EASTERN INSTRUMENTS

QVT™ Multivariable Transmitter

The QVT™ Multivariable Transmitter from Eastern Instruments is a Smart Transmitter that can be used for the accurate measurement of up to four separate process variables including Differential Pressure, Temperature and Absolute Pressure. When coupled with any DP based flow measurement element, the QVT™ will calculate the fully compensated mass flow of air/gas travelling through any process which is at or near atmospheric pressure (5 - 25 psia). The QVT™ is uniquely designed for high accuracy at low DP ranges and can accurately measure differential pressures down to 0.0009 in WC. Its high accuracy is due in part to its unique process seal which requires no diaphragm seal. Due to condensate, diaphragm seals often cause inaccuracies in a transmitter's sensor readings.

FEATURES AND BENEFITS

- **Modes of Operation:** Multivariable Transmitter (Measurement of two or more of DP, Temperature and Absolute Pressure), DP Transmitter (DP Measurement only)
- **DP Measurement:** Operating Range is 10000:1 (0.0009 in WC to 9.0 in WC) measuring Differential Pressure across any primary flow element such as VAP Averaging Pitot or HBP Flow Conditioner
- **AP Measurement:** Measurement of Absolute Pressure (integral sensor tied to low port of primary flow element)
- **Temperature Measurement:** Measurement of Temperature via 100 ohm 3-Wire Class A DIN RTD
- **Process Seal:** Our unique method of isolating sensors from the process requires no diaphragm seal and can be further enhanced with a Purge Seal (Low Volume Continuous Purge coupled directly to transmitter)
- **Flow Accuracy:** The accuracy of the flow measurement can be as high as ±0.50% of Reading over 100:1 DP (10:1 flow) range
- **Rangeability:** the span of the 4-20 mA signal corresponding to DP can be ranged from 0 to 0.05 in WC up to 0 to 8 in WC (160:1)
- **Response Time:** Updates flow calculation 10 times a second
- **Functionality:** All measured and calculated variables are available on LCD panel
- **Output:** 4-20 mA Compensated flow output using measured/input values for Differential Pressure, Absolute Pressure and Temperature (Can also be a single variable output only)
- **Simplicity:** Ae and the 4-20 mA full scale value are set from LCD panel's push buttons
- **Zero:** Differential pressure can be zeroed from the LCD/push button interface
- **Power Supply:** Loop Power 8.8 - 42.5 vDC range
- **Versatility:** LCD can be rotated independently of the head (LCD rotates 270° and head can rotate 180°) for ultimate adjustability

Specifications

MEASURED VARIABLE SENSOR PERFORMANCE

Differential Pressure Sensor

SENSOR ACCURACY OVER VARIOUS TEMPERATURE RANGES			
SENSOR RANGE	**AMBIENT TEMP**	**HIGH ACCURACY MODEL**	**EXTREME ACCURACY MODEL**
BU	25° C	± 0.05% Reading and ± 0.005% URL at Operating Temp. of 25°C	
	0° to 50° C	± 0.2% Reading and ± 0.2% URL at Operating Temp. of 0° to 50°C	± 0.05% Reading and ± 0.005% URL at Operating Temp. of 0° to 50°C
	-20° to 70° C		± 0.05% Reading and ± 0.005% URL at Operating Temp. of -20° to 70°C

- Static Pressure Effect: Less than 0.00375% URL over specified operating range (5 - 25 PSI)
- Typical Operating Range: 10000:1 (0.0009 in WC to 9.0 in WC) at -40° to 70° C (-40 to 160° F)
- Minimum Resolution: (1 ct) 0.0001 in WC
- Position Effect: Less than 0.00375% URL in any plane
- Rangeability: 160:1 (0 - 0.05 to 0 - 8.0 in WC) - [4-20 mA Full Scale Range]
- Ambient Temperature Effect: 0-50° C Accuracy does not degrade (Extreme Accuracy Only)
- Update Rate: 10 times/s without strobing
- Long Term Stability: 0.125% URL/year
- Maximum Common Mode Pressure: ±10 PSI
- Maximum Differential Pressure: 4 PSI

Absolute Pressure Sensor

SENSOR ACCURACY OVER VARIOUS TEMPERATURE RANGES			
SENSOR RANGE	**AMBIENT TEMP**	**HIGH ACCURACY MODEL**	**EXTREME ACCURACY MODEL**
JU	25° C	± 0.05% Reading ±0.005% URL at Operating Temp. of 25°C	
	0 - 50° C	± 0.2% Reading ± 0.2% URL at Operating Temp. of 0° to 50°C	+/- 0.05% Reading ± 0.005% URL at Operating Temp. of 0° to 50°C
	-20° to 70° C		± 0.05% Reading and ± 0.005% URL at Operating Temp. of -20° to 70°C

- Operating Temperature Range: -40° to 70° C (-40 to 160° F)
- Minimum Resolution: (1 ct) 0.001 PSI
- Position Effect: Less than 0.00375% URL in any plane
- Ambient Temperature Effect: 0-50° C Accuracy does not degrade (Extreme Accuracy Only)
- Update Rate: 5 times/s without strobing
- Long Term Stability: 0.05% URL/year

Temperature Sensor	
SENSOR ACCURACY	
TEMP. RANGE	ACCURACY
SU	± 0.05% Reading (abs) and ±0.005% of URL (abs)

- Transmitter is compatible with any Class A DIN 100 ohm 385 Platinum RTD Sensor (3 Wire)
- Update Rate: 5 times/s without strobing
- Minimum Resolution: 0.024° C

COMPUTED VALUE PERFORMANCE

Density Computation			
TRANSMITTER ACCURACY OVER VARIOUS TEMPERATURE RANGES			
SENSOR RANGE	AMBIENT TEMP	HIGH ACCURACY MODEL	EXTREME ACCURACY MODEL
BU	25° C	± 0.25% Reading over full range of AP and Process Temperature	
	0 - 50° C		± 0.25% Reading over full range of AP and Process Temperature
	-20° to 70° C		± 0.25% Reading over full range of AP and Process Temperature

- Absolute Pressure Range: 5 - 25 PSIA; Process Temperature Range: -328° to 1562° F
- Accuracy calculation does not include RTD probe accuracy
- Update Rate: 5 times/s without strobing
- Density is computed using live/measured values or entered values for Absolute Pressure and Temp.

Mass Flow Computation			
TRANSMITTER ACCURACY OVER VARIOUS TEMPERATURE RANGES			
SENSOR RANGE	AMBIENT TEMP	HIGH ACCURACY MODEL	EXTREME ACCURACY MODEL
BU	25° C	±0.50% Reading 100:1 dP (10:1 flow) ±1.0% of Reading 225:1 dP (15:1 flow)	
	0 - 50° C		±0.50% Reading 100:1 dP (10:1 flow) ±1.0% of Reading 225:1 dP (15:1 flow)
	-20° to 70° C		±0.50% Reading 100:1 dP (10:1 flow) ±1.0% of Reading 225:1 dP (15:1 flow)

- Update Rate: 10 times/s without strobing
- Operating Range: 100:1

SENSOR LIMITS

Sensor Range Limits		
SENSOR	**LOWER LIMIT(LRL)**	**UPPER LIMIT (URL)**
BU	0 in WC	8 in WC
BB	-8 in WC	8 in WC
JU	5 PSIA	25 PSIA
SU	-328° F	1562° F

Sensor Span Limits		
SENSOR	**MIN SPAN**	**MAX SPAN**
BU	0.05 in WC	8 in WC
BB	0.05 in WC	16 in WC
JU	0.15 PSIA	20 PSIA
SU	20° F	1890° F

WARRANTY

QVT™ Multivariable Transmitter		
DP RANGE	**HIGH ACCURACY**	**EXTREME ACCURACY**
0 - 8 in WC	1-Year Limited Warranty	1-Year Limited Warranty

4-20 mA Output

Zero and Span Adjustment

Zero and Span can be set anywhere within the range of the sensors listed. The 2-wire 4-20 mA output is user-selectable for either a standard square root output (0.5 power) or for Eastern Instruments' own modified power output (0.455 power).

Accuracy: ±0.05% Full Scale (-40° to 70° C)

Power Supply*

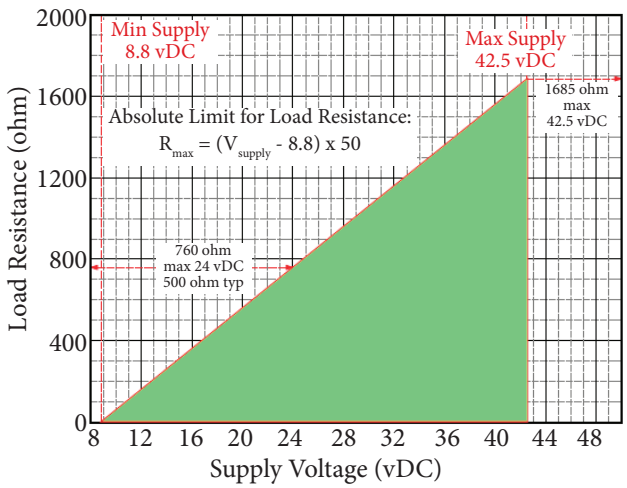
Loop Power Required:

- Supply Voltage Range: 8.8 to 42.5 Vdc

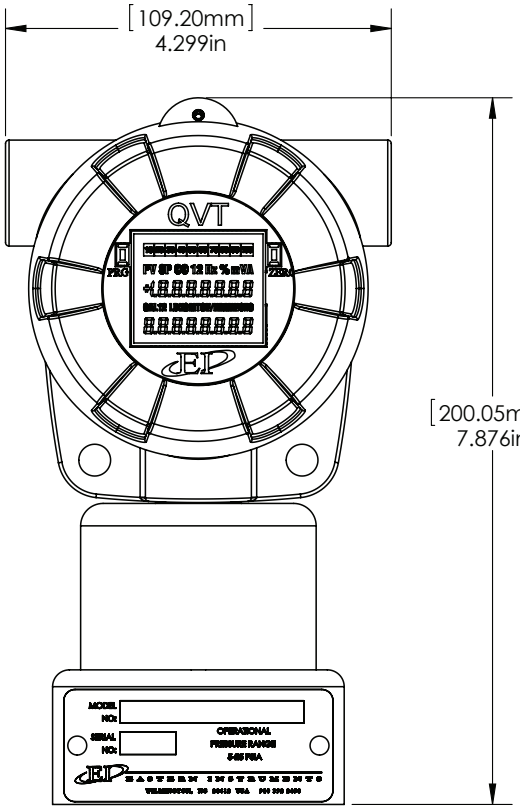
* Power Supply Effect is negligible

Maximum load resistance is determined by the voltage level of the external power supply as described in the graph (right):

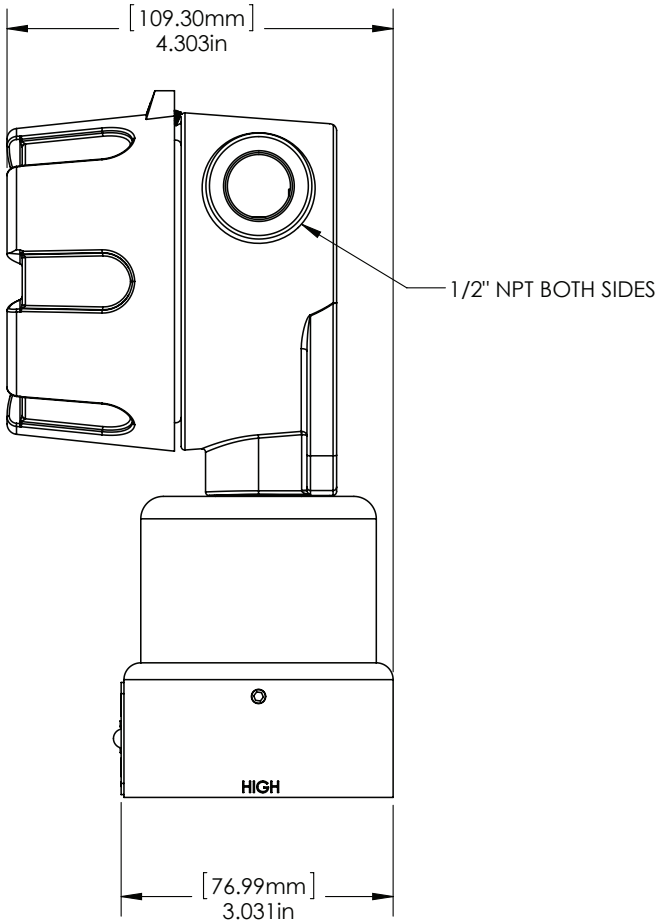
LOAD LIMITS



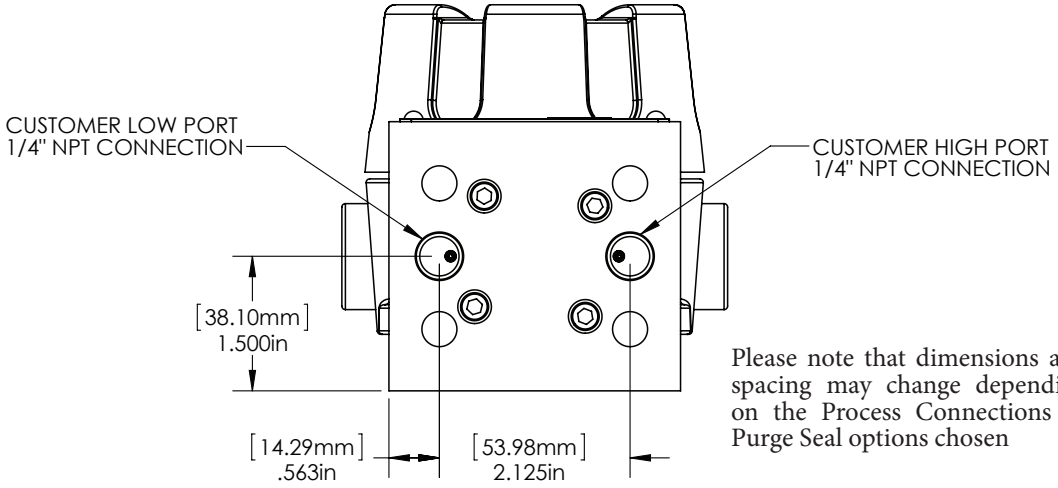
DIMENSIONAL DRAWINGS



FRONT VIEW



SIDE VIEW



Please note that dimensions and spacing may change depending on the Process Connections or Purge Seal options chosen

BOTTOM VIEW

Model Number

MODEL NUMBER TABLE

TRANSMITTER TYPE	
MF	Multivariable Transmitter with Compensated Mass Flow Output
SV	Single Variable Transmitter with Calculated Mass Flow Output

MEASURED VARIABLES	
1	Differential Pressure, Absolute Pressure, Temperature
2	Differential Pressure, Temperature
3	Differential Pressure

DIFFERENTIAL PRESSURE RANGE	
BU	0 to 8 in WC
BB	-8 to 8 in WC

ABSOLUTE PRESSURE RANGE	
JU	5 to 25 PSIA
NA	Not Applicable

TEMPERATURE RANGE	
SU	RTD Input (Class A, 100 ohm, -328° F to 1562° F [-200°C to 850°C])
NA	Not Applicable

PERFORMANCE AND ACCURACY	
1C	+/- 0.2% of Reading +/- 0.03% URL at an Operating Temperature of 20° to 25°C
5A	+/- 2.0% of Reading +/- 0.2% URL at an Operating Temperature of 0° to 50°C
5D2	+/- 0.05% of Reading +/- 0.005% URL at an Operating Temperature of 0° to 50°C
9D2	+/- 0.05% of Reading +/- 0.005% URL at an Operating Temperature of -20° to 70°C

OUTPUT/COMMUNICATIONS	
420	4-20 mA Output: Proportional to Mass Flow
CM	Communications Mode - Modbus to HMI: Proportional to Mass Flow

MODEL NUMBER TABLE *CONT'D*: Selectable Options for the QVT™ Quad Variable Flow Transmitter.

PROCESS CONNECTIONS	
PA	Port Adapter
M3	3 Valve SS Manifold
M5	5 Valve SS Manifold
NA	None

PURGE SEAL	
LP	Low Volume Purge - Assembled to Manifold
NA	None

ELECTRONICS HOUSING	
AL	Blue Aluminum Housing, 1/2-14 NPT Conduit Connection

ADDITIONAL OPTIONS	
2P	2 inch Pipe Mount Bracket
VA	VAP Pitot Mount Adapter
H1	Assembly Hardware - M3/M5 Only
H2	Assembly Hardware - PA Only
H3	Assembly Hardware - M3/M5 + LP
H4	Assembly Hardware - VA with M3/M5 only
H5	Assembly Hardware - VA with M3/M5 +LP
NA	Not Applicable