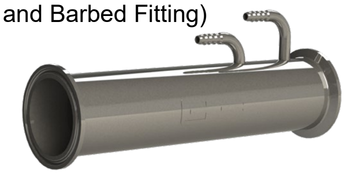
TRI CLAMP METERING STATION

METERING STATION SPECIFICATIONS



PSI / Temperature Rating: 150 PSIG / 250º F (Rating controlled by Clamp Connection and Barbed Fitting)
Housing Material: 304 Stainless Steel (125 Grit O.D./63 Grit I.D).
Flow Metering Venturi: 304 Stainless Steel (32 Grit)
Body Tappings: Barbed Hose Fitting Elbow for 1/4" Hose ID, Welded
End Connection: 2" Clamp Ferrules suitable for Tri-Clamp connection

TRANSDUCER SPECIFICATIONS

Accuracy[1]: ≤±0.5% FS (at constant temp of 77F)
Zero Temp Drift %FS/°F (%/°C): ±0.02 (< ±0.04)
Span Temp Drift %FS/°F (%/°C): ±0.02 (< ±0.04)
Response Time: ≤ 10 milliseconds
Circuit 2-wire
Pressure Range 0-120"H2O
Fittings 1/4" – 18 NPT internal
Maximum Working Pressure: 725 psig

Supply Voltage 7-30 Vdc
Output at Zero Pressure 4mA
Output at Full Range 20mA
Stability 0.1%F.S./Year
Insulate Resistance > 100M Ω @100V

Operating Temperature °F(C) -40 to 185 (-40 to 85)
Storage Temperature °F(°C) -40 to 221 (-40 to 105)
Welded Material 316L Stainless Steel
Electrical Connection Fixed Cable IP67
Load Resistance 0.02 Ω

FLOW RATES (+/-3%)

SIZE	KIT MODEL NO.	FLOW GPM[2] AT 4 FT/SEC	Cv[3]	Fc[4]	GPM RANGE FOR 5"–120" H2O
2"	MSSF-T	25.4	47.0	6.57	13.9 – 68.2

DIMENSIONS & WEIGHTS (NOMINAL)

All dimensions are for planning purposes only and may change without notice.

KIT MODEL NO.	PRODUCT	PART NO.	LENGTH (MM)	HEIGHT (MM)	WEIGHT (LBS.)
MSSF-T	Metering Station	MSSF	220	64	3.5
	Transducer	9680-195	72	117	1.0

NOTES

[1] Consists of Linearity, Repeatability and Hysteresis
[2] The generally accepted upper limit as recommended by ASHRAE to prevent pipe noise is 4 ft/sec.
[3] Cv is used to calculate the permanent pressure drop. PSID=(Flow/Cv)^2.
[4] Fc is used to calculate the signal for flow measurement. InH2O=(Flow/Cv)^2.

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GRISWOLD CONTROLS
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DESCRIPTION

Griswold Controls' high output, low differential pressure transducer (DPT) is designed for wet-to-wet differential pressure measurements of liquids or gases. It contains a fast-response capacitance sensor, and signal conditioning electronic circuitry necessary for providing a highly accurate, linear analog output proportional to pressure. The electronic circuit linearizes output vs. pressure, standardizes the output (zero and gain) and compensates for thermal effects on the sensor.

OPERATION

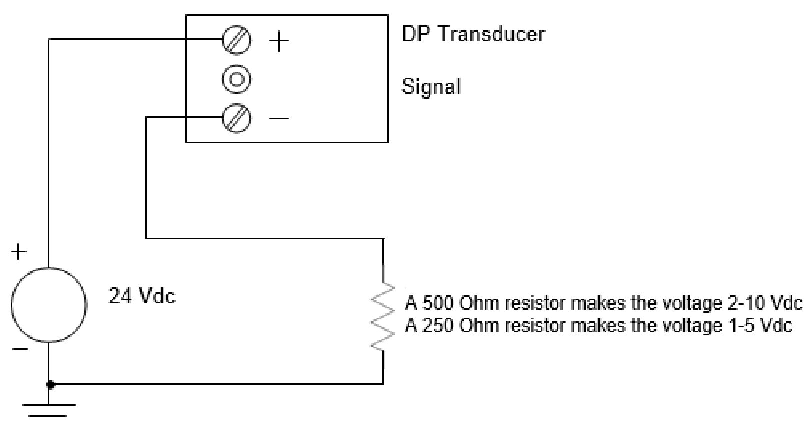
The Electronic Transducer is designed to measure flow using a Differential Pressure Transducer (DPT) that senses a pressure drop across a Griswold Controls venturi in a Metering Station. The DPT is very sensitive and will tend to pick up minor pressure oscillations that exist in typical hydronic systems. These oscillations in pressure are generally produced by the pump impeller. The DPT is a true 2-wire 4-20mA transducer converts the signal to 1-5Vdc or 2-10 Vdc depending on which resistor is used.

The DPT unit is threaded into the 1/4" NPT ports on the venturi valve. The high port on DPT (marked HIGH) connects to the high port on the venturi valve which is on the inlet of the valve. Valves are marked with an arrow to determine flow direction.

Air must be bled from the system.

WIRING DIAGRAM

WARNING! Improper connection of 24V supply can permanently damage the Transducer.



PRESSURE DIFFERENTIAL – FLOW RELATIONSHIP

Q=Cv (SQRT(ΔP/SG))	(equation 1.0)	Where ΔP is in PSID and SG is the Specific Gravity
Q=Fc (SQRT(ΔP/SG))	(equation 2.0)	Where ΔP has been converted into inches of water column

CURRENT - PRESSURE DIFFERENTIAL RELATIONSHIP

$\Delta P = Ai + B$

Where:

- i is the signal current in milliamps (mA)
- ΔP is the differential pressure in inches of water column

A = 25.115 and B = -100.45

Therefore:

$\Delta P = 25.115i - 100.45$ (equation 3.0)

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CURRENT - FLOW RATE RELATIONSHIP

Substituting equation 3.0 into equation 2.0 and simplifying results in the following equation:

$Q = \mathrm{Fc}\sqrt{\frac{|25.115i - 100.45|}{SG}}$ (equation 4.0) Where $4 \le i \le 20$

Equation 4.0 demonstrates the relationship between signal current (mA) and flow rate (GPM) where i ranges from 4 to 20 mA. In the real world, current can drop below 4 mA Therefore the absolute value of $|25.115i - 100.45|$ is taken to avoid computation of the square root of a negative number. Computer control systems that use equation 4.0 should assume that flow equals zero if i is less than or equal to 4 mA.

VOLTAGE - PRESSURE DIFFERENTIAL RELATIONSHIP

$\Delta P = AV + B$

Where:

- V is the signal current in Volts
- ΔP is the differential pressure in inches of water column

A = 100.27 and B = -100.27

Therefore:
$\Delta P = 100.27V - 100.27$ (equation 5.0) Where ΔP (Inches W.C.

Substituting eq. 5.0 into eq. 2.0 and simplifying results in the following equation:

$Q = \mathrm{Fc}\sqrt{\frac{|100.27(V-1)|}{SG}}$ (equation. 6.0) Where $1 \le V \le 5$

Equation 6.0 demonstrates the relationship between signal Volts (V) and flow rate (GPM) where V ranges from 1 to 5 Volts. In the real world, voltage can drop below 1 V, hence the absolute value of $|100.27V\text{-}1|$ is taken to avoid computation of the square root of a negative number. Furthermore, any computer program that uses equation 6.0 should assume that flow equals zero if V is less than or equal to1 V.

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