

ABB MEASUREMENT & ANALYTICS

# FSM4000

## The electromagnetic flowmeter of choice

For critical applications in a wide range of industries



# Electromagnetic flow measurement with the FSM4000 made in ABB

## Your application easily mastered

### Volume flow measurement for conductive fluids

The FSM4000 is a real all-rounder. It is the perfect choice for flow measurement in both basic and highly demanding applications, in a whole range of industries – whether your measurements involve solid-loaded liquids, low conductivity fluids, pulsating flows, or other inhomogeneous materials.

## The FSM4000 at a glance

### Easiest installation, commissioning and maintenance

- Parameters can all be entered quickly and easily thanks to the Easy Set-up feature
- Data may be entered via keys at the open device or via magnet sensors with the housing closed
- The FSM4000 enables you to carry out a wide variety of function tests and simulation routines to ensure successful commissioning

### Modular platform design

- A flexible process connection concept ensures that the flowmeter sensor can be easily installed in pipelines
- The universal transmitter may be connected to any flowmeter sensor in the product line

### Outstanding availability

- With the transmitter's backwards compatibility with flowmeter sensors that have been in use for over 25 years, money and storage space can be saved while performance is improved
- Transmitters can be replaced rapidly without the need for reconfiguration using FRAM technology

### Optimized signal processing

- Ideally suited to processes that change rapidly and require fast response times or short-term dosing, thanks to the use of AC field technology in combination with the latest Digital Signal Processor (DSP) technology

### Comprehensive diagnostic functions

- Extended diagnostic functions and self-monitoring facility due to an integrated diagnostics tool
- Early detection of changes affecting the application
- Cyclical acquisition of electrode circuit and coil circuit parameters using an integrated data logger. A fingerprint database enables evaluations to be made with respect to quality and deviations from the initial calibration process
- A sustained level of product quality is ensured thanks to quality-assurance evaluations of the diagnostics data
- Parameters for the diagnostic functions are set directly on the transmitter or using a Device Type Manager (DTM)
- Statistical evaluations can be carried out using calculation software

### Communication

- HART protocol, PROFIBUS PA, and FOUNDATION Fieldbus
- Bus addresses can be set using DIP switches, even without power supply
- Freely programmable current output (active) and pulse output (active / passive)

- 01 Transmitter S4
- 02 Sensor SE41F with aluminium housing
- 03 Sensor types SE21 with stainless steel housing

### Transmitter S4

- Accuracy  $\leq 0.5\%$  from measured value (> DN 2) in conjunction with flowmeter sensor SE21 / SE41F
- A universal transmitter for any flow sensor in the range
- Ambient temperature -25 to 60 °C
- IP 67 ingress protection
- Freely configurable contact inputs and outputs
- Current output conforms to NAMUR NE43
- Pulse output (active / passive)
- Supply power: 100 to 230 V AC, 50 / 60 Hz; 24 V AC / DC



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### Flowmeter sensor SE41F

- Flange connection DN 3 to DN 1000 in accordance with DIN or ASME, and others on request
- Standardized installation length, DVGW-ISO 4064 short or ISO 13359, VDE / VDI 2641
- Fluid temperature -25 to 130 °C / 180 °C
- IP 67 / 68 ingress protection
- Ambient temperature -25 ° to 60 °C
- Linings: PFA, PTFE, hard rubber, soft rubber, ceramic carbide; others available on request



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### Flowmeter sensor SE21

- Sensor made entirely from stainless steel
- DN 1 to DN 100 with the following connection types: wafer, threaded pipe connection, weld stubs, Tri-Clamp, external thread, and hygiene connections
- Fluid temperature -25 to 130 °C
- IP67 / 68 ingress protection
- Ambient temperature -25 to 60 °C
- Lining: PFA, PEEK, Torlon
- Certificates for hygienic applications: FDA, 3A



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## Did you know?

ABB is a leader in power and automation technologies. We enable you to improve performance and use power efficiently. Increasing efficiency and saving energy starts with highly accurate measurement of process parameters. The FSM4000 by ABB creates the ideal conditions for acquiring accurate raw materials data thanks to its volume flow measurement facility. That's how the FSM4000 can help you achieve lasting success, by increasing efficiency and conserving resources.

# Electromagnetic flow measurement with the FSM4000 made in ABB

01 Typical noise spectrum of a solid-loaded liquid

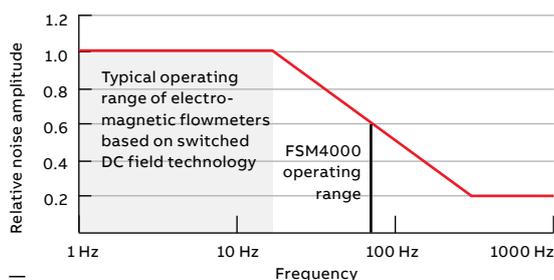
02 Comparison of switched DC field and AC field technology

03 FSM4000 for pulp and paper solutions

04 Installed flowmeter sensor

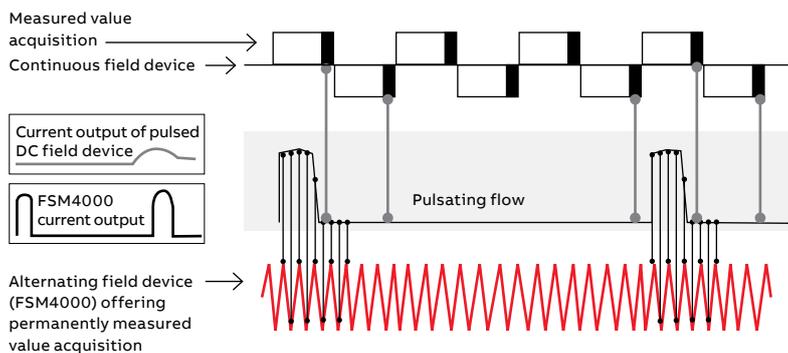
## The benefits of AC field technology

By harnessing the power of AC field technology, the FSM4000 operates with a field frequency that is around ten times higher than what is offered by an electromagnetic flowmeter using pulsed DC field technology. Together with this high field frequency, special digital filters ensure that the FSM4000 is only affected by process noise within an extremely small range.



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Using the example of a noise spectrum for a solid-loaded liquid, the figure shows the extremely small range in which the FSM4000 can be affected by process noise. The highest proportion of process noise occurs in the low-frequency range, which reaches up to approximately 15 Hz. Electromagnetic flowmeters based on pulsed DC field technology operate within this frequency range, meaning that the FSM4000 is ideally suited to flow measurement for solid-loaded liquids and ensures an output signal without any interference.



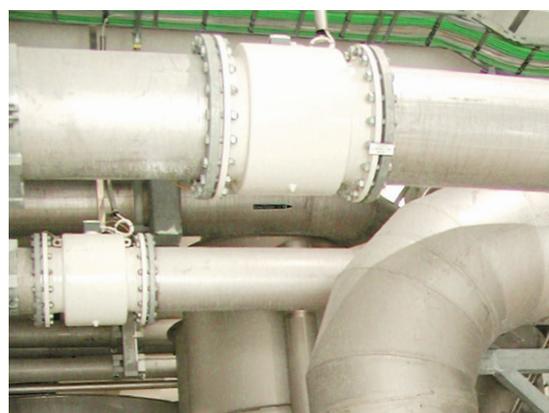
02

In offering nearly uninterrupted sampling of the flow signal, AC field technology is extremely well suited to measure pulsating flow, generated by piston pumps, diaphragm pumps or hose pumps. Flowmeters working with DC field technology can only acquire pulsating flow data intermittently.

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05 Ceramic carbide lining

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06 'Swedish design'  
electrode

## Your paper and pulp-processing applications easily mastered

The FSM4000 is the premier choice for basic and highly demanding applications alike, measuring not only pulp stock concentrations of up to 15 % (oven-dry), but also high levels of impurities (such as shards of glass and plastic particles) found when measuring reject materials and in closed water cycles. By providing an undammed, noise-free output signal at the heat box, the FSM4000 ensures that basis weight control systems keep on running without encountering any problems.

### Industry-specific solutions

- **Black liquor**

The system used may lead to vacuum shocks arising in the pipeline. The FSM4000, featuring a vacuum-proof PFA lining, offers the ideal solution to this issue. As an option, the device can be obtained in a version designed for high-temperature applications (up to 180 °C).

- **Material mixtures**

#### in the medium-consistency range

The FSM4000 is the ideal solution for materials to which larger quantities of auxiliary materials have been added, as well as for measuring rejected materials with abrasive properties. To increase its service life, the device can be fitted with a special ceramic lining (ceramic carbide) that's highly robust and resistant to abrasion.



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- **Pulp mixtures with resin content**

The self-cleaning 'Swedish design' electrodes in the FSM4000 prevent resin content from being deposited on the surface of the signal electrodes and enable decoupling of the measuring signal.



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- **Prevention of cotton balling**

Designed with measuring the paper / water mixture in the constant part of the paper machine in mind, ABB provides a special, seamlessly integratable version of the flowmeter sensor that stops the build-up of cotton balling in fibrous material – not only preventing tears in the paper web, but also ensuring utmost paper quality.

# Electromagnetic flow measurement with the FSM4000 made in ABB

— 01 Different hygienic process connections

— 02 Process connection in detail

— 03 FSM4000 for food and beverage solutions

— 04 Installation of transmitter S4

## Your food and beverage applications easily mastered

The FSM4000 is the perfect solution in the food and beverage industry. Including the measurement of fruit content in mixture control systems, measurements of concentrate with low conductivity levels, mash, yogurt with cereals, liquid sugar, and pulsating flows, the applications found in this industry are demanding. ABB's precise flowmeter technology, featuring high levels of signal stability, keeps system operation both reliable and efficient.

### Industry-specific solutions

- The FSM4000 features a variable process connection concept with a common flowmeter sensor, certified in accordance with FDA and 3A requirements
- Just one device is required for each nominal diameter, simplifying inventory stock
- Simple installation into the pipeline using variable connection adapters, ensuring the system offers the best possible availability even when service tasks need to be performed
- The metallic limit stop ensures a perfect fit for the gasket as well as a gap-free transition without leaving dead space in the adapter
- A leakage hole in the adapter, designed for checking the function of the gasket, helps maintain process safety
- The flowmeter sensor is suitable for in-line cleaning and CIP / SIP up to 150 °C, as well as featuring a vacuum-proof, robust PFA lining



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Leakage hole

Flat gasket

Adapter as an insert



— 02

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05 FSM4000 in  
mining application

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06 FSM4000 in  
water and wastewater  
applications

## Your mining applications easily mastered

Flow measurement in mining industry could be challenging. Slurries, chunks of rocks and gravel result in noisy flowsignals and are most abrasive. Corrosive liquids require chemical compatibility of the wetted parts within the flowmeter sensor. FSM4000's digital signal processing combined with most modern filtering technology result in a most stable flowsignal. Industry specific lining and electrode materials, ensure longest service life of the FSM4000.

### Industry-specific solutions

- Soft rubber liner, protection plates and an option for tungsten carbide coated measuring electrodes make FSM4000 extremely resistant to wear.
- A ceramic carbide liner is recommended for the FSM4000 in applications involving sludge with fine-grained content.

## Your water management applications easily mastered

The FSM4000 is the perfect choice.

### Industry-specific solutions

- The FSM4000 can provide reliable measurements for sludge containing up to 23 % dry substances (DS).
- Based on AC field excitation, the device's concept enables it to successfully rise to the challenge of measuring tasks involving pulsating conveying processes.
- Miniscule quantities of precipitating agents can be dosed at even extremely low flowrates (from 0.5 ml/s with DN 1).
- The device can also be used for measuring highly solid-loaded water in applications involving dredging rivers. Thanks to its special lining and dimensions that are perfectly matched to its applications, the FSM4000 offers not only an extremely long service life, but also precise, uninterrupted flow measurement.

### Trademarks

HART is a registered trademark of HART Communication Foundation  
PROFIBUS PA is a registered trademark of  
PROFIBUS & PROFINET International (PI)  
FOUNDATION Fieldbus is a registered trademark of  
FieldComm Group, Austin, Texas, USA

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**ABB Limited****Measurement & Analytics**

Howard Road, St. Neots  
Cambridgeshire, PE19 8EU, UK  
Tel: +44 (0) 870 600 6122  
Fax: +44 (0)1480 213 339  
Email: [enquires.mp.uk@gb.abb.com](mailto:enquires.mp.uk@gb.abb.com)

**ABB Inc.****Measurement & Analytics**

125 E. County Line Road  
Warminster, PA 18974, USA  
Tel: +1 215 674 6000  
Fax: +1 215 674 7183

**ABB Automation Products GmbH****Measurement & Analytics**

Dransfelder Str. 2  
37079 Göttingen, Germany  
Tel: +49 551 905 0  
Fax: +49 551 905 777  
Email: [vertrieb.messtechnik-produkte@de.abb.com](mailto:vertrieb.messtechnik-produkte@de.abb.com)

**[abb.com/measurement](http://abb.com/measurement)**