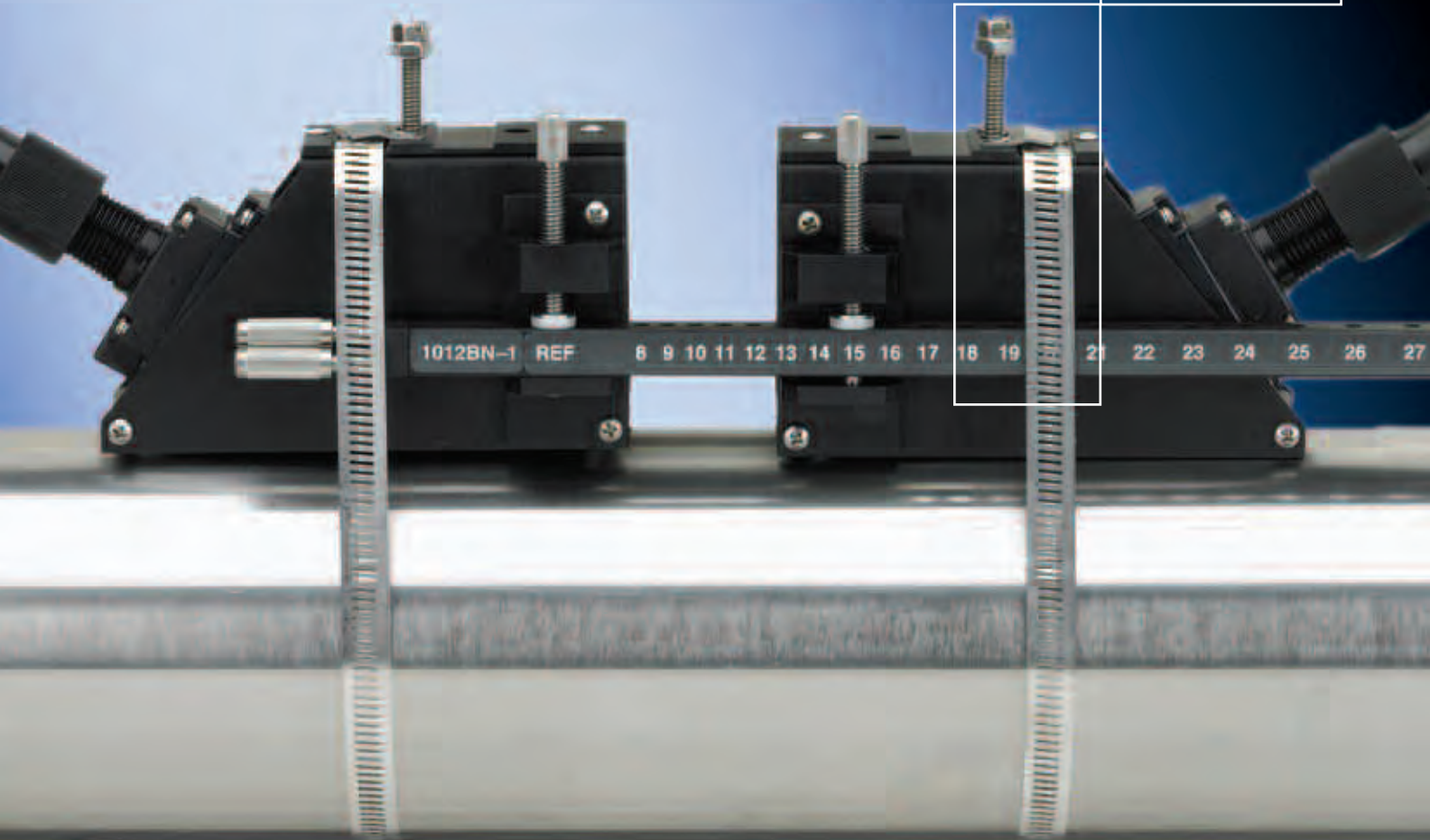


**SITRANS F US Clamp-On**  
Reliable ultrasonic flowmeter solutions



sitrans f

CLAMP-ON

**SIEMENS**



# SITRANS F US Clamp-on Flowmeters deliver the WideBeam advantage

The ultrasonic technology employs three main types: Transit-Time, WideBeam Transit-Time and Doppler signal processing. Transit-Time provides an innovative direct ultrasound transmission technique that ensures reliable and accurate signal detection for a wide range of processes. WideBeam Transit-Time is the preferred choice when the best accuracy is desired for both liquid and gas applications. Doppler technology makes it possible to measure liquids which contain very high levels of aeration or suspended solids.

## **Transit-Time technology**

One of the keys to the ultrasonic flowmeter precision performance is its transmission technique. Difficult applications involving many bends, valves or short inlet conditions often require closer examination to maximize accuracy and performance. Knowing that the quality of a Transit-Time flowmeter depends on its ability to determine exactly when the ultra-sound signal reaches the receiving transducer, Siemens engineers have developed a new correlation method that greatly improves signal detection.

## **WideBeam technology**

Clamp-on flowmeters employ Siemens patented WideBeam Transit-Time technology, in which the pipe wall is utilized as an amplifier to optimize the signal to noise ratio and provide a wider area of vibration. This technology increases precision by reducing the sensitivity to any change in the medium type or pressure. It can be used for steel, aluminum, titanium and plastic pipes and is especially valuable for energy, hydrocarbon process and gas applications.

## **Doppler technology**

Doppler operation is suggested for liquids with extensive suspended solids or aeration, with up to 1% flow accuracy. Automatic switching back and forth between WideBeam Transit-Time and Doppler operation allows quick adaptation to varying conditions without changing meters.

## **Automatic Zero Drift Correction (ZeroMatic Path™)**

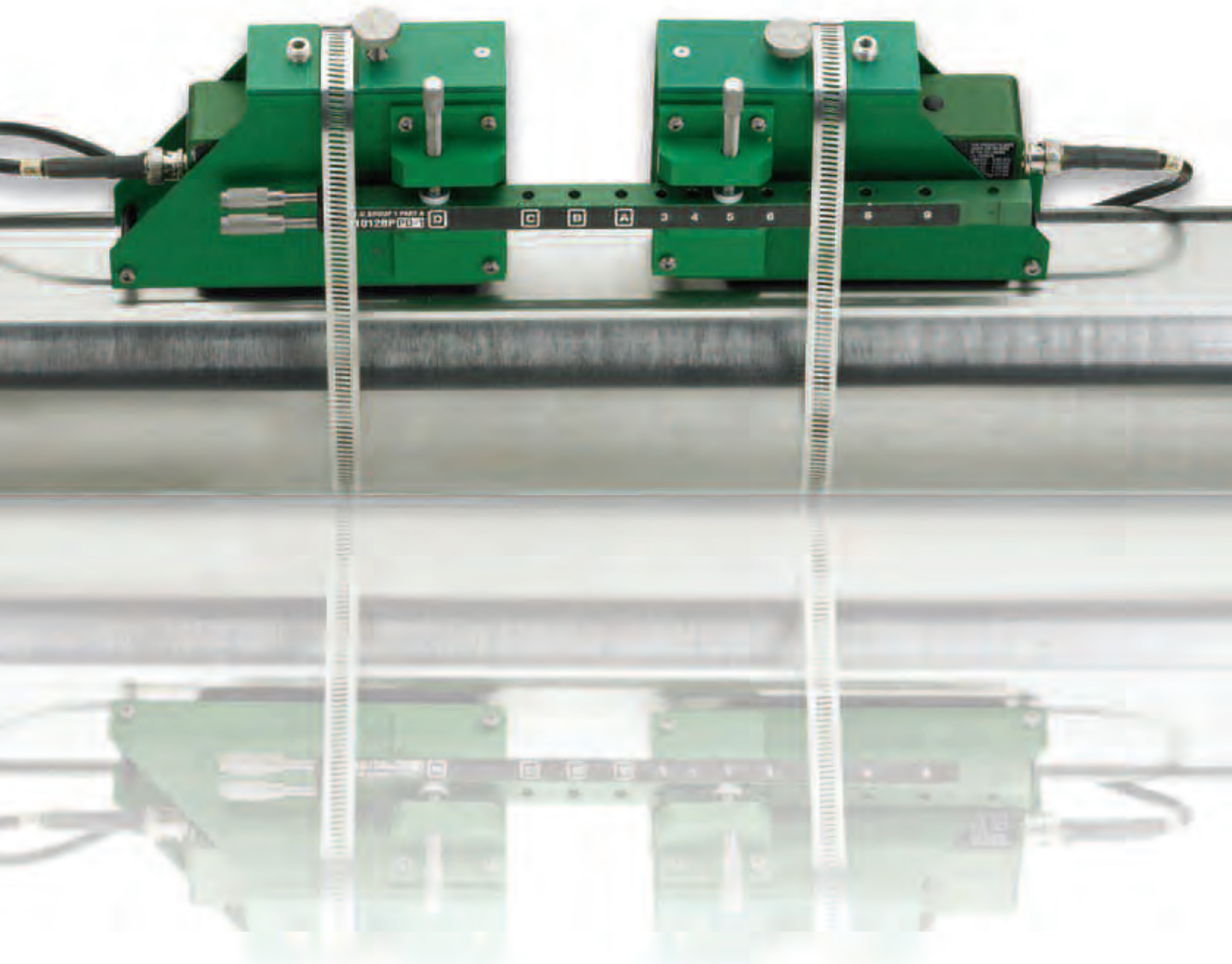
When WideBeam transducers are installed in the "Reflect" mode, the acoustic signal travels in two different paths between transducers. One path travels through the pipe wall and fluid, while the other path travels only through the pipe wall to the other transducer.

This later path provides the meter with a reference signal that is completely independent of flow rate and can therefore be used as a measure of transducer "mis-match". By continually analyzing this pipe wall signal the FUS1010 meter can dynamically correct for flow errors caused by zero drift.



# SITRANS F US Clamp-on Solutions

Don't guess how much money flows through your pipes!  
Clamp-on and know!





## Dedicated Clamp-On Flowmeters

### Continuous Accuracy, Verifiable Confidence

All Siemens FUS1010 flowmeters are full function permanently mounted non-intrusive ultrasonic flowmeters that provide all the benefits of ultrasonic technology combined with the performance of traditional meters.

Siemens ultrasonic flowmeters offer many advantages in capabilities and application versatility that can not be matched by any other single metering technology. From high performance to ease of installation Siemens ultrasonic meters are the best choice when faced with applications that require:

- High precision
- Tolerance of aerated liquids
- Wide viscosity range
- High reliability combined with low maintenance
- High turn down ratio
- Low cost of installation and ownership
- Valuable application diagnostics
- No pressure drop
- Insensitivity to outside noise

Siemens non-intrusive meters are available in single, dual, and optional four channel configurations, in addition to the three different enclosures: IP65 (NEMA 4X) standard wall mount ; IP65 (NEMA 7) compact ; IP66 (NEMA 7) wall mount; and the FUS1020 basic IP65 (NEMA 4) wall mount.

Ultrasonic meters are quickly becoming the meter technology of choice in today's marketplace. Siemens offers a product portfolio to meet the demands of virtually every major industry. Siemens has the right product for applications where traditional meters have limitations, or where the many benefits offered by ultrasonic meters are required.



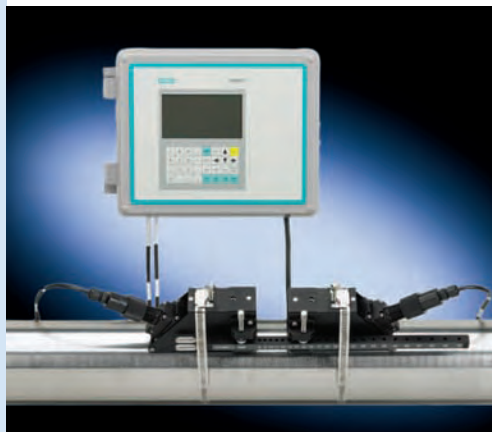
*FUS1010 Standard wall mount IP65 (NEMA 4X)*



*FUS1010 IP65 (NEMA 7) compact , FUS1010 IP66 (NEMA 7) wall mount*



*FUS1020 basic IP65 (NEMA 4) wall mount*



**Clamp-on flowmeters are recommended if you need:**

- easy / low cost installation
- no interruption in operation; no need to cut pipe
- no periodic cleaning and no moving parts to wear or foul
- no contact with media
- large pipe diameters up to 9140 mm (360")
- media under high pressure
- gas or liquid measurement

# Portable Clamp-On Flowmeters

## The ideal solution for plant surveys!

Clamp-on ultrasonic flowmeters utilize external transducers that can quickly and easily be installed on the outside of the pipe. They can also be easily moved from one job site to another. There is no need to cut the pipe or interrupt the flow. Siemens ultrasonic clamp-on battery powered portable flowmeters are available in two different versions:

A standard portable meter with a compact plastic IP40 (NEMA 1) enclosure intended for indoor use. It weighs only 3.4 kg (7.5 lbs), making it extremely easy to carry from one location to another.

A waterproof portable meter with an IP67 enclosure is ideal for outdoor use. It can be left in place without worrying about rain damage. The rugged, impact resistant plastic case

enables it to withstand rough treatment that normally would damage most other meters. Portable meters operate on AC or DC power, and have an internal battery that provides 4 hours of operation. The internal battery can be recharged in 1.5 hours.

Portable meters operate in either WideBeam Transit-Time mode or Doppler mode making them suitable for virtually any liquid, even those with high aeration or suspended solids.

The FUP1010 is an ideal checkmeter for verification of your mechanical meters, and / or measurement in locations that are not currently being metered. Utilizing the meter's internal datalogger, process history can be recorded and stored or downloaded to a PC or laptop.



FUP1010 IP67



FUP1010 IP40 (NEMA 1)



FUP1010 IP40 (NEMA 1)  
soft case

### Clamp-on ultrasonic portable meters feature:

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance
- No moving parts to wear or foul
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single or dual channel models minimizes total cost
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow





**FUE1010: Energy, dedicated and portable. Highly accurate thermal energy sub-metering and efficiency monitoring.**

**FUE1010 IP65 (NEMA 4x), FUE1010 impact resistant IP40 (NEMA 1), FUE1010 portable IP40 (NEMA 1)**



## HVAC and Power Solutions

### Seamless measurement without interruption

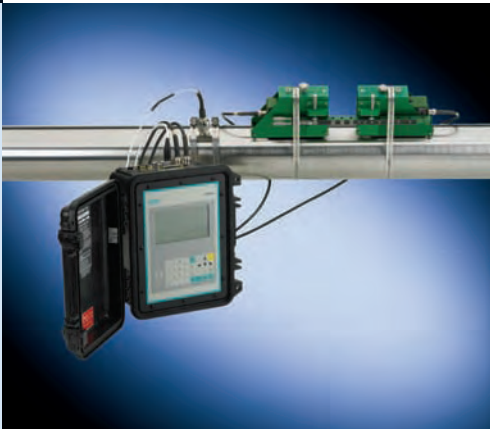
SITRANS FUE1010 clamp-on ultrasonic energy meters, avoid the performance and reliability problems that afflict conventional intrusive thermal energy flowmeters. Its high accuracy, wide bi-directional rangeability, and high sensitivity prevent the loss of energy cost billing now suffered when flow rates fall below the operating range of intrusive meters. Absolutely no pressure drops means lowest operating costs. Installation is quick and easy; shutdown is never needed for installation, maintenance, or calibration check, saving additional cost and inconvenience. Non-intrusive, clamp-on “no-wear” flow sensing delivers intrinsic high reliability.

Ideal for a wide range of district energy heating and cooling applications and for power plants. Dual channel models can be configured to measure two different pipes, or to apply the second channel as a dual path for applications with convoluted piping configurations. The two channel meter can measure both chilled water and hot water in one enclosure. In some cases chilled water/glycol mixes can foam, causing the transit-time

technology to fail. In a case like this a dual channel system with both transit-time and doppler transducers can be installed on the same line to provide seamless measurement without any interruptions. The FUE1010 can also become a remote communication module by accepting 4–20 mA inputs from other data sources, such as for electrical KW load, pressure and steam flow. This information is integrated into its built-in datalogger and allows you to time-stamp all data and down-loads it for your billing, efficiency, and operation analysis.

SITRANS FUE1010 portable meters are a reliable source for checking your existing meters. They can also be used for surveys of HVAC applications that are not being metered. These portable units can be left in place to track the usage of both your flow and BTU measurement, and then supply a test report upon completion of the survey.

Whether it is installation, managing operations, or verifying continuous accuracy customers rely on Siemens for the best energy measurement possible.



#### Heating and cooling applications include:

- Chilled water sub-metering
- Hot water sub-metering
- Condenser water
- Potable water
- Ammonia and glycol
- Diesel and fuel oils
- Checkmetering
- River and lake water
- Lake source cooling

# Water & Wastewater Solutions

## Dual technology that's flexible and economical

Siemens offers a wide range of clamp-on ultrasonic flowmeters to suit virtually every water industry application. Both permanent and portable models are available and all meters install quickly and easily since it is not necessary to cut the pipe or shut down operations. The transducers mount on the outside of the pipe, no deposits can form and maintenance expense is minimized.

Siemens state-of-the-art 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. The clamp-on systems range from simple single meter installations to complete flowmetering and/or leak detection systems for large distribution and collections systems plants.

SITRANS FUS1010 provides both transit-time and doppler operating modes and can be supplied in single, dual or

four channel configurations. Dual channel meters can be set up on two separate applications and can also provide math functions between the two channels. Likewise, the four channel meter can monitor four lines and also has math and multipath functions.

SITRANS FUS1020 is a basic flowmeter that provides affordable high performance flow measurement using transit-time technology. Single or dual channel models are available.

SITRANS FUP1010 is ideal to be used as a checkmeter for existing conventional meters and monitor applications that do not have existing metering. Single and dual channel models are available in compact portable or ruggedized weather proof enclosures. The portable meters also contain both transit-time and doppler technology making them ideal for plant testing or survey applications.



**FUS1010: General purpose, dedicated liquid meters. WideBeam Transit-Time or Doppler operation.**

**FUS1010 IP65 (NEMA 4X), FUS1020 IP65 (NEMA 4), FUP1010 IP67 weather proof, FUP1010 IP40 (NEMA 1)**



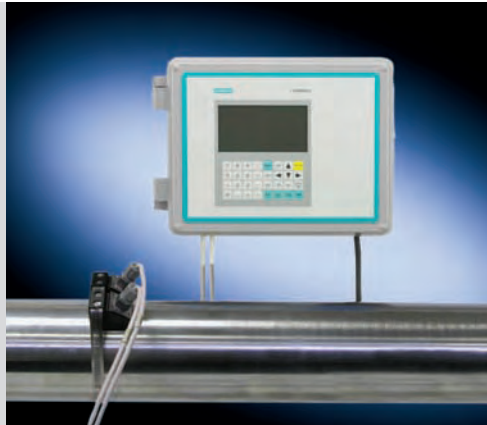
Ideal for almost all water and wastewater applications:

**Water Industry:**

- Raw Water
- Potable water
- Sludges
- Chemicals

**Wastewater Industry:**

- Raw sewage
- Effluent
- Sludges
- Mixed Liquor
- Chemicals





# Hydrocarbon Solutions

## Addressing the needs of the hydrocarbon industry

Liquid hydrocarbon applications are demanding on a flowmeter, many applications vary and prove difficult for traditional meters. Siemens liquid hydrocarbon ultrasonic meters are specifically designed to address the needs of the industry in applications where traditional meters just can't perform.

Siemens FUH1010 non-intrusive ultrasonic meters can:

- Maintain operation with highly aerated liquids
- Measure flow under a very wide range of viscosity
- Perform under less than ideal flow profile conditions
- Install easily and quickly with zero down time
- Produce high performance with a very high turn-down ratio

Siemens offers three types of FUH1010 meters: The viscosity compensated gross volume flowmeter and the standard volume (mass) flowmeter. Both dynamically compensate for changes of viscosity as liquid properties change for continuous correction of Reynolds number. They allow analog output of inferred viscosity values in addition to valuable diagnostic data.

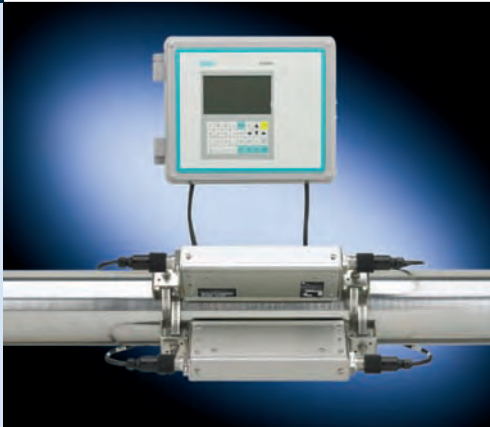
The standard volume (mass) meter has additional features. Volume is compensated to a standard (user defined) temperature. It infers the density for mass calculation and outputs the density and API values. For even more precise density compensation, an analog input from a densitometer can be utilized. There are multiple analog outputs generated when a liquid interface passes and a separate relay output when a scraper passes.

Additionally, Siemens offers The SITRANS FUH1010 clamp-on interface detector, which is temperature and pressure compensated. It precisely detects crude oil and multi-product interfaces. The system provides the user with exceptional repeatability over a wide range of products, independent of changes in temperature or pressure.

Data outputs include API number, density, and specific gravity at base temperature and pressure – and also at actual operating conditions. Clamp-on products are a direct replacement for intrusive densitometers.

*FUH1010: Liquid hydrocarbon, dedicated meters for crude oil, refined petroleum, liquefied gas.*

*FUH1010 IP65 (NEMA 4X), FUH1010 IP65 (NEMA 7), FUH1010 IP66 (NEMA 7) wall mount*



### Hydrocarbon applications, including:

- Ship off-loading
- Pipeline transportation
- Line balance (leak detection)
- Allocation measurement
- Check metering
- Liquid quality monitoring
- Process control metering
- Offshore production
- Storage tank inflow/outflow

### Interface applications, including:

- Multi-product interface detection
- Product identification
- Scraper ("pig") detection

# Gas Solutions

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

In the field and in the lab, our clamp-on gas solutions prove reliable. SITRANS FUG1010 flowmeters are ideal for most natural, specialty, and process gas industry applications, including checkmetering, lost and unaccounted for (LAUF) analysis, allocation measurement, flow survey verification, production well testing, underground storage applications, and gas fired power stations.

Siemens externally mounted gas meters offer many advantages to the gas industry. Easy installation, wide range of operation, low cost of ownership, valuable application diagnostics combined with the portability of clamp-on transducers and high performance, all bring superior value over traditional insert

ultrasonic technology. Where application conditions limit the use of insert technology, Siemens clamp-on gas meters are the ideal solution.

Easy to use "Data View" software provides diagnostic capabilities, data logging and trending of meter performance. This diagnostic assures calibration and operational integrity. AGA-10 speed of sound calculation is incorporated in the software for speed of sound verification. An internal AGA-8 table for fixed gas composition is available for standard volume computation. Single, dual, or optional four beam versions are available along with rugged, stainless steel transducer enclosures permit permanent and direct burial installations.



*FUG1010 ideal for checkmetering and allocation applications with field proven accuracy.*

*FUG1010 IP65 (NEMA 4X), FUG1010 IP65 (NEMA 7), FUG1010 IP66 NEMA 7 Wall Mount*



## Natural and process gas industry applications, including:

- Checkmetering
- Allocation measurement
- Flow survey verification
- Lost and unaccounted for (LAUF) gas measurement
- Production well measurement
- Underground Storage
- Specialty gas measurement



## General

## Energy

## Basic



### Application and brief description

FUS1010 is the most versatile clamp-on ultrasonic flowmeter available today. It can operate in either WideBeam Transit-time or reflexor (doppler) mode, making it suitable for virtually any liquid, even those with high aeration or suspended solids.

All liquid applications

FUE1010 is a highly accurate clamp-on non-intrusive ultrasonic flowmeter for revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real time co-efficient of performance (COP) for HVAC systems.

All liquid applications

FUS1020 is an economical clamp-on ultrasonic flowmeter. It offers reliable flow measurement at a much lower cost than other clamp-on meters, with most applications.

Any liquid application that is not highly aerated or has suspended solids which would require doppler operation.

### Flow range

± 12 m/s (± 40 ft/s), bi-directional

± 12 m/s (± 40 ft/s), bi-directional

± 12 m/s (± 40 ft/s), bi-directional

### Flow sensitivity

0.0003 m/s (0.001 ft/s) flow

0.0003 m/s (0.001 ft/s) flow

0.0003 m/s (0.001 ft/s) flow rate independent

### Pipe size

6.4 mm ... 9.14 m (0.25" ... 360")

6.4 mm ... 9.14 m (0.25" ... 360")

6.4 mm ... 9.14 m (0.25" ... 360")

### Optional inputs

Current: 2x 4 ... 20 mA DC  
Voltage: 2x 0 ... 10 V DC  
Temperature: 2x 4 wire 1 kΩ RTD

Current: 2x 4 ... 20 mA DC  
Voltage: 2x 0 ... 10 V DC  
Temperature: 2x 4 wire 1 kΩ RTD  
Totalizer commands (clear/hold)

Current: 2x 4 ... 20 mA DC  
Voltage: 2x 0 ... 10 V DC  
Temperature: 2x 4 wire 1 kΩ RTD

### Outputs

Current: 2x 4 ... 20 mA DC (1 kΩ at 30 V DC)  
Voltage: 2x 0 ... 10 V DC (5 kΩ min.)  
Status Alarm: 4x SPDT relays  
Frequency: 2x 0 ... 5 kHz  
RS232

Current: 2x 4 ... 20 mA DC (1 kΩ at 30 V DC)  
Voltage: 2x 0 ... 10 V DC (5 kΩ min.)  
Status Alarm: 4x SPDT relays  
Frequency: 2x 0 ... 5000Hz  
RS232

Current: 4 ... 20 mA DC  
1x for single channel  
1x0 ... 5kHz pulse rate, digital isolated  
RS232

### Accuracy

± 0.5% ... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s)  
± 0.0015 ... 0.003 m/s (± 0.0050 ... 01 ft/s), for velocities less than 0.3 m/s (1 ft/s)

± 0.5% ... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s)  
± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)

1%...2% of actual volume reading (higher accuracy is pipe condition dependent)

### Batch repeatability

± 0.15% of flow, for velocities greater than 0.3 m/s (1 ft/s)  
± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

± 0.15% of flow, for velocities greater than 0.3 m/s (1 ft/s)  
± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

± 0.15% ... 1.0% of flow  
0.05%...0.1%, of actual volume reading, for 1.5 ... 30 m/s (5 ... 100 ft/s) velocities (pipe condition dependent)

### Data refresh rate

5 Hz

5 Hz

5Hz

### IP Rating

IP65 (NEMA 4X), IP65 (NEMA 7)  
IP66 (NEMA 7)

IP65 (NEMA 4) and IP40 (NEMA 1)

IP65 (NEMA 4)

### Liquid temperature

Standard  
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)

### Power supply

90 ... 240 V AC, 50 ... 60 Hz,  
30 VA or 9 ... 36 V DC, 12 W

90 ... 240 V AC, 50-60 Hz, 30 VA  
9 ... 36 V DC, 12 W  
100 ... 240 V AC, 50 ... 60 Hz,  
9 ... 36 V DC, 10W  
Internal NiCd battery (4 hour)

100 ... 240 V AC, 50 ... 60 Hz, (30 VA)  
9 ... 36 V DC, 12 W

### Approvals

FM, CSA, ATEX, CCOE, INMETRO, GoST

FM, CSA, CE, (dedicated)  
UL, ULc, CE (portable)

UL, ULc, CE

## Portable

## Hydrocarbon

## Gas



### Application and brief description

FUP1010 portable clamp-on non-intrusive flowmeters offer the versatility of WideBeam transit-time or reflexor (doppler) operation, making it suitable for virtually any liquid, even those liquids with high aeration or suspended solids.

All liquid applications and also used for checkmetering of existing meters.

FUH1010 family of flowmeters are ideal for virtually all hydrocarbon applications. Designs include capabilities to dynamically compensate for changes in viscosity and density while also offering functions for interface detection.

Allocation metering, line balance metering, transmix, blending, interface and ship off-loading, among others.

FUG1010 clamp-on gas meters are suitable for most natural, specialty and process gas industry applications where intrusive type meters are not desired.

Check measurement, production well testing, LAUF, specialty gas measurement.

### Flow range

± 12 m/s (± 40 ft/s), bi-directional

± 12 m/s (± 40 ft/s), bi-directional

± 30 m/s (± 100 ft/s), bi-directional

### Flow sensitivity

0.0003 m/s (0.001 ft/s) flow

0.0003 m/s (0.001 ft/s) flow rate independent

0.0003 m/s (0.001 ft/s) flow rate independent

### Pipe size

6.4 mm ... 9.14 m (0.25" ... 360")

6.4 mm ... 9.14 m (0.25" ... 360")

25 mm ... 1.52 m (1" ... 60")

### Optional inputs

Current: 2x 4 ... 20 mA DC  
Voltage: 2x 0 ... 10 V DC  
Temperature: 2x 4 wire 1 kΩ RTD

Current: 4x 4 ... 20 mA user selectable  
Temperature: 2x 4 wire 1 kΩ RTD

Current: 2x 4 ... 20 mA  
Temperature: 2x 4 wire 1 kΩ RTD

### Outputs

Current: 2x 4 ... 20 mA DC (1 kΩ at 30 V DC)  
Voltage: 2x 0 ... 10 V DC (5 kΩ minimum)  
Status Alarm: 4x SPDT Relays  
Frequency: 2x 0 ... 5000 Hz  
RS232

Current: 2x 4 ... 20 mA (1 kΩ at 30 VDC)  
Voltage: 2x 0 ... 10 V DC (5 kΩ min.)  
2x 0...5kHz pulse rate, digital quad.  
(None for IP65 (NEMA 7)  
RS232

Current: 2x 4 ... 20 mA a programmable standard  
Voltage: 2x 0 ... 10 V DC  
Frequency: 2x 0 ... 5kHz  
RS232

### Accuracy

± 0.5% ... 2% of flow, for velocities greater than 0.3 m/s (1 ft/s)  
  
± 0.0015 ... 0.006 m/s (± 0.005 ... 0.02 ft/s), for velocities less than 0.3 m/s (1 ft/s)

.05% of API No. (interface detector)  
  
calibratable to 0.15 ... 0.3 of flow depending on version

Out of box 1-2% calibratable to 0.5%  
  
± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)

### Batch repeatability

± 0.15% of flow, for velocities greater than 0.3 m/s (1 ft/s)  
  
± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

± 0.05% of flow

± 0.15% of flow, for velocities greater than 0.3 m/s (1 ft/s)  
  
± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

### Data refresh rate

5 Hz

5 Hz (80 Hz output optional)

5 Hz (80 Hz output optional)

### IP Rating

IP67, IP40 (NEMA 1)

IP65 (NEMA 4X), IP65 (NEMA 7), IP66 (NEMA 7)

IP65 (NEMA 4X), IP65 (NEMA 7), IP66 (NEMA 7)

### Liquid/Gas temperature

Standard  
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 ... +60°C (-40 ... +140 °F) (for higher temperatures consult factory)

### Power supply

100 ... 240 V AC, 50-60 Hz, 30 VA  
9 ... 36 V DC, 12 W  
  
Internal NiCd battery (4 hour)

90 ... 240 V AC, 50 ... 60 Hz, (30 VA) or 9 ... 36 V DC, (12 W)  
90 ... 240 V AC, 50 ... 60 Hz, (compact 7) 15 VA or 9 ... 36 V DC, 10 W (compact 7)

90 ... 240 V AC, 50 ... 60 Hz, (30 VA) or 9 ... 36 V DC, (12 W)  
90 ... 240 V AC, 50 ... 60 Hz, (compact 7) 15 VA or 9 ... 36 V DC, 10 W (compact 7)

### Approvals

UL, ULc, CE

FM, CSA, ATEX, CCOE, INMETRO, GoST

FM, CSA, ATEX, CCOE, INMETRO, GoST

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