



Measurement & Analytics | Measurement made easy

# Flow measurement made easy A solution for every application

Power and productivity  
for a better world™



# Expertise in technology

## More than a century of experience

To operate any process efficiently, it is essential to measure, control, actuate and record. With ABB's measurement and analytics products and solutions, you receive the best technology combined with the most reliable products available on the market.

ABB offers a broad range of life cycle services for optimum product performance. A global network of measurement product specialists delivers local service and support.

Research and development is a vital source of ABB's technology leadership. It builds on the foundation of existing technologies for new applications, and continues to develop the breakthrough technologies needed to meet future challenges.

ABB and its heritage companies have been leaders in innovation and technology for more than 100 years.

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MEASUREMENT & CONTROL SYSTEMS

# ABB Measurement & Analytics

## Your global partner

### World-class measurement solutions

ABB measurement and analytics products provide world-class measurement solutions for any industry, utility or municipality. Latest innovations deliver technological solutions to make it easier for you to run your plant. ABB's measurement and analytics products are based on common technology, providing a common look and feel and method of operation. This results in products, that are easy to configure, easy to integrate, and easy to maintain.

For more information please visit:  
[www.abb.com/measurement](http://www.abb.com/measurement)

### ABB's measurement and analytics products portfolio:

- Analytical measurement
- Flow measurement
- Natural gas measurement
- Valve automation
- Pressure measurement
- Temperature measurement
- Recorders and controllers
- Level measurement
- Device management
- Force measurement
- Service

1 Water and waste water | 2 Power and industrial steam | 3 Chemical and petrochemical | 4 Oil and gas | 5 Pulp and paper | 6 Minerals | 7 Metals | 8 Food and beverage | 9 Marine



# Flow measurement expertise

## Making measurement easy

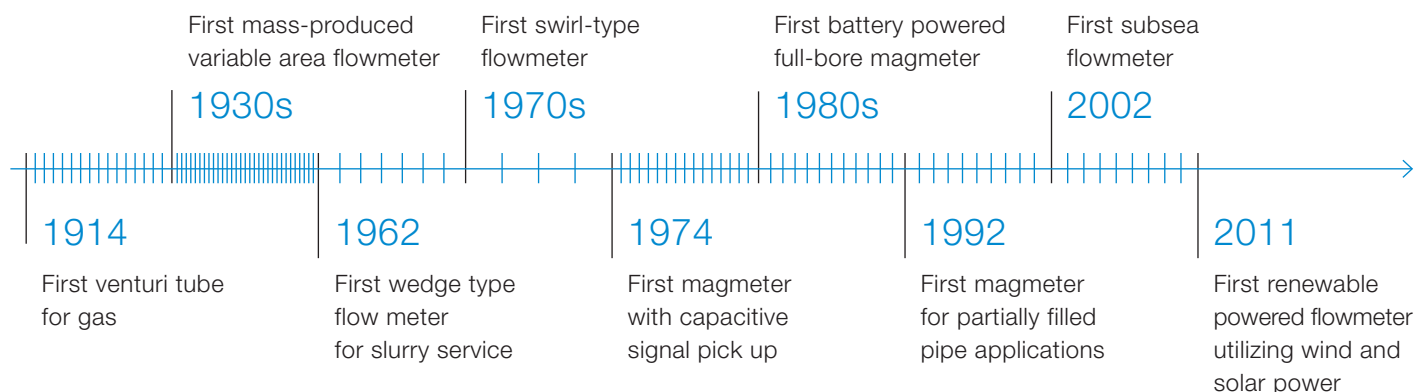
For more than 100 years, ABB's flow measurement products deliver reliability, accuracy, repeatability and easy maintenance to customers worldwide.

Getting the best levels of efficiency and performance from your production process requires reliable, accurate flow measurement. Choosing ABB flow measurement solutions for your application means to decide for high-quality measurement. ABB offers one of the world's largest and most innovative product ranges, unrivalled in its breadth and scope.

A common HMI platform (human machine interface platform) enables you to easily configure, integrate and maintain ABB measurement products.

For more information please visit [www.abb.com/flow](http://www.abb.com/flow)

### Some of ABB's innovations in flow measurement



# Flowmeters for liquids, gases and steam

## A quick application guide

Application, product features	Electro-magnetic	Vortex/Swirl	Thermal mass	Coriolis mass	Variable area	Differential pressure	Flow computers
<b>Liquids</b>							
Conductive	•	•		•	•	•	
Non-conductive		•		•	•	•	
Solids content	•			•	•	•	
Pulsating	•			•	•		
Viscosity > 10 cSt	•	•		•		•	
<b>Liquid calculations</b>				•			•
Custody liquid measurement	•			•			•
Gas/oil well optimization							•
<b>Gases</b>							
Dry/clean		•	•	•	•	•	
Moist		•	•	•	•	•	
Corrosive				•		•	
Contaminated		•	•	•	•	•	
<b>Gas calculations</b>		•					•
Custody gas measurement				•			•
<b>Steam*</b>		•		•	•	•	•
<b>Fluid temperature</b>	-40...180 °C -40...356 °F	-55...400 °C -67...752 °F	-25...300 °C -13...572 °F	-50...205 °C -58...401 °F	-20...400 °C -4...752 °F	-50...500 °C -58...932 °F	
<b>Ambient temperature</b>	-40...60 °C -40...140 °F	-40...85 °C -40...185 °F	-25...70 °C -13...158 °F	-40...70 °C -40...158 °F	-25...60 °C -13...140 °F	-40...85 °C -40...185 °F	-40...60 °C -40...140 °F
<b>Accuracy</b>	0.2% of rate	0.5% of rate	1% of rate	0.1% of rate 1 g/l	1.6 per VDI/VDE 3513	0.7% of max.	0.075% of DP/SP span Flow-X: 0.002%
<b>Partially filled pipelines</b>	•						
<b>Nominal diameter</b>	DN 1...2400 [1/25...96"]	DN 15...400 [1/2...16"]	DN 25...3000 [1...120"]	DN 1.5...150 [1/16...6"]	DN 15...100 [1/2...4"]	DN 15...8000 [1/2...320"]	
<b>Typical up-/ downstream sections</b>	3D/2D	15D/5D 3D/2D	15D/5D	OD/OD	OD/OD	10D/4D	
<b>Standard pressure ratings</b>	PN 10...250 CL 150...2500 JIS 7.5...20K	PN 10...64 CL 150 CL 300	PN 40 CL 150 CL 300	PN 16...100 CL 150...600 JIS 5...20K	PN 16...100 CL 150...600	PN 10...400 CL 150...2500	
<b>Hygienic/sterile certifications</b>	EHEDG 3A, FDA		CIP/SIP	EHEDG FDA			
<b>Certified calibrations</b>	•	•	•	•	•	•	•
<b>Ex-approvals</b>	ATEX, IEC FM, CSA NEPSI, GOST	ATEX, FM CSA NEPSI, GOST	ATEX, FM CSA GOST	IECEX, ATEX cFMus, NEPSI GOST	ATEX, FM CSA	ATEX, FM CSA	ATEX CSA IEC, UI, FM
<b>Communication</b>	FF, HART PA	FF, HART, PA	HART, DPV1	HART, PA FF MODBUS	HART	FF, HART PA	Totalflow, Serial MODBUS TCP/IP, HART

\* e.g. saturated steam, superheated steam

### Selection and sizing made easy

ABB provides an excellent tool for selection and sizing of flow meters – including quick and simple flow calculation and a unique feature to compare different flow technologies.

### The Product Selection Assistant (PSA) | Flow

The tool is available online or offline, to give a freedom of choice for various user groups. Find out more at [www.abb.com/flow-selector](http://www.abb.com/flow-selector)



# Global availability

## A partner to rely on, wherever you are



ABB's calibration facilities are available around the world



Providing recalibration service and fast response times

Did you know that ABB is manufacturing in your area? This leads to quick response times and enables market leading delivery times. ABB focusses on your local needs in terms of certifications by local approval agencies for electrical, mechanical, operating environment, and calibration certifications.

ABB has flowmeter calibration facilities located in Australia, China, Germany, India, the UK and the USA. The wet calibration rigs are built in accordance with ISO standards and certified to meet key international standards bodies, such as SIMT, UKAS, NIST, DAkkS, NVLAP and NATA. The ABB flow calibration certification laboratories are recognized by the International Laboratory Accreditation Cooperation (ILAC). The flow rigs are some of the largest in the world based on their constant flow capability.

Looking for a service partner to support you during the entire product lifecycle? ABB offers you reliable service and support from planning, commissioning and training to after sales service.

# Information whenever you need it

## Easy device management and industry standard communication protocols

ABB's instrumentation devices feature the latest in onboard diagnostics and intelligence to help you run your business more effectively. Just as important, ABB gives you the choice to decide which communication protocols you want to use to access this information. You can choose from a family of tools and from different ways to manage the lifecycle of the devices in order to get the most out of your investment.

### ABB's device management product range includes

- Fieldbus and wireless solutions
- Handheld terminals
- Device management software Asset Vision



# Electromagnetic flow measurement For the process industry

ProcessMaster: for efficient plant operation and constant product quality

The first choice for demanding process industry applications. ProcessMaster electromagnetic flowmeter is tough, reliable, and incredibly easy to work with. It helps save resources at every stage of the lifecycle.

## The solution

It offers the industry's widest range of liners, electrodes and sizes to meet the needs of even the most demanding process applications. The powerful transmitter is easy to use and provides the output signal that meets your needs. With ProcessMaster you get a versatile, reasonably priced, most accurate flow meter tailored for your applications.



FSM4000: your robust flowmeter for conductive fluids in heavy duty applications

It masters your critical applications and conserves valuable resources with highly accurate measurement of process parameters in a wide range of industries.

## The solution

FSM4000 provides a highly stable output signal in challenging applications such as slurries within the mining industry – even with large pieces of rock. Its measurement performance is unsurpassed in applications with – high content of solids (e.g. pulp stock in pulp and paper industry), – pulsating flows or – any other high signal noise application.







## HygienicMaster: your first choice for demanding hygienic applications

It provides best levels of performance, flexibility and control in the most demanding hygienic applications, resulting in better product quality and highest reliability.

### The solution

HygienicMaster is designed specifically for the food and beverage, pharmaceutical and biotechnology industries. Manufactured from FDA approved materials and certified in accordance with EHEDG and 3A, HygienicMaster sets a benchmark. The sensor is fully CIP/SIP cleanable. Variable process connections simplify installation and reduce inventory as well as replacement costs.



### General specifications

Product	ProcessMaster	FSM4000	HygienicMaster
Nominal diameter	DN 3...DN 2000 (1/10...80")	DN 3...DN 000 (1/10...40")	DN 1...DN 100 (1/25...4")
Nominal pressure	PN 10...PN 100, CI 150...CI 2500	PN 10...PN 40, CI 150...CI 300	PN 10...PN 40, CI 150...CI 300
Process connection	Flanges in accordance with DIN/EN, ASME, JIS and others		Weld stubs, threaded pipe connections, Tri-Clamps, wafer-type, flanges in accordance with DIN/EN, ASME, JIS
Lining	Hard rubber, soft rubber, PTFE, PFA, ETFE		PFA, vacuum stable
Protection class	IP 67 or IP 68	IP 67 or IP 68	IP 67 or IP 68
Fluid temperature	Up to 180 °C (356 °F)	Up to 180 °C (356 °F)	Up to 180 °C (356 °F)
Ex approvals	ATEX, IEC zone 1 and zone 2, FM, CSA Div 1 and Div 2, NEPSI zone 1 and zone 2, GOST	–	ATEX, IEC zone 1 and zone 2, FM, CSA Div 1 and Div 2, NEPSI zone 1 and zone 2, GOST
Certificates	–	–	3A, EHEDG, FDA approved materials
Inputs/outputs	Analog output (4...20 mA), pulse output, contact input/output		
Communication	HART protocol (standard), PROFIBUS PA, FOUNDATION Fieldbus		
Verification tool	ScanMaster software	–	ScanMaster software

# Electromagnetic flow measurement For the water industry

WaterMaster enables easy flow measurement for water industry applications

It sets the standard for water, wastewater, sewage and effluent flow measurement and management. WaterMaster helps to efficiently manage precious water resources by accurately measuring water volumes consumed from production processes.

## The solution

The modular design concept offers flexibility and reliability while providing a long service life and exceptionally low maintenance costs. WaterMaster's self-monitoring and diagnostic functions increase the plant availability and reduce downtime. The flowmeter is accurate and easy to use, offering in-situ verification as well as advanced self-calibration.



AquaMaster: For billing, survey and leak detection in remote locations

Providing economic and reliable water measurement, it saves energy and cost, naturally. It is a direct result of ABB's worldwide experience in the water industry and targeted at resolving environmental and industry specific requirements.

## The solution

The AquaMaster is designed specifically for clean water applications. Its versatile power management options, 5-year battery or energy efficient wind and solar power, allow it to be placed remotely in the field; it can be buried and flooded. It measures flow and pressure accurately, provides logged data and can communicate remotely. AquaMaster is the perfect tool for irrigation, abstraction, distribution and revenue metering.





## AquaProbe: The flowmeter for probe-based in-situ flow measurement

Maximum performance with easy, low-cost installation. Whatever the location or installation requirements, AquaProbe provides a cost-effective insertion flowmeter solution. Both the FEA200 flow sensor and the transmitter are fully submersible, enabling installation in flooded chambers.

### The solution

AquaProbe is an insertion type electromagnetic flowmeter; used as a permanent flow measurement solution or a portable survey tool. Assisting in the building of an accurate network model, locating leaks to check the operation of installed, full-bore meters. The sensor can be installed in pipelines without the need for major excavations or alterations to pipework.



### General specifications

Product	WaterMaster	AquaMaster	AquaProbe
Application	Water, waste water and sludge	Clean water	Clean water
Meter body style	Flanged	Flanged	1 in. BSP/1 in. NPT
Line sizes	10 to 2,400 mm (3/8 to 96 in.)	15 to 600 mm (1/2 to 24 in.)	200 to 8,000 mm (8 to 320 in.) nominal bore
Flow ranges	0...200,000 m <sup>3</sup> /h	0...7,875 m <sup>3</sup> /h	0...5 m/s (insertion size dependent)
Typical pressure loss	< 0 bar	< 0.63 bar	< 0.63 bar
Operating pressure	Nominal 16 bar	Nominal 16 bar	Nominal 16 bar, max. 20 bar
Accuracy	0.4% of rate standard or 0.2% optional	0.5% battery or 0.25% mains	± 2% of rate or ± 2 mm/s (± 0.08 in./s) whichever is the greater
Transmitter output	4...20 mA or 4...12/20 mA, galvanically isolated	Pulse output – 50 Hz maximum, 50% nominal duty cycle	Pulse output – 50 Hz maximum, 50% nominal duty cycle
Transmitter mounting	Remote/integral	Remote/integral	Remote
Agency approvals	OIML/MID/FM/ATEX/FMc/IECEX	OIML/MID	Drinking water (WRAS) approved
Digital communications	Profibus/HART/Modbus	SMS/GPRS	SMS/GPRS/Profibus/HART/Modbus
Power supply	Mains 85 to 265 V AC @ < 7 VA, DC 24 V ± 30% @ < 0.4 A	Battery/renewable/mains	Battery/renewable/mains
Wetted material	–	–	PEEK/stainless steel
Liner material	Elastomer/polypropylene/PTFE (size dependent)	Elastomer	PEEK
Electrode material	Stainless steel/Hastelloy C	Stainless steel	Stainless steel

# Coriolis mass flow measurement

## From accurate dosing of single drops to filling ocean-going tankers

CoriolisMaster flowmeters offer high precision and lowest pressure drop

They help you save on installation costs due to a compact design, and save on lifetime costs due to minimum pressure drop, no moving parts and no wear-out of wetted parts in most applications. Measure flow rate (mass and volume), density, temperature and concentration in one meter.

### The solution

The FCB400 is a general purpose mass flow meter for all industries, ideal for high precision filling and for process or well monitoring under tough conditions. Its wide variety of connections and software options allow flexibility for various applications. The FCB100 version is made for system integration, offering full access Modbus communication and fast pulse/frequency outputs.





## CoriolisMaster Hygienic flowmeter: mass flow measurement for hygienic applications

The CoriolisMaster Hygienic is a general purpose meter for hygienic applications where polished wetted materials are required: from high precision filling to process monitoring under tough conditions. Its certified cleanability enables safe use in all hygienic flow measurement applications.

### The solution

The CoriolisMaster FCH400 is one of the most cost saving meters on the market with minimal installation space requirements and lifetime costs. Plus it is suitable for hygienic applications. The CoriolisMaster FCH100 series is ideal for system integration with a simple to use transmitter interface.



# Coriolis mass flow measurement

## From accurate dosing of single drops to filling ocean-going tankers

Coriolis FCM2000 is your flowmeter for many industries and applications

The Coriolis FCM2000 MS2 meter series features a bent single tube meter, designed for very low flow rates. It can measure single drops of liquid with high precision.

The Coriolis FCM2000 MC2 meter's unique S-shape tube and modular design makes it the ideal instrument for tough measurement requirements.

### The solution

The MS2 series is a low flow meter for all industries and various applications. It is easy to install and offers unrivalled measurement performance. The MC2 series is a general purpose meter delivering excellent results under tough conditions such as fast changing fluids, proven in thousands of applications worldwide.



### General specifications sensors

Product	FCBxxx	FCHxxx	FCM2000 MC2/MS2
Application	O&G, chemicals, marine, P&P, power, ...	F&B and pharma	All industries
Sensor design	Bent twin tube sensor	Bent twin tube sensor	MC2: double bent twin tube sensor MS2: bent single tube meter
Meter sizes	15...150 mm (1/2"...6")	25...80 mm (1"...3")	MC2: 20...150 mm (3/4"...6") MS2: 1.5...6 mm (1/16"...1/4")
Flow ranges	0...860 t/h	0...250 t/h	MC2: 0...600 t/h   MS2: 0...1 t/h
Accuracy flow	FCBx30: 0.25% of measure value FCBx50: 0.1% of measured value	FCHx30: 0.25% of measure value FCHx50: 0.1% of measured value	MC2: 0.1% or measured value MS2: 0.15% or measured value
Accuracy density	FCBx30: 0.01 kg/m <sup>3</sup> FCBx50: up to 0.0005 kg/m <sup>3</sup>	FCx30: 0.01 kg/m <sup>3</sup> FCx50: up to 0.0005 kg/m <sup>3</sup>	MC2: 0.001 kg/m <sup>3</sup> MS2: 0.01 kg/m <sup>3</sup>
Wetted material	Stainless steel or Ni-Alloy	Stainless steel or Ni-Alloy	Stainless steel or Ni-Alloy

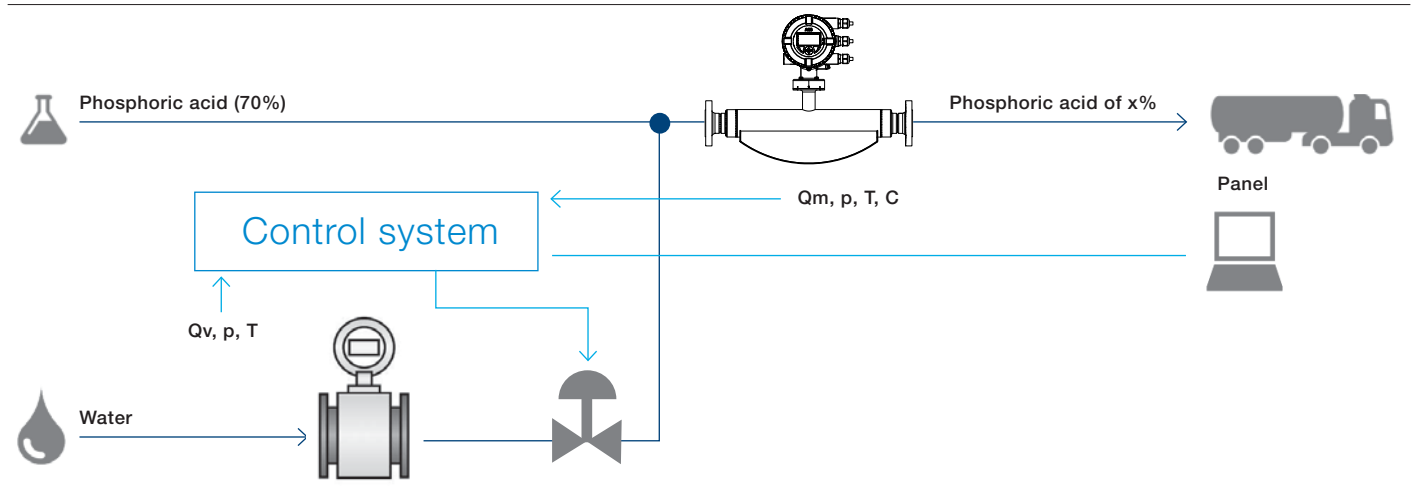
### General specifications electronics

Product	FCx400	FCx100	FCx300 and FCM2000 ME2
Transmitter output	Up to 5 modular I/O, freely selectable and adjustable, HART	MODBUS RS485, 2 digital outputs (pulse, frequency, contact)	2 x mA, 1 pulse, 1 digital out, 1 digital in HART, Profibus PA, FF
Display	Through the glass operation	No	Through the glass operation
Power supply	110...240 VAC or 11...30 VDC	11...30 VDC	110...240 VAC or 24 VAC
Special features	Diagnostics, verification (VeriMass) DensiMass concentration measurement FillMass batch software	Diagnostics, verification (VeriMass) DensiMass concentration measurement FillMass batch software	Diagnostics DensiMass concentration measurement



## Saving resources made easy – flowmeters in filling applications

Whether filling road tankers, containers or blending liquids – ABB flow measurement products help saving resources, for example in the chemical industry.



### The solution

In the process of a chemical plant shown above, phosphoric acid in varying quantities and varying concentrations is produced. The operator selects two parameters: the quantity in kilos and the concentration of phosphoric acid. The control system then operates the blending and filling automatically, dosing water according to the concentration required.

In the past, the operator would have initially filled a calculated volume of highly concentrated acid into the tank and then added water to create the required concentration level. This led to inaccuracies of the volume filling. Either trucks were not loaded to 100 percent of their capacity, or had to be reloaded after controlling the weight. Using Coriolis meters solves these issues.

The meters read the massflow directly with a filling accuracy of approximately 0.1% and supply a highly accurate density or concentration measurement as required, to provide a highly accurate online blending process of acid and water. An electromagnetic flowmeter may be used as a cross-reference. Using CoriolisMaster in this application, the filling time for each truck is reduced by 20 minutes. With approximately 3000 trucks being loaded per year, CoriolisMaster helps to accomplish great savings in both time and cost.

# Differential pressure (DP) flowmeters

## Simplifying complex measurements

Orifice plates and carriers for all applications

Orifice plates are available with different profiles for applications from clean to dirty fluids and from low to high viscosity liquids. They are usually supplied with a data tab welded to (or integral with) the circumference. Designs available include square edged, quarter circle, conical entrance, eccentric and segmental.

### The solution

Orifice plates are an incredibly versatile flow metering technology and are used in a wide range of flow measurement applications, including:

- Clean liquids, gases and steam
- Fluids containing solids
- High viscosity fluids
- Fluids at low flowrates
- Flow monitoring
- Gas and utility flows to combustion plants
- Steam consumption
- Pilot plants



Compact DP flowmeters for improved reliability and economic installation

Improved reliability and economy are achieved by reducing or eliminating the impulse piping between transmitter and restriction element. The complete flowmeter is comprised of the primary element, manifold and transmitter – in a one-piece assembly, leak tested and ready to use.

### The solution

Compact DP flowmeters are used for flow monitoring and flow control loops, measuring liquids, gases and steam in small to medium sized pipelines or ductwork, with averaging pitot model. Integral DP and multivariable transmitters are available and sizing/configuration is facilitated by ABB's CompactMaster software.







## Wedge meters: extremely robust flowmeters for difficult applications

Wedge meters are bi-directional and are particularly suitable for fluids which have a high solids content, are erosive/abrasive or have a high viscosity.

### The solution

The V shaped restriction element design allows solids to pass through the restriction without accumulating. The meter characteristic remains constant down to very low Reynolds Numbers, making it suitable for high-viscosity liquids. Flanged or chemical tee remote seal versions offer use of large sensing surfaces to improve performance in otherwise difficult applications.



### General specifications

Product	Orifice	Compact DP	Wedge meters
Application	Liquids, gases and steam in circular pipes		-
Function	Flow measurement, flow restriction, pressure reduction	Flow measurement	Flow measurement
Mounting	To fit between RF, FF or RTJ flanges	To fit between RF, FF or RTJ flanges	To fit between RF, FF or RTJ flanges
Line sizes	Typically 25 to 1200 mm (1 to 48 in.) nominal bore	15 to 600 mm (1/2 to 24 in.) depending on meter type	15 to 600 mm (1/2 to 24 in.) and above
Typical pressure loss	35 to 95% of generated DP	1 to 95% of generated DP	20 to 60% of generated DP
Typical accuracy	± 0.5% of rate (based on uncertainty of coefficient)	± 1.5 to 2% of rate	± 0.5% of rate when calibrated
Operating pressure	As flange rating	Up to 100 bar g (1450 lbf/in 2g)	As flange rating [chemical tee models are limited to 20.6 bar (300 lbf/in 2 g )]
Operating temperature	538 °C (1000 °F) for 316 SS, higher temperatures possible for other materials	Liquids and gases: 121 °C (250 °F) Saturated steam: 230 °C (446 °F)	538 °C (1000 °F) for 316 SS, higher temperatures possible for other materials
Element types	Concentric, eccentric, conical entrance, quarter circle, segmental	Concentric Orifice, Integral Orifice, Averaging Pitot, Wedge	Wedge
Design standards	ISO5167, R W Miller, AGA-3	ISO5167	ABB proprietary device
Plate thickness	Typically 1 to 25 mm (0.04 to 1 in.) dep. on function and design standard	-	-
Wetted material	316/316L, CrNi steel (other steels, alloy steels & specialist alloys available)	316L	Carbon steel, 316/316L, CrNi steel, (other steels, alloy steels & specialist alloys available)
Transmitter output	4...20 mA or Digital	4...20 mA or digital	4...20 mA or digital
Transmitter mounting	Optional - remote	Integral - direct on element	Optional - remote or integral
Digital communications	Hart, Profibus, FF and Modbus	HART, Profibus, FF and Modbus	Hart, Profibus, FF and Modbus
Tapping options	To suit corner or flange taps	Varies with device	Pipe taps, remote seals (flanged branches or chemical tees)
Body material	-	-	Carbon steel, 316/316L stainless steel
Wedge element material	-	-	(other steels, alloy steels & specialist alloys available)

# Differential pressure flowmeters

## Simplifying complex measurements

Torbar averaging pitot tubes: the multiport self-averaging flow meter

Torbars are suitable for flow measurement of gases, liquids and steam. Some of the many typical applications include water, natural gas, flue gas, nitrogen, combustion gases, ventilation air, sea water, cooling water, crude oil, saturated and superheated steam.

### The solution

The Torbar design is based on the classical pitot tube concept of fluid flow measurement. Since its design and launch, thousands of Torbar flowmeters have been installed. The withdrawable versions can be easily retracted from the pipeline even under flowing pressure.



Venturi tubes for low pressure loss and high accuracy

Metering liquids, gases and steam in oil and gas, chemical, power and general industry, venturi tubes offer significantly lower permanent pressure losses leading to reduced pumping/compression costs.

### The solution

The Venturi tube is a robust device, designed for use where low pressure-loss is required.

- Reduce energy costs by typically 20 to 25%
- Reduce greenhouse gas emissions
- Can be designed for elevated pressures and/or temperatures
- Full data dossiers available covering manufacture, materials and testing
- Flow calibration available for enhanced performance





## Flow nozzles for high velocity flow measurement

The flow nozzle offers excellent long-term accuracy with less wear and reduced possibility of distortion as it does not rely on a sharp edge (which can degrade over time) for maintaining its accuracy. It therefore measures higher flow rates than an equivalent orifice plate at the same differential pressure.

### The solution

Nozzles are primarily used where their high velocity and erosion-resistant characteristics are required. These include power industry applications including metering of boiler feed water and superheated steam, including verifying the performance of turbine generator sets in accordance with design code ASME PTC-6.



### General specifications

Product	Torbar	Venturi tubes	Flow nozzles
<b>Application</b>	Liquids, gases and steam in circular or rectangular conduits	Liquids, gases and steam in circular pipes	Clean and contaminated liquids, gases and steam in circular pipes
<b>Mounting</b>	Insertion via threaded or flanged tapping, direct in line (for small line sizes)	Flanged or welded-in	Flanged or welded-in
<b>Line sizes</b>	15 to 8000 mm (1/2 to 315 in.)	50 to 1200 mm (2 to 48 in.)	50 to 630 mm (2 to 25 in.) 60 to 600 mm (2 to 24 in.)
<b>Typical pressure loss</b>	< 0.1 bar	5 to 20% of generated DP	35 to 95% of generated DP
<b>Operating pressure</b>	Up to ASME class 2500 flange rating	As flange rating	As flange/pipe rating
<b>Operating temperature</b>	Typically up to 1200 °C, depending on fittings and materials	538 °C (1000 °F) for 316 SS, higher temperatures possible for other materials	
<b>Typical accuracy</b>	± 0.75 to 1% of rate (based on uncertainty of coefficient)	± 0.8 to 1% of rate (based on uncertainty of coefficient)	
<b>Probe diameters</b>	12, 25 or 60 mm (0.5, 1 or 2.36 in.) diameter probes, opt. with end supports	N/A	N/A
<b>Wetted material</b>	316/316L CrNi steel (other steels, alloy steels and specialist alloys available)		
<b>Versions and Design standards</b>	In-line, fixed insertion, withdrawable	Classical, long pattern	Long radius, ISA1932, ASME PTC-6

# Differential pressure flowmeters

## Simplifying complex measurements

### StackFlowMaster for stack emission control

StackFlowMaster offers stack gas flow metering solutions that, when combined with a CEMS analyzer, form a complete CEMS package for the measurement of the mass flowrate of pollutants into the environment. It is based on the Torbar multi-port self-averaging pitot flow meter and offers ultra-low pressure loss coupled with options of auto zero / span and purging.

#### The solution

- New stack gas installations
- Add flow measurement to existing stack gas installations that lack flow metering, either to meet the legislation or for process information.
- Maintenance/repair/overhaul of existing stack gas installations, replacing the old flow meters to bring the installation up to the standards required by current legislation.



#### General specifications

<b>Product</b>	<b>StackFlowMaster</b>
<b>Application</b>	Combustion exhaust gas metering in circular or rectangular stacks
<b>Mounting</b>	Full- or partial-insertion across stack via flanged branches
<b>Stack diameters</b>	1 to 8 meters (1.1 to 26.25 ft)
<b>Typical pressure loss</b>	< 0.1 bar
<b>Operating pressure</b>	As mounting flange rating (but typically these are low pressure systems)
<b>Operating temperature</b>	Maximum 1200 °C (2192 °F) depending on probe material
<b>Typical accuracy</b>	± 2% typically
<b>Probe types</b>	25 or 60 mm (1 or 2.36 in.) diameter probes, optionally with end supports
<b>Probe material</b>	316L and 321H stainless steel or UNS N06625 alloy
<b>Mounting</b>	Insertion via flanged branch with optional end support
<b>Variants</b>	Probe and tx only, optionally with MCERTS interface, meter purging or automatic zero/span checking
<b>Transmitter output</b>	4...20 mA
<b>Transmitter mounting</b>	Remote, direct on probe or within enclosure
<b>Agency approvals</b>	MCERTS/TUV to EN 14181 and EN 15267-3
<b>Digital communications</b>	HART or Modbus

# Multiphase flowmeters

## The radioactive-free solution

VIS Multiphase flowmeter for produced oil, gas and water

ABB VIS (VEGA Isokinetic Sampling) multiphase flowmeter is the ideal solution for flowmetering in upstream applications close to the wellhead. Based on a unique and patented technology, VIS provides the same accuracy of conventional test separators with no time delay and a much lower investment cost in a product sized radioactive-free device.

### The solution

- Unique and patented technology
- Based on conventional instrumentation only (easy to commission and maintain)
- Radioactive-free, no gamma source involved
- Portable solution in a skid-mounted configuration for well-testing applications
- Tailored for gas storage applications
- Customizable according to specific requirements in terms of size, material and rating



### General specifications

Product	VIS Multiphase
Operating envelope	80-100% gas volume fraction
Accuracy for liquid flow rate	± 3% of reading
Accuracy for gas flow rate	± 3% of reading
Accuracy for water flow rate	± 5% of reading
Gas turndown	6:1 standard, 30:1 and 100:1 with special engineered solutions
Liquid turndown	Unlimited
Process connections	ANSI, API, UNI or according to project specifications
Nominal diameter	DN 50 (2")...DN 300 (12"), larger sizes available on customer request
Material	Carbon steel, duplex steel or according to customer specification or process requirements
Design pressure	100 bar (1450 psi) and 230 bar (3300 psi) in standard configurations, Special configurations available according to process requirements
Process temperature	-40 °C (- 40 °F)...300 °C (572 °F)
Ex approvals	ATEX CE Ex II 1 G Ex, US Class1 division1&2, IEC zones 1&2 Exd, other approvals can be provided on request
Communication	Analog (4...20 mA), Modbus (Ethernet or serial), other standards available on request
Pressure drop	0.3...1 bar
Size and weight	Footprint 0.5 x 0.8 mt, height 1.2 mt, 390 kg (for 4" ANSI 1500)
Flow direction	Vertical downward
Output signals	Gas, liquid and water flowrates, liquid and water density, pressure and temperature

# Vortex and swirl flow measurement

## Precise and cost effective

SwirlMaster – the flowmeter with a twist – uniquely available at ABB

The SwirlMaster FSS430/450 combines excellent measuring performance and enhanced flow calculation capability with flexibility in installation, due to low required inlet and outlet sections. Save 75% straight pipe run by employing SwirlMaster instead of traditional vortex meters, turbines or orifice plates.

### The solution

SwirlMaster is used in almost every industry. In particular in chemical or petrochemical, oil and gas applications or power generation, especially in steam applications and energy measurement. SwirlMaster helps to reduce measurement uncertainty by 50% or more and offers significantly lower pressure loss compared to vortex meters with reduced bore.



VortexMaster – accurate measurement of non-conductive fluids

It features an integrated flow computer, excellent measuring performance and enhanced flow calculation capability. The VortexMaster FSV430/450 provides accurate and reliable flow measurement data and is able to compensate for vibrations as well as pressure and temperature effects.

### The solution

Whether chemical or petrochemical, oil and gas industry or power generation, vortex flowmeters are used in almost every industry. The integral flow computer function allows direct mass and energy measurement with one device especially for steam applications and energy measurement.





## Vortex/Swirl measurement for extremely dynamic flow measurement with high accuracy

- Simple, compact in-line installation
- The integral flow computer function in combination with the connectivity of remote sensors for pressure, temperature or density allows direct mass and energy measurement with one device
- Internal temperature compensation saves investment and installation effort
- Increased plant availability, no moving parts, no wear, no maintenance



### General specifications

Product	SwirlMaster	VortexMaster
Application	Liquid, gas and steam flow measurement directly in volume, mass or energy units	
Meter body style	Flanged design	Flanged or wafer design
Line sizes	Flange: 15 to 400 mm (½ to 16 in.)	Flange: 15 to 300 mm (½ to 12 in.) Wafer: 25 to 150 mm (1 to 6 in.)
Flow ranges	Liquids: 0.5...2500 m³/h Gases/steam: 3.7...21500 m³/h	Liquids: 1...2600 m³/h Gases/steam: 7...23500 m³/h
Flow turndown	Typically 1:30, depending on application	Typically 1:20, depending on application
Operating pressure	Up to PN160/900 lb	
Accuracy	0.5%	0.65% for liquids, 0.90% for gases and steam
Transmitter output	Pulse output, contact output and frequency output	
Transmitter mounting	Remote/integral	
Agency approvals	IECEX, ATEX, FM, NEPSI	
Digital communications	HART and analog (4...20 mA)	
Power supply	12...42 V (DC)	
Wetted material	Stainless steel, optionally Hastelloy C, Duplex	

# Thermal mass flow measurement

## Dynamic mass measurement of gases

Sensyflow FMT400-VTS/FMT500-IG – intelligent and versatile

Sensyflow direct gas mass flowmeters operate within the widest flowrange. Highly accurate, even at low pressure and/or low flow rates, they improve process quality and provide easy installation and commissioning, low maintenance costs and short response times.

### The solution

Direct gas mass flowmetering solutions succeed in a variety of industries and are essential at key stages across the process industry, where direct mass flow measurement combined with high accuracy, short response times, reliability and easy installation is required. Sensyflow saves you up to 30% set up time and 10% in gas consumption.



Sensyflow FMT200-ECO2 – compact, dynamic and universal

Sensyflow FMT200-ECO2 is used for pneumatics, paint robot control, compressed air systems, gas dosing and burner control. It features compact and arbitrary mounting. Its highly modular process connections allow a universal machine integration and test set up.

### The solution

The Sensyflow FMT200-ECO2 is a compact, dynamic and universal meter. It is easy to integrate in OEM solutions or other stationary dosing equipment. The fast response time of less than 25 milliseconds, its low weight and a great variety of process adapters allow for flexible integration. User-friendly system integration into customer-specific machines and the individual control loops are very easy to realize.







## Sensyflow FMT700-P – highly dynamic and precise

It combines perfect precision, sensitivity and fast response time with user friendly intuitive system handling. The Sensyflow FMT700-P is the reference system for engine test benches, quality control and development applications worldwide.

### The solution

At motor test benches it monitors the intake air measurement as a very important measure for the burning process of piston engines. Other applications include emission tests, quality control of flow components and homologation tests.



### General specifications

Product	Sensyflow FMT400-VTS/FMT500-IG	Sensyflow FMT200-ECO2	Sensyflow FMT700-P
Application	All technical gases	Pneumatic, compressed air, gas dosing, OEM	Engine test benches, reference class air mass flowmeter
Meter body style	Flanged, inertial w/o pipe	Highly modular process connections	Flanged, compact quick fit setup
Line sizes	25...3000 mm (1"...120")	8...25 mm (0,31...1 in.)	DN 25...DN 200 mm (1...8")
Flow ranges	Gases, 0...3,000,000 kg/h / 0...6,600,000 lb/h, e.g. for atmospheric air, N2	0...100 kg/h / (0...220 lb/h), e.g. for atmospheric air, N2, all common norm/standard-volume flow units	0...4000 kg/h / 0...1000 g/s, air
Flow turndown	Up to 1:150	Up to 1:100	Up to 1:40
Typical pressure loss	Very low / < 3 mbar / < 0,145 psi	Low / < 100 mbar / < 10 kPa / < 1,45 psi	Very low / < 20 mbar / < 0,290 psi
Operating pressure	Up to nom. 40 bar/40*10 <sup>5</sup> Pa/580psi	10 (16) bar/10 (16)*10 <sup>5</sup> Pa/145(232)psi	0,6...2,5 bar abs./60...250 kPa/8.7...36 psi
Accuracy	< 0.9% (1,85%) o.R./gas & setup dep.	< 3% o.rdg	< 1% o.rdg.
Transmitter output	4 (0)...20 mA/HART	0...5 V, 0...10 V, 4 (0)...20 mA	0...10 V, 4 (0)...20 mA
Agency approvals	ATEX zone 0,1 & 2, FM ClI Div1/2	ATEX zone 2 and 22	–
Transmitter mounting	Remote/integral	Integral	Remote
Digital communications	HART, Profibus DPV1, Totalizer	Totalizer pulse or frequency, adjustable	RS232
Power supply	110...230 V AC, 24 V AC/DC	24 V DC ±10%	110...230 V AC
Wetted material	Stainless steel, ceramic sensor	Aluminium body/connections, glass sensor	Aluminium body, glass sensor
Others	Hygienic version: FMT400-VTCS	Test kit available	Perfect quick fit pipe setup
Response time	< 500 ms	< 25 ms	Extremely fast, typ. ~ 12 ms

# Variable area flow measurement

## Low cost measurement for gases, liquids and steam

PurgeMaster for optimum flexibility with a minimum number of components

PurgeMaster A6100 flowmeters are low capacity variable area flowmeters for both liquid and gas with an excellent selection of material and scale lengths in a single product family design. They feature a corrosion resistant, high strength stainless steel body, quick, easy snap-in tube construction and a safety tested operator protection shield.

### The solution

PurgeMasters are ideal for applications such as the purging of control lines and instrument enclosures. Their use is easily extended into fluid sampling, liquid specific gravity, level measurement and similar services.



FGM1190 flowmeter for a high degree of reproducibility

The wide variety of float weights and meter tubes allows the glass tube flowmeter FGM1190 to be matched exactly to the required flow range. The three ribs, parallel to the center axis of the meter tube, guide the float over the entire flow range. This enables a high degree of reproducibility because the float is absolutely centered in the meter tube.

### The solution

Designed for flowrate measurements in many industries including system manufacture, food, water treatment plants and chemical. Aggressive fluid applications are possible because the fluid wetted parts can be made from a wide variety of different materials.





## 10A2235 RatoSight: stable and reliable

The RatoSight is a rugged, low cost glass tube meter providing stable and reliable operation. Its materials selection and outstanding installation flexibility make it the solution for visual indication of moderate viscosity liquids. It can be suited with fully adjustable, vibration-proof magnetic switches and relays.

### The solution

Suitable for automatic shutdown of heavy equipment with forced lubrication control, extremely resilient on marine uses, desalination RO systems and high corrosion exposure environments.



### General specifications

Product	PurgeMaster A6100	FGM1190	10A2235
Application	Clean, low viscosity liquids and gases	Clean, low viscosity liquids and gases	Clean liquids and gases
Mounting	Vertically, in line, wall/surface or back of panel	Vertically, in line	Vertically, in line
Connections	¼ in. NPT or BSPP female, vertical or horizontal	¼ to 2 in. threaded, DN10 to DN50 flanged, SC15 to SC50 hygienic (DIN11851), vertical	½ to 2 in. threaded NPT1 – horizontal/vertical
Seals	Buna N, Viton®, EPR, Kalrez™	BUNA N, Viton®, EPDM	BUNA N, Viton®
Flow range	Full scale water flows from 0.53...2200 cm <sup>3</sup> /min	Water flows from 0.002...17600 l/h	Water flows: up to 50 gpm Air: up to 110 SCFM
Flow turndown	Typically 10:1	Typically 10:1	Typically 10:1
Operating pressure	Up to 18 bar (261 lbf/in 2 g)	Up to 18 bar (261 lbf/in 2 g)	Up to 12 bar-g (175 PSIG or lbf/in 2 g)
Operating temperature	Up to 120 °C (248 °F)	Up to 180 °C (356 °F)	Up to 121 °C (250 °F)
Nominal scale lengths	38, 76, 125 or 250 mm (1½, 3, 5 & 10 in.)	100, 130 or 250 mm (4, 5 and 10 in.)	–
Accuracy	Class 1.6 to class 10, depending on tube diameter and scale length	Class 1.6 to Class 6, depending on tube diameter and float type	Standard 2-10% Calibrated 3-5%, size dependent
Flow control: - Alarms - Regulation	Proximity sensors, up to 2 off SS needle valve option, brass or SS flow regulator option	Inert gas switches, up to 2 off –	Reed Switch – min/max/both –
Tube/end con. materials	Glass/brass, 316SST or KYNAR™	Stainless steel, PVC or PVDF	Glass/brass
Float materials	Glass, Sapphire, Carboly, Tantalum and Stainless steel	St. steel, Glass, Sapphire, Carboly, PVC, Tantalum, Hastelloy™, Aluminium, PTFE	Brass: Liquids, Aluminum: Gases
Chassis	Stainless steel	Stainless steel	Bronze

# Variable area flow measurement

## Low cost measurement for gases, liquids and steam

VA Master 10A4500 – the one for all solution

The VA Master is one of the highest quality and versatile variable area flowmeters on the market and is proven over a long history. Fully retrofitable with several float and tube designs for practically any clean liquid or gas process. Its wide view angle visibility, highly stable stainless steel frame and alarming capabilities make the VA Master the one for all solution.

### The solution

The 10A4500 is suitable for gas and liquid applications. Beneficial for processes with low to no pipe run availability and low pressure loss limitations. It is particularly useful for aggressive and corrosive liquid measurement with the use of PTFE float and PVC fitting options.



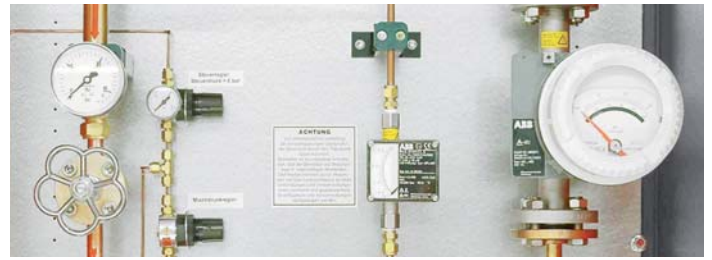
FAM3200 flowmeter for small gas and liquid flows

The FAM3200 is an armored purgemeter designed to meter small gas and liquid flows. This meter is especially suited for applications with cloudy, opaque or aggressive fluids in chemical and pharmaceutical industries, gas analyzers, process systems, well systems and wherever glass metering tubes cannot be used for safety reasons.

### The solution

- Water purification
- Gas sampling systems, nitrogen generators
- Burner control
- Chemical injection
- Food and beverage applications





## FAM540 flowmeter – first choice for oil rigs and chemical plants

Provided with a digital display, the all-metal variable area flowmeter is ideal for tough industrial flow measurement of liquids, steam and gases. It is resistant against salt spray and other external influences, reliable and precise.

### The solution

Proven in many applications even under hardest conditions FAM540 flowmeter is suited where high pressure and/or high temperature operating conditions exist.

- Deionization, water purification, waste water treatment
- Gas sampling systems, nitrogen generators
- Power utility applications, cooling water, burner control
- Corrosive liquids, chemical injection
- Food and beverage applications



### General specifications

Product	VA Master 10A4500	FAM3200	FAM540
Application	Clean, low viscosity liquids and gases	Clean, low viscosity liquids and gases	Clean liquids, gases and steam
Mounting	Vertically, in line	Vertically, in line or wall-mounted	Vertically, in line
Connections	½ to 2 in. threaded NPT/flanged CL150 – horizontal/vertical	¼ in. to 1 in. threaded, vertical or horizontal	½ in. to 4 in., flanged, hygienic (DIN, SMS), vertical
Flow ranges	Water flows: 0.2...90 GPM Air: 1...160 SCFM	Water flows: 1...3000 l/h	Water flows: 0.028...120 m³/h
Flow turndown	Typically 10:1	Typically 10:1	Typically 10:1
Operating pressure	Up to 18 bar (261 lbf/in 2 g)	Up to 100 bar (1450 lbf/in 2 g)	Up to 100 bar (1450 lbf/in 2 g)
Operating temperature	Up to 121 °C (250 °F)	Up to 180 °C (356 °F)	Up to 400 °C (752 °F)
Nominal scale lengths	Standard: 250 mm (10 in)	–	–
Accuracy	Standard: 2%, Calibrated: 1 % full scale	Class 6	Class 1.6 (Class 2.5: PTFE lined tube opt.)
Repeatability	0.5% full scale	–	–
Flow control: - Alarms - Regulation	Inert gas switches, up to 2 off –	Slot sensors, up to 2 off SS needle valve option, brass or SS flow regulator option	Slot sensors, up to 2 off –
Alarm amplifier power	24 DC, 110 VAC, 230 VAC	24 VDC, 110 VAC, 230 VAC	24 VDC, 110 VAC, 230 VAC
Transmitter option	–	4...20 mA, 2-wire	4...20 mA, 2-wire
Tube/end con. materials	Stainless steel, PVC	–	–
Tube material	Borisilicate glass	Stainless steel	Stainless steel, optional PTFE lined
Float material	Stainless steel, Hastelloy™, PVC, PTFE	Stainless steel	St. steel, opt. PTFE lined/float damping
Chassis	Stainless steel	–	–

# Flow computers

## Spirit IT Flow-X Series

Flow-X flow computers offer the most advanced measurement technology, combined with powerful and flexible computation and communication capabilities.

Flow-X calculates and controls liquid and gas flows, according to the highest measurement standards. The core element is the Flow-X module that can be combined in various enclosures for single or multi-stream solutions. Each module offers real-time digital and analog signal processing, and advanced control features, such as: Proving, sampling, batching, valve control and PID logic.

### The solution

- Flexible, compact and modular design to suit any gas or liquid application
- Compatible with most flow meters, transmitters and other field equipment
- Speed and power: Modern hardware to ensure the highest accuracy (0.002% at 20 °C) and to enable advanced software features
- High level of security and traceability: personal user-login with historical log of user activity
- User-friendly touch-screen
- Remote access through web server interface



### General specifications per Flow-X/M module

<b>Input</b>	Analog inputs	6	Total number of analog inputs + HART inputs = 6
	4-wire PRT inputs	2	
	HART loop inputs	4	
	Pulse inputs (Single/Dual)	1	
	Density inputs (100 µs - 5000 µs)	4	
	Digital inputs	16	
	Sphere detector inputs	4	
<b>Output</b>	Digital outputs	16	Total number of digital inputs + digital outputs + pulse outputs + density inputs + sphere detector inputs = 16
	Pulse outputs (max. 10 Hz)	4	
	Analog outputs (4...20 mA)	4	
	Prover bus outputs	2	
	Frequency outputs (max 10 kHz)	4	
<b>Interfaces</b>	RS485/RS232	2	
	RJ45	2	
<b>Power supply</b>	20 V DC - 32 V DC, normal 24 V DC		
<b>Processors</b>	32-bit microprocessor with math coprocessor and FPGA		
<b>Memory</b>	1 GB on-board memory for time-stamped data, report archive and audit trail		

### General specifications per Flow-X enclosure

Flow-X/R	max. 8 Flow-X/M modules	approx. max. 14 kg	354.8 x 482 x 135 mm (h x w x d)	13.9 x 18.98 x 5.31 inch (h x w x d)
Flow-X/P	max. 4 Flow-X/M modules	approx. max. 7kg	237.5 x 139 x 294 mm	9.3 x 5.5 x 11.6 inch
Flow-X/C	1 Flow-X/M module	approx. max. 3kg	237.5 x 139 x 145 mm	9.3 x 5.5 x 5.7 inch
Flow-X/S	1 Flow-X/M module	approx. max. 2.5kg	250 x 142 x 164.1 mm	9.8 x 5.6 x 6.46 inch

# Flow computers

## Spirit IT eXLerate supervisory software

eXLerate is a software platform developed specifically for flow metering supervisory systems within the oil and gas industry. With eXLerate we make flow measurement systems better, smarter and more accurate.

eXLerate provides an automation solution for many oil and gas applications: Local or corporate flow measurement systems, crude gathering, meter calibration facilities, truck or ship loading and tank terminal automation. eXLerate offers comprehensive HMI tools to control and manage measurement data. In the critical process of oil and gas custody transfer, reliability is essential. eXLerate offers fully synchronized and integrated redundancy, guaranteeing a consistent environment.

### The solution

- Accurate and flexible communication with field equipment
- Searchable measurement and audit historical data
- Sophisticated and flexible oil and gas production reports
- Extensive set of flow and fluid property calculations
- Embedded Virtual Flow Computing (VFC) functionality
- Integrated instrument validation & calibration functionality



# Flow computers

## Totalflow

Flow computers and RTUs for accurate and reliable flow measurement and automation of natural gas.

All ABB flow computers and RTUs comply with API, AGA, and ISO standards for custody-transfer electronic measurement devices and for flow rate, volume and energy calculations. In addition, all calculations are performed once per second and historical flow volumes and data logs can be stored for more than 40 days.

### The solution

- Automate and control right from the office
- Measure in compliance with AGA/API standards
- Cost savings and increased revenues
- Multi-tube capabilities for control of large sites
- Explosion-proof, cast aluminum models available



### General specifications

Flow computers	Enclosure type/size	Approximate weight (without battery)	Maximum input/output modules	Maximum battery capacity	Supports automation applications	Integrated multivariable transducer
<b>Differential flow computers</b>						
XFC <sup>G4</sup> 6410	Small enclosure	13.5 lbs	0	26AH	•	•
XFC <sup>G4</sup> 6413	Medium enclosure	15 lbs	3	26AH	•	•
XFC <sup>G4</sup> 6713	Large enclosure	29 lbs	6	52AH	•	•
μFLO <sup>G4</sup> 6213	Medium enclosure	15.1 lbs	4-Point I/O opt. expansion card	26AH		•
XFC <sup>G4</sup> 6200	EX explosion-proof enclosure	16.5 lbs	12-Point I/O opt. expansion card	Internal battery not supported	•	•
<b>Linear flow computers</b>						
XFC <sup>G4</sup> 6411	Small enclosure	11.5 lbs	0	26AH	•	•
XFC <sup>G4</sup> 6414	Medium enclosure	12 lbs	3	26AH	•	•
XFC <sup>G4</sup> 6714	Large enclosure	27 lbs	6	52AH	•	•
μFLO <sup>G4</sup> 6213	Medium enclosure	15.1 lbs	4-Point I/O Opt. expansion Card	26AH		•
XFCG4 6201	EX explosion-proof enclosure	16.5 lbs	12-Point I/O Opt. expansion card	Internal battery not supported	•	•
<b>RTUs</b>						
XRC <sup>G4</sup> 6490	Small enclosure	15 lbs	3	26AH	•	
XRC <sup>G4</sup> 6790	Medium enclosure	29 lbs	6	52AH	•	
XRC <sup>G4</sup> 6890	Large enclosure	45 lbs	14	140AH	•	
XRC <sup>G4</sup> 6895*	X-Large enclosure	60 lbs	22	Internal battery not supported	•	
XRC <sup>G4</sup> 6990	Panel mount	12 lbs	6 per board (max. 2 boards)	26/30AH	•	

\*XRCG4 6895 also has 20 fused power terminals (DIN rail mounted) and 259 mini terminal connections (mini DIN rail mounted).



# Flow computers

## Universal measuring computer FCU

FCU200 and FCU400 for various signal processing applications

The FCU is a universal measurement computer that combines the very latest communication methods with many years of expertise in the field of measurement technology. Reliable microelectronics, developed in line with standards DIN EN ISO 1434-1...6 and OIML75. The physical "density" and "enthalpy" values of steam and water are calculated in accordance with the latest version of industry standard IAPWS-IF 97.

### The solution

- FCU200-W: Heat quantity, cold quantity computer for water and brine
- FCU400-S: Steam, saturated steam computer (flow, heat)
- FCU400-G: Gas flow computer, gas translator
- FCU200-T: 2-channel current-pulse converter
- FCU400-P: Signal combination, highly-precise  $\Delta T$  measurement, totalizing, leakage measurement, boiler water-level, measurement, etc.
- FCU400-IR: Contactless temperature monitoring



### General specifications

<b>Product</b>	<b>Universal measuring computer FCU200/400</b>
<b>Application</b>	Heating-, cooling-, steam-, gas-calculation, temperature monitoring
<b>Calculation</b>	Of density/enthalpy for water/steam with industry standard IAPWS-IF 97
<b>Input</b>	4...20 mA inputs and 2-wire transmitter supply, precision inputs for 4-wire Pt100 Pulse/frequency input (0...10 kHz)
<b>Output</b>	Active mA-outputs/passive pulse outputs
<b>Display</b>	Three-line display with background lighting
<b>Basic board</b>	Electrically isolated I/Os, infrared interface
<b>Communication</b>	M-BUS, MODBUS, PROFIBUS communication (converter)
<b>Degree of protection</b>	IP 65, IP 40 (only in the case of FC400-IR)
<b>Power supply</b>	24 V DC, 24 V AC, 110 V AC, 230 V AC
<b>Calibration error</b>	< 0.2% of end value
<b>Accuracy</b>	Accuracy class of calculator EN 1434-1, OIML 75 class 2
<b>Certification</b>	PTB (Germany) EN1434 for custody transfer by Water, GOST approval
<b>Mounting</b>	DIN rail mounting or wall mounting 144 mm x 72 mm x 183 mm, panel mounting 144 mm x 72 mm x 117 mm

# Control systems

## Productivity and security for your plant

A reliable and easy-to-use process control system is one of the most important success factors for a production facility. As the world's largest supplier of control systems ABB delivers state-of-the-art products for an efficient and secure operation of your industrial processes.

ABB's control systems are characterized by scalability, high availability and consistent architecture. The systems can be easily adapted to needs of new plants as well as varying requirements during the complete life cycle. Additionally, the philosophy of an unlimited life cycle offers highest productivity, plant availability and investment protection.

### Extended Automation

System 800xA: Maximum productivity through integration of control technology, instrumentation, electrical equipment, package units and safety components in all process industries

- Highest operator effectiveness
- Efficient alarm management
- Extended protection against cyber threats

### Essential Automation

Freelance: Compact and reliable control system with easy installation, engineering and operation providing a cost-effective automation solution throughout the complete life cycle of your plant

- Highly scalable
- Extremely robust
- Easy to use and to maintain

### Compact Product Suite

Single or dual loop controllers, paperless recorders, process controllers, safety controllers, I/O systems, panels and visualization software developed for the process industry as stand-alone or combinable automation components.



ABB process control systems – higher cyber security, lower costs, better productivity.

1 Extended Automation | 2 Essential Automation | 3 Compact Product Suite



# Services for flow measurement products

## Performance optimization solutions



Dedicated to optimizing your plant productivity and performance, ABB's services enable improved utilization and performance of your equipment, processes, and personnel. ABB's service specialists are strategically located to support all products and systems globally. ABB's broad scope of services lays the foundation for end-to-end support for your enterprise.

### Flow calibration and verification services

- Utilizing ABB's strategically located flow calibration facilities ABB offer calibration services for all ABB products and third party products including control valves
- To check the performance of products installed in the field ABB offer a range of services from flow profiling and site surveying to in-situ calibration using invasive or non-invasive flow measurement techniques.
- ABB service provide verification services using a suite of verification tools and experience to ensure your product continues performing

### Full list of ABB's performance optimization services

- Consulting
- Installation and commissioning
- Maintenance and field services
- Asset management systems
- Fieldbus and wireless solutions
- Project execution
- Migration and upgrades

- Repairs and calibration
- Spare parts and consumables
- Support, remote service, and training
- Maintenance support agreements
- In the field meter verification
- Meter recalibration

### Life-cycle services

- ABB service specialists are available to assess the condition of your equipment. Providing advice on the optimum time for replacement, or extending the life of your asset by upgrading, refurbishing or recalibrating
- To ensure products always operate correctly ABB service specialists can take care of installation and commissioning and provide annual maintenance and verification services
- To allow a company's maintenance personnel to respond to all situations now and in the future, ABB provide suitable training options.
- If a problem does occur ABB can provide spare parts, ensuring the right spare part is delivered and fitted quickly and within the agreed timeframe



ABB service – value added services for bottom-line results.

# Contact us

To find your local ABB contact visit:

[www.abb.com/contacts](http://www.abb.com/contacts)

For more product information visit:

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