



FLOW MONITORING IN PIPES JUST GOT HIGH-TECH

SITRANS FS290 portable clamp-on flow meter test kit

The next generation of digital flow meter systems

www.usa.siemens.com/sitransfs290

SIEMENS

Flow measurements during ongoing operation: **easy, versatile, precise, cost-effective**

The SITRANS FS290 is a portable ultrasonic flow meter system for remote monitoring of volumetric flow in pipes. The system is made up of the SITRANS FST090 battery-operated transmitter and SITRANS FSS220 clamp-on transducers. The transducers are installed quickly and easily on the outside of a pipe – without any process interruptions or plant downtime.



How does it work?

Each measuring path is formed by two coordinated transducers that transmit ultrasonic signals back and forth through the pipe. Using the transmit and receive time difference between the two signals, caused by the flow in the pipe slowing the transit time against the flow and accelerating the time with the flow, the transmitter calculates the resulting flow measurement.

The transmitter performs analog signal processing for the transducers pair and digitalizes the generated measurements for display. The data measured can be recorded on the on board micro SD storage card. Data output can be user-defined or take place via either analog signal or Modbus RTU.

Users can install clamp-on transducers on the pipe during ongoing operation, which means the pipe is not disturbed and the flow does not need to be stopped, for installation or service.





SITRANS FST090 transmitter specifications

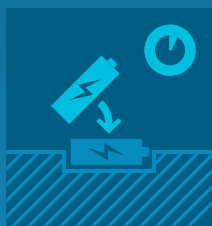


Application and specifications

Nearly every type of pipe composed of all sorts of materials – is easy for the FS290 to adapt to. The only exceptions? Cement pipes and special plastic composite pipes, due to their physical properties. Interior pipe coatings and liners are stored in the meter and are factored into the device's input.

SITRANS FS290 nominal temperature range is -40°F to +248°F, Siemens also offers high-temperature transducers up to a maximum of +446°F for more extreme applications. To simplify media selection, the transmitter provides a liquid table with all common material data. This makes it easy to select the relevant data, which can then be quickly integrated.

SITRANS FS290 is not suitable for gases, steam, or inhomogeneous liquids.



Enclosure/rating	Weather-resistant, rugged plastic case, IP67, NEMA 4X-certified
Dimensions	L 12.61 in x W 9.64 in x H 6.91 in
Weight with spare battery	8.82 lb
Ambient conditions	Operation 14°F to 140°F
Power supply	External power supply unit 100–240 Vac input / 24 Vdc output, 10 W (PSU, 1 battery, and charger included in scope of delivery)
External charger	Fast-charging feature, battery charging time: 4.5 hours
Battery operation	Lithium-ion battery (99 Wh), 24 V DC up to 24 hours, possible to hot swap batteries without interrupting measurement
Certification	UL, ULc, CE
Input/display	4 pushbuttons, illuminated graphical display, 240 x 160 pixels
Language options	Switchable, 14 languages (english, german, italian, french, spanish, portuguese, danish, swedish, finnish, dutch, chinese, japanese, russian, polish)
Programming	Wizards menu, free input, 50 measuring points can be saved
Inputs/outputs	Power/pulse/relay; via external connection box
Communication	Modbus RTU RS 485
USB service port	USB – SIMATIC PDM/internal storage
Internal storage	4 GB (up to 32 GB possible) for years of recordings
Diagnostics option	Loggers, alarms, and events, separated in table form
Transducers	FSS200 portable clamp-on transducers, compatible with older FUP1010 transducers
PVC sensor cable	Length 20 ft/50 ft with plug-in connector



SITRANS FST090 transmitter: **easy, flexible, versatile, practical**

The SITRANS FST090 transmitter is the successor to highly popular SITRANS FUP1010 that is a globally proven design. In combination with the SITRANS FSS200 clamp-on transducers, this go anywhere flow meter is capable of overcoming almost any flow measurement challenge.



High tech reduces measurement errors to under 0.15%

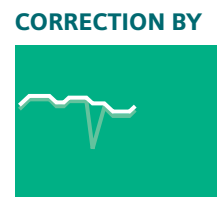
The technology of SITRANS FST090 is based on the SITRANS FST030 high-end transmitter. The device immediately digitalizes acquired analog measurements, enabling real-time signal processing and diagnosis. SITRANS FST090's electronics were developed to reduce transmitter errors to less than 0.15% under ideal measuring conditions, the device will reliably deliver 1.0% measuring accuracy in typical field applications.

Measurement errors by ultrasonic flow meters are often 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 physically detect. For portable applications, the FS290 comes equipped with the Siemens patented pipeline anomaly tool that helps improve measuring accuracy, by compensating for less than optimal installation environments.

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 FST090 can be programmed via USB interface, using the proven Siemens Process Device Manager (PDM) software.

LESS THAN
0.15%
MEASUREMENT
ERRORS



CORRECTION BY
ANOMALY
TOOL

≥24 HRS.
BATTERY
OPERATION

Decades of precision: **SITRANS FSS200 ultrasonic** **clamp-on transducers**

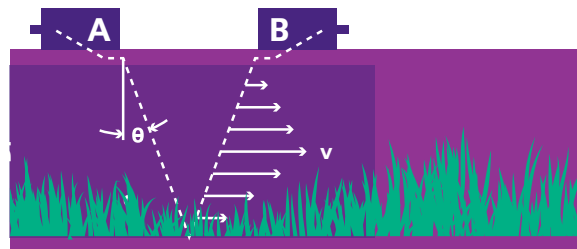
The SITRANS FSS200 family includes all transducers with clamp-on technology. For portable applications, universal transducers are recommended. Why? They're designed for a wide range of applications with simple accuracy requirements.

Large bandwidth for professional use

Clamp-on transducers from Siemens have often stood the test of time. Decades, in fact. Basic transducers in sizes B3, C3, and D3 cover all applications from pipe diameters 0.79 inches to 24 inches. A2 transducers are used for very small pipes, whereas E2 transducers are suitable for all pipe sizes above 24 inches.

No tools are required for installation and connection. Just attach the portable SITRANS FSS200 transducers using tension chains and then easily power them up using a quick-release connector. Older Siemens/Controlotron transducers are also compatible with SITRANS FST090. While clamp-on transducers are usually installed in reflect mode, under harsh conditions, it may be desirable to install them in direct mode, or opposite one another.

Ultrasonic transducers transmit and receive acoustic signals directly through the existing pipe wall, where the angle of refraction into the fluid is subject to Snell's law of refraction. The device thus individually calculates the best sensor distance.



Reflect mode

c = speed of sound in the fluid

v = flow velocity

$Re = Di \cdot v / \text{visc } Q = K(Re) \cdot (\pi / 4 \cdot Di^2) \cdot v$

Data, figures, facts: Important information at a glance

Sensor table

MLFB no.	FSS200 sensor model and size	Portable	Pipe material	Pipe diameter	Temperature
7ME3951-0LB00	Uni, portable, size A2	✓	✓	0.50 in to 1.9685 in	-40°F to +249.8°F
7ME3951-0LC00*	Uni, portable, size B3	✓	✓	0.7480 in to 5.0 in	-40°F to +249.8°F
7ME3951-0LD00*	Uni, portable, size C3	✓	✓	2.0079 in to 12.0079 in	-40°F to +249.8°F
7ME3951-0LE00*	Uni, portable, size D3	✓	✓	7.9921 in to 23.6614 in	-40°F to +249.8°F
7ME3951-0LF00	Uni, portable, size E2	✓	✓	11.9685 in to over 2362.205 in	-40°F to +249.8°F

* Basic sensor sizes

Optional: High-temperature transducers up to 446°F, high-precision transducers for wall thicknesses from 0.0394 in to 1.3780 in

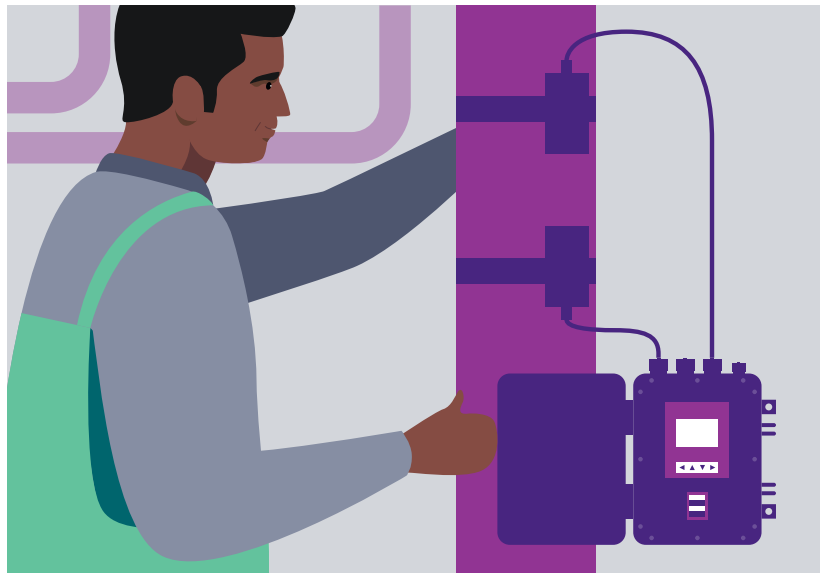
Easy sensor installation and typical applications

The transmitter specifies the transducers' optimal position on the pipe. Transducers can be installed quickly and easily without tools. SITRANS FS290's properties make it ideal for all types of flow meter applications.

SITRANS FST090 calculates the optimal transducer spacing based on raw material, size, and wall thickness, while also taking into account the liquid to be measured. The distance is specified as an Ltn value and as an index value from a reference point. The Ltn value makes it possible to precisely monitor the distance between the transducers.

Mounting rails are ideal for the small sensor sizes A and B and mounting frames with spacers are suitable for the larger sensor sizes C, D, and E. Both rails and frames can be easily attached to the pipe without tools using tension chains. The transducers are always optimally positioned for every possible condition. The correct sensor spacing is based on calculated index points, and the transducers are then clamped on at exactly these points. There's no need to measure the sensor spacing on the pipe to achieve the best possible signal, as the spacing ruler supplied as standard helps with alignment and specifies the index spacing.

Magnetic frames are universally usable for all size C, D, and E transducers. Rare earth magnets ensure a strong hold on steel pipes. Use on plastic pipes is also possible, although this requires tension bands. A special spacing bar makes it easy to position the transducers.



Typical applications

SITRANS FS290 is often used for temporary monitoring in the areas of water supply and wastewater disposal. This makes it possible to monitor cooling and hot water, reference quantities, and leaks. A typical example is monitoring and testing fire prevention systems and other emergency facilities. Check metering, which is the periodic checking of installed meters, then becomes extremely simple. The portable meter also proves its versatility in cases where it provides temporary measurements for stationary meters that have been removed for repair or calibration. In fact, SITRANS FS290 can be used virtually anywhere that flows occur.



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Order No. PIBR-B10212-1222
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