

ACCUTEST:

The world's first transfer proving turbine meter including accuracy adjusting corrector

The USA patented ACCUTEST turbine meter was first introduced in 1999 and comprised methods and an apparatus for accurately measuring gas flow in a gas pipeline. The apparatus includes two independent rotors in close proximity to each other, housed in the same meter body, but isolated from the effects of each other.



There are two operation modes for this apparatus; the first being continuous operation as a tandem rotor turbine meter and the second being periodic use as a field calibrator module connected to a Mercury Mini-AT or 800 series corrector. This connected apparatus comprises a second independent or reference metering rotor, placed behind and downstream from the existing main, clockwise rotating, 30/45 degree pitched rotor. This 18-degree pitched calibration rotor rotates in a counter-clockwise direction and registers the same flow. Again both rotor modules operate totally independently of each other and rotate in opposite directions.

Flow conditioning vanes are incorporated in the module housing ahead of the second downstream rotor, which isolates the two rotors from the effects of each other. The reference rotor is more reliable than the main rotor since its bearings are protected from gas contaminants in its downstream location and it drives no mechanical output. This 18-degree pitched reference rotor also operates at a lower speed than the main rotor, thus further enhancing its service life.

The apparatus is built and calibrated as a complete double rotor meter made up of two individual measuring modules, which fit into the same meter body. In a continuous operating mode, the reference rotor module provides an electronic measurement output through an RF sensor installed in the meter body, which is independent from the main rotor.

The main rotor also provides an electronic measurement output through its own RF sensor also installed in the meter body. These RF sensors monitor rotor blade rotations and result in a series of K factors that are similar to the calibration curve of a transferring master meter. At factory calibration a series of K factors at line conditions are developed for both the new main rotor and new downstream reference rotor at five different flow rates and at three different (customer selected) pressures.

These K factors are also programmed into the corrector at the American Meter factory for all flow rates and pressures selected. Low accuracy correction limits and low accuracy alarms are also programmed into the corrector prior to installation. The corrector is programmed to wake up at timed intervals, sample the Accutest meter's pulse stream from the RF sensors and compute the meter's accuracy at line conditions, at that specific point in time. The corrector also samples the pressure and temperature conditions and then provides a visual or remote display through pulse outputs of volume that is corrected for pressure, temperature and accuracy conditions for the Accutest turbine meter. The Mercury corrector can be used to monitor instantaneous accuracy, average accuracy, main rotor accuracy and reference rotor accuracy. Because the Accutest meter can now be monitored at low, medium and high flow rates via the corrector, any non-fluid friction build up in the main rotor power train can easily be detected by the difference seen from the original (as new) K factors set at factory calibration. Previously, excessive non-fluid friction could only be determined at low flow rates as this friction is "masked" at the higher flow rates due to the physical energy of the gas stream which has enough kinetic energy (mass in motion) to overcome the effects of the friction present.

The American Accutest turbine meter with the corrector is designed for on-site corrected volume and in-line testing under actual operating conditions. It can eliminate costly tear down and spin testing as well as laboratory testing conducted at atmospheric pressure. Mercury's "MasterLink" software is used to calibrate, configure and download current or storage data. Many field technicians today are already familiar with these instrument functions using this software.

Many customers change out their "top loading" measurement cartridges every year for maintenance due to their harsh gas conditions (dirty). The Accutest "PTA" informs them when to perform the change-out with meter accuracy condition & alarms.

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