
PROCESS INSTRUMENTATION

# Non-Intrusive flow measurement **for liquids and gases**

Digital innovation with SITRANS F S ultrasonic flow portfolio

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SIEMENS

# **Minimize costs. Maximize simplicity** with SITRANS F S Portfolio

**Clamp-on ultrasonic flow measurement**

SITRANS F S clamp-on ultrasonic flow meters showcase the benefits of digital signal processing: market-leading accuracy, noise immunity, reliability, high-speed data update rate and superior user-friendliness at every stage of installation and operation. There is no pressure drop, providing a wide turn-down ratio with non-intrusive sensors that are installed without disturbing the pipe.

# SITRANS FS230 –
# **A versatile top performer.**

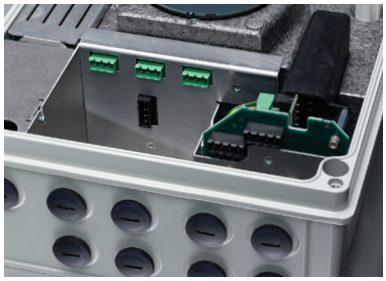

## Unique support tools and tailoring

The SITRANS FS230 offers user-friendliness and customization options at every stage of installation, commissioning, and day-to-day operation. The transmitter's Flash® microSD card gives you access to all product data, certificates, operating instructions, and audit trails. The easy to read, graphical interface features intuitive menu navigation that provides the display of up to 6 user-configurable parameters displayed on the 6 individual screens, along with a comprehensive set of diagnostic tools to improve your monitoring ability and streamline your operations.

**Simple to use**
Experience easy handling with a large, fully graphical display. Intuitive navigation, a built-in pipe configuration menu and multiple setup wizards providing full support from the very first moment.


**Service in a flash**
In addition to storing all settings, calibration data and certificates, the on-board micro SD card provides data logging, audit trails and quick information transfer between units for efficient service with less downtime.

**Fully customizable**
The FS230 offers a broad range of programmable I/O, communication, FM approvals, – configurable alarms, 3 totalizers and up to 6 different user configurable display views at once.



# **Exceptional performance and outstanding savings.** With the SITRANS FS230, you never need to compromise.

**SITRANS FS230 clamp-on ultrasonic flow perfection**
Maintaining quality control. Keeping operating and usage costs to a minimum. Protecting public safety. Liquid and gas flow measurement serves a variety of critical roles for the process industries – and the SITRANS FS230 is up for the challenges faced by a broad array of industries, including water and wastewater, HVAC and power, hydrocarbon, food and beverage, pharmaceutical, chemical, mining, and pulp and paper.

**Precision and safety – Hydrocarbon industry**
Featuring high measurement accuracy, best-in-class Ex approvals, the SITRANS FS230 is built to meet the demands of the hydrocarbon industry. The FS230 provides advanced liquid analysis capabilities; including precise identification of the liquid hydrocarbon type and liquid interface detection, enabling the detection of any changes in the measured liquid hydrocarbon composition. Additionally it can detect and alarm for scraper or pig passage of the measured location.

For additional verification purposes in the gas industry, a speed of sound calculation in compliance with the American Gas Association's AGA 10 standard is iavailable. An internal AGA 8-compliant table for fixed gas composition is also available for standard volume computation.

**Cost-reducing simplicity – Water and wastewater**
The versatile SITRANS FS230 can be installed on almost any pipe size and material. Its accurate, non-intrusive volumetric measurement helps to reduce water wastage and better comply with strict regulations. The nonintrusive transducers make installation simple, with no need for pipe alterations or process shutdown.

Key application areas for the FS230 are raw and potable water, low-flow chemical dosing, raw sewage and effluent, mixed liquor and sludges, billing, and plant testing.

**Optimized energy efficiency – HVAC and power**
Its rugged design and innovative engineering enable the SITRANS FS230 to provide precise measurements even in installations with low flow rates.

Within the HVAC industry, key application areas for the FS230 include district heating and cooling, hot, and chilled water sub-metering, condensate water, thermal storage and lake source cooling. The FS230 supports many power industry applications such as coolant, hydroelectricity, penstocks and nuclear feed water.

| SITRANS FSS200 transducers | WideBeam® | Universal | High Temperature |
|---|---|---|---|
| **Installation (architecture)** | Clamp-on | | |
| **Media** | Liquids and gases | | |
| **Pipe sizes** | 0.5" to 33 feet (2.0" - 53" for gas) | | |
| **Transducer materials** | Polyetherimide, stainless steel | | Stainless steel |
| **Temperature range** | -40 to 250 °F | -40 to 250 °F | -40 to 450 °F |
| **Pipe material** | Steel and carbon steel | Steel and non-steel | Steel and non-steel |


| Product | FS230, FS220, FS290 | FS230, FS220, FS290 | FS230, FS220, FS290 | FS230, FS220 , FSDSL, FS290 | FS230 , FS220 | FS230 , FS290 |
|---|---|---|---|---|---|---|
| **Industry/ Application** | **Water** | **Wastewater** | **HVAC** | **Oil/Gas** | **Chemical/Industrial** | **Power** |
| **Order No.** | 7ME3723, 7ME3570, 7ME3745 | 7ME3723, 7ME3570, 7ME3745 | 7ME3723, 7ME3570, 7ME3745 | 7ME3723, 7ME3745, 7ME3720 | 7ME3723, 7ME3745 | 7ME3723, 7ME3745 |
| **Liquid Line Sizes** | 1/2" - 33 feet liquid flow | | | | | |
| **Measurement** | Volumetric standard volume and density | | | | | |
| **Liquid Types** | Clean, dirty, entrained gas (model dependent) | | Clean liquid, dirty liquid, gas (model dependent) | Hydrocarbon, gas, clean and dirty liquid (model dependent) | Clean and dirty liquid (model dependent) | |
| **Mounting** | Clamp-on (not process wetted) | | | | | |
| **Sensor Types** | WideBeam transit-time, shear wave transit-time | | | | | |
| **Paths/ Channels** | Single path, dual path, 4 path (model dependent) | | | | | |
| **Accuracy** | FS230 - 0.5% - 1.0%, FS220 - 1.0%, FS290 - 1.0% | | | | | |
| **Repeatability** | 0.25% | | | | | |
| **Transmitter Temperature Limits** | FS230 -40 to 140 °F<br>FS290 14 to 122 °F<br>FS220 14 to 122 °F | | | | | |
| **Process Temperature** | +446 degrees °F (with high temperature transducers )<br>250 degrees °F (with standard transducers) | | | | | |
| **Inputs I** | RTD & Analog | | | | | |
| **Output** | 4-20 mA, frequency, pulse, relay customizable | | | | | |
| **Communication** | HART 7.5, Modbus RTU, (Ethernet IP and BACnet available via external converter) | | | | | |

# SITRANS FS220 **best solution for liquid flow measurement**

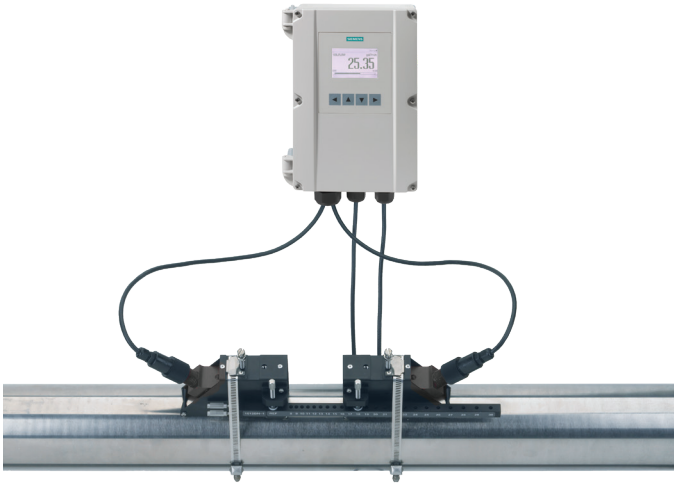
The SITRANS FS220 clamp-on ultrasonic liquid flow meter provides the most essential measurement functions, superior accuracy, cost efficiency and ease of use.

**SITRANS FS220 transmitter –**
**Unique support tools, leading reliability**
The tried-and-trusted SITRANS FS220 transmitter delivers enhanced performance, user-friendliness and options for customization. Driven by the powerful PerformancePlus™ algorithm, it measures virtually any liquid with consistently high accuracy of 1% of flow rate, improved zero stability and a repeatability of 0.25% according to ISO 11631. The removable SensorFlash® microSD card provides unique opportunities for data analysis and servicing, while SIMATIC PDM connectivity allows for trouble-free meter operation. The transmitter is so simple to use every step of the way – from initial startup through day-to-day operation and servicing.

**The FS220 transmitter also features:**

- Patented pipe configuration menu that automatically adjusts for unfavorable pipe mounting conditions
- Exceptional noise immunity and high-speed 100 Hz data update rate
- Compliance with current electromechanical compatibility (EMC) standards
- Optional commissioning and other service packages available directly from the PIA Life Cycle Portal, with 24/7 access to the worldwide network of Siemens technical experts

**SITRANS FSS200 transducers –**
**High precision, low maintenance**
The versatile FSS200 transducers ensure a long meter lifetime and low cost of ownership since they never touch the medium, have no moving parts and can be mounted on pipes as large as 33 feet (394") without any cutting or process downtime. As a result, they are a perfect choice for installation on existing pipelines as well as for corrosive, toxic, hygienic or high-pressure liquids.




| SITRANS FS220 clamp-on ultrasonic flow meter | |
|---|---|
| Channels | Single channel |
| Communication | Modbus RTU, compatible with SIMATIC PDM |
| Enclosure rating | IP65 (NEMA 4X) |
| Display | Fully graphical display, 240 x 160 pixels |
| Power supply | 100-240 Vac 15 W max. or 11.5-28.5 Vdc 7.5 W max. |
| Inputs | 2x digital inputs for totalizer start/stop and reset |
| Outputs | 1x 4 -20 mA, 1x relay, 1x pulse/frequency |
| Accuracy | ±1.0% for velocities ≥1 ft/s |
| Pipe size range | 0.5" to 33 feet |
| Temperature range | Transmitter: 14 to 122 °F operating<br>Transducers: -40 to 450 °F |
| Approvals | UL, ULc, CE |

# SITRANS FS-DSL clamp-on **ultrasonic gas flow meter**

**SITRANS Gas FS-DSL clamp-on ultrasonic gas flow meters provide several benefits:**

- Power utilization of less then 1.0 Watts for remote locations or solar arrays
- Transit-time technology ensures accuracy and tolerance of gas conditions
- Cost conscious with a very low cost of ownership out of the box
- Data analysis through AGA-8 compliant diagnostics and AGA-10 compliance for software accuracy verification
- Single-, dual- and four-path versions accommodate various flow profiles
- Easy installation and commissioning

The SITRANS FS-DSL is ideal for natural, specialty and process gas industry applications, including:

- Lost and unaccounted for (LAUF) analysis
- Allocation
- Production
- Storage
- Gas-fired power stations

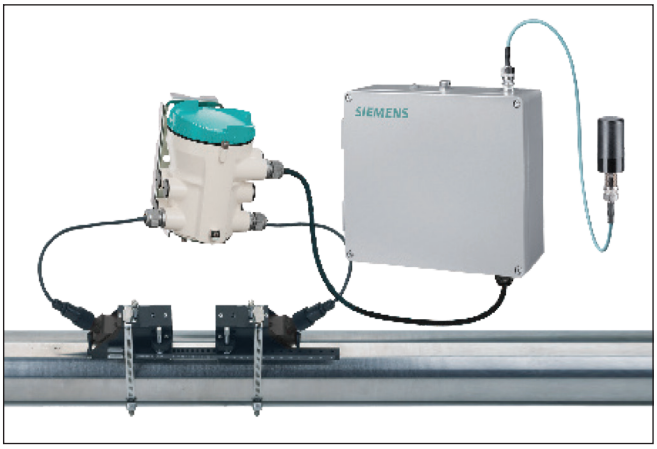
SITRANS Gas FS-DSL clamp-on ultrasonic gas flow meter deals well with remote gas applications where low power utilization is critical and space is limited. Other meters would be challenged in such environments, but the SITRANS FS-DSL can deliver accurate readings even when there is less then 0.750 Watts of spare power left in the solar array.

**Quality-assured features**

The Siemens diagnostic software provides the SITRANS FS-DSL with diagnostic capabilities that deliver crucial information about the application and meter performance. This data can be extracted and downloaded to a PC for thorough analysis and systems check.

For additional verification purposes, a speed of sound calculation in compliance with the American Gas Association's AGA-10 standard is incorporated into the software.The Built-in AGA-8 compliant table, for fixed gas composition, can be utilized for the standard volume compensation of natural gas.

When installation conditions require it, the transducers can be delivered in rugged stainless steel hi-precision mount enclosures. For additional protection the transducers can be sealed with denso couplant or RTV silicone for permanent submergence.


**The WideBeam principle**

All SITRANS clamp-on flow meters employ transit-time technology, in which the pipe wall is utilized as an amplifier to optimize the signal-to-noise ratio. This increases precision by reducing sensitivity to any change in the medium type or pressure. It also renders the flow meter immune to most pressure-reducing valve noises. The WideBeam principle is optimal for pipes used in the gas industry.

**Flexible product offering**

The SITRANS Gas FS-DSL is designed for gas flow measurement, delivering market-leading accuracy of 0.5 to 1% of flow rate and repeatability of 0.25% according to ISO 11631. The 100 Hz data refresh rate maximizes diagnostic and error handling efficiency, and improved meter responsiveness to flow variations. The intelligent pipe configuration menu compensates for various flow profile anomalies. The FS-DSL is available in single to four-path configurations.

# SITRANS FS290 **easy, flexible, versatile, practical**

The SITRANS FS290 is a portable ultrasonic flow meter system for remote monitoring of volumetric liquid flow in pipes. The system is made up of the SITRANS FS290 battery-operated transmitter and SITRANS FSS200 clamp-on transducers. The transducers are installed quickly and easily on the outside of a pipe – without any process interruptions or plant downtime.

**Digitization reduces measurement errors**

The technology of SITRANS FS290 immediately digitalizes acquired analog measurements, enabling real-time signal processing and diagnosis. SITRANS FS290's electronics were developed to reduce transmitter errors to less than 0.15% under most measuring conditions, the device will reliably deliver 1.0% measuring accuracy in real world conditions.

**LESS THAN**
**0.15 %**
**MEASUREMENT ERRORS**

Most errors by ultrasonic flow meters are caused by anomalies in the flow measurement area. An insufficient distance from a 90° elbow or spatial bend (3D double bend) can lead to flow-profile challenges that a clamp-on flow meter can't detect. For these challenging applications, the FS290 comes equipped with the Siemens patented pipeline anomaly tool that helps improve measuring accuracy, by compensating for less then optimal installation environments.

**CORRECTION BY**

**ANOMALY TOOL**

**Long battery life, simple battery replacement**

Improved energy management enables a minimum of twelve and a maximum of over 24 hours of battery operation at full capacity. The battery is easily replaced in situ with the hot swap feature. The transmitter remains powered during the battery change so measurement is not interrupted. The SITRANS FS290 can be programmed via USB interface, using the proven Siemens Process Device Manager (PDM) software.

**≥24 HRS.**
**BATTERY OPERATION**

# **Monitor and control your energy efficiency** in more ways

With energy costs continuing to rise, the financial benefit of knowing exactly where and when your energy is being used grows. Siemens diverse portfolio of flow and temperature meters combined with the versatile SITRANS FEC920 Thermal Energy Meter provides you the real-time data you need to verify your equipment's operational efficiency and more effectively manage your energy usage.

The SITRANS FEC920 Thermal Energy Meter is the perfect solution for taking back control of your energy costs. Designed with a single or dual channel system capable of accepting a wide range of flow and temperature measurements. Whether measuring heating, cooling, or condensate systems with new or existing flow meters installed, the FEC920 provides revenue grade thermal energy measurements and can connect to any building management system.

**Seamless Integration**
The FEC920 Thermal Energy Meter can be incorporated into nearly any flow system at use in your building. For new applications, Siemens can design a reliable and cost-effective energy monitoring solution with our extensive line of flow and temperature sensors. In areas with difficult space constraints or previously installed meters, the FEC920 easily collects data in a centralized location from any combination of disparate flow systems.

**Diverse Applications**
The SITRANS FEC920 is the ideal solution for measuring thermal energy in a wide range of applications, including:

- Sub-metering for universities, Industrial HVAC systems
- Energy billing in residential buildings
- Chilled or hot water plants in corporate complexes, hospitals, shopping malls, airports, and more!

**Ease of Use**
The SITRANS FEC920 is built and configured to your system's specifications, making setup and use simple. The thermal energy calculator provides the ability to read thermal energy measurements on the local graphical display or via any building management system. Whether locally or remotely, you can monitor Volumetric Flow rate, Differential Temperature, Heat Energy Rate, Total Heat Energy, Cooling Energy Rate, and Total Cooling Energy to give you greater control over your heating and cooling systems.

**Versatility**
The FEC920 can accept inputs from any flow meter, whether they're electromagnetic, turbine, vortex, clamp-on sensor, or a combination of installed technologies. The ability to measure flow from multiple technologies means you get the best measurements for the application.

## Measuring everything that matters:

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Siemens Process Instrumentation offers best-in-class measurement and seamless integration into your automation system. We are the total solution provider for flow, level, pressure, temperature, weighing, positioners and more.

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Order No. PIBR-00052-1023