How can the guesswork be taken out of flow measurement?

SITRANS F US clamp-on ultrasonic flowmeters ensure reliable readings that improve process efficiency and productivity.

Answers for Industry.

SIEMENS

Don't guess how much money's flowing through your pipe. Clamp-on and know!

With no moving parts to wear or foul, no need to cut the pipe for installation, and high accuracy thanks to the patented WideBeam ultrasonic flow measurement technology, there is nothing to lose.

SITRANS F US Clamp-on Flowmeters
Bringing you the WideBeam advantage

The clamp-on ultrasonic flow technology offers several advantages over other flow measurement methods, number one being the utilization of external sensors.

They are quickly and easily mounted on the outside of the pipe, making them the perfect choice for retrofit applications and applications where corrosive, toxic or high pressure liquids and gases rule out the option of cutting the pipe.

With the use of the WideBeam technology, clamp-on flowmeters from Siemens have proven their superiority in both the field and the lab. They offer several benefits:

- Measurement of practically any liquid and gas
- Performance unaffected by viscosity, flow rate, pipe size, solids and aeration content
- High accuracy and repeatability through automatic temperature compensation and zero drift correction
- Installation flexibility on pipe sizes up to DN 9140 (360")

Combine this with flexible configuration options that allow you to either customize your flowmeter or to order complete systems, you can rest assured that we have the right solution for you.

Whatever your choice...
There is no need to search further.

The sensor is key
One of the keys to the high performance of the ultrasonic flowmeters from Siemens is the sensors.

They are available with Doppler and WideBeam transit time measurement capabilities, and as hybrid versions for added flexibility. This ensures that there is a solution for practically any installation.

The patented WideBeam technology increases flow measurement precision by reducing the sensitivity to any change in the medium type or physical properties.

The signal-to-noise ratio is optimized by utilizing the resonance frequency of the pipe wall to transmit

the sound signal into the media with the wall acting as a waveguide. This method produces a particularly strong, focused and coherent signal.

Custody transfer accuracy
With the permanently mounted sensor system TransLoc™ available for the pre-calibrated SITRANS FUT1010, Siemens has developed a highly accurate and reliable custody transfer solution for the hydrocarbon industry.
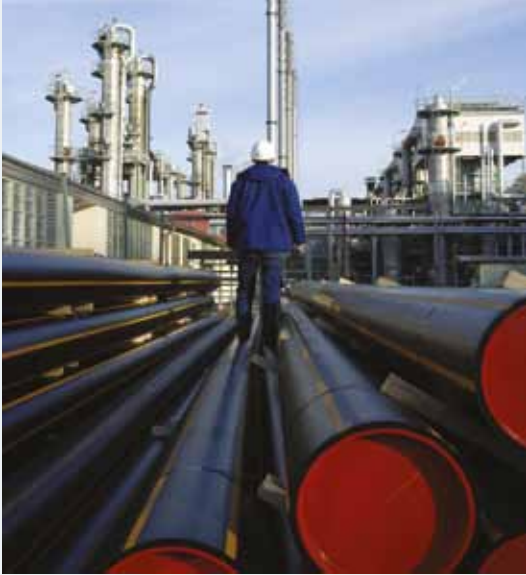
Using TransLoc, the WideBeam sensors are permanently mounted onto the pipe, which permits flow calibration and subsequent use in custody transfer accuracy applications.

Sensor selection
Since the accuracy of a clamp-on ultrasonic flowmeter depends on choosing the right sensor, this selection is crucial for a meter's performance. Siemens offers four types of sensors: universal, universal high temperature, high precision and Doppler.

Our sensors cover a wide range of applications and challenges. By entering application data such as pipe wall thickness, diameter and material, liquid/gas type, and amount of aeration in the liquid, meter performance is optimized. It will work exactly the way you want it. Right from day one.

	Universal	High temp.	High precision	Doppler
Homogeneous liquids with moderate aeration	X	X	X	
Moderately aerated liquids and multiple products		X	X	
Highly aerated liquids or slurries				X
Natural or process gases			X	
Liquid temperatures from +120...+232 °C (+248...446 °F)		X		
Steel pipes and liquid temperatures below 120 °C (248 °F)	X		X	
Wall thickness less than 32 mm (1.25")	X			
Steel pipes with diameter/wall thickness ratio above 10	X			
For increased accuracy on steel pipes			X	

Flexible or pre-configured? The choice is yours...

With flexible configuration options combined with permanent and portable versions, finding exactly what you need has become a lot easier.

The clamp-on ultrasonic flowmeters from Siemens are either available as customized versions that can be configured from a wide selection of sensors and enclosures or as pre-configured check metering kits. These kits come with all the required equipment and are available for selected industries.

As a crucial accessory, the clamp-on program also includes an easy-to-use, stand-alone digital ultrasonic pipe wall thickness gauge. Its high precision makes it a valuable flow tool since even the smallest pipe thickness miscalculations can have an impact on accuracy.

The features and benefits of the SITRANS F US flowmeter portfolio is geared towards various industries and applications. These include but are not limited to:

- General industry
- HVAC and power
- Water and wastewater
- Gas
- Hydrocarbon
- Leak detection

Flexibility and versatility
Since the dedicated SITRANS FUS1010 ultrasonic flowmeter can be used within a wide variety of applications it is the meter of choice for most general industries. It offers numerous advantages in application adaptability that cannot be matched by any other single flow measurement technology. Main features include:

- Zero pressure drop
- Insensitivity to outside noise
- High turn down ratio
- WideBeam and Doppler mode
- Interface software

To accommodate varying installation requirements, the flexible SITRANS FUS1010 is available in single, dual and four channel/path configurations. This is in addition to the three enclosure types: IP65 (NEMA 4X), IP65 (NEMA 7) compact and IP66 (NEMA 7) wall mount.

Basic flow measurement
For basic applications, the dedicated SITRANS FST020 is considered an optimal and affordable alternative to more complex flow solutions. Among the features offered are: single channel version, limited configuration options that make product selection straightforward while still

Versatile standard solutions

With flexible configuration options you can either customize your flowmeter by choosing from a wide selection of sensors, number of channels and enclosures, or to decide on a complete pre-configured system available for selected industries...

offering solutions that fit industry requirements, RS232 communication and lastly, a simple and user-friendly design. This not only ensures easy set-up and configuration but also results in delivery times up to par with market expectations.

Portability in nature, ease in use
In addition to dedicated meters, Siemens offers portable versions of the clamp-on ultrasonic flowmeter. These are ideally suited for applications that do not require long-term continuous monitoring or pipes where operators need to check the flow against a known or expected value. The portable flowmeters come with an internal battery that provides up to seven hours of continuous operation, and AC or DC power for backup.

With the dual channel version, switching between Doppler and transit time operation for quick adaptation to varying conditions can be done without changing meters. This makes it suitable for any liquid; even those with high aeration, glycol or suspended solids. In addition, utilizing the meter's internal data logger, process history can be recorded and stored or downloaded to a PC or laptop.

Check metering kits
The portable meters are also available as pre-configured check metering kits. They are an ideal solution for flow

surveys or when checking the performance and accuracy of any type and brand of flow or energy meter.

The kits come in weatherproof and sturdy rolling cases with a telescope handle. The cases hold all the required equipment including cables, multiple ultrasonic sensors and the transmitter; no extra parts need to be ordered.

The clamp-on ultrasonic check metering kits are available for the following industries: general liquid, water and wastewater, energy and gas.

HVAC and Power Solutions

Seamless measurement without interruption

The family of energy meters with its rugged and high precision characteristics is ideally suited for thermal energy and power applications, and is particularly suitable for large pipe sizes. Highlight features include:

- Accurate measurement at low flow and delta T
- Precise energy rate and total consumption computation
- Improved accuracy with 1000 ohm high resolution clamp-on or insert RTD's
- Customized display with option to save 50 flow measurement sites with the portable version

The SITRANS FUE1010 is available in permanent and portable versions. The permanent version comes in single and dual channel models, and the portable as dual channel. Using the dual channel function, the meter can be configured to measure two different pipes, or to apply the second channel as a dual path for extra accuracy on convoluted pipe configurations.

As a stand-alone energy meter, the SITRANS FUE1010 can be used as a remote communication module. Inputs from other data sources are transferred into the built-in data logger, making it easy to time-stamp all data and download it for billing, efficiency and operation analysis.

The portable version of the SITRANS FUE1010 as well

as the pre-configured check metering kit are reliable sources for checking existing meters. They can be used for performance and accuracy verifications or surveys of any type and brand of flow or energy meter by tracking the usage of both flow and BTU measurement. Upon completion of the survey a test report can be printed.

Key application areas for the SITRANS FUE1010 include high precision revenue grade sub-metering of thermal

energy production, chilled and hot water HVAC installations, measurement of ammonia and glycol mixtures, and energy efficiency monitoring of HVAC equipment and nuclear power plants.

Water and Wastewater Solutions

Flexible and economical dual technology

The clamp-on ultrasonic transit time and Doppler flowmeters are engineered to measure a diverse range of flow applications found in the municipal water and wastewater industries. Important features are:

- Automatic switch between transit time and Doppler mode to accommodate varying liquid conditions
- Installation on any pipe size and pipe material
- Applications range from simple, single meter installations to complete flow metering and/or leak detection systems for large distribution and collection system plants

For the water and waste water industry there are several clamp-on ultrasonic flowmeter solutions available.

The flexible and versatile SITRANS FUS1010 comes in single, dual or four channel configurations that offer great cost saving options. The dual channel version can be set up on two separate applications and can also provide math functions between the two channels. The same applies for the four channel meter, which can monitor multiple lines and has multi-path functions, which greatly reduces the cost per measurement channel.

The SITRANS FST020 combines basic flow measurement functionalities with a simple set-up and configuration wrapped in a simple single channel design. It features single channel measurement, RS232 communication and the WideBeam flow measurement technology.

Another option is the SITRANS FUP1010, which is ideally suited as a check meter for existing conventional meters and to monitor applications that do not have existing metering. Single and dual channel models are available that come with both WideBeam transit time and Doppler technology, making them fitting for plant testing and survey applications.

The SITRANS FUP1010 is also available as a pre-configured, all-inclusive water kit that comes in a weatherproof and sturdy rolling case. The case holds all equipment needed to conduct flow measurements, including cables, multiple sensors and the ultrasonic flow computer.

This significantly eases the portability of the meter, making it the perfect choice for performance check or verification of any type or brand of flowmeters installed anywhere in a water or waste water plant.

Application areas include measurement of raw and potable water, chemicals, raw sewage and effluent, and mixed liquor and sludges

Gas Solutions

In the field and in the lab, our solutions prove reliable

Thanks to the Widebeam technology, the externally mounted gas flowmeters from Siemens bring several advantages to the gas industry, including:

- Tolerance of most wet gas environments; a condition so challenging that most competing meters are incapable of delivering readings
- Gas interface software that facilitates data extraction and enables identification of the type of gas running through a pipe at any given time
- Relay alarms that are triggered when a change in gas composition is detected, alerting the plant or pipeline operator

Additional features of the SITRANS FUG1010 family include an internal AGA-8 table for fixed gas composition for standard volume computation, easy commissioning with Zeromatic path that automatically sets to zero without stopping flow, and immunity to most pressure-reducing valve noises, making installation in very close proximity to valves and pumps possible. It is also compatible and in compliance with the American Gas Association's AGA-10 speed of sound

measurement practice, providing an industry-accepted approach to calculating the speed of sound in natural gas. The SITRANS FUG1010 is available in single, dual and four channel/path configurations and with an optional rugged stainless steel sensor enclosure that permits permanent and direct burial installations.

The gas meter comes in a pre-configured version ideal for use as a check metering device. Applicable uses include installations where a flowmeter is not currently installed or where the performance of an existing meter needs to be checked or verified. This makes it an invaluable tool in gas processing and storage plants.

All SITRANS FUG1010 flowmeters are very versatile, making them ideal for most natural, specialty, and process gas industry applications, including: check metering, lost and unaccounted for (LAUF) analysis, allocation measurement, flow survey verification, production well testing, underground storage applications and gas fired power stations.

Hydrocarbon Solutions

Addressing the needs of the hydrocarbon industry

The wide range of hydrocarbon meters are specifically designed to address the needs of the hydrocarbon industry in applications where traditional meters cannot perform. Using the SITRANS FUH1010 for such demanding conditions has several benefits:

- Flow measurement under a wide range of viscosities
- Ideal for pipelines carrying multiple products
- Output options include standard volume and mass
- Enables reliable interface detection
- Easy and quick installation with zero process down time

The clamp-on ultrasonic flowmeters for the hydrocarbon industry are available in three different versions that all come with single, dual, three or four paths.

The SITRANS FUH1010 Interface Detector offers extremely precise interface, crude oil and multi-product identification. It is ideal for scraper "pig" detection and density indication. The system provides the user with outputs that include API number, density, and specific gravity at base temperature at both reference and current operating conditions.

The Precision Volume SITRANS FUH1010 flow meter dynamically compensates for viscosity changes as liquid properties change for continuous correction of Reynolds number. It allows analog output of inferred viscosity values in addition to diagnostic data.

The Standard Volume SITRANS FUH1010 for accurate standard volume and mass flow measurement is suitable for high-end applications that carry multiple liquids and liquids with varying viscosity. It is also ideal for line balance applications that require normalized volume or mass output. For even more precise density compensation, analog inputs from densitometers, temperature sensors, viscometers and pressure transmitters can be utilized.

In addition to the dedicated hydrocarbon flowmeters, SITRANS FUS1010 and SITRANS FUP1010 flowmeters can be used for hydrocarbon applications under limited conditions such as single liquids and limited viscosity range.

The SITRANS FUH1010 flowmeters are a great match for crude oil, refined petroleum or liquefied gas applications.

Pipeline Leak Detection Solutions

Safeguarding against valuable product loss and environmental hazards

With the Siemens pipeline leak detection system based on the clamp-on ultrasonic flow technology, pipeline operators can achieve a unique combination of superior sensitivity, reliability and robustness; something that only the fewest manufacturers can deliver...

Siemens pipeline leak detection system is a turnkey solution that offers all components of a leak detection system from one vendor: hardware, software and service. Combine this with ease of installation, leak location, product identification, high sensitivity, accuracy and reliability, and the package is complete.

Key features at a glance:
- Real-time detection of small and large product releases under flow and no flow conditions
- Accurate leak location
- Easily accessible pipeline performance data
- Operation unaffected by changes in liquid properties
- Product type and quality identification
- Pig passage alarm and tracking

By means of alarm thresholds that can be set in accordance with user requirements to accommodate specific operating conditions, the leak detection system detects releases in real-time. If an imbalance between the inlet and outlet data is detected, an alarm is activated, calling for operator attention.

On the user-friendly display the operator can quickly and easily identify where the release is located and take action accordingly. The display also features a visual trend line that facilitates identification of very small releases that occur before the alarm thresholds are breached.

The Siemens leak detection system is extremely sensitive; also at very low flow conditions. This is made possible by a unique combination of temperature and pressure algorithms and computation models, continuous Reynolds number flow profile compensation and sonic signature liquid density and viscosity identification.

Being that the system is based on the clamp-on ultrasonic flow technology it offers highly unique features: easy sensor mounting on the outside of the pipe, minimized maintenance, no deposit formations, and most importantly, installation without pipe modification or flow interruption. This makes the Siemens solution particularly suitable for pipeline retrofit projects. And since system components are specified on a project-by-project basis, each solution fits the customer's exact needs and requirements.

For hydrocarbon storage sites, tank farms and pipelines, the clamp-on leak detection system can be combined with the SITRANS FUT1010 flowmeter to create an integrated leak detection and custody transfer accuracy solution.

Hydrocarbon Liquid and Gas Solutions

TransLoc sensor mounting brings WideBeam into the wetted world

The SITRANS FUT1010 has been developed specifically for the requirements of the hydrocarbon industry, offering numerous benefits:

• Highly accurate flow measurement thanks to the WideBeam technology
• Stable performance unaffected by valve-generated acoustic noise
• Non-intrusive sensors result in minimal maintenance
• Flowmeter calibration guarantees accuracy

Featuring the TransLoc mounting system, the WideBeam sensors are permanently mounted onto the pipe, preventing contact with the medium. This means no cavities or clogging by high paraffin liquids found in many hydrocarbon applications. It also permits flow calibration and subsequent use in applications that require custody transfer accuracy.

The SITRANS FUT1010 is available in two versions: one for gas and one for liquid hydrocarbon applications. To accommodate varying customer accuracy requirements, both flow meters are come with two, three or four paths, and are suitable for installation in Zone 1 and hazardous areas.

SITRANS FUT1010 for liquids
The performance of the liquid version meets OIML R117

and API requirements, which makes it ideal for a wide range of custody transfer pipeline, terminal, refinery and transportation applications. Its stable performance allows continuous operation in applications where the measured media is contaminated by e.g. water or gas.

Output options include standard volume or mass, liquid density and API, making it a perfect replacement for intrusive densitometers. With the sensors mounted on the outside of the pipe, it easily accommodates scraper and pig detection. It also compensates for changes in liquid temperature, viscosity and density to assure the highest performance regardless of operating conditions.

SITRANS FUT1010 for gases
Since the gas version of the SITRANS FUT1010 is compliant with AGA-9 there are strict requirements to the manufacturing process and accuracy of the flowmeter.

In addition, the internal AGA-8 table allows the meter to report standard volume flow without the need for a separate volume compensating flow computer. This ensures high precision while being useful for fixed gas compositions. The WideBeam technology also reduces impact of cross and swirl flow by using a "bounce" or reflect path configuration.

Get it all from Siemens

Siemens Sensor Systems has the vision and experience to provide solutions for various industrial needs, both now and tomorrow. Over and above instrumentation, our insight into sharpening the competitive edge may even surprise you.

By choosing Siemens you gain the benefit of:

Your total solution provider
Siemens is the market leader in total solutions for process automation and instrumentation. More than merely a supplier, Siemens is integrated into the value chain, providing services from engineering to commissioning or services, locally or worldwide.

TIA – Totally integrated automation
Thanks to a common program environment, database and open communication systems, our products, systems and solutions can be totally integrated into any industry sector. Siemens TIA solutions are scalable, engineered for upgrade from stand-alone to automated system on demand.

The power of a single partner
Standardized concepts across technology and business areas make it easy to exploit Siemens synergies to the full, for any size or complexity of task.

Future-proof product range
Continual innovation and technological leadership ensure future-proof automation and instrumentation systems.

Flexibillity
Our breadth of technologies means we are always able to offer the best combination or adaptation of sensor and transmitter, for any application in virtually any industry.

Accuracy
We test and calibrate all flowmeters in our own EN 45001-approved laboratories. Our meters meet or exceed international OIML standards, ensuring long-term accuracy – and traceability back to international norms.

The best flowmeter for the job

Siemens offers the ultimate flexibility in its range of flowmeters. For a given task, we can often provide solutions based on two or three different technologies. The broadness of our range means we always find the best flowmeter for the job. The overview makes it easy to select just the right SITRANS F US flowmeter solution for your very application.
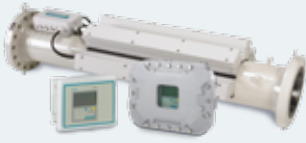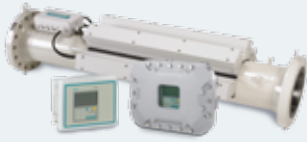

SITRANS F US

Ultrasonic flowmeters achieve greater accuracy rates – 0.25% of actual flow – than previous generations of transit time flowmeters and Doppler-based systems. Siemens line of ultrasonic flowmeters can detect weak signals and be used for a wide spectrum of applications.

		FUE380	FUS380	SONOKIT / FUS060	SONO 3100 / FUS060	SONO 3300 / FUS060	FUS1010	FUP1010	FUE1010	FUG1010	FUH1010	FSTO20	FUT1010
Water and Wastewater	Abstraction		○	◐	◐	◐	●	●				●	
	Water treatment		○	◐	●	●	●	●				●	
	Distribution		○	◐	●	●	●	●				●	
	Wastewater treatment		○	○	○	○	●	●				●	
	Irrigation		●	●	◐	◐	○	●				◐	
HVAC / Energy	District heating	●	●	◐	◐	◐	●	●	●			●	
	Distribution/transmission	●	●	◐	◐	◐	●	◐	◐			◐	
	District cooling and chillers	●	●	◐	◐	◐	◐	◐	●			◐	
Hydrocarbon	Upstream			○	●	●					●		●
	Midstream			◐	●	●					●		●
	Downstream			●	●	●					●		●
Gas	Natural gas									●			●
	Process gas									●			●
	Storage									●			●
	Allocation									●			●
	Check-metering									●			○
Others	Aerospace						○	●					
	Chemical			○	○	○	●	●					●

● Most often used　◐ Often used　○ Can be used

Meter	SITRANS FUS1010	SITRANS FUE1010	SITRANS FST020	SITRANS FUP1010
Flow range	±12 m/s (±40 ft/s), bidirectional	±12 m/s (±40 ft/s), bidirectional	±12 m/s (±40 ft/s), bidirectional	±12 m/s (±40 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s) of flow	0.0003 m/s (0.001 ft/s) of flow	0.0003 m/s (0.001 ft/s) of flow	0.0003 m/s (0.001 ft/s) of flow
Pipe size	DN 6.4...9140 (0.25...360")	DN 6.4...9140 (0.25...360")	DN 6.4...9140 (0.25...360")	DN 6.4...9140 (0.25...360")
Optional inputs	Current: 2x 4-20 mA DC Voltage: 2x 0-10V DC Temperature: 2x 4 wire 1 kΩ RTD	Current: 2x 4-20 mA Voltage: 2x 0-10V DC Temperature: 2x 4 wire 1 kΩ RTD Totalizer commands (clear/hold)	Totalizer: 2x 2-10V DC	Current: 2x 4-20 mA DC Voltage: 2x 0-10V DC Temperature: 2x 4 wire 1 kΩ RTD
Outputs	Current: 2x 4-20 mA DC Voltage: 2x 0-10V DC Status alarm: 4x SPDT relays Frequency: 2x 0-5 kHz RS232 Modbus	Current: 2x 4-20 mA DC Voltage: 2x 0-10V DC Status alarm: 4x SPDT relays Frequency: 2x 0-5000 Hz RS232 Modbus	Current: 1x 4-20 mA DC Status alarm: 1x relay 30V DC Pulse: 1x 10 mA	Current: 2x 4-20 mA DC Voltage: 2x 0-10V DC Status alarm: 4x SPDT relays Frequency: 2x 0-5 kHz RS232
Accuracy	±0.5-1% of flow at <0.3 m/s (1ft/s)	±0.5-1% of flow at <0.3 m/s (1ft/s)	For velocities ≥ 0.3 m/s (1 ft/s) 4-20 mA ± 1.0 % - 2.0 % of flow Pulse, relay output ± 0.5 % - 1.0% of flow	±0.5-2% of flow at <0.3 m/s (1ft/s)
Repeatability	±0.15% at <0.3 m/s (1ft/s)	±0.15% at <0.3 m/s (1ft/s)	±0.15% at <0.3 m/s (1ft/s)	±0.15% at <0.3 m/s (1ft/s)
Data refresh rate	5Hz	5Hz	5Hz	5Hz
Enclosure rating	IP65 (NEMA 4X), IP65 (NEMA 7) IP66 (NEMA 7)	IP65 (NEMA 4X)	IP65 (NEMA 4X)	IP67
Liquid temp. Optional	-40...+120 °C (-40...+250 °F) -40...+230 °C (-40...+450 °F)	-40...+120 °C (-40...+250 °F) -40...+230 °C (-40...+450 °F)	-40...+120 °C (-40...+250 °F) -40...+230 °C (-40...+450 °F)	-40...+120 °C (-40...+250 °F) -40...+230 °C (-40...+450 °F)
Power supply	90-240V AC, 50-60 Hz, 30 VA 9-36 V DC, 12W	90-240V AC, 50-60 Hz, 30 VA 9-36V DC, 12W 100-240V AC, 50-60 Hz 9-36V DC, 10W Internal battery	100-240V AC, 15 VA max. 11.5-28.5V DC, 10W max.	100-240V AC, 50-60 Hz, 30 VA 9-36V DC, 12W Internal battery
Approvals	INMETRO, CSA, FM, CE, ATEX, C-TICK	FM, CSA, CE, (dedicated) UL, ULc, CE (portable)	UL, ULc, CE, C-TICK	UL, ULc, CE

Meter	SITRANS FUH1010	SITRANS FUG1010	SITRANS FUT1010 Liquid	SITRANS FUT1010 Gas
Flow range	±12 m/s (±40 ft/s), bidirectional	±30 m/s (±100 ft/s), bidirectional	±12 m/s (±40 ft/s), bidirectional	±30 m/s (±100 ft/s), bidirection
Flow sensitivity	0.0003 m/s (0.001 ft/s) of flow	0.0003 m/s (0.001 ft/s) of flow	0.001 f/s, (0.0003 m/s) of flow	0.001 f/s, (0.0003 m/s) of flow
Pipe size	DN 6.4...9140 (0.25...360")	DN 25...152 (1...48")	DN 100...600 (4...24")	DN 100...600 (4...24")
Optional inputs	Current: 4x 4-20 mA Temperature: 2x 4 wire 1 kΩ RTD	Current: 2x 4-20 mA Temperature: 2x 4 wire 1 kΩ RTD	Current: 4x 4-20 mA (pressure, temperature, etc.)	Current: 4x 4-20 mA (pressure, temperature, etc.)
Outputs	Current: 2x 4-20 mA DC Voltage: 2x 0-10V DC Pulse: 2x 0-5 kHz, digital quad RS232 Modbus	Current: 2x 4-20 mA programmable standard Voltage: 2x 0-10V DC Frequency: 2x 0-5 kHz RS232 Modbus	Current: 4x 4-20 mA Voltage: 2x 0-10V DC Pulse: 2x open collector, Pulse: 2x 0-5V TTL RS232 Modbus RS485/422	Current: 4x 4-20 mA Voltage: 2x 0-10V DC Pulse: 2x open collector, Pulse: 2x 0-5V TTL RS232 Modbus RS485/422
Accuracy	±0.5-1% of flow at <0.3 m/s (1ft/s) Calibratable to 0.15...0.3% of flow 0.05% of API No.	±1-2% of actual volume reading (higher accuracy is pipe condition and flow profile dependent)	<0.15% of flow at <0.3 m/s (1ft/s)	<0.2% of flow at <0.3 m/s (1ft/s
Repeatability	±0.05% at <0.3 m/s (1ft/s)	±0.15% at <0.3 m/s (1ft/s)	±0.05-0.1% of actual reading	±0.05-0.1% of actual reading
Data refresh rate	5Hz	5Hz	5Hz	5Hz
Enclosure rating	IP65 (NEMA 4X), IP65 (NEMA 7), IP66 (NEMA 7)	IP65 (NEMA 4X), IP65 (NEMA 7), IP66 (NEMA 7)	IP65 (NEMA 4X) - sensor IP66 (NEMA 7) - transmitter	P65 (NEMA 4X) - sensor IP66 (NEMA 7) - transmitter
Liquid temp. Optional	-40...+120 °C (-40...+250 °F) -40...+230 °C (-40...+450 °F)	-40...+60°C (-40...+140 °F) Consult factory for higher temperatures	-28...+93 °C (-20...+200 °F)	-28-...+93 °C (-20...+200 °F)
Power supply	90-240V AC, 50-60 Hz, 30 VA 9-36V DC, 12W 90-240V AC, 50-60 Hz, 15 VA 9-36V DC, 10W	90-240V AC, 50-60 Hz, 30 VA 9-36V DC, 12W 90-240V AC, 50-60 Hz, 15 VA 9-36 VDC, 10W	90-240V AC, 50-60 Hz, 30 VA 9-36V DC, 12W	90-240V AC, 50-60 Hz, 30 VA 9-36V DC, 12W
Approvals	NMETRO, CSA, FM, CE, ATEX, C-TICK	NMETRO, CSA, FM, CE, ATEX, C-TICK	INMETRO, CSA, FM, ATEX (PED)	INMETRO, CSA, FM, ATEX (PED)

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