

Minimize Faulty Gas Measurement and Save Money

► The Application

The ability to accurately measure the flow of gas in the pipeline is critical for custody transfer. In particular, the measurement uncertainties count against the seller's favor and can therefore not be invoiced. A leading interstate pipeline operator of natural gas in USA used the RTC temperature calibrator to improve temperature accuracy in their gas flow measurement.

► The Challenge

In recent years the industry has switched to using more precise ultrasonic flow meters as the technology has matured and price levels come down. Ultrasonic sensors have no moving parts, do not suffer pressure loss, and provide virtually maintenance-free operation. However, an often overlooked fact is that without an equally reliable temperature reading the actual gas volume through the pipeline cannot be correctly determined.

If accuracy improvements from using the new ultrasonic flow meters were to be realized, the company needed the right solution to verify the temperature sensor measurements.

With an accuracy of $\pm 0.3\%$ from the ultrasonic flow meters, it was determined that an uncertainty of less than 0.1°F (0.06°C) was required from the temperature calibrator for the RTD probe verification.



Historically, lower-priced temperature calibrators with a higher uncertainty had been used. Several calibrators had been tested and found lacking for the new requirements.

► The Solution

The company tested and decided to standardize on the Reference Temperature Calibrator type RTC-157 together with a reference probe.

The RTC-157, with its active dual-zone heating technology, was capable of measuring with an accuracy of $\pm 0.07^\circ\text{F}$ (0.04°C), sufficient for the verification.

The following conservative assumptions were applied for the calculation on savings and ROI:

- Pipeline diameter: 10 inch (0.254 m)
- Gas flow velocity: 50 ft/s (15.24 m/s)
- Static pressure: 1080 psi (74.11 bar)
- Gas price: \$4.4/MMBTU (\$0.16/m³)
- Temperature: $\sim 69^\circ\text{F}$ (20.56°C)

► Benefits

- Calibrator accuracy provides >1000% Return On Investment
- 1% improvement in gas flow accountability
- Reduced uncertainty enables invoicing of an additional \$216,000 annually

► Conclusion

With an improved temperature accuracy of 0.2°F (0.11°C) the error in the calculated flow volume per hour is reduced by 5.7 MMTBU (161 m³) corresponding to \$25.83 per hour or \$18,597 per month of previously unaccounted gas value.

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Jofra RTC 156 and 157; Temperature calibration at its best !