



FLOW MONITORING IN PIPES JUST GOT HIGH-TECH

SITRANS FS290

clamp-on test kit

The next generation of digital flowmeter systems
[siemens.com/sitransfs290](https://www.siemens.com/sitransfs290)

SIEMENS

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

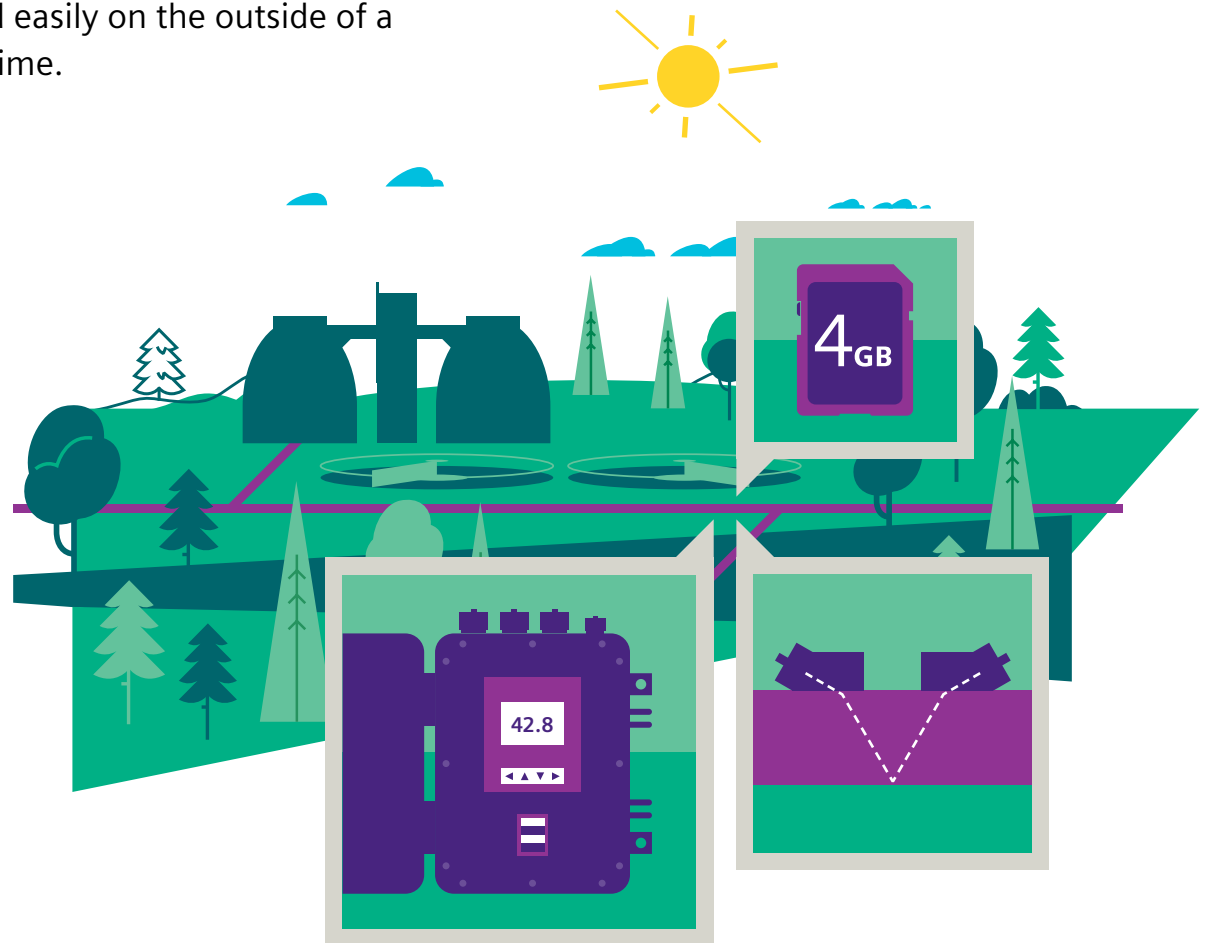
SITRANS FS290 is a portable ultrasonic flowmeter system for monitoring volumetric flow in pipes. It contains the SITRANS FST090 battery-operated transmitter and SITRANS FSS220 clamp-on sensors. Install the sensors quickly and easily on the outside of a pipe – without any process interruptions or plant downtime.

How does it work?

Each measuring path is formed by two coordinated sensors that transmit ultrasonic signals back and forth through the pipe. Using the time difference between the two signals, the transmitter calculates the resulting measurement.

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

Users can install clamp-on sensors on the pipe during ongoing operation, which means the pipe is not cut open and the flow does not need to be stopped.



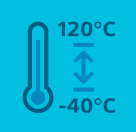
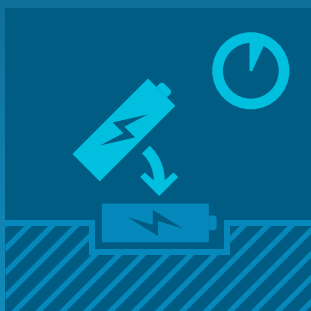


Application and specifications

Nearly every type of pipe composed of all sorts of materials – the flowmeter can handle it. 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 measures flow on virtually all pipe diameters starting from DN10, with a maximum pipe wall thickness of up to 35 mm (1.38 in). While the recommended temperature range is -40 °C (-40°F) to 120 °C (+248°F), Siemens also offers high-temperature sensors up to a maximum of 230 °C (+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.



SITRANS FST090 transmitter specifications

Enclosure/rating	Weather-resistant, rugged plastic case, IP67, NEMA 4X-certified
Dimensions	L 320,4 mm x B 244,8 mm x H 175,4 mm L 12.61 in x W 9.64 in x H 6.91 in
Weight with spare battery	4kg (8.82 lb)
Ambient conditions	-10 °C ... +60 °C / 14°F to 140°F
Power supply	External power supply unit 100–240 V DC/24 V DC, 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), 14.4 V DC up to 24 hours, possible to change battery 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, 10 measuring points can be saved
Inputs/outputs	Power/pulse/relay; via external connection box
Communication	Modbus RTU
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
Sensors	FSS200 portable clamp-on sensors
PVC sensor cable	Length 6m to 15m (20 ft to 50 ft) with plug-in connector



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

The SITRANS FST090 transmitter is the successor to SITRANS FUP1010 in a globally proven design. In combination with the SITRANS FSS200 clamp-on sensors, it's capable of overcoming almost any challenge.



High tech reduces measurement errors to under 0.25%

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 below 0.25% under ideal measuring conditions, but the device reliably delivers 1% measuring accuracy in normal use.

Measurement errors by ultrasonic flowmeters are often caused by anomalies in the infeed area. An insufficient distance from a 90° elbow or spatial bend (3D double bend) can lead to flow-profile problems that a clamp-on flowmeter can't physically detect. For portable applications, the patented anomaly tool helps improve measuring accuracy.

Long battery life, simple battery replacement

Improved energy management enables at least twelve hours of battery operation at full capacity. Replacing the battery during ongoing operation? No problem. As an ideal supplement to existing, stationary measurements, SITRANS FST090 can also be programmed via USB interface using the proven Siemens Process Device Manager (PDM) software and integrated in the control system.

LESS THAN
0.25 %
MEASUREMENT
ERRORS

CORRECTION BY



**ANOMALY
TOOL**

**≥24 HRS.
BATTERY
OPERATION**

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

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

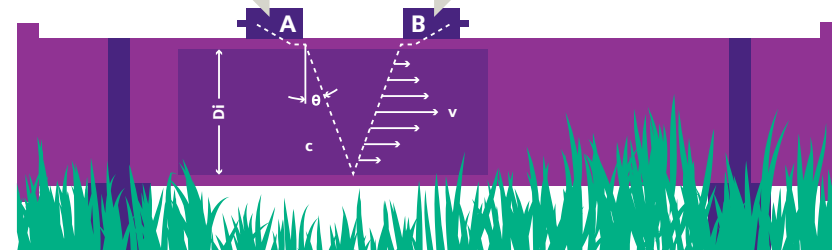
Large bandwidth for professional use

Clamp-on sensors from Siemens have often stood the test of time. Decades, in fact. Basic sensors in sizes B3, C3, and D3 cover all applications from DN 20 to DN 600. A2 sensors are used for very small pipes, whereas E2 sensors are suitable for all pipe sizes above DN 600. However, monitoring of wide beam sensors in stationary systems is also possible for maximum measuring accuracy.

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



Ultrasonic sensors 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-OLB00	Uni, portable, size A2	✓	✓	12,7 mm to 50 mm 0.50 in to 2 in	-40 °C to +121 °C -40°F to +250°F
7ME3951-OLC00*	Uni, portable, size B3	✓	✓	19 mm to 127mm 0.75 in to 5 in	-40 °C to +121 °C -40°F to +250°F
7ME3951-OLD00*	Uni, portable, size C3	✓	✓	51 mm to 305 mm 2 in to 12 in	-40 °C to +121 °C -40°F to +250°F
7ME3951-OLE00*	Uni, portable, size D3	✓	✓	203 mm to 610 mm 8 in to 24 in	-40 °C to +121 °C -40°F to +250°F
7ME3951-OLF00	Uni, portable, size E2	✓	✓	304 mm to over 6.000 mm 12 in to 2362 in	-40 °C to +121 °C -40°F to +250°F

* Basic sensor sizes

Optional: High-temperature sensors up to 230 °C (446°F), high-precision sensors for wall thicknesses from 1 mm (0.039 in) to 35 mm (1.38 in)

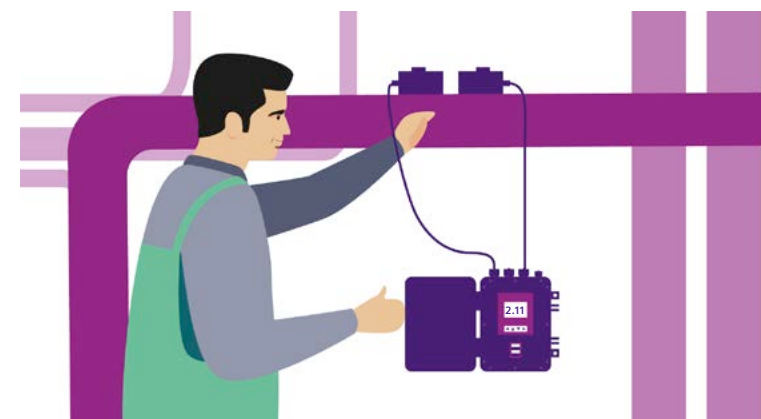
Easy sensor installation and typical applications

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

SITRANS FST090 calculates the optimal sensor 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 sensors.

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 sensors are always optimally positioned for every possible condition. The correct sensor spacing is based on calculated index points, and the sensors 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 sensors. Super 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 sensors.



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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