval codes may effect limits)

- 40°C to 120°C ( -104°F to 248°F )

## Isolation

- Input/output isolated to 500Vrms (707 Vdc)

## Working pressure limits (silicone oil)

- Model D & G 0-13.79 MPa - # 3-8
- Model G 0-40.00 MPa - # 9  
0-75.00 MPa - # 0
- Model H 0-31.02 MPa - # 4-7
- Model A 0-525 KPa - # 4  
0-3000 KPa - # 5  
0-5250 KPa - # 6

## Hydrostatic test pressure

- Model D 3000 psi (20.7 MPa)
- Model H 6750 psi (46.5 MPa)
- Model G 2000 psi (13.8 MPa) - # 3-8  
11600 psi (80 MPa) - # 9  
11600 psi (80 MPa) - # 0
- Model A 101.5 psi (700 KPa) - # 4  
580 psi (4000 KPa) - # 5  
1015psi (7000 KPa) - # 6

## Burst Pressure

- Model D, G, H 68.9 MPa
- G8-9 50 MPa
- G0 80 MPa
- Model A4 1050 KPa
- A5 4000 KPa
- A6 7000 KPa

## 5 Digit LCD

- Express all pressure unit and flow unit
- Use 5 digit
- Select decimal place (0 to 4)

## User define unit function



## Change main parameter by button

- Change unit
- Change upper range value
- Change lower range value
- Change the damping second
- Select the decimal place
- Zero trim
- Zero adjustment



Moving within Menu : Zero  
Moving to below Menu : Span  
Moving Top Menu : Zero+Span

## Physical Specifications

### Wetted materials

- Isolating diaphragms 316L SS, Monel, Tantalum, HAST-C
- Drain/Vent valves 316 SS, HAST-C
- Flanges and Adapters 316 SS(ASTMCF8M), HAST-C
- O-ring Viton, PTFE

### Non-Wetted Materials

- Fill Fluid Silicone oil or Inert fill
- Bolts 304 SS



- Electronics housing Aluminum or 316L SS (Optional)  
Flameproof and Waterproof (IP67)
- Cover O-ring Buna-N KPa
- Paint Epoxy-Polyester or Polyuret
- Mounting bracket 304SS with U-bolt
- Nameplate 304SS

## Electrical connections

- 1/2-14 NPT conduct with M4 screw terminals

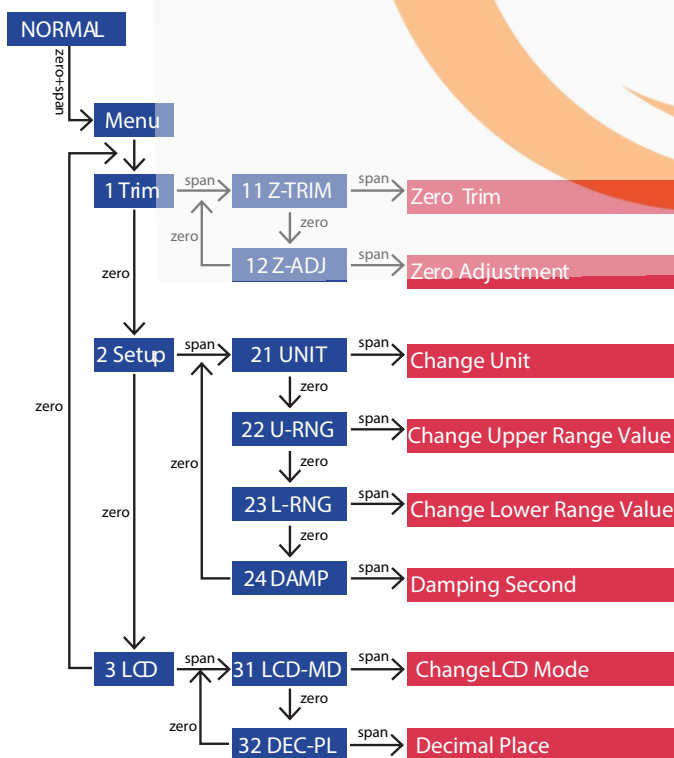
## Process connections

- 1/4-18 NPT on 2.126 inch (54.0 mm) centers on flanges for standard
- 1/2-14 NPT on process adapter (option)  
\*Refer to drawing in the last page

## Weight

- 3.9 Kg/8.59 lb ( Standard - excluding options )  
5.35 Kg/11.79 lb (SS Housing- excluding options)

## Button menu tree



## Hazardous Location Certifications (option)

### KCs Approvals K1 Code

Flameproof for class I, Zone 1: Ex d II C T6, IP67  
 Operating temperature: -20 to 60°C  
 Max. process temperature: 80°C  
 Power supply: Max. 45 Vdc  
 Output: 4 to 20 mA + HART, Max. 22 mA

### ATEX Approvals E1 Code

CE 0344 II 2 G Ex d IIC T6, T5 or T4 operating  
 Temperature: -20°C ≤ t<sub>amb</sub> ≤ 60°C  
 T6 for process ≤ 85°C ; T5 for process ≤ 100°C  
 T4 ≤ 130°C  
 APT 3100 ATEX Certification is according to the  
 below standards : EN 60079-0: 2012 EN 60079-1 :  
 2007 ATEX Certificate No.: KEMA 07ATEX 0103X  
 IECEx Certificate No.: IECEx DEK 15.0071X

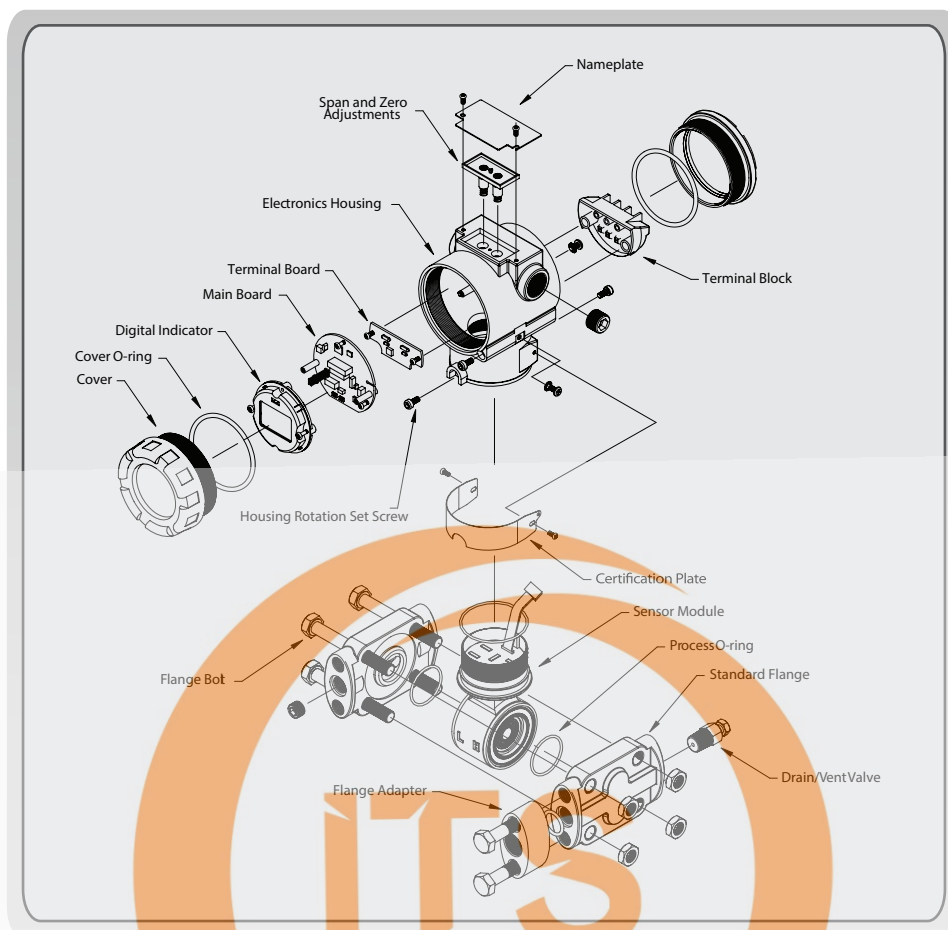
### ATEX Certification E2 Code

\*Intrinsic Safety: Ex ia IIC T5 or T4  
 Operating Temperature: For T5: -30°C to 40°C  
 For T4: -30°C to 80°C  
 Ui=30Vdc, Ii=200mA, Pi=0.9W, Ci=27nF, Li=104μH  
 ATEX Certificate No.: DEKRA 11ATEX0132X

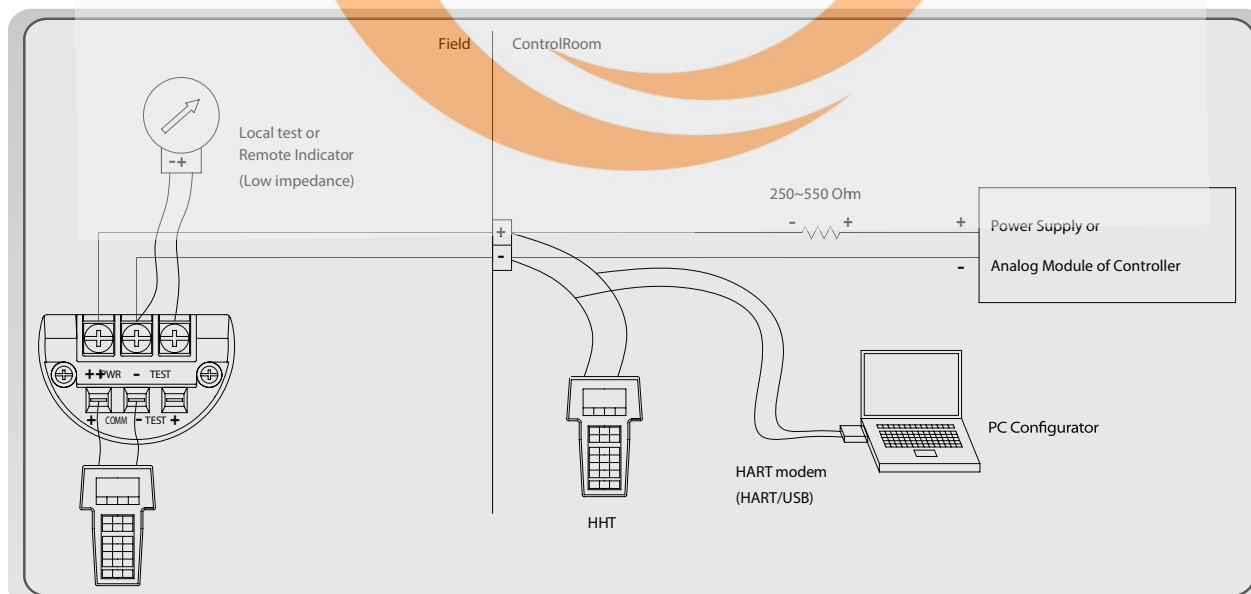
### FM and FM Canada Approvals F1 Code

FM: Factory Mutual explosion proof  
 FM Canada: Canadian requirements  
 Explosion proof for Class I, Division 1  
 Groups A, B, C and D  
 Dust-ignition proof for Class II/III, Division 1,  
 Groups E, F and G  
 Non incendive for Class I, Division 2, Groups A, B, C &  
 D; Class II, Division 2, Groups E, F & G; and Class III,  
 Division 1,  
 Enclosure: indoors and outdoors, NEMA Type 4X

## Exploded drawing of APT 3100



## Connection Diagram of Signal, Power, HHT for Transmitter



1. HHT (HART Communicator) or PC Configurator may be connected at any termination point in the signal loop.
2. HART Communication requires a loop resistance between 250 and 550 ohm @ 24 Vdc
3. Power Supply
  - Voltage Range : 12 to 45 Vdc
  - Voltage Rating : 24 Vdc  $\pm$ 30%

## APT 3100 MP Option

*Easy installation regardless fluid line condition*

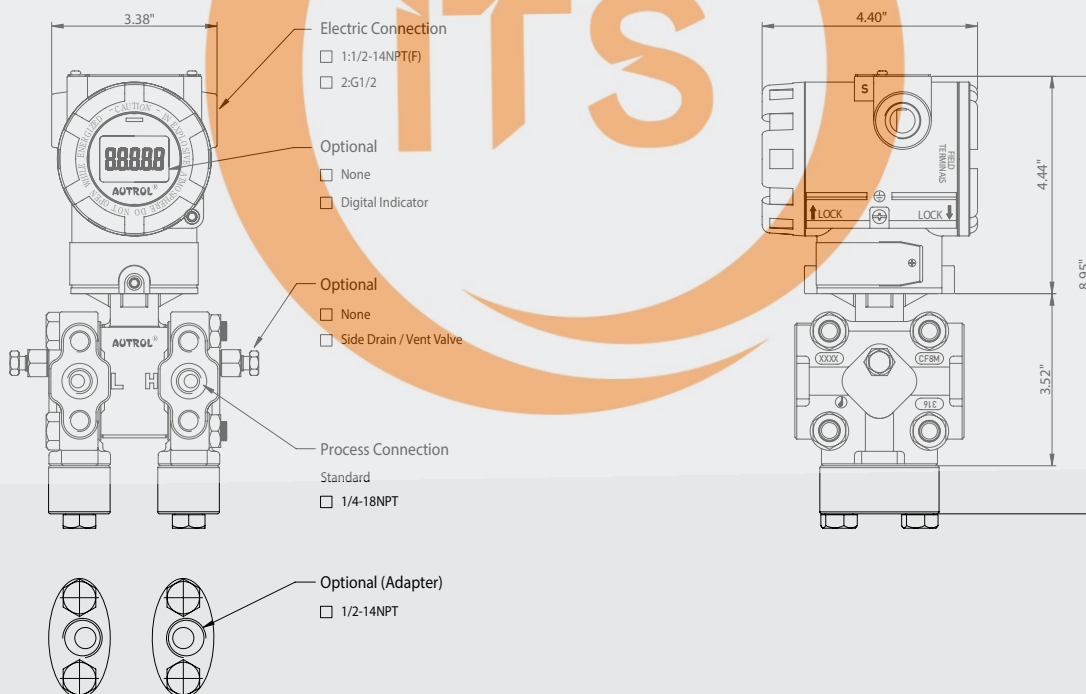
### Advantages

Conventionally, in the case where the pressure transmitter should be vertically installed irrespective of the orientation of the fluid inflow lines, modified flanges are required in addition to the basic flanges. As a result, the modified flanges must be additionally provided.

The Multi-planar pressure transmitter has been made in an effort to solve the problems occurring in the related art, and an object of this multi-planar is to provide a pressure transmitter, capable of being vertically installed without a separate adapter or various types of brackets regardless of the position of each fluid inflow line.



### Dimension





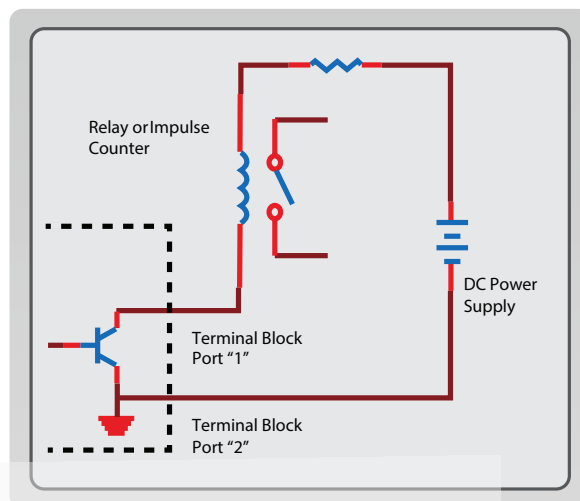
## APT3100F

### Description

APT 3100F is added the totalizing function in APT 3100 transmitter. So it is available to check the flow rate and total flow.

- Measuring & express flow rate and total flow
- Pulse output by accumulation of total flow
- APT 3100F measures the flow rate by using differential pressure so it is not compensated by the temperature and static pressure

### Wiring



### External Appearance

APT3100F is the same shape with APT 3100 but the terminal block is different.



In the case of connecting with Relay or Counter.

### Pulse Specification

- Scaled Pulse : A single pulse is an output for a specified flow amount
- Pulse Width : 10ms, 50ms, 100ms selectable (negative going pulse)
- Duty Cycle : Max. - 49 Pulse/sec.
- Output Type : Open collector, 30V, 500mA Max.

- 1: Pulse out +
- 2: Pulse out -

## General Specification

(Rangeability : #2=20:1 / #3=50:1 / 4-0=100:1)

### 1. APT 3100 Pressure sensor range & URL

| Range Code | Calibrated Span (psi) | DP / GP / HP / F        |                         |       |        | AP                    |             |
|------------|-----------------------|-------------------------|-------------------------|-------|--------|-----------------------|-------------|
|            |                       | Upper range (URL) (KPa) | Lower range (LRL) (KPa) |       |        | Calibrated span (KPa) | Range (KPa) |
|            |                       |                         | D.P                     | G.P   | H.P    |                       |             |
| 2          | 0.01-0.217            | 1.5                     | -1.5                    | -1.5  | NA     | NA                    | NA          |
| 3          | 0.02-1.087            | 7.5                     | -7.5                    | -7.5  | NA     | NA                    | NA          |
| 4          | 0.054-5.41            | 37.3                    | -37.3                   | -37.3 | -37.3  | 2.5-250               | 0-250       |
| 5          | 0.270-27              | 186.5                   | -186.5                  | -100  | -186.5 | 15-1500               | 0-1500      |
| 6          | 1-100.073             | 690                     | -690                    | -100  | -690   | 25-2500               | 0-2500      |
| 7          | 2.999-299.93          | 2068                    | -2068                   | -100  | -2068  | NA                    | NA          |
| 8          | 10-1000               | 6895                    | -6895                   | -100  | NA     | NA                    | NA          |
| 9          | 29.99-2999.303        | 20680                   | NA                      | -100  | NA     | NA                    | NA          |
| 0          | 60-6000.211           | 41370                   | NA                      | -100  | NA     | NA                    | NA          |

| Range Code | KPa   | Kg/cm <sup>2</sup> | bar   | psi      | inH <sub>2</sub> O@4°C | mmH <sub>2</sub> O@4°C | inHg@0°C |
|------------|-------|--------------------|-------|----------|------------------------|------------------------|----------|
| 2          | 1.5   | 0.015              | 0.015 | 0.217    | 6                      | 152                    | 0.442    |
| 3          | 7.5   | 0.076              | 0.075 | 1.087    | 30                     | 765                    | 2.215    |
| 4          | 37.3  | 0.38               | 0.373 | 5.41     | 149                    | 3804                   | 11.014   |
| 5          | 186.5 | 1.902              | 1.865 | 27.049   | 749                    | 19018                  | 55.072   |
| 6          | 690   | 7.036              | 6.9   | 100.073  | 2773                   | 70361                  | 203.75   |
| 7          | 2068  | 21.088             | 20.68 | 299.93   | 8310                   | 210878                 | 610.66   |
| 8          | 6895  | 70.309             | 68.95 | 1000.009 | 27708                  | 703097                 | 2036.025 |
| 9          | 20680 | 210.876            | 206.8 | 2999.303 | 83105                  | 2108781                | 6106.597 |
| 0          | 41370 | 421.856            | 413.7 | 6000.211 | 166085                 | 4218566                | 12216.55 |

### 2. Electrical specifications

|                      |                    |
|----------------------|--------------------|
| Power supply         | 12 to 45 Vdc       |
| HART loop resistance | 250-550 ohm        |
| Output signal        | 4-20 mA dc / HART  |
| Isolation            | 500 Vrms (707 Vdc) |

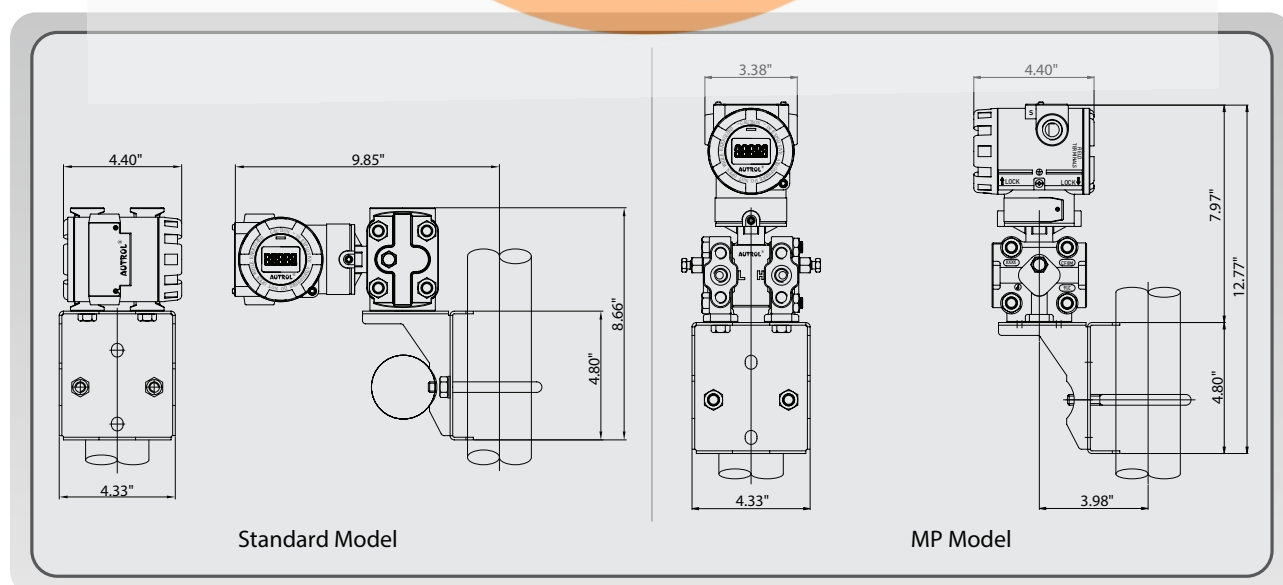
### 3. Performance Specifications

|                         |                                                                                              |
|-------------------------|----------------------------------------------------------------------------------------------|
| Reference accuracy      | ± 0.075% of Span (0.1URL≤Span≤URL), ±[0.025+0.005x(URL/Span)]% of Span (0.01URL≤Span<0.1URL) |
| Ambient temp. effect    | ±[0.019%URL+0.125% Span] / 28°C                                                              |
| Stability               | ±0.125% URL for 36 Months                                                                    |
| Ambient temperature     | -40°C - 85°C (-40°F - 185°F)                                                                 |
| LCD meter ambient temp. | -30°C - 80°C (-22°F - 176°F)                                                                 |

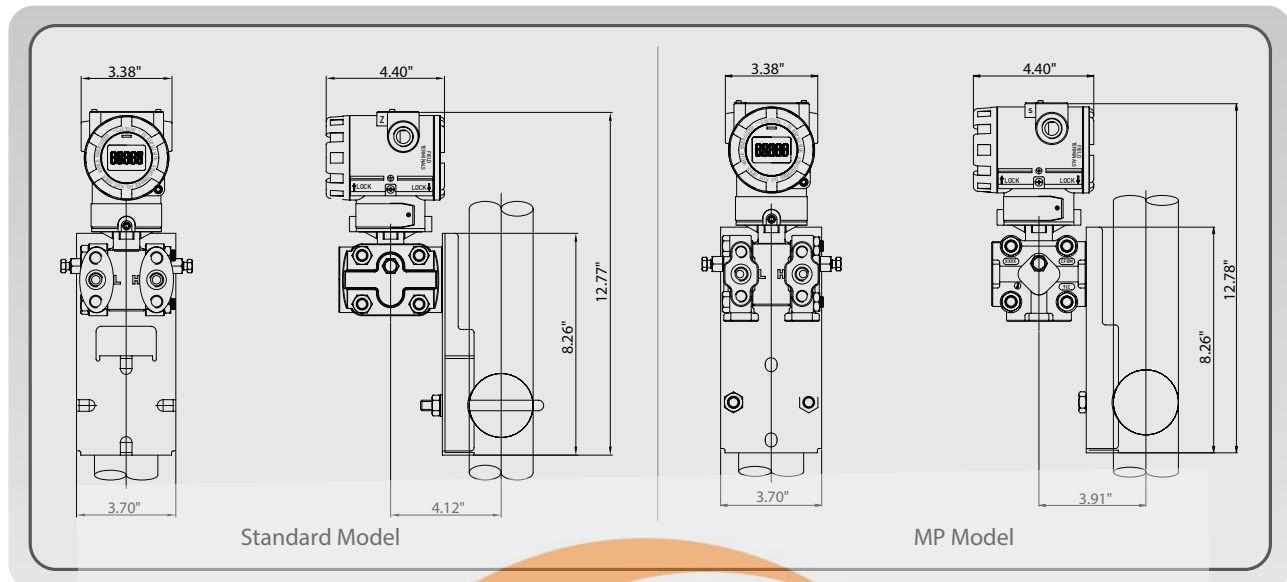
|                                   |                                                                                      |
|-----------------------------------|--------------------------------------------------------------------------------------|
| Static pressure effects           | ±0.1% of URL per 1015 psi (Zero Error)<br>±0.2% of Reading per 1015 psi (Span Error) |
| Humidity limits                   | 5%-100% RH                                                                           |
| Process temperature limits        | -40°C-120°C                                                                          |
| Power supply effects              | ±0.005% of Span per Volt                                                             |
| Mounting position effects         | Zero Shift up to 1.40 in wc No Span Effect                                           |
| <b>4. Physical specifications</b> |                                                                                      |
| Isolating diaphragm               | 316L SS                                                                              |
| Drain & vent valve                | 316L SS                                                                              |
| Flange & adapter                  | 316L SS                                                                              |
| O-ring                            | Viton or PTFE                                                                        |
| Electronic housing                | Aluminum (Option: 316L SS)                                                           |
| Bolts & bolting flange            | 304 SS                                                                               |
| Process connection size           | 1/4 - 18 NPT                                                                         |
| Adapter – Option                  | 1/2 – 14 NPT                                                                         |
| Electrical connections            | 1/2 – 14 NPT                                                                         |
| Weight (excluding option items)   | 3.9 Kg (Standard)<br>5.35Kg(SS Housing)                                              |
| 2" Pipe stanchion type bracket    | Angle or Flat type                                                                   |
| Housing class                     | Waterproof (IP67), 4X                                                                |

## Installation with mounting bracket

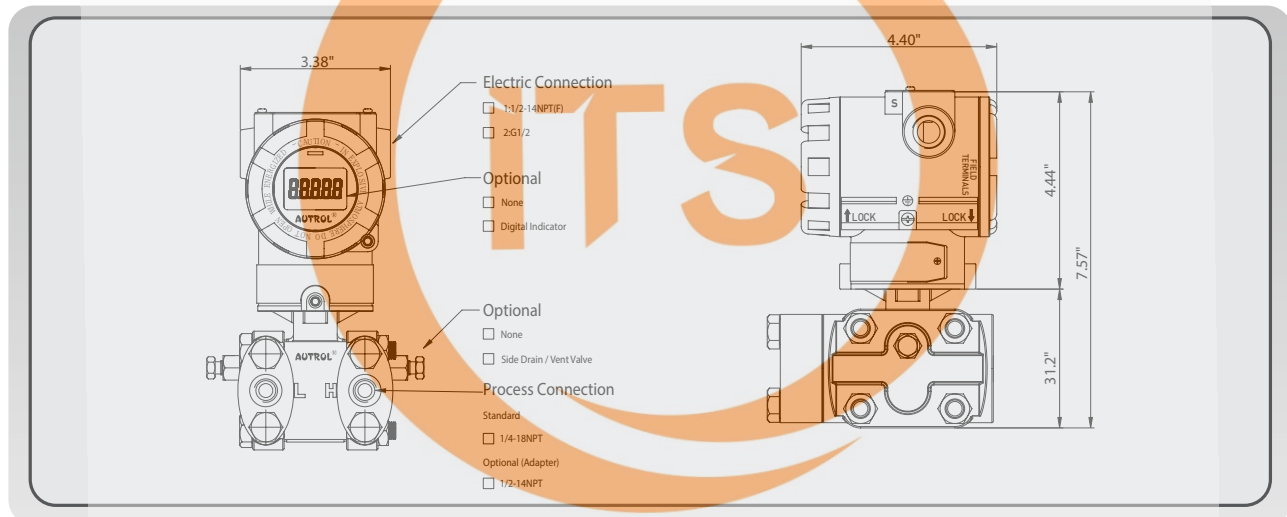
### 2" Pipe mounting bracket model angle type



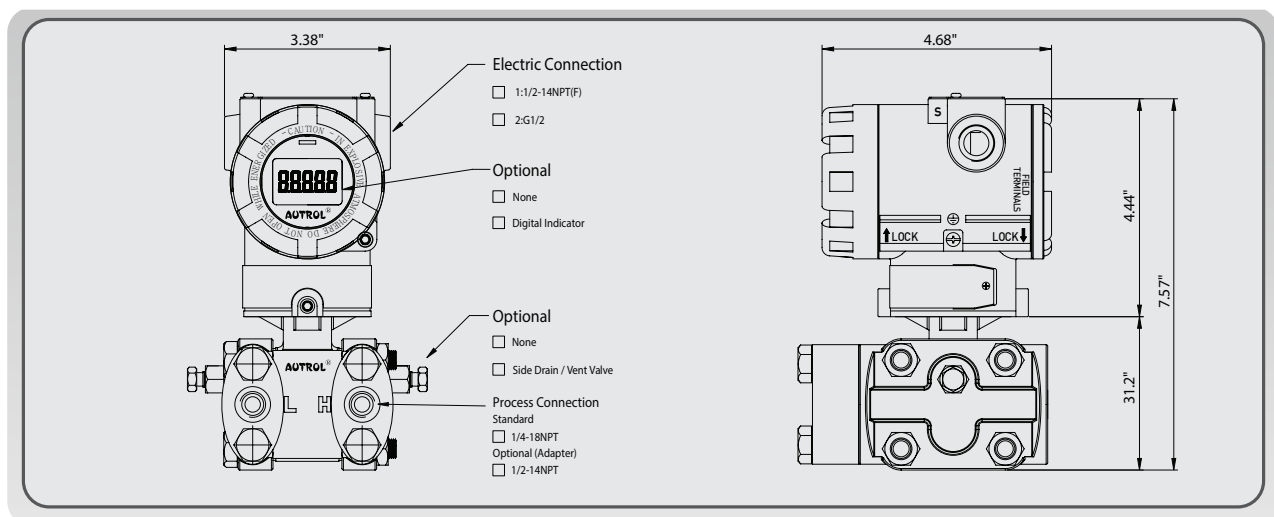
## 2" Pipe mounting bracket model flat type



## Dimensions of transmitter Standard model



## Intrinsically safe model





## Model Chart

| MODEL                                | Code | Description                                                                                    |                   |                                                     |                                   |                       |            |
|--------------------------------------|------|------------------------------------------------------------------------------------------------|-------------------|-----------------------------------------------------|-----------------------------------|-----------------------|------------|
| APT 3100                             | -D   | Differential Pressure Transmitter (Static Pressure 13.79 MPa / 2000psi)                        |                   |                                                     |                                   |                       |            |
|                                      | -F   | Flow Transmitter (on the principle of Differential Pressure Use and only for Head)             |                   |                                                     |                                   |                       |            |
|                                      | -G   | Gauge Pressure Transmitter                                                                     |                   |                                                     |                                   |                       |            |
|                                      | -H   | Differential Pressure Transmitter for High Line Pressure (Static Pressure 31.02MPa / 4500psi ) |                   |                                                     |                                   |                       |            |
|                                      | -A   | Absolute Pressure Transmitter                                                                  |                   |                                                     |                                   |                       |            |
| Ranges                               |      | DP/GP/HP                                                                                       |                   |                                                     |                                   |                       | *AP        |
|                                      |      | Calibrated Span<br>Min. to Max                                                                 | Lower Range Limit |                                                     |                                   | Upper Range<br>Limit  | Range      |
|                                      |      |                                                                                                | APT 3100-D        | APT 3100-G                                          | APT 3100-H                        |                       | APT 3100-A |
|                                      | 2    | 0.01-0.217 psi                                                                                 | -1.5 KPa          | -1.5 KPa                                            | NA                                | 1.5 KPa (6.022 inH2O) | NA         |
|                                      | 3    | 0.02-1.087 psi                                                                                 | -7.5 KPa          | -7.5 KPa                                            | NA                                | 7.5 KPa (30 inH2O)    | NA         |
|                                      | 4    | 0.054-5.41 psi                                                                                 | -37.3 KPa         | -37.3 KPa                                           | -37.3 KPa                         | 37.3 KPa (150 inH2O)  | 0-250 KPa  |
|                                      | 5    | 0.270-27 psi                                                                                   | -186.5 KPa        | -100KPa                                             | -186.5 KPa                        | 186.5 KPa (750 inH2O) | 0-1500 KPa |
|                                      | 6    | 1-100.073 psi                                                                                  | -690 KPa          | -100KPa                                             | -690 KPa                          | 690 KPa (100 psi)     | 0-2500 KPa |
|                                      | 7    | 2.999-299.93 psi                                                                               | -2068 KPa         | -100KPa                                             | -2068 KPa                         | 2068 KPa (300 psi)    | NA         |
|                                      | 8    | 10-1000 psi                                                                                    | -6895 KPa         | -100KPa                                             | NA                                | 6895 KPa (1000 psi)   | NA         |
|                                      | 9    | 29.99-2999.303 psi                                                                             | NA                | -100KPa                                             | NA                                | 20680 KPa (3000 psi)  | NA         |
|                                      | 0    | 60-6000.211 psi                                                                                | NA                | -100KPa                                             | NA                                | 41370 KPa (6000 psi)  | NA         |
|                                      | X    | Special                                                                                        |                   |                                                     |                                   |                       |            |
| Mounting Flange /Material            |      | Body                                                                                           |                   | Vent Plug                                           |                                   | Diaphragm             |            |
|                                      | M11  | 316 SS                                                                                         |                   | 316 SS                                              |                                   | 316L SS               |            |
|                                      | M12  | 316 SS                                                                                         |                   | 316 SS                                              |                                   | HAST - C              |            |
|                                      | M13  | 316 SS                                                                                         |                   | 316 SS                                              |                                   | Monel                 |            |
|                                      | M14  | 316 SS                                                                                         |                   | 316 SS                                              |                                   | Tantalum              |            |
|                                      | *M21 | HAST - C                                                                                       |                   | HAST - C                                            |                                   | HAST - C              |            |
|                                      | *M22 | HAST - C                                                                                       |                   | HAST - C                                            |                                   | Monel                 |            |
|                                      | *M23 | HAST - C                                                                                       |                   | HAST - C                                            |                                   | Tantalum              |            |
| Hazardous Location<br>Certifications | K0   | Maker Standard (Waterproof : IP67 )                                                            |                   |                                                     |                                   |                       |            |
|                                      | K1   | KOSHA Flameproof Approval                                                                      |                   | *K2                                                 | KTL Intrinsic Safety Approval     |                       |            |
|                                      | E1   | ATEX(KEMA) Flameproof                                                                          |                   | E2                                                  | ATEX(KEMA) Intrinsic Safety       |                       |            |
|                                      | F1   | FM & FM Canada Explosion proof                                                                 |                   | *F2                                                 | FM & FM Canada Intrinsic Safety   |                       |            |
| Fill Fluid                           | 1    | Silicone (DC200)                                                                               |                   | 2                                                   | Inert fill fluid (Halocarbon oil) |                       |            |
| Process Connection                   | S    | 1/4 - 18 NPT (Standard)                                                                        | O                 | 1/2 - 14 NPT Female (Adapter)                       |                                   | X                     | Special    |
| Electrical Connection                | 1    | 1/2-14NPT<br>Epoxy-Polyester Painted Aluminum                                                  | 2                 | G1/2 Epoxy- Polyester Painted<br>Aluminum (Adapter) |                                   | X                     | Special    |
| Option                               | M1   | LCD Indicator (5digit)                                                                         |                   |                                                     |                                   |                       |            |
|                                      | MP   | Multi-Planar                                                                                   |                   |                                                     |                                   |                       |            |
|                                      | LPI  | Lightening Protector (Internal)                                                                |                   | LPE                                                 | Lightening Protector (External)   |                       |            |
|                                      | K    | Oil Free Finish                                                                                |                   |                                                     |                                   |                       |            |
|                                      | F1   | Side Vent / Drain Top                                                                          |                   |                                                     |                                   |                       |            |
|                                      | F2   | Side Vent / Drain Bottom                                                                       |                   |                                                     |                                   |                       |            |
|                                      | 2W   | 2 Way Manifold (SS) : Remote type type                                                         |                   | 2WF                                                 | Flange type                       |                       |            |
|                                      | 3W   | 3 Way Manifold (SS) : Remote type type                                                         |                   | 3WF                                                 | Flange type                       |                       |            |
|                                      | 5W   | 5 Way Manifold (SS) : Remote type type                                                         |                   | 5WF                                                 | Flange type                       |                       |            |
|                                      | BA   | Stainless Steel Bracket (Angle type) with SS Bolts                                             |                   |                                                     |                                   |                       |            |
|                                      | BF   | Stainless Steel Bracket (Flat type) with SS Bolts                                              |                   |                                                     |                                   |                       |            |
|                                      | ST   | Stainless Steel Housing                                                                        |                   |                                                     |                                   |                       |            |
|                                      | T    | Teflon O-Ring (Wetted Part)                                                                    |                   |                                                     |                                   |                       |            |
|                                      | X    | Special                                                                                        |                   |                                                     |                                   |                       |            |

Example: APT 3100-D5-M11-E1-1-S-1-M1-BA

Note 1: Request to manufacturer for Draft Range, Absolute (small pressure and vacuum) and Items marked " \* " before order.

# Customer Service and Support



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