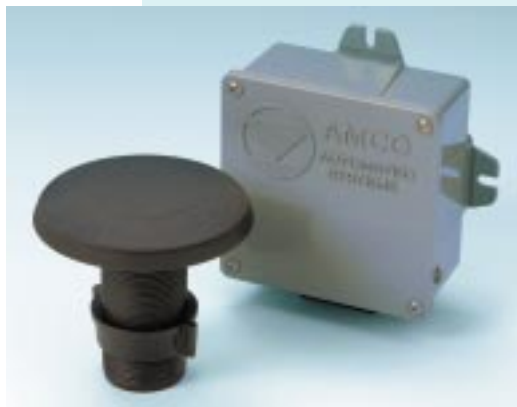


THE TRACE VRT SYSTEM:

# Now for Water Applications in any Location

The TRACE VRT Remote Water-Meter Transponder (RWT) and Pit Water-Meter Transponder (PWT) both complement the TRACE VRT Automated Meter Reading (AMR) system through different designs. While the RWT is designed for above-ground water applications, the PWT is intended for use with water meters installed below ground, in pits.



The TRACE VRT Remote Water-Meter Transponder along with PWT

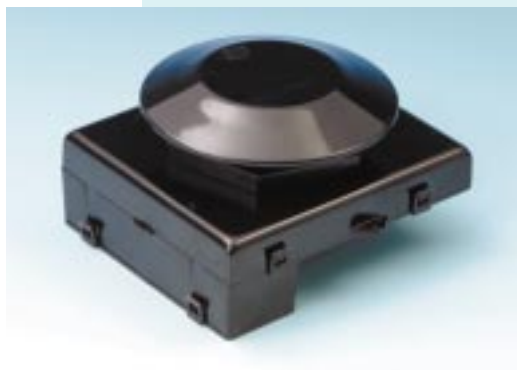
The TRACE VRT transponder is part of the TRACE VRT AMR system that uses mobile, two-way, radio-frequency (RF) communication technology to request and collect specific meter data.

**The system includes:**

- ▶ Transponders that encode, process and store individual

meter data and then, on command from an interrogator, transmit requested meter data. This processing and storing of meter data and two-way communication provides data acquisition flexibility usually associated with more expensive, fixed-base AMR systems.

- ▶ Route management software that:
  - processes route files from a Utility's customer information system (CIS)
  - downloads and uploads meter routes to and from interrogators
  - stores meter readings for local validation, editing and analysis
  - creates files to transfer meter readings to the Utility's CIS.



The TRACE VRT Pit Water-Meter Transponder

Both the RWT and PWT maintain a real-time clock and calendar. These are used to record real-time data for retrieval as required during the normal read cycle. In addition to maintaining an electronic-index (e-index) reading that corresponds to the meter index reading, the RWT and PWT:

- ▶ store 35 daily index readings in separate e-indexes recorded at the start of the utility day (factory programmable)
- ▶ maintain up to four time-of-use (TOU) e-indexes that each have programmable start and stop times and,

- ▶ monitor the change in index readings over successive intervals (programmable in one-hour steps) and: (a) records the interval with the smallest index change (b) records the size of the change and (c) sets an alarm that is transmitted at the next interrogation of the transponder if the size of the change in index reading over an interval exceeds a programmable limit value.

The history of daily e-index readings can be used to eliminate expensive "off-cycle" reads for move-in/move-out billing. The TOU e-indexes can be used to encourage water conservation measures.

**Basic Operation**

To maximize battery life, both the RWT and PWT change from its normal, low-power, quiescent state every 1.5 seconds into an intermediate power state for 2.5 milliseconds in order to:

- ▶ update the e-index for the meter index and time-of-use e-indexes
- ▶ poll the tamper detectors and
- ▶ check valid interrogation signal is received.

Once a day, at a factory-programmable time, the transponder stores the current index reading for that day into the e-index for that day.

**Communication**

When a valid interrogation signal (including the transponder's unique serial number) is received, a two-way communication link is established. A current reading and other historical data is transmitted to the interrogator. The transponder can also be instructed to update time-of-use and other background settings at this time, if required. Data collected by an interrogator are validated, audited and stored for uploading to TRACE VRT software later.

**Transmission Accuracy**

The accuracy of transmitted data is insured in two ways:

- ▶ transponder only replies after detection of its unique serial number and
- ▶ transponder transmits an error-detection code with the meter data that is used by the interrogator to confirm that the data has been received without errors.

TRACE VRT has always offered solutions for your hard-to-read gas meters, but now, the technology is available for your water systems as well.

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