



Technology Solutions

TEK-BAR 3800XA

Explosion Proof Multivariable
Process Flow Transmitter



PRESSURE



Introduction

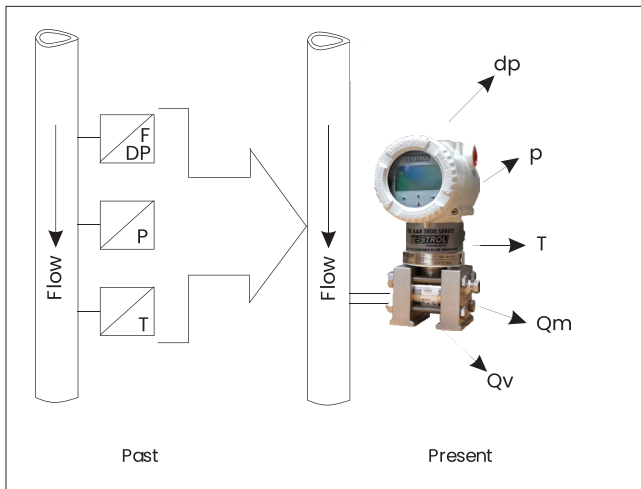
Tek-Trol's advanced Tek-Bar 3800XH/A Explosion Proof Multivariable Transmitter consists of multisensory and microprocessor technologies that are capable of measuring three separate process variables at the same time and provide the option of calculating the following values:

- Mass flow for gases, steam, and liquids using dynamic compensation.
- Standard volume flow for gases using dynamic compensation.
- Heat flow for water and steam.
- Drum water level and level measurement with density compensation of liquids.



Tek-Bar 3800XH/A Multivariable Transmitter is a best-in-class design solution to obtain measurement combinations of different process variables, including DP (Differential Pressure), SP (Static Pressure), PT (Process Temperature), which compensated mass or volume flow rate and totalized flow for gases, steam, and liquids. They are measured by two integrated sensors and an external standard Pt100 resistance thermometer.

Measuring Principle



The Tek-Bar 3800XH/A Multivariable Transmitter measures differential pressure, static pressure (absolute or gauge), and process temperature. It also performs flow calculations, compensating for pressure or temperature and accounting for variables such as discharge coefficient, thermal expansion, Reynolds number, and compressibility factor.

The multivariable transmitter includes flow calculations "of" superheated steam, saturated steam, gases, and liquids—so you only need one device for your system. The Multivariable Transmitter illustrates more economical solution than the designs that have been used for this type of measuring point up to now, in which three different transmitters for differential pressure, absolute pressure, and temperature report their values to a DCS, PLC, or flow computer.

The dynamic mass flow of the 3800XH-A is calculated using the following equation:

$$Q_m \approx C / (\sqrt{1 - \beta^4}) \cdot \epsilon \cdot d^2 \cdot \sqrt{p_1 \cdot dp}$$

Where,

Q_m = Mass Flow

C = Discharge Coefficient

β = Diameter Ratio

ϵ = Gas Expansion Factor

d = Inside diameter of the differential flow sensor

dp = Differential pressure

p_1 = Density

Features

- Automatic static pressure and temperature compensation.
- Easy configuration & calibration
- Field-replaceable modules reduce downtime.
- Flexible configuration options
- Universal transmitter terminals save installation and start-up time.
- Large turn down ratio of up to 100:1
- Integrated counting function

Applications

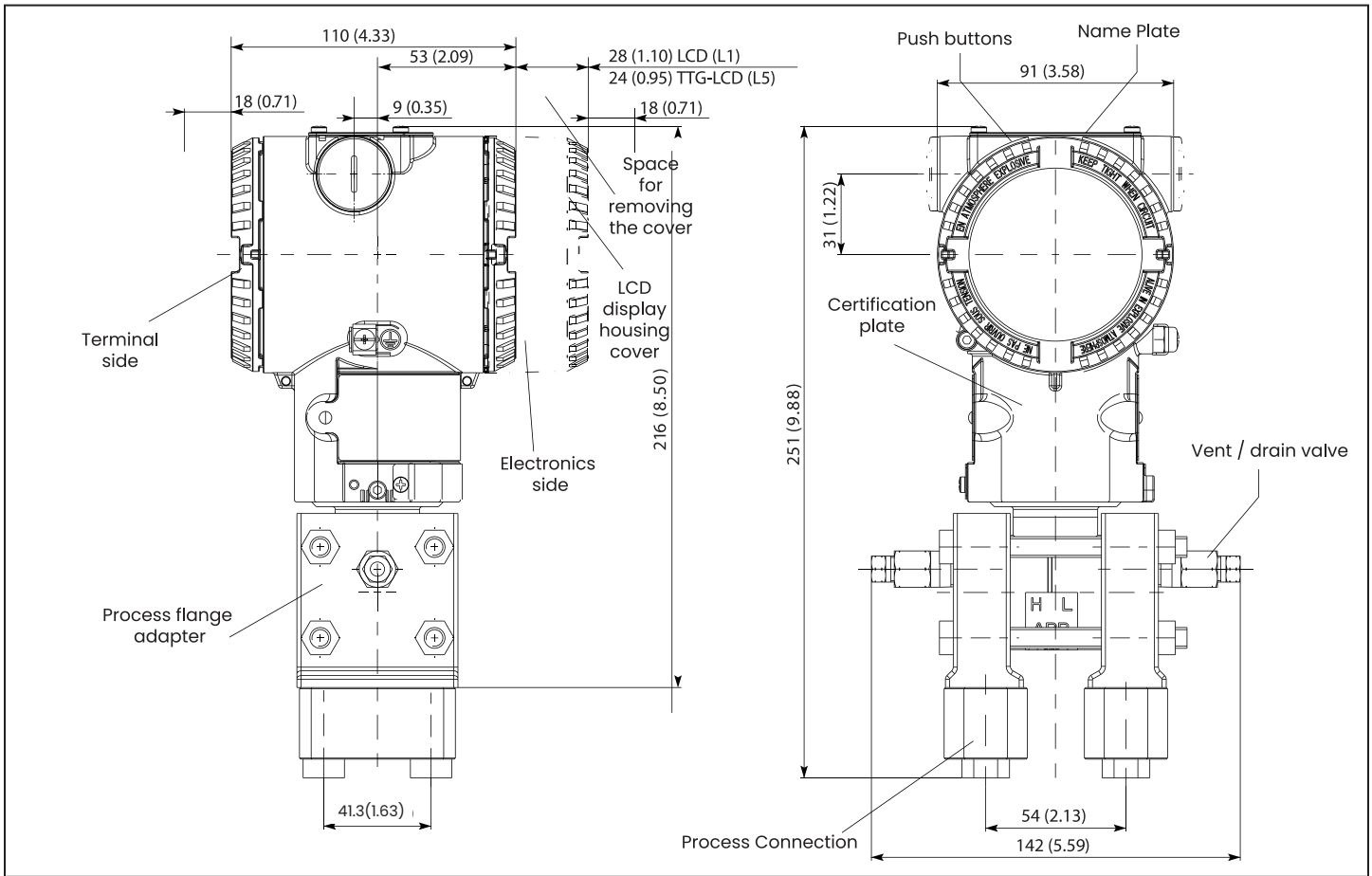
- Steam and Natural Gas
- Compressed Air
- Nitrogen, Oxygen, Argon, Hydrogen Gases
- Boiler Control
- Power Plant

Specifications

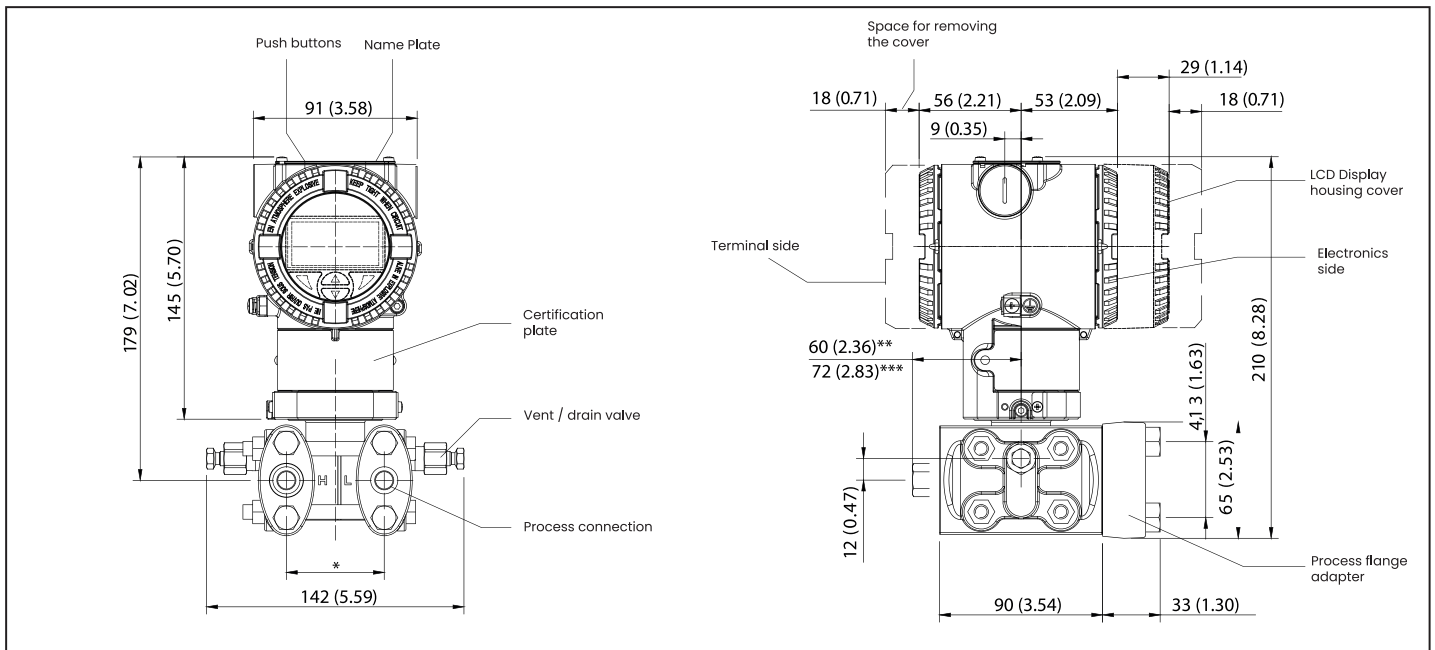
Measuring Range	Differential pressure sensor: 1kPa 10 mbar 4 in H ₂ O, -1kPa -10 mbar -4 in H ₂ O, 0.05 kPa 0.5 mbar 0.2 in H ₂ O Absolute pressure sensor: 600 kPa 6 bar 87 psi, 0 abs, 6 kPa 0.06 bar 0.87 psi
Accuracy	%FS
Span limits	± URL (TD = 0.5)
Relative humidity	up to 100 %. Condensation, icing: permitted
Output Signal	4 to 20 mA HART, Modbus RS485
Storage Temperature	-67 to 248°F (-55 to 120°C)
Temperature input	Process temperature range -200 to 850 °C (-328 to 1562 °F) with external resistance thermometer (Pt100) in four-wire circuit.
Damping	Between 0 to 60s.
Warm-up time	Ready for operation as per specifications in less than 10 s with minimum damping
Power supply	Operates on terminal voltage of 10.5 to 30 VDC
Electronic Housing Material	Pure Polyester Powder Coated Low Copper (<0.4%)-Aluminum
Fill Fluid	Silicone Oil DC200, Silicone Oil 704, NEOBEE® M-20 or CTFE (Chlorotrifluoroethylene)
Process Connections	1/4"-18 NPT (F), 1/2"-14 NPT(F), M10 with operating pressure upto 100 bar, M12 with higher operating pressure of 410 bar
Insulation resistance	> 100 M at 500V DC (between terminals and ground)
Cable entry	2, 1/2"-14 NPT or M20 × 1.5 threaded bores for cable glands, directly on housing.
Materials	Stainless steel 1.4435 (AISI 316L); Hastelloy C276®; Monel 400®; Monel 400®, gold-plated; Tantalum
Net Weight	8.3pounds (3.8kg) with Aluminum Housing
Mounting position	The transmitters can be installed in any position.
Approvals	ATEX/IEC, FM

Dimensional Drawing

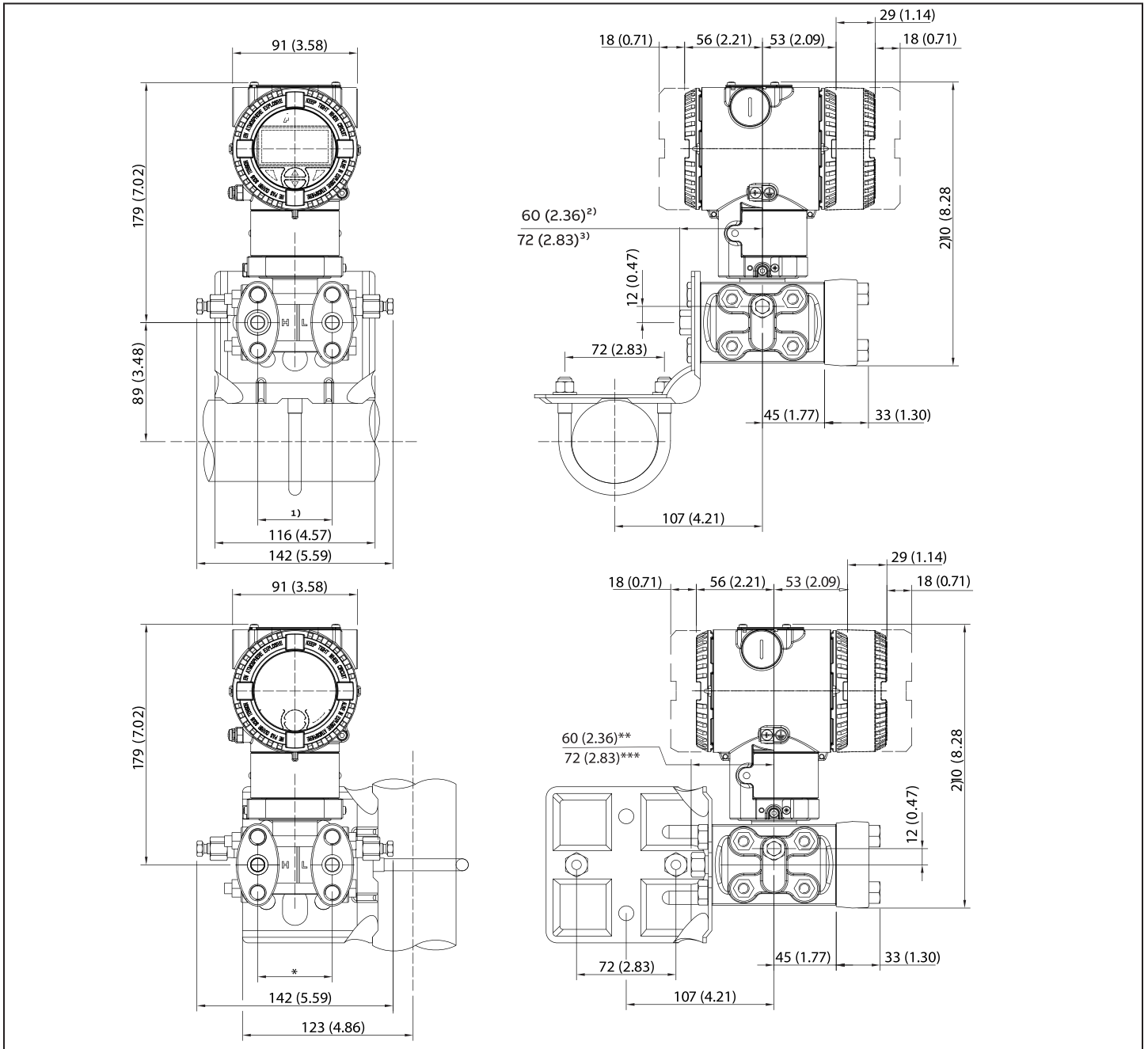
1. Transmitters with Barrel Housing – Vertical Flange



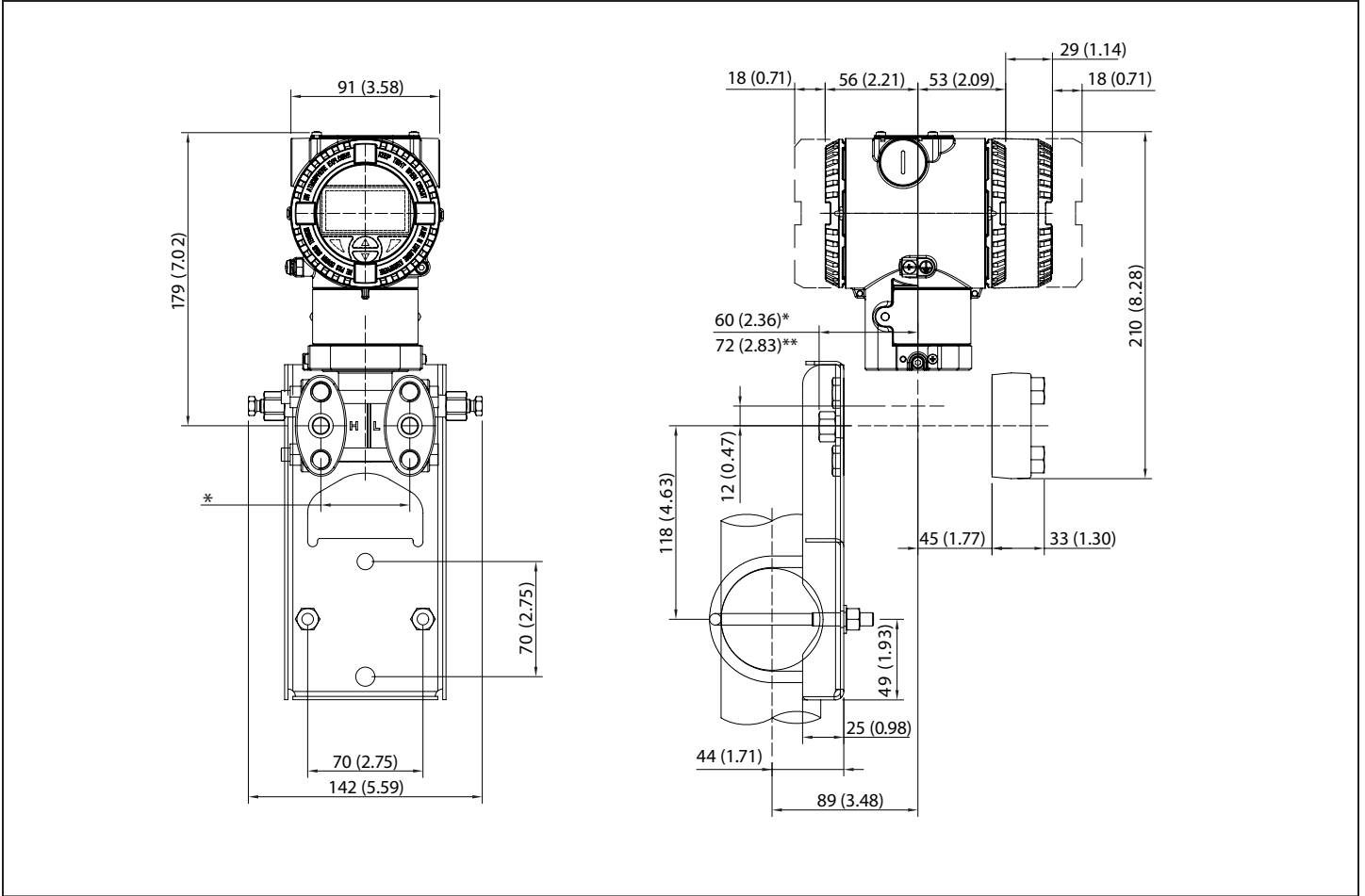
2. Transmitter with barrel housing – Horizontal flanges



3. Transmitter with mounting bracket, for vertical or horizontal mounting on 60 mm (2in) pipe



4. Transmitter with flat bracket, for vertical or horizontal mounting on 60 mm (2 in) pipe



Model Chart

Example	Tek-Bar 3800XA	AI	1	K1	Q	3	A	01	EN	L1	VI	FC	Tek-Bar 3800XA-AI-1-K1-Q-3-A-01-EN-L1-VI-FC
Series	Tek-Bar 3800XA												Multivariable Transmitter
Range Options		A1 C2 F2 L2 L3											DP: +/- 4" H2O (+/- 1 Kpa) / Static: 87 psia (6 bar) / Min span 0.2" H2O (0.05 Kpa) DP: +/- 24" H2O (+/- 6 Kpa) / Static: 290 psia (20 bar) / Min span 0.8" H2O (0.2 Kpa) DP: +/- 160" H2O (+/- 40 Kpa) / Static: 1450 psia (100 bar) / Min span 1.6" H2O (0.4 Kpa) DP: +/- 1000" H2O (+/- 250 Kpa) / Static: 1450 psia (100 bar) / Min span 10" H2O (2.5 Kpa) DP: +/- 1000" H2O (+/- 250 Kpa) / Static: 5945 psia (410 bar) / Min span 10" H2O (2.5 Kpa)
Temperature Sensor input			1 2										Single Input - RTD (2/3/4 Wire - Sensor Customer Supplied) ** Standard Single Input - RTD 3 Wire Sensor with SS Thermowell NPT Included
Wetted or Diaphragm Material / Fill Fluid				K1 S1 M2 T2 Y1 X									Hastelloy C-276 / Silicone Oil ** Standard Option 316L SS / Silicone Oil Monel 400 / Inert Fluid - Galden Tantalum / Inert Fluid - Galden Gold Plated Monel 400 / Silicone Oil Custom
Process Connection					Q A D G								1/4" NPT female AISI 316L SST (CF3M) / NACE / vertical connection 1/4" NPT female AISI 316L SST (CF3M) / NACE / horizontal connection 1/4" NPT female Hastelloy C-276 / NACE / horizontal connection 1/4" NPT female Monel 400 / NACE / horizontal connection
Bolt / Gasket Material						3 4 X							AISI 316 L SST / Viton AISI 316 L SST / PTFE Max 250 Bar / 3625 psi ** Standard Option Custom
Electrical Connection / Housing Material							A T						1/2" NPT / Aluminium Alloy Epoxy Coated ** Standard Option M20 / AISI 316L SST
Output								01 06					4-20 mA + Hart Digital Communication ** Standard Option RS485 Modbus RTU
Approvals									EN X				Combined ATEX / IECX and FM approvals (USA / Canada) ** Standard Option Custom
Display										L1 L2			With Integral LCD ** Standard Option Integral Display with Through the glass push button
Vent											VI		Side Vent
Options												FC BA ST	Factory Configuration, No Certification Pipe Mounting Bracket (Remote Mount) Stabilization Tap for Direct Mount

Customer Service & Support



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