



Technology Solutions

TEK-BAR 3800XA

Explosion Proof Multivariable Process Flow Transmitter



PRESSURE



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Introduction

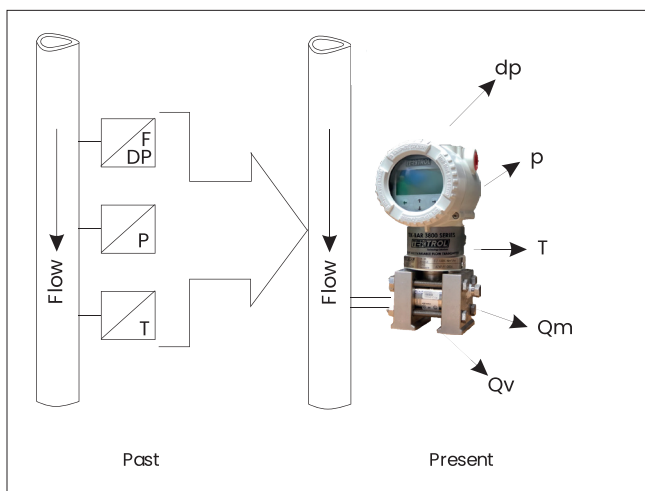
Tek-Trol's advanced Tek-Bar 3800XA Explosion Proof Multivariable Transmitter consists of multisensory and microprocessor technologies that are capable of measuring three separate process variables at the same time and provide the option of calculating the following values:

- 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 3800XA Multivariable Transmitter is a best-in-class design solution to obtain measurement combinations of different process variables, including DP (Differential Pressure), SP (Static Pressure), and PT (Process Temperature), which compensated mass liquids. There are two integrated sensors and an external standard Pt100 resistance thermometer to measure them.



Measuring Principle



The Tek-Bar 3800XA 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 is a more efficient solution than the designs used previously. It replaces multiple transmitters for differential pressure, absolute pressure, and temperature to report their values to a DCS, PLC, or flow computer.

The dynamic mass flow of the 3800XA 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

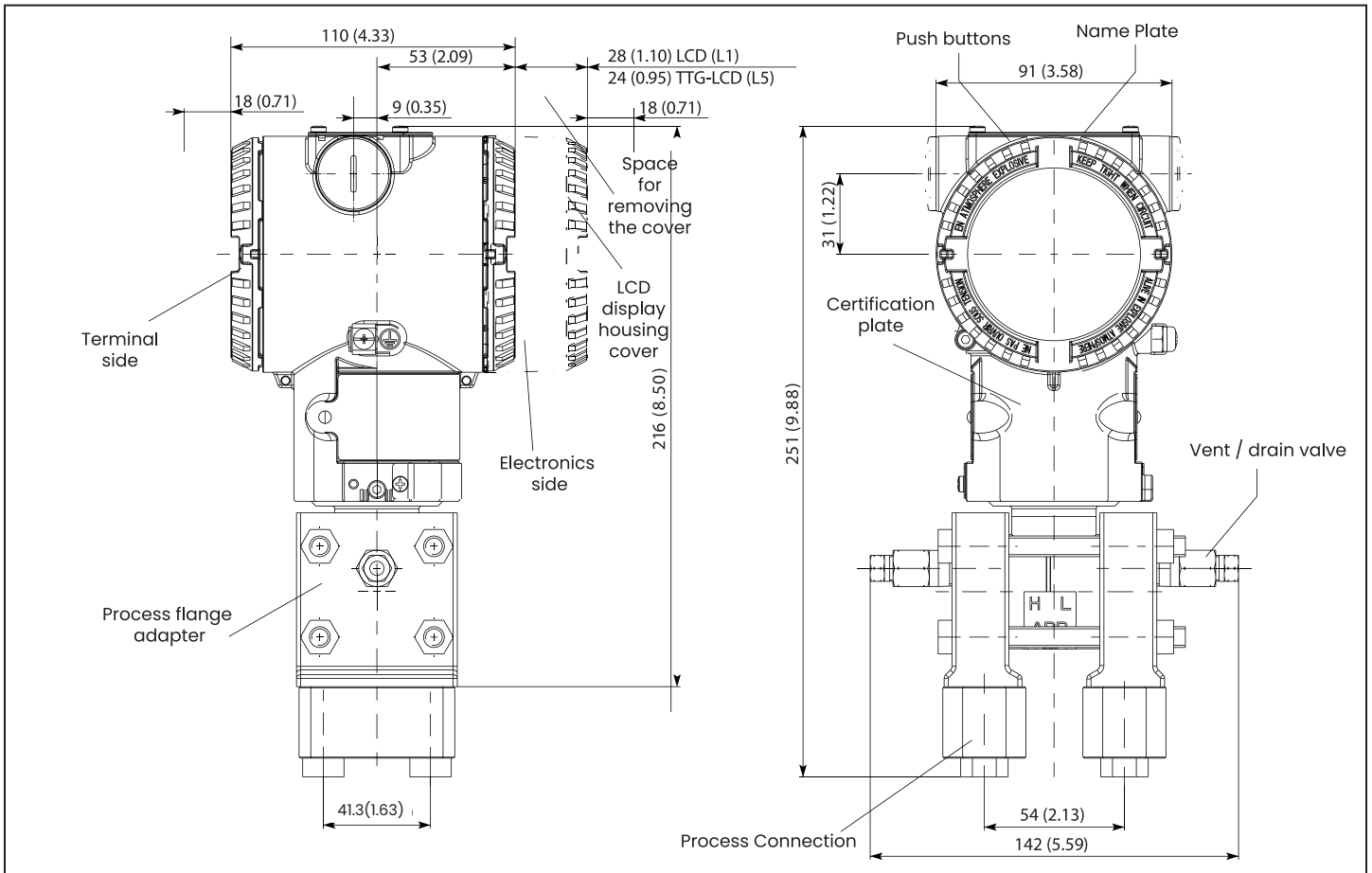
- Steam and Natural Gas
- Compressed Air
- Nitrogen, Oxygen, Argon, Hydrogen Gases
- Boiler Control
- Power Plant

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 (Chlorotrifluoro-ethylene)
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	8.3 pounds (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



Model Chart

Example	Tek-Bar 3800XA	A1	1	K1	Q	3	A	1	EN	V1	FC	Tek-Bar 3800XA-A1-1-K1-Q-3-A-1-EN-V1-FC
Series	Tek-Bar 3800XA											Multivariable Transmitter
Range Options		A1										DP: +/- 4" H ₂ O (+/- 1 Kpa) / Static: 87 psia (6 bar) / Min span 0.2" H ₂ O (0.05 Kpa)
		C2										DP: +/- 24" H ₂ O (+/- 6 Kpa) / Static: 290 psia (20 bar) / Min span 0.8" H ₂ O (0.2 Kpa)
		C3										DP ±24" H ₂ O (±6 kPa) / Static: 1450 psi (100 bar) / Min span 0.8" H ₂ O (0.2 kPa)
		C4										DP ±24" H ₂ O (±6 kPa) / Static: 5945 psia (410 bar) / Min span 10" H ₂ O (2.5 Kpa)
		F2										DP: +/- 160" H ₂ O (+/- 40 Kpa) / Static: Static: 290 psia (20 bar) / Min span 0.8" H ₂ O (0.2 Kpa)
		F3										DP: +/- 160" H ₂ O (+/- 40 Kpa) / Static: 1450 psia (100 bar) / Min span 1.6" H ₂ O (0.4 Kpa)
		L3										DP: +/- 1000" H ₂ O (+/- 250 Kpa) / Static: 1450 psia (100 bar) / Min span 10" H ₂ O (2.5 Kpa)
		L4										DP: +/- 1000" H ₂ O (+/- 250 Kpa) / Static: 5945 psia (410 bar) / Min span 10" H ₂ O (2.5 Kpa)
		F4										DP: +/- 160" H ₂ O (+/- 40 Kpa) / / Static: 5945 psia (410 bar) / Min span 10" H ₂ O (2.5 Kpa)
		N4										DP: +/- 160" H ₂ O (+/- 40 Kpa) / / Static: 5945 psia (410 bar) / Min span 10" H ₂ O (2.5 Kpa)
Temperature Sensor input			1									Single Input - RTD (2/3/4 Wire - Sensor Customer Supplied) ** Standard
			2									Single Input - RTD 3 Wire Sensor with SS Thermowell NPT Included
Wetted or Diaphragm Material / Fill Fluid				K1								Hastelloy C-276 / Silicone Oil ** Standard Option
				S1								316L SS / Silicone Oil
				M2								Monel. 400 / Inert Fluid - Galde
				T2								Tantalum / Inert Fluid - Galden
				Y1								Gold Plated Monel 400 / Silicone Oil
				X								Special Seal (used when selecting the high static pressure options like L4 or F4)
Process Connection					Q							1/4" NPT female AISI 316L SST (CF3M) / NACE / vertical connection
					A							1/4" NPT female AISI 316L SST (CF3M) / NACE / horizontal connection
					D							1/4" NPT female Hastelloy C-276 / NACE / horizontal connection
					G							1/4" NPT female Monel 400 / NACE / horizontal connection
Bolt / Gasket Material						3						AISI 316 L SST / Viton
						4						AISI 316 L SST / PTFE Max 250 Bar / 3625 psi ** Standard Option
						X						Custom
Electrical Connection / Housing Material							A					1/2" NPT / Aluminium Alloy Epoxy Coated ** Standard Option
							T					M20 / AISI 316L SST
Output								1				4-20 mA + Hart Digital Communication ** Standrd Option
								6				RS485 Modbus RTU
Approvals									EN			Combined ATEX / IECX and FM approvals (USA / Canada) ** Standard Option
									X			Custom
Vent										V1		Side Vent

Options											FC	Factory Configuration, No Certification
											BA	Pipe Mounting Bracket (Remote Mount)
											ST	Stabilization Tap for Direct Moun
											3WR	3-Way Manifold Valve (Remote Mount)
											5WF	5-Way Manifold Valve (Remote Mount)
											5WC	5-Way Manifold Valve (Compact Mount)
											CC	Custome Calibration with 5 point Calibration Certificate
											TAG	SS Hang Tag wired
											FC	Factory Configuration, No Certification
											CPC	Custom Product Code

Customer Service & Support



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