

XFC 6410, XFC 6413, and XFC 6713 Differential flow computer



Introduction

XSeries devices, from the Totalflow division of ABB, provide functionality only possible through the convergence of RTU, PLC and flow computer concepts. Representing a unique milestone in the development of remote, low power measurement and control devices, ABB Totalflow's XSeries products are available in one of two product families:

- eXtendable Flow Computers (XFC)
- eXtendable Remote Controllers (XRC)

This datasheet focuses on the XFC products for differential meters. Benefits and features of these particular products include:

- Smart Integral Multivariable Transducer (XIMV)
- Comprehensive custody quality math and data history
- Automation, control, alarming and data logging capability
- Local display and optional keypad
- Quick, easy installation
- Flexible communications
- Extendable hardware and software

These XSeries devices provide significant value for remote measurement sites. With low power, accuracy and system integrity built in, these flow computers are proven daily on thousands of sites. Totalflow products provide users the best opportunity for successful projects – site by site or system by system.

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Differential flow computer

Description

These XSeries devices are full featured units that are provided with an Integral Multivariable Transducer (XIMV) to measure differential pressure, static pressure and temperature from a single differential pressure meter run. Each XIMV is housed in a shielded environmentally protected enclosure which is mounted inside the main electronics compartment and is certified and calibrated at Totalflow's factory before shipment. Multi-tube capability is included with each unit and is easily invoked with a few configuration changes and interface connection to external transducers, either digital or analog.

Each unit is powered by an internal battery that can be solar charged (or other suitable DC supply) for remote unattended operation. Several charging options are available. The XFC 6410 and XFC 6413 accommodate up to a 26AH battery and the XFC 6713 accommodates up to a 42AH.

XIMV calibration and flow computer configuration parameters are programmed into a permanently non-volatile memory at the factory. This allows the units to be shipped to your exact configuration that will remain intact, even if a 'cold start' is required.

Communications interface cables and equipment can be installed at the factory, ready for quick installation.

Checking and modifying configuration and calibration is accomplished with ABB Totalflow's PCCU32 laptop software running on a 32-bit Windows operating system.



In addition to basic flow computer inputs (DP, SP and TF), the standard device includes: two analog inputs (0-5 volts), two digital outputs, and two state inputs (configurable as either digital inputs or pulse accumulator inputs). IO modules can be added to extend the hardware IO capability. The XFC 6413 accommodates up to three (3) TFIO modules and the XFC 6713 accommodates up to six (6). The XFC 6410 cannot accommodate IO modules.

In addition to the local configuration port, two communications ports are supplied with the standard unit. These ports are modular and user selectable for RS232 and/or RS485. An additional port may be added using a TFIO Module. Communications throughput is rated to 19.2 Kbaud. Protocols can include Totalflow native low power, Totalflow modbus RTU or ASCII, Enron modbus, others.

Hardware modularity

Hardware functionality of XSeries devices can be extended in a flexible and simple way by adding modular IO as needed.

Totalflow's TFIO modules are designed to accommodate low power, harsh environments at economical cost. The system recognizes the module types automatically and configures the IO Scanner subsystem accordingly.

Supported TFIO Modules Include:

- Analog In (8 channel)
- Analog Out (4 channel)
- Binary (DI, DO, PI-8 channels, software selectable)
- RTD (4 channel)
- Thermocouple (4 channel)
- Valve Control (digital or analog)
- Communications (software selectable RS232,485,422-1 channel)

For more detailed information about TFIO modules request information on data sheets 2101105 through 2101112.



Software modularity

A keenly flexible and stable real time environment, this software represents significant modularization through use of object oriented design principles. Totalflow supplied objects (applications) can be instantiated in our factory or by you, one or more times on the same device. It is this framework that allows the support for multi-tube measurement.

Supported Software applications continually grow, but a sample of standard applications include:

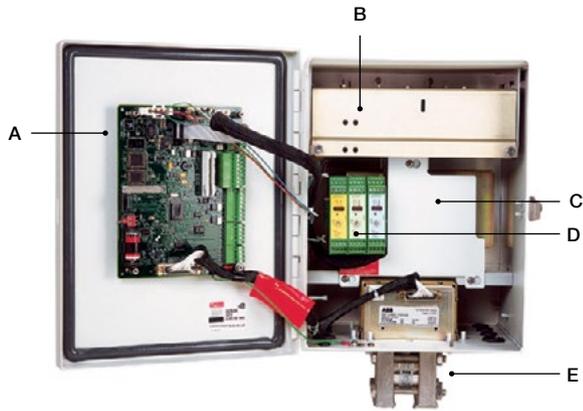
- AGA3 orifice meter run
- ISO 5167 orifice meter run
- VCone meter run
- AGA7 rotary/turbine meter run
- Ultrasonic meter run
- Wedge meter (water or gas)
- Realtime Datalogger (trending)
- Valve Control (Feedback controller)
- RAMS (Alarming, Exception Reporting)
- Operators (simple custom math / logic)
- IEC 61131 (complex math / logic)
- Selectable Units (user selectable engineering units)
- Display/Keypad Handler
- IO subsystem handler
- Tank level application
- Therms master application
- Therms slave application
- Multiple protocols (Totalflow native low power, Modbus slave (RTU/ASCII), Modbus master (RTU/ASCII), LevelMaster, Btu 8000/8001, Enron Modbus, MotorSaver, ABB 267CS/269CS (XMV) Multivariable, Altronic and others).

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XSeries flow computer features

- Significant hardening against over-current / transients
 - Positive temperature coefficient fuses and transient protection on
 - VBATT and SWVBATT outputs
 - Each of the Digital Outputs
 - Battery Charger input
 - EMI/RFI suppression beads on all I/O points
 - Protection against reverse polarity wiring
 - Power supply circuit designed to protect XIMV from hot insertion
- Low power design operating as low as 8ma (<100 mW)
- Aluminum enclosure, powder coated
- Flexible accommodation of communications hardware
- Cost effective communications kits
- Stable time base (accurate integration)
- Rechargeable, lead acid batteries
- Solar, AC or DC charging options
- Dual level security code data protection
- Monitors user limits for detection, and reporting of abnormal conditions
- 40+ days historical records (user configurable up to 180+ days of hourly and daily data records)
- Defaults to 200 Events. User configurable.
- Complies with API 21.1 standard for custody transfer devices
- Flow and energy calculations per AGA 3-85, AGA 3-92 and AGA-5
- Optional support for other primary elements
- Super compressibility calculations per NX-19 or AGA8-92 Gross or Detail
- Smart (temperature and pressure compensated) integral, factory calibrated, multi-variable transducer (XIMV)
- Flow retention during transducer calibration
- Selectable 3 or 5 point transducer calibration
- Programmable DP zero cut-off
- 100 ohm platinum RTD
- Automatic internal calibration of RTD with user programmable offset
- Hazardous Area Classifications: CSA C/US Class 1, Div 2 Groups C/D, (ATEX EExd11B, IECEx Exd11B-Pending)
- Real time clock that keeps running on lithium battery
- Advanced embedded data logger
- Programmable alarm filtering
- Exception reporting capability
- Multiple protocol options including Totalflow packet protocol, various modbus protocols and others
- User programmable modbus register maps
- User programmable math and logic sequences
- IEC 61131 capability
- Valve control and nominations capability



- A. FC195 board
- B. Communications equipment compartment
- C. Battery compartment
- D. TFIO modules
- E. XIMV, Integral Multivariable Transducer

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Differential flow computer

General specifications

		XFC 6410	XFC 6413	XFC 6713
Dimensions	Width	10.000 in. (254.00 mm)	12.756 in. (324.00 mm)	14.920 in. (379.53 mm)
	Height	13.200 in. (335.28 mm)	17.825 in. (452.76 mm)	21.845 in. (554.86 mm)
	Depth	9.370 in. (233.00 mm)	10.269 in. (260.83 mm)	13.710 in. (348.23 mm)
Installed depth	Pipe mount	10.680 in. (271.27 mm)	11.584 in. (294.23 mm)	14.560 in. (369.82 mm)
	Wall mount	10.120 in. (257.05 mm)	11.019 in. (279.88 mm)	14.000 in. (355.60 mm)
Weight (w/o battery)		Approx. 13.5 lbs (6.13 kg)	Approx. 15 lbs. (6.8 kg)	Approx. 29 lbs. (13.1 kg)
Max IO modules		0	3	6
Max battery capacity		26AH	26AH	42AH
Certification		CSA C/US Class 1, Division 2, Groups C & D hazardous area classification. (ATEX Zone 2 pending)		
Mounting		Wall, pipe, or direct		
Operating temperature (ambient)		-40°F to 140°F (-40°C to 60°C)		
Humidity		0 - 95% non-condensing		
EMC requirements		<p>EMISSIONS: European Regions: EN55011/EN55022 Class A Emissions (Radiated & Conducted)</p> <p>EMISSIONS: North America Regions: CFR 47, Part 15, Subpart B, Class A, FCC Emissions ICES-003 Issue 2, Rev. 1, Class A ITE Emissions</p> <p>IMMUNITY: European Regions: EN50082-1:98 Immunity EN61000-4-2:95, ESD, + 8 kV Air, + 4 kV Contact EN61000-4-3:95 RF Immunity, 10 V/m EN61000-4-4:95 EFT, 1 kV EN61000-4-5:95 Surge; 1kV line to line, 2kV line to earth EN61000-4-6:95 Conducted Susceptibility, 3 Vrms EN610004-8:93 Power Frequency Magnetic Field 3 A/m EN610004-11:94 Voltage DIP and interrupt</p>		
FC195 board				
Power		Nominal 12 VDC battery		
Charger		Solar or 16-18 VDC		
Memory		Data stored in 512K SRAM. (Lithium battery backup) Applications programs stored in 512K Flash. Flash loader stored in 512K PROM Registry and configuration files stored in 32K E ² PROM Transducer factory calibration data stored in separate E ² PROM		
Comm Ports		1 - dedicated – PCCU (Local Configuration Port) 2 - RS232 or RS485 (via board insertion modules)		
Microprocessor		High integration micro-controller with 20bit address bus (1M), operating at 11MHz		
LCD interface		Dedicated interface for 2 X 24 Liquid Crystal Display (LCD)		
Keypad interface		Dedicated interface for optional ABB supplied keypad		
IO expansion		I ² C bus interface for TFIO modules		
Security switch		Dual-level security switch on-board		
Time base stability		± 7.5 ppm (parts per million)		
IO scan rate		1 time per second		

Integral Multivariable (XIMV) specifications

Multivariable unit

Temperature limits	Compensated	-20 to 140°F (-29 to 60°C)
	Operational	-40 to 185°F (-40 to 85°C)
	Storage	-40 to 185°F (-40 to 85°C)
Analog-to-Digital resolution (IMV & Onboard AI's)	18 Bit maximum resolution (0.00038% FS); 16 Bit nominal resolution (.0015%FS)	
Vibration performance	1.5 INW per G (2G maximum) at 1 Hz, decreasing to zero at 1KHz in straight line mode	
Mounting specification	Change from perpendicular (front to back / around X-axis) will be ≤ 1.5 INW (Can be corrected with calibration)	
Reference conditions	Temperature at most recent factory or user calibration; Static pressure and differential pressure < 100% of URL	

Static pressure

Accuracy (including linearity, hysteresis, & repeatability at reference conditions)	$\pm 0.05\%$ of user calibrated spans from 20% to 100% of URL
Ambient temperature effect per 160 °F (71 °C)	$\pm 0.15\%$ of URL $\pm 0.125\%$ of reading
Stability (for 12 months)	$\pm 0.1\%$ of URL

Differential pressure

Accuracy (including linearity, hysteresis & repeatability at reference conditions)	$\pm 0.05\%$ of user calibrated spans from 20% to 100% of URL
Ambient temperature effect per 160 °F	$\pm 0.15\%$ of URL $\pm 0.125\%$ of reading
Stability (for 12 months)	$\pm 0.1\%$ of URL
Static pressure effect (DP Zero) per 1500 psi	+ 0.03% of URL per 1500 psi (3200 psi maximum)
Static pressure effect (DP Span) per 1500 psi	+ 0.1% of Reading per 1500 PSI (3200 PSI maximum)

Temperature

Process range	-80 to +230°F (-62 to 110°C)
Accuracy (as shipped from factory)	$\pm 0.35^\circ\text{F}$ ($\pm 0.2^\circ\text{C}$) over operating range
Accuracy (after single point field calibration)	$\pm 0.2^\circ\text{F}$ ($\pm 0.12^\circ\text{C}$) repeatability over operating range

Available ranges

AP (psia)	DP (inches H2O)	100	150	250	500	1000	1500	2000	3200
	100	✓		✓	✓	✓	✓		
	150	✓	✓	✓	✓	✓	✓	✓	
	250	✓	✓	✓	✓	✓	✓	✓	✓
	400			✓		✓	✓		✓
	800						✓		✓

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