

TFH 3000

Thermal Mass Flowmeter

Smart, Real-Time Mass Flow Measurement for Energy & Process Monitoring

The TFH 3000 thermal mass flowmeter is an effective solution for energy and process monitoring applications. It provides highly accurate, direct mass flow measurement, as well as exceptional low-flow sensitivity, fast response and low maintenance requirements. The TFH 3000 measures two process variables with a single instrument, providing isolated 4 to 20 mA and pulse outputs for flow rate and a 4 to 20 mA pulse output for process gas temperature or a second flow rate output.

The TFH 3000 flowmeter is virtually immune to changes in temperature and pressure, delivering repeatable, accurate mass flow measurement under varying loads. Its rugged, no-moving-parts design is ideal for high-vibration environments and enhanced EMI immunity makes it suitable for locations where electric motors, ignitors or dirty power may affect instrument performance.

In-situ Calibration Validation

TFH 3000 calibration validation is designed to reduce the need to send the meter back to the factory for calibration. Using two tests - CAL-V™ and Zero CAL-CHECK™ - the TFH 3000 allows users to validate the calibration of the meter in the pipe with just the push of a button. A passing CAL-V in-situ sensor and electronics test coupled with a passing Zero CAL-CHECK test provides complete validation of flow meter calibration accuracy including confirmation that the sensing elements are clean.

CAL-V. TFH 3000's in-situ calibration routine validates the flowmeter's calibration accuracy by testing the functionality of the sensor and its associated signal processing circuitry. It lets you validate instrument calibration in your pipe – at your process conditions – with just a push of a button. At the conclusion of the test, the meter displays a pass/fail message and the calibration data is saved in the meter for review at any time.

During the test, the meter's microprocessor adjusts the signal to the sensor elements and determines the resulting electrical



Benefits:

- Reliable accuracy under varying temperatures, pressures and loads
- Low-flow sensitivity, wide turndown and fast response
- NIST traceable calibration with in-situ validation
- Explosion-proof electronics enclosure with enhanced EMI immunity
- Rugged, low-maintenance design with no moving parts
- EPA-compliant direct measurement

characteristics. These site-determined characteristics are compared with the data that was collected and stored in the instrument electronics during original factory calibration. Matching data within established tolerances confirms the meter is measuring accurately.

CAL-V calibration tests are operator-initiated and can be performed at any flow rate, including zero. A test takes only three to four minutes to complete and may be initiated from the front panel, USB connection, RS485 Modbus or HART® Protocol. If a calibration test is initiated by the



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TFH 3000's software tool, a validation certificate can be produced at the conclusion of the test. This feature is especially valuable in environmental monitoring applications where periodic calibration validation is mandated. It can also be used to streamline quality assurance, improve process initiatives and apply scheduled maintenance procedures. It is recommended CAL-V be performed at least semiannually or as required by federal, state and local agencies, if applicable.

Zero CAL-CHECK. Zero CAL-CHECK performs the following:

- Checks for build-up on sensor that could affect calibration
- Further validates the zero stability of the meter
- Checks the thermal conductivity repeatability of the sensor

Unlike CAL-V, which may be performed in the pipe and at process conditions, Zero CAL-CHECK must be performed at zero flow to insure a valid test result. Depending upon the configuration – in-situ or out of pipe - zero flow will either be compared to a customer-established field baseline or factory baseline.

Rugged, Reliable Performance

The TFH 3000 sensor operates at a higher power level than competitive thermal flow sensors, resulting in improved response time and wider turndown. The TFH 3000 sensor also provides exceptional accuracy at high velocities up to 60,000 SFPM (280 NMPS).

The TFH 3000 features a dual-compartment, explosion-proof electronics enclosure. One compartment houses the instrument electronics and the second compartment is accessible for wiring terminations. A waterproof seal between the compartments helps prevent moisture damage and maintain the integrity of the instrument electronics.

An optional on-board 2 line x 16 character backlit display is available to view flow rate, total flow, elapsed time, process gas



TFH 3000 in flare monitoring application

temperature and alarms. The display is also used in conjunction with the configuration panel for field-configuration of flowmeter settings such as 4 to 20 mA and pulse output scaling, pipe area, zero flow cutoff, flow filtering or damping, display configurations, diagnostics and alarm limits. Optically activated keys provide interface to the flowmeter without removing the cover. The TFH 3000 features galvanically isolated outputs and enhanced EMI immunity. A variety of meter configurations,

materials, process connections and output options offer improved design flexibility, lower cost of ownership and enhanced control capabilities.

The TFH 3000 is available in both insertion and inline models. The insertion meter is easily installed with a weld-o-let and compression fitting. The inline model is available in ¼-inch to 6-inch sizes and includes built-in flow conditioners that eliminate the need for long, straight pipe runs.

Communications Options

A USB connection is standard. TFH 3000 software (included at no additional charge) provides complete configuration and remote process monitoring functions. TFH 3000 software lets you adjust the meter configuration, evaluate transmitter alarm conditions, collect process data and view measurements from your PC or control station. HART® Protocol and RS485 Modbus are available options. All digital communication is isolated to provide immunity from electrical interference.

NIST Traceable Factory Calibration

Calibrations are performed with NIST traceable flow standards. Whether you require a straightforward air calibration or a complex mixed gas calibration, our goal is to achieve the highest accuracy and the fastest turnaround time. The factory calibration lab employs a wide range of gases, gas mixtures, temperatures, pressures and line sizes to simulate actual fluid and process conditions. This real-world approach improves installed accuracy and minimizes measurement uncertainty.



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