

Ultrasonic Metering Applications With The Bristol® 3808 MVT Smart Multivariable Transmitter

Emerson Process Management has made sure that the Bristol® 3808 MVT, multivariable smart transmitter meets all the needs of users who are installing the latest technology primary meters.

Particularly for users of ultrasonic gas flow meters, key design attributes include the following:

- Emerson offers a smart, P/T (pressure/temperature) transmitter. By excluding the differential pressure measurement, this product is very cost effective for use with linear meters.
- We have paid attention to the temperature measurement as well as the pressure measurement, ensuring high accuracy for both. Use of ultrasonic meters has illuminated the importance of the temperature measurement, which has been overlooked in many of today's MVT product designs.
- We have provided cost effective and reliable networking with those controllers, flow computers and RTU products that are most likely to be used with ultrasonic meters.



Emerson's Bristol® 3808 MVT P/T version provides very accurate measurements of pressure & temperature and networks with those tertiary devices most commonly used with ultrasonic meters.

Model 3808-10A Smart P/T Transmitter Performance

Emerson's Bristol 3808 MVT Smart P/T transmitter is an excellent match to ultrasonic meters as well as the tertiary devices that are used in conjunction with them.

Key performance specifications are:

- Combined effects of nonlinearity, nonrepeatability and hysteresis at reference pressure and over the operating temperature range: GP linear mode: $\pm 0.075\%$ of Calibrated Span or 0.015% of URL, whichever is greater.

- Temperature effect on gauge pressure: $\pm 0.21\%$ URL maximum combined shift of zero and span with an ambient temperature change of 60°C (108°F)
- RTD Conversion Accuracy: $\pm 0.1^\circ\text{C}$, or $\pm 0.1\%$ of reading, whichever is greater
- Ambient temperature effect on RTD measurement: $\pm 0.01^\circ\text{C} / ^\circ\text{C}$ max

Not only does the 3808 MVT provide excellent pressure measurement over the full operating pressure range, it also offers industry best temperature measurement.

A three-wire platinum RTD per DIN 43760 is supported. The temperature, T, in degrees Celsius is calculated using the Resistance vs. Temperature Tables according to the DIN EN 60751 standard for Class A and B RTDs. The DIN EN 60751 equation is:

$$R(t) = R_0 * (1 + At + Bt^2)$$

Where:

$$A = 3.9083 * 10^{-3} \text{ } ^\circ\text{C}^{-1}$$

$$B = -5.775 * 10^{-7} \text{ } ^\circ\text{C}^{-2}$$

$$R_0 = 100 \text{ ohms}$$

In addition, the user may enter the R_0 , A, and B coefficients of a custom calibrated RTD, another platinum standard or a different material (Nickel, Balco or Copper). During the RTD calibration, the User will be able to set the R_0 , A, and B coefficients, restore the factory default for these coefficients, and calibrate the internal reference resistor.

The 3808 MVT provides a major advantage, here. Normally, MVT products don't allow entry of the constants for the probe. In order to account for the probe, users must resort instead to a separate, smart temperature transmitter.

3808 MVT Networking

As explained in our accompanying application data sheet, "3808 MVT Communication using BSAP and Modbus over RS 485," the 3808 MVT offers a number of networking advantages:

The 3808 MVT supports both BSAP and Modbus protocols to provide compatibility with practically every controller and RTU likely to be used in conjunction with ultrasonic meters.

BSAP networking supports global communication and allows OpenBSI web page HMI at any point up the network.

BSAP and Modbus can operate in bilingual mode so the benefits of both protocols are available to the user.

In an RS 485 network, local calibration via a PC only temporarily interrupts communication with the target transmitter. The rest of the network continues operating.

RS 485 networking exceeds the API 21.1 requirement for live updates by supporting once-per-second updating for as many as eight transmitters. In practice, users have favored once-per-second updates of the live pressure and temperature variables in applications with ultrasonic meters.

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