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Daniel 3410/3810 Series Electronics for Ultrasonic Flow Meters

Ultra-Fast, Reliable and Easy-to-Use

Next-generation Daniel 3410/3810 Series Electronics detect changing flow dynamics in real time by processing critical flow data with high speed and exceptional accuracy. Compatible with Daniel SeniorSonic and JuniorSonic Gas 3410 Series and Liquid 3810 Series Ultrasonic Flow Meters and most prior models, the innovative electronics are engineered for ultra-fast sampling to ensure flow variables are communicated in a matter of seconds.

Powerful and flexible, the new electronics platform provides superior low-flow accuracy and linearity throughout the calibrated flow range. This accuracy and repeatability is maintained over the life of the meter to ensure stable, long-term performance and a strong return on investment.

New configuration wizards and a streamlined electronics module simplify setup and installation. Once the meter is online, true Base100T Ethernet connectivity expedites delivery of flow information to staff in remote locations to improve communication and integration.

Features and Benefits

- Rapid sampling rate results in a larger sample size for real-time detection of changing flow dynamics
- Comprehensive hourly and daily logs help facilitate auditing and dispute resolution
- Transducers operate at 24 VDC while maintaining intrinsic safety rating for superior performance under demanding conditions
- Fewer cables and wiring connections simplify installation and maintenance
- Local LED display (optional) with up to 10 user-selectable scrolling variables
- Separate boards for the CPU, I/O, intrinsic safety and power supply allow for individual replacement to reduce maintenance time and cost
- True Base100T Ethernet connectivity enables enterprise-wide communication and integration
- Superior transient (lightning) protection maximizes uptime

DANIEL™

EMERSON™

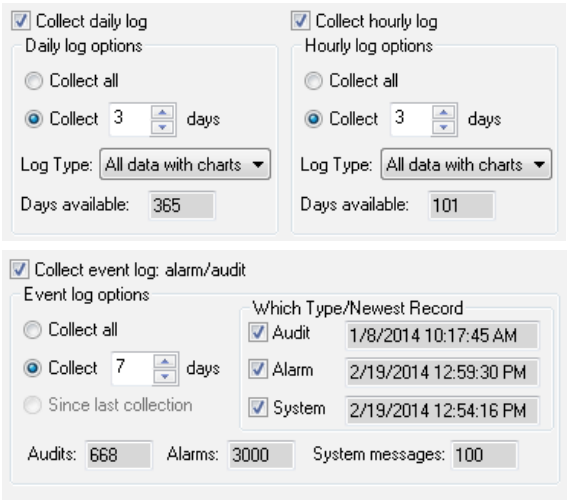
Enhance Operations with Advanced Electronics

Real-Time Detection of Flow Disturbances

The powerful 3410/3810 Series Electronics process a significantly larger sample size, enabling operators to rapidly detect changing flow dynamics. With real-time detection of disturbances to the profile factor, including asymmetry, cross flow and turbulence, measurement uncertainty is minimized. Regardless of high or low flow, the electronics provide by-the-second updates on all outputs with an optional ¼ second update on frequency.

Improved Accountability

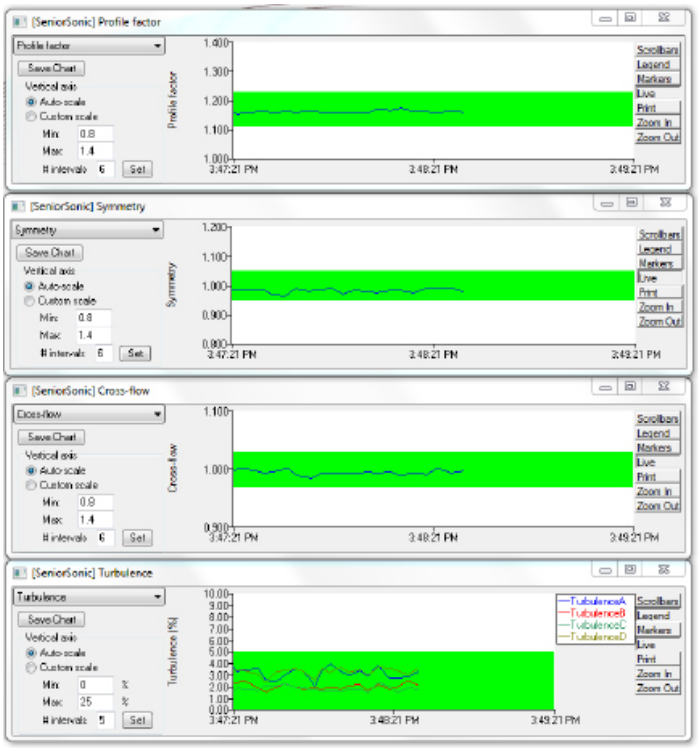
The electronics store comprehensive hourly and daily logs that contain detailed records to simplify accounting and auditing. The expanded hourly and daily logs improve the accuracy of manual recalculations, ensuring audits, adjustments and disputes can be resolved quickly.



Logging options simplify accounting and auditing.

Stay Online with Intelligent Diagnostics

Every Daniel ultrasonic flow meter is provided with MeterLink™ Diagnostics Software to simplify meter configuration, monitoring and troubleshooting. The advanced software displays a number of performance-based diagnostics that indicate meter health. In addition, dynamic flow-based diagnostics help operators identify flow disturbances that may affect measurement uncertainty.



Advanced diagnostics within MeterLink™ software help operators rapidly identify flow variations.

Performance-Based Meter Diagnostics

- Signal-to-noise ratio per path, upstream or downstream
- Gain per path, upstream or downstream
- Average velocity of gas
- Average speed of sound
- Path velocities of gas
- Path speeds of sound
- Path percent performance

Dynamic Flow-Based Meter Diagnostics

Profile Factor provides rapid recognition of abnormalities that change the velocity profile from baseline performance values

- Indicates dirt buildup in upstream piping, blockages upstream or swirling flow conditions

Symmetry enables detection of flow velocity variations in the top half compared to the bottom half of the pipe

- Indicates debris trapped in a flow conditioner, liquids along the bottom of a gas pipe or bubbles in the top of a liquid pipe

Cross Flow enables detection of variations in the vertical stability of the flow

- Indicates blockages or pre-swirling conditions of the fluid in the pipe

Swirl indicates the magnitude (degrees) and direction (positive or negative) of swirl in the pipe

- Indicates high levels of blockages or significant installation effects

Turbulence allows for accurate monitoring of the stability of the flow per path

- Indicates blockages or pulsation of fluid

Achieve Immediate Indication of Gas Flow Disturbances

Provide operators with faster, more in-depth diagnostics by activating the optional Continuous Flow Analysis (CFA) feature within the 3410 Series Gas Ultrasonic Meter. CFA helps minimize flow measurement uncertainty by determining the root cause within the meter of the diagnostic parameter indication. Using these intelligent gas flow diagnostics, operators can more easily maintain meter health and ensure the highest measurement integrity.

The Baseline Viewer™ within MeterLink displays the following abnormal flow profiles and process upsets:

Upstream Blockage

- Minimize meter maintenance by scheduling flow conditioner inspections only as required.

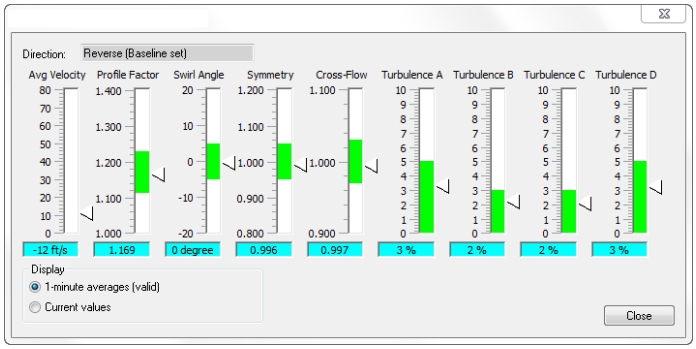
Abnormal Flow Profiles

- Quickly identify potential pipeline flow conditions that will affect measurement before the conditions exceed the meter uncertainty.

Dirty Meter

- Identify deposit buildup within the meter as well as long term pipeline wall buildup before the meter uncertainty is exceeded.

A Snapshot of All Key Flow Parameters



The MeterLink Baseline Viewer™, available in CFA-equipped 3410 electronics, enables operators to quickly confirm the meter is operating within established ranges.

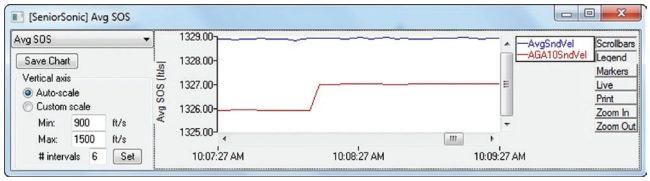
Easily Compare Speed of Sound (SOS)

Improve accuracy and productivity by automating SOS calculations. 3410 Series Electronics enable AGA 10 SOS to be calculated from the pressure, temperature and gas composition data. 3410 Series Electronics equipped with the optional Continuous Flow Analysis (CFA) key allow a direct comparison of the measured and calculated SOS to alert operators to temperature or gas composition measurement issues.

Liquid Hydrocarbon Detection

An invaluable feature in shale plays, CFA-equipped electronics feature a liquid hydrocarbon sensing function that is helpful in locating remaining hydro test water in new pipeline construction. This function also helps identify process upsets that occur in gas plants or to pinpoint gas flow that is below dew point.

Detection of Gas Composition Changes



CFA-equipped 3410 Series Electronics simplify detection of gas composition changes via direct comparison of measured SOS (top trace). The flow meter detects composition changes faster than the calculated SOS (bottom trace) from the pressure, temperature and gas chromatograph (GC). The calculated SOS is step changing as the GC data is updated after analysis (i.e. GC cycle time delay).

Ensure Compliance with Industry Standards

Daniel SeniorSonic and JuniorSonic 3410 Series Gas Ultrasonic Flow Meters comply with:

AGA 9

- Daniel meters also offer built-in calculations for AGA 10 SOS and AGA 8 gas compressibility

ISO 17089-1:2010 Measurement of Fluid Flow in Closed Conduits – Ultrasonic Meters for Gas – Part 1: Meters for Custody Transfer and Allocation Measurement

OIML R-137-1 Gas Meters

Daniel 3810 Series Liquid Ultrasonic Flow Meters comply with:

API MPMS Ch. 5.8

OIML R-117-1 Dynamic Measuring Systems for Liquids Other than Water

Improve Performance with Pre-Assembled Upgrade Kit

Enhance existing Daniel gas and liquid ultrasonic flow meters by installing a pre-assembled 3410/3810 Series Electronics Upgrade Kit. All Daniel Mark III equipped meters and most earlier models can be retrofitted to improve measurement performance and enhance productivity.

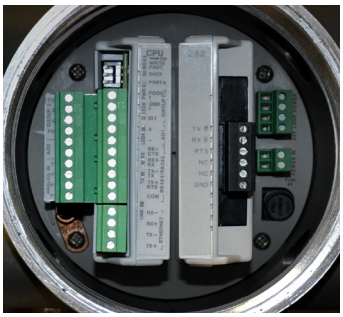
The electronics feature a modular, compact design that offers a plug-in CPU and I/O board assembly. The retrofit enclosure that is only available for Daniel gas ultrasonic meters provides a more spacious interior to accommodate field wiring and offers two I/O slots on the electronics module for optional serial outputs. With both enclosures containing fewer components than Mark III electronics, troubleshooting is simplified and maintenance time is minimized.

New software wizards make configuration of existing meters quick and easy. Unlike Mark III electronics, there is only one hardware switch. All other 3410/3810 Series Electronic settings are software configurable. In addition, the wizards include a one-button conversion utility to further facilitate field configuration. The wizards also ensure all Mark III settings are properly downloaded.

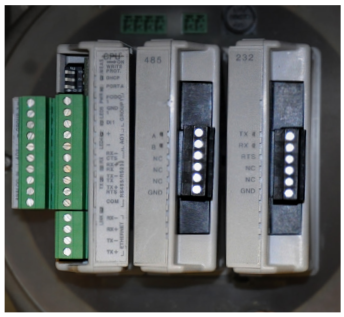
The more compact electronics enclosure is the standard for all Daniel gas and liquid ultrasonic meters. The larger, retrofit electronics enclosure is currently an option for Daniel gas ultrasonic meters only (no optional display available).

Expand I/O with Minimal Investment

Flexibility is a requirement when specifying ultrasonic flow measurement technology for oil and gas applications. The scalable 3410/3810 Series Electronics enable users to expand metering capabilities while reducing capital costs. The electronics are designed to allow I/O or other components to be added as needed, including serial communication capabilities. Installation of the additional components is straightforward and can be performed while the meter is in operation to minimize downtime.



The electronics within the standard enclosure feature a plug-in CPU and I/O module that increases reliability and facilitates expansion.



The electronics within the larger, retrofit enclosure offer two slots for optional RS232 or RS485 serial outputs.

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	Temperature Measurement		Flow Measurement
	Marine Measurement & Analytical		Gas Analysis
	Liquid Analysis		Flame and Gas Detection
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