

Cooling Water Flow Measurement at Industrial Facilities

Application Note: W-AN21



Industries

Power, Chemical,
Petrochemical, Oil & Gas

Applications

Large Cooling Water
Channels Supply and
Return Flow Measurement

Significant Issues:

- Wide, deep channels influenced by wind affects
- Varying levels and velocities
- Potential fouling and corrosion of wetted items (especially if cooling water is from a saltwater source)
- Installation while cooling water lines stay in operation
- Need for high accuracy per permit requirements
- Need for high accuracy for heat rate calculation at power plants
- Need for high repeatability for control and or pacing requirements

Objective:

Provide accurate and repeatable flow measurement under difficult application conditions. Flow measurement data to be utilized for control purposes and heat rate calculation. Installation and maintenance to be performed while the cooling water system is in operation and downtime is not permitted. Strong preference for non-contact flow measurement to avoid fouling and corrosion.



Site Challenges:

- Safety concerns – installation and maintenance under normal operating conditions
- Seawater corrosive to wetted parts.
- High velocity leading to turbulent surface water conditions.
- Low velocity leading to smooth surface water conditions.
- Wind affected surface velocity – prevailing wind direction negatively impacting cooling water return line with a surface velocity 180 degrees opposite average channel velocity.
- Wind affected surface velocity – prevailing wind direction positively impacting cooling water supply line increasing surface velocity well above channel average velocity.

Solution:

To address the site challenges and fully meet the stated objective, the Teledyne ISCO LaserFlow Non-Contact Open-Channel Flow Meter is the only viable option.

- Installed and maintained safely during full cooling operation.
- Non-contact measurement simplifies installation and reduces maintenance.
- Not surface water dependent, as non-contact radar flowmeters are, allowing accurate and repeatable performance throughout the entire operating range.
- 15-Point sub-surface measurement allows for high-accuracy and repeatability even in the presence poor hydraulic flow profile.

Benefits:

- High-performance flow measurement under difficult installation and application conditions meeting all the established objectives for the project.

LaserFlow®

- The TIENet 360 LaserFlow sensor is a non-contact, area-velocity flow and water-level measurement device that remotely senses flows in open channels using non-contact Laser Doppler Velocity Sensing and non-contact Ultrasonic Level Sensing technologies. The sensor uses advanced technology to measure velocity with a laser beam directed at single or multiple points below the surface of the water stream. Therefore, unlike radar technology, it does not require the creation of ripples on the surface of the stream.
- Zero deadband from measurement point in non-contact level and velocity measurements
- Continuous measurements in submerged conditions
- Advanced velocity diagnostics for data quality evaluation and analysis
- Bidirectional velocity measurement
- Low level velocity measurement
- Also available is the intrinsically safe LaserFlow Ex, specifically designed with safety in mind. For applications within the United Kingdom requiring certification by The Environment Agency, LaserFlow is designated MCERTS Class 2.



Signature® Flow Meter

- The Signature flow meter from Teledyne ISCO, designed for open channel flow measuring, supports flow measurement methods including bubbler, non-contact laser area velocity, ultrasonic, and submerged Doppler ultrasonic area velocity. With the ability to connect up to nine sensors, the Signature flow meter provides a broad range of I/O and communications options:
 - pH and temperature
 - SDI-12
 - RS485
- The Signature flow meter is rugged (IP 66) even if the cover of the lid is open. It performs data logging with variable rate data storage and data integrity verification and has the ability to connect a USB drive for data/report retrieval and programming.



DuraTracker® Flow Meter

- The DuraTracker flow meter and DuraTracker Ex for hazardous conditions is the most efficient and reliable flow measurement solution available. It supports non-contact laser area velocity, submerged Doppler area velocity, ultrasonic, and other technologies. The DuraTracker cost-effectively integrates cellular communications and multiple flow technologies within one. Bluetooth makes programming, sensor calibration, and data retrieval easy through wireless devices. A field upgradable remote cell phone communication option also is available.
- Rugged, submersible enclosure meets IP68 environmental specs
- Quick connect plug-and-play multiple sensors connectivity: Ultrasonic, AV, and laser pH and sampler interface
- MODBUS output
- Variable data-rate storage

