Flow-X® SERIES

FLOW COMPUTERS

Spirit it
A MEMBER OF THE ABB GROUP

Measurement Data: from Well to Awareness

Many devices claim to be a flow computer or to have flow computing capabilities. However, the Flow-X flow computers are true flow computers that are not a general purpose control device like an RTU, a PLC or a DCS. Instead it is especially designed for custody transfer and allocation metering. The Flow-X series complies with the most stringent requirements for security, traceability and auditability. A true flow computer like the Flow-X provides accurate and indisputable input data for invoicing.

Accuracy is key when every drop counts. The Flow-X sets the highest accuracy standard in flow computing. The accuracy of the analog inputs is better than 0.002 % at room temperature and 0.008% over the full ambient temperature range.

The Flow-X has a powerful CPU to support even the most demanding gas and oil calculations, such as GERG-2008, which is currently the most accurate standard for natural gas. All data processing and storage including Modbus communication is based on 64-bit resolution to avoid any loss of accuracy.

The Flow-X/M flow module is a complete flow computer with all the IO needed for any gas or liquid flow meter installation. It can be used in both single stream and multi-stream configurations. Because of its modular concept it is ideal for single stream installations and also for meter stations with a multiple parallel flow meters it provides cost-effective redundancy without sacrificing accuracy and security.

ONE MODULE, DIFFERENT ENCLOSURES

The heart of the Flow-X product family is the Flow-X/M module. One and the same module is used for all enclosures and applications. Each module is a stand-alone flow computer with each own LCD display and provides sufficient input and out signals to handle any gas or liquid flow meter.

The Flow-X module can be used in several different enclosures. The different enclosures provide flexibility in the way a Flow-X flow computer can be installed ranging from a control room with panel mounted flow computers to space efficient rack mounted solutions in the field.

LARGE AMOUNT OF I/O

Each module provides:	
6	Analog Input (4-20 mA, 1-5 / 0-5 V DC)
4	HART inputs
2	Pt100 temperature inputs
4	Analog output
16	Digital I/O (open collector, configurable threshold)
2	Serial input (RS-232 / RS-422 / RS-485)
2	Ethernet (RJ45, TCP/IP)

Each of the 16 digital I/O channels can be assigned to a:	
Pulse input (single/dual)	max. 1 meter (dual = 2 inputs)
Time period input (density)	max. 4 signals
Prover detector input	max. 4 signals
Status input	max. 16 signals
Status output	max. 16 signals
Pulse output	max. 4 signals
Prover bus output	max. 1 signal

FLOW-X/P

The Flow-X/P is a panel mounted enclosure for 1 up to 4 Flow-X/M modules.

- ✓ *Touchscreen display;*
- ✓ *Additional three serial RS232/RS485 interfaces (located on the back);*
- ✓ *Additional on-board station module;*
- ✓ *Additional processor capacity and internal memory;*
- ✓ *Horizontal or vertical positioned.*

FLOW-X/S

Flow-X/S is the DIN-rail mountable enclosure for 1 Flow-X/M module.

- ✓ *Termination of the wires directly on the Flow-X/S backplane;*
- ✓ *2 Ethernet ports;*
- ✓ *Option to connect a separate touch panel PC to have a touch interface;*
- ✓ *DIN rail mounting or directly against the wall.*

FLOW-X/K

Flow-X/K is the DIN-rail rack enclosure for 1 Flow-X/M module.

- ✓ *Clean & compact design;*
- ✓ *Connection through two 37 pin D-Sub connectors;*
- ✓ *2 Ethernet ports;*
- ✓ *Option to connect a separate touch panel PC to have a touch interface;*
- ✓ *DIN rail mounting, directly against the wall or in a 19" rack (in combination with a DIN rail - rack adapter).*

FLOW-X/R

The Flow-X/R is a 19" rack enclosure for 1 up to 8 Flow-X/M modules.

- ✓ *Each Flow-X/M has its own power supply;*
- ✓ *Each Flow-X/M has its own two Ethernet ports;*
- ✓ *Option to connect a separate touch panel PC, which creates a touch interface with each of the modules inside the rack.*

PART OF A SYSTEM

Field I/O

Except for the Flow-X/S, which provides onboard wiring terminals, the field signals are connected through a terminal block that connect via a D-Sub cable to the flow computer. Either a standard terminal block or the Flow-X/B breakout board can be used.

The breakout board provides additional components such as fuses, pull-up resistors and relays for convenient connection to the field equipment.

Operator interface

The Flow-X/P has an integral touch screen for local operation, while the other enclosures may be operated from a separate operator panel. Furthermore the full operator interface is accessible from a web browser for remote operation.

The operator interface is used for the daily operation and maintenance of the flow metering system. The same operator interface can also be used for basic configuration of the flow computer itself.

Flow-X/S
On-board wiring terminals

Flow-X/P
Local Touch screen

Flow-X/B
Break-out board with signal conditiong, relays and fuses

Flow-X/T
Local Operator Panel

Teminal Block
Standard I/O connector block

Web browser
Everywhere on your desktop

The wide selection of enclosures makes it possible to use the Flow-X flow computers in various application situations, from control room with panel mounted flow computers to space efficient rack mounted solutions in the field.

QUICK & EASY CONFIGURATION

The Flow-X flow computer comes with 4 different software applications:

- ✓ *Liquid, metric*
- ✓ *Liquid, US Customary*
- ✓ *Gas, metric*
- ✓ *Gas, US Customary*

These standard applications provide all functionality that is required for most flow metering systems. Although the standard applications are ready to go, full customization is possible through the Flow-Xpress software. Calculations, displays, reports, alarms, Modbus or HART communication interfaces and much more can be freely defined from a rich library of functions and tools.
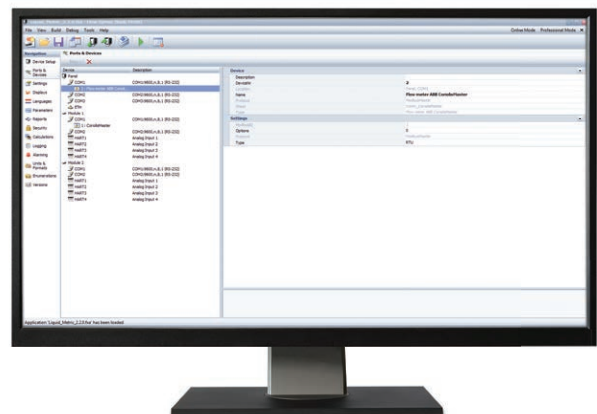
Flow-Xpress Basic Mode

Configurate without restart

The Flow-Xpress Online mode can be used to manage configurations and users without the need to restart the flow computer, hence the term 'Online'.
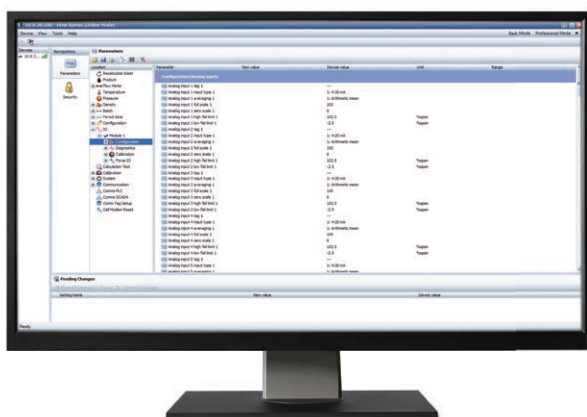
Flow-Xpress Online mode

Create your own application

With Flow-Xpress Professional users can add custom functionality to the standard applications and even write their own applications (training by Spirit IT is needed).
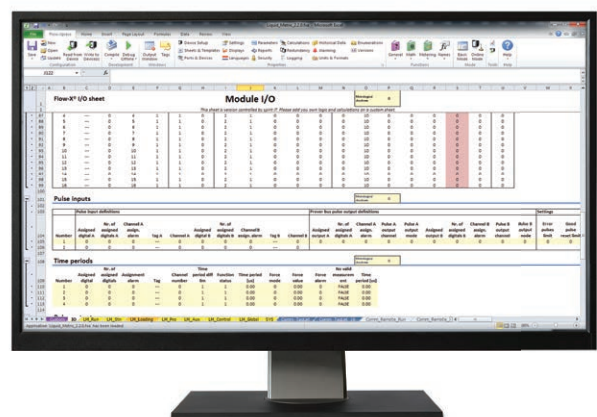
Flow-Xpress Professional mode

Testing & Debugging

Advanced verification and troubleshoot capability through an embedded Modbus / HART protocol analyser, emulation capability to check the configuration and calculations without a physical flow computer and an online debugger to (remotely) troubleshoot a flow computer.

Security & Tracebility

Personal user-login password protection instead of rollbased protection. Changes can be traced back to any particular user in the Audit Trail. Predefined access levels can be configured for each user. Log files keep track of all user activities.

Prover Support

All prover types are supported: small-volume, compact, bidirectional and unidirectional.
Master meter proving is supported for both liquid and gas. Supports up to 30(!) runs per prover sequence, including detailed results for each run. Supports the API MPMS 4.8 alternate method to accommodate proving of Ultrasonic and Coriolis flow meters.

Advanced control functions

Embedded flow, flow/pressure, valve and sampling control functions eliminate the need for a PLC and sampling controller, depending on the application and client specification.

External systems

Web services automation interface allows for full integration of real-time, historical and configuration data in external systems.

Reporting & Archiving

The reporting function provides a readable printout for the user, while archives are accessible by remote systems for further processing. With 1 GB storage capacity the Flow-X can keep months of hourly and years of daily report data in its memory.

Device communication

The Flow-X applications provide generic inputs to connect to any measurement device. A generic input can be an analog input,like a 4 to 20 milliamp signal, a HART signal or a variable communicated via Modbus over a serial or Ethernet link. Generic inputs are provided for:

- ✓ *Density meters (also with time period signal),*
- ✓ *Differential pressure transmitters,*
- ✓ *Static pressure transmitters,*
- ✓ *Temperature transmitters,*
- ✓ *Gas quality analyzers (gas chromatograph: ABB, Daniel, Elster, Siemens, Yamatake),*
- ✓ *Viscosity meter,*

- ✓ *Water cut monitors,*
- ✓ *Pt100 temperature sensor,*
- ✓ *Pulse generating flow meter types (turbine, positive displacement, ultrasonic & Coriolis)*
  (Ultrasonic: Caldon, Daniel, FMC, Faure Herman, Instromet, Krohne, General Electric, RMG, Sick)
  (Coriolis: ABB, Endress + Hauser, MicroMotion),
- ✓ *Differential pressure flow meters (orifice, Venturi & V-Cone)*

With the Flow-Xpress software additional communication interfaces can be defined for any device that supports Modbus or HART.

CALCULATIONS

Liquid

API 5, 6, 23, 24, 53, 54, 59 and 60 tabes (A, B, C, D and E)
API 11.1 1980 (API 2540) and 2004/2007
API 1952 historical tables
API 11.2.1, 11.2.2, 12.2, 21.1, 21.2
API 11.3.2.1 Ethylene (API-2565)
GPA TP15, TP16, TP25, TP27
Propylene (API 11.3.3.2)
Butadiene (ASTM D1550)
Ethylene (IUPAC 1988, NIST 1045, API 2565)
Carbon dioxide (NIST)

Gas

AGA3, AGA5, AGA7, AGA8, AGA10, AGA11
AGA-NX19
SGERG-88
GERG-2008
GPA 2172
IAPWS-IF97 (steam and water)
ISO 6976 (all editions)
Gas viscosity
GSSSD MR113

Flow

ISO 5167 (all editions)
ISO/TR15377
AGA3
GOST 8-586
V-cone

CERTIFICATES

CE	*Marking as per Conformité Européene, Directive 93/68/EEC. Declaration of conformity*
EN 12405-1	*European Standard for Gas meters and Gas-volume electronic conversion devices; part of MID*
OILML R117	*Dynamic measuring systems for liquids other than water standard, Edition 2007; part MID Software Guide - Measuring*
WELMEC 7.2	*Instruments Directive 2004/22/EC; included in MID*
WELMEC 8.3	*Quality of production, final product inspection and product testing*
WELMEC 8.8	*Intended use as 'electronic calculating and indicating device' part of measuring system of liquids other than water (MI-005) and intended use as 'Calculator and Indicator device for a gas meter' (MI-002)*
EN 61326	*Electromagentic Compliance specification for Industrial locations; included in MID*
EN 55011	*Electromagnetic Compliance specificationl included MID*
CSA C22.2 61010-1	*Issued:2004/07/12 Ed:2 (R2009) Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use Part 1: General Requirements, with general instruction No. 1: 2008/10/28 - (R2009)*
UL 61010-1	*Issued: 2004/07/12 Ed:2 Rev:2008/10/28 UL Standard for Safety Electrical Equipment for Measurement, Control, and Laboratory Usel; Part 1: General Requirements*
2004/108/EC	*Electric compatibility directive*
2004/22/EC	*Measuring Instruments Directive*

ENCLOSURE COMPARISON

Flow-X/S   Flow-X/K   Flow-X/P   Flow-X/R   Flow-X/B

Flow-X/M modules can be delivered with various mounting assemblies to create a variety of form factors, each with specific features for maximum flexibility and many different system architectures. All options require an external 24 V DC power supply with optional redundant connections.

	Approximate weight	Overall dimensions (h x w x d)	Mounttype	Max. Flow-X/Ms	Maximum I/O
Flow-X Flow Computers					
Flow-X/M	0,8 kg / 1.7 lbs	166/6.5 x 50/2.0 x 115/4.5 [mm/inch]	N.A.	N.A.	N.A.
Flow-X/S*	2,5 kg / 5.4 lbs	250/9.8 x 142/5.6 x 164/6.5 [mm/inch]	Wall / DIN rail	1	2 x 39 pin screw terminals 2 x Ethernet 1 x 8 pin power
Flow-X/K*	1,7 kg / 3.6 lbs	353/13.9 x 60/2.4 x 131/5.2 [mm/inch]	Wall / DIN rail / Rack***	1	2 x 37 pin D-Sub 2 x Ethernet 1 x 4 pin power
Flow-X/P0**	3,7 kg / 8.2 lbs	235/9.3 x 137/5.4 x 322/12.7 [mm/inch]	Panel / Rack	4	8 x 37 pin D-Sub 2 x Ethernet 1 x 4 pin power
Flow-X/R0**	5,0 kg / 11.0 lbs	355/14.0 x 482/19.0 x 135/5.3 [mm/inch]	Rack / Wall	8	16 x 37 pin D-Sub 16 x Ethernet 8 x 4 pin power
Flow-X Accessoires					
Flow-X/B	1,2 kg / 2.6 lbs	130/5.1 x 482/19.0 x 55/2.2 [mm/inch]	Wall	N.A.	1 x 37 pin D-Sub 1 x 5 pin power 8 x 5 pin DI connector 2 x 3 pin AO connector 3 x 3 pin AI connector 1 x 4 pin PRT connector 1 x 4 pin I/O_gnd connector

* Including Flow-X/M module
** Excluding Flow-X/M modules
*** In combination with a DIN rail - Rack adapter

ABOUT SPIRIT IT

We make flow measuring systems better, smarter and more accurate.

A MEMBER OF THE ABB GROUP

ABB
Power and productivity
for a better world™

Since November 2014, Spirit IT has become a member of the ABB Group. The acquisition adds a new line of high-performance custody transfer solutions to ABB's measurement business unit.

ABB is a leader in power and automation technologies that improve performance while lowering environmental impact. With thousands of experts around the world and high-performance innovations, ABB's team is dedicated to making measurement easy for its customers.