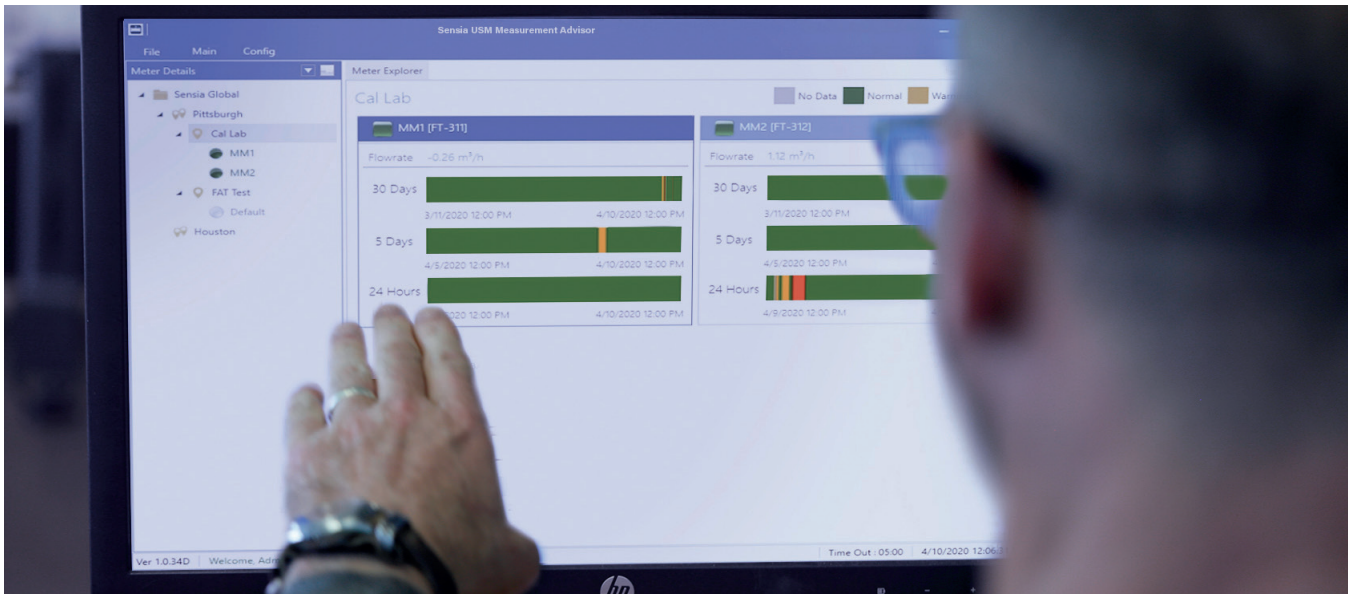
+ CALDON USM Measurement Advisor

Condition-based monitoring and configuration software

CALDON USM Measurement Advisor condition-based monitoring and configuration software gives you continuous and full control over the health of your CALDON LEFM* ultrasonic flowmeters. With this advanced yet user-friendly software package, you can monitor multiple ultrasonic flowmeters simultaneously from your desk – for any meter installed worldwide.



The CALDON USM Measurement Advisor software easy-to-use interface shows real-time and historical health data for each meter connected in a single overview. The number of meters is limited only by network and CPU availability. No in-depth knowledge is needed to operate the software – intuitive and intelligent alarming will give you guidance every step along the way.

Measurement specialists can perform detailed analysis using different types of graphical, trending, and visualization tools. Customized analysis and presentation are supported by enabling the export of data to third party software such as Microsoft Excel.

During the lifetime of a CALDON LEFM ultrasonic flowmeter, all valuable data are stored within a relational database to maintain data integrity. These data can be used for audit trail purposes and clarification of any historical (mis)measurement issue.

The CALDON USM Measurement Advisor software validates the millions of dollars' worth of gas and oil passing through your CALDON LEFM ultrasonic flowmeter. It helps you reduce the exposure and consequences of mismeasurement, manage your operations more closely, and reduce costs by providing

+ Historical and live intelligent alarming
+ Complete audit trail data integrity using an advanced database structure
+ Multidimensional fingerprinting, customized to your application
+ Easy-to-use, icon-driven user interface

STANDARD AND INTELLIGENT ALARMS

The alarm features in the CALDON USM Measurement Advisor software provide operators with standard and configurable intelligent alarms for fast decision-making. Standard alarms monitor individual parameters, such as the amplifier gain on each measurement path. Output options include screen, historian, and reports. Intelligent alarms combine these standard alarms to give insight into the probable cause of the alarms, for example, by recognizing combinations of gain and other parameters that indicate meter contamination.

MULTIDIMENSIONAL FINGERPRINTING, CUSTOMIZED TO YOUR APPLICATION

Optimize your decision-making by fingerprinting meter behavior during the normal operation under changing process conditions (flow velocity, temperature, pressure, and speed of sound).

Capture a fingerprint of data with discrete points for different conditions to better monitor each meter. By comparing the meter operation to these reference points over time, you can detect patterns that indicate a change in the operating condition of the meter,signaling the need for recalibration, maintenance action to be taken, or that a potential failure could be impending. This allows for preventative and corrective maintenance to be carried out at the right time leading to significant improvement in uptime of the connected multipath ultrasonic meters.

EASY-TO-USE, ICON-DRIVEN USER INTERFACE

Easily monitor the active and historical health status of multiple ultrasonic flowmeters from a single overview. You can also drill down to all available information using an icon-driven interface to get a more intelligent and detailed insight into a specific ultrasonic flowmeter in as few as three clicks.

Additional features

- **Compliance with international standards used within the oil & gas industry, such as ISO, AGA, and API**
- **Standard diagnostic data including gain, signal-to-noise ratio, and speed of sound in real time**
- **Time-based trending**
- **Simultaneous monitoring of meters installed worldwide**
- **Customer-defined hierarchy mapping, with easy navigation**
- **Easy and user-friendly meter configuration**
- **Modifiable trendlines and timeframes**
- **Role-based levels of access for data security**

COMPLETE AUDIT TRAIL DATA INTEGRITY USING AN ADVANCED DATABASE STRUCTURE

Guarantees coverage of all historical key data to ensure full traceability for up to 10 years. The relational database structure uses multiple tables and provides data integrity and security to protect your valuable data.

COMMUNICATION (ETHERNET AND SERIAL)

The use of TCP/IP is preferred. If only serial communication is available, the CALDON USM Measurement Advisor software will give you full and continuous access to your CALDON LEFM ultrasonic flowmeter. However, features like world-wide monitoring, simultaneously analyzing multiple meters, and retrieving historical data (back fill) require Ethernet.

Standard alarms

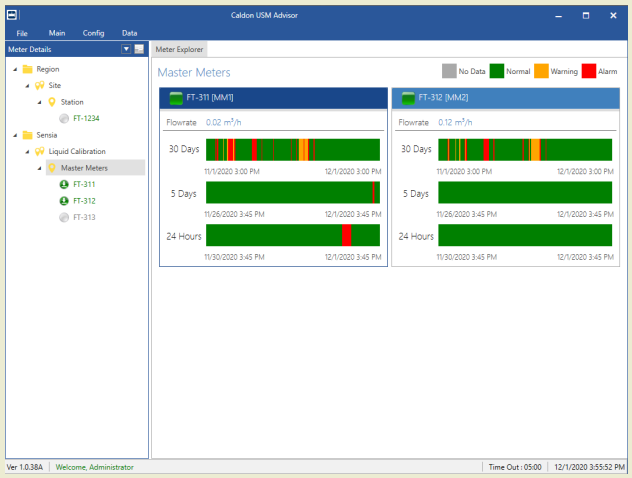
- **Gain**
- **SIgnal-to-noise ratio**
- **Percent acceptance of pulses**
- **Speed of sound**
- **Turbulence**
- **Normalized path velocities**
- **Flow profile**
  - Flatness
  - Asymmetry
  - Swirl[1]
  - Plane balance[1]

Output options include screen, historian and reports
[1] Eight-path meter only

Intelligent alarms

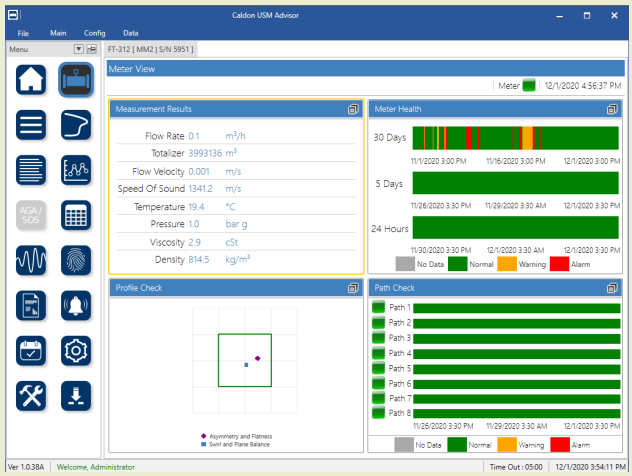
Fouling + **Bore buildup** + **Transducers**	Recognizes fouling (transducers or internal bore)[1]
Flow profile distortion + **High swirl** + **Flow conditioner blockage** + **Abnormal**	Recognizes moderate to extreme flow distortions and can classify if a distortion is extreme swirl, blocked flow conditioner, or other abnormal flow conditions (symmetry, flatness, plane balance)
Liquid detection (gas) and gas detection (liquid)	Recognizes wet gas situations or entrained gas in liquid situations
Stratification	Issues warnings for stratification, which can cause meters to deviate
User configurable	Provides self-configurable capability using logical statements on standard diagnostic data

[1] CALDON LEFM ultrasonic meters can be supplied with a proprietary internal coating that is adhesion and corrosion resistant.



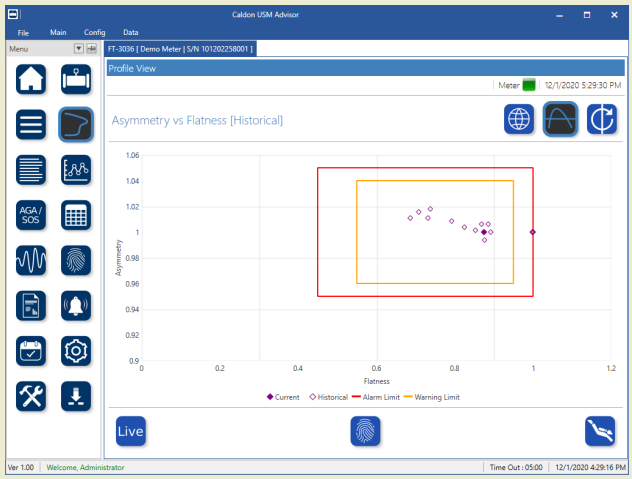
Status overview of multiple meters
See in one view the live and historical status of multiple meters installed worldwide

Historical data analysis (trending)
Further analyze your historical data by trend analyses of multiple and path-dependent parameters

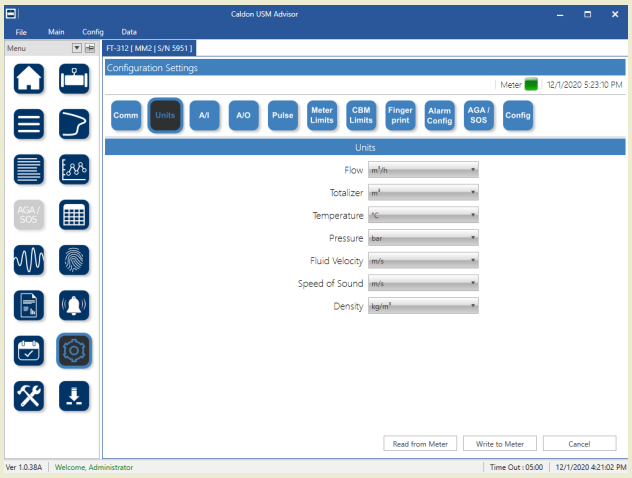


Detailed overview of single meters via tree structure
Using the tree structure to focus on the live and historical data of one meter installed anywhere worldwide

Live data (signal quality)
Review your live data using bar graphs including applicable warning and alarm settings

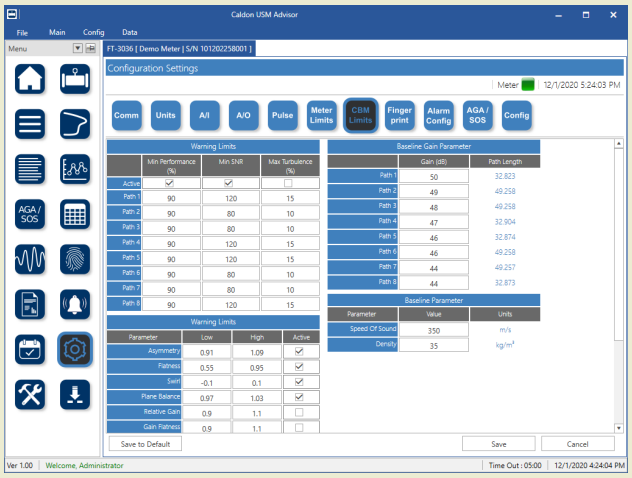


Live and historical data (flow profile)
Easily recognize flow profile anomalies in live and historical data



Configuration (units)
Configure your software in your preferred units (imperial and/or metric)

Live data (path comparison)
Paths are checked for self-consistency (up and down) and for consistency with other paths



Configuration (CBM limits)
Modify the default factory settings to optimize the diagnostic tools to your application

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