ABB MEASUREMENT & ANALYTICS | DATA SHEET

XFC^{G5}

Differential flow computer

Measurement made easy

An upgraded path to new digital technologies

The new generation of Flow Computers and RTUs offers a low-power, high-reliable microprocessor-based unit with a new Linux operating system, persistent memory, and new connectivity, combined with the same wide range of measurement, monitoring, and alarm applications for remote oil and gas systems. It also provides an upgrade path to new digital technologies and protocols such as MQTT, and a secured wireless connection (WiFi-Access Point or Bluetooth).

Forward compatibility

- Built to be compatible for future applications

New features

- Supports Wi-Fi access point and Bluetooth
- New pulse inputs voltage range

Integral multivariable

- Accuracy of ±0.05% of user calibrated spans from 20% to 100% of URL
- Ambient temperature effect of ±0.075% of URL
- Stability (for 12 mo) of ±0.1% of URL

Backward compatibility

- Same hardware form and factor of previous generation
- Majority of the features such as on board I/O, wirings, and software configurations are compatible with G4 XFC & XRC devices

Certifications (hazardous location classification)

- CSA C/US Class I, Div 2, Groups C&D T3 -40°F (-40°C) to +140°F (+60°C)
- ATEX: Sira 10ATEX4138X II 3G Ex nAc IIB Ge T3 Ta= -40°C to +60°C (European Union Directive 2014/34/EU)
- IECEx: CSA09.0013X, Ex nAc IIB Ge T3 (-40°C ≤ Tamb ≤ +60°C)

Overview

XSeries^{G5} devices continue to provide a large set of functionalities related to RTC, PLC, and flow computer concepts but now in a forward-looking microprocessor and a Linux environment. ABB Totalflow's XSeries G5 products are available in one of two product families:

- eXtendable Flow Computers (XFC^{G5})
- eXtendable Remote Controllers (XRC^{G5})

This datasheet focuses on the XFC^{G5} products for differential meters. The XFC^{G5} is the "fifth generation" of Totalflow flow computers. Benefits and features of these particular products include:

- Smart Integral Multivariable Transducer (XIMV)
- Comprehensive custody quality data history
- Automation, control, alarming and data logging capability
- Base I/O targeted at low cost automation projects
- New PI operational range
- Quick, easy installation
- WiFi and Bluetooth for local wireless connectivity
- Onboard Ethernet port
- Backward compatibility
- Extendable hardware and software

Description

The XFC^{G5} includes an Integral Multivariable Transducer (XIMV) to measure differential pressure, static pressure and temperature from a single differential pressure meter run. The XIMV is housed in a shielded, environmentally protected enclosure which is mounted inside the flow computer enclosure and is characterized and calibrated at Totalflow's factory. Multi-tube capability is available in each unit and is easily invoked with a few configuration changes and interface connection to external transducers, either digital or analog.

The processing and memory capability of the XFC^{G5} allows the user to run more applications faster than ever before. Up to twenty (20) AGA3 measurement tubes performing full calculations once a second or eight (8) wells with fully configured control and measurement applications for liquid and gas.

In addition to the basic flow computer inputs (DP, SP and TF), the standard device includes: two (2) analog inputs (0 to 10 volts DC), two (2) digital outputs and two (2) digital inputs which can be configured as either status inputs or pulse accumulator inputs and two different operation voltage ranges.

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.

In addition to the local configuration serial port, two communications ports are supplied with the standard unit. These ports are modular and user selectable for RS232 and/or RS485.

One integrated 10/100 Base-T Full duplex Ethernet port for net-work connectivity as standard offering together with WiFi and Bluetooth is available as well as a local wireless connectivity for Flash download and local configuration.

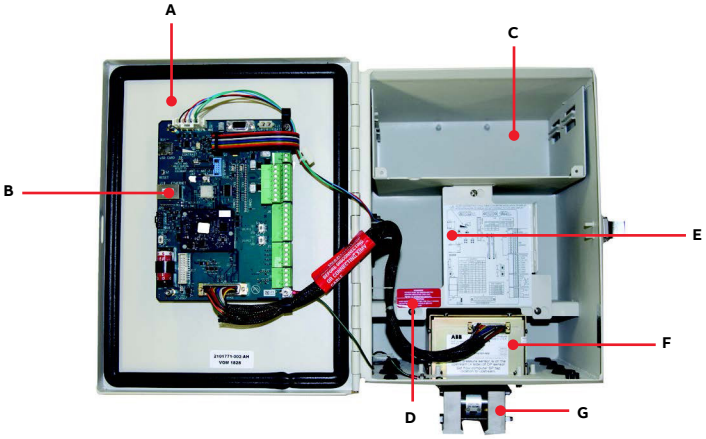
XSeries^{G5} remote controller features

- 399Mhz, TI ARM Cortex AM335X, 32-bit microprocessor
- Embedded Linux operating system (allows for a single software development environment for all G5 products
- Integrated Ethernet 10/100Base port (full networking capabilities)
- Wireless Access Point (Wi-Fi) which support up to 10 client connections
- On-Board Bluetooth Capability which can be used for configuration & collection.
- USB host and USB device ports (ver 2.0): used as a high speed local configuration and collection port
- Significant hardening against over-current transients:
  - Positive Temperature Coefficient, resetting fuses and transient protection on
  - VBATT and SWVBATT outputs
  - Each of the digital outputs
  - Battery charger input
  - Power supply circuit designed to protect XIMV from hot insertion
- Base I/O on XFC^{G5} main electronics board:
  - 2 analog inputs
  - 2 digital inputs (all can be configured as hi speed PI inputs Configurable IEC & STD PI inputs)
  - 2 digital outputs
  - Battery voltage
  - Charger voltage
- Low power design operating as low as 8 mA (<100 mW)
- Aluminum, powder-coated enclosure (3R)
- Flexible accommodation of communications hardware
- Cost-effective communications kits
- Stable time base (accurate integration)
- Rechargeable, lead acid batteries
- Solar, AC or DC charging options
- User-selectable, simple dual-level security code data protection or enhanced user-configurable Role Based Access Control (RBAC)
- Hazardous Area Certification: CSA C/US, ATEX and IECEx
- Real-time clock that continues running on lithium battery
- Additional real-time clock back-up for 48 hrs without lithium battery

Hardware modularity

Hardware functionality of XSeries^{G5} devices can be extended in a flexible and simple way by adding modular I/O as needed. ABB's TFIO modules are designed to accommodate low power, harsh environments at economical cost. The system recognizes the module types automatically and configures the I/O Scanner subsystem accordingly.

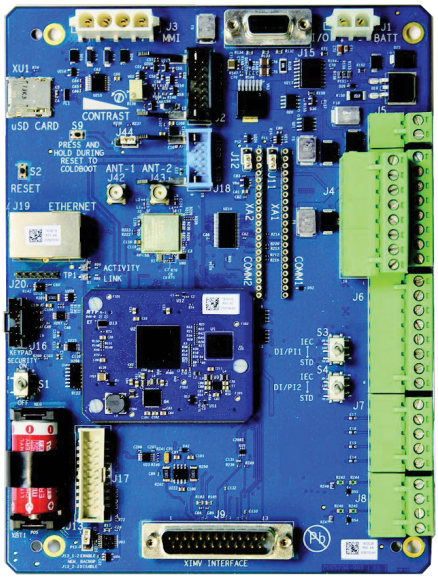
For more detailed information about TFI0 modules, request information on data sheets 2101105 through 2101112.



A XFC^{G5} board
B Ethernet port
C Communications equipment compartment
D Battery compartment
E USB (host & device)
F TFIO expansion modules
G Integrated multivariable transducer

Software modularity

The software design supplied applications that can be enabled in our factory or by the user, one or more times on the same device. It is this framework that allows the support for multitube measurement, well optimization, site operation, and engineering tools that allows customization to each particular installation.



Model comparison	XFC^{G5} 6410	XFC^{G5} 6413	XFC^{G5} 6713
Dimensions	10" wide x 13.2" high x 9.37" tall 254 mm x 335.28 mm x 233 mm	12.76" wide x 17.83" high x 10.27" tall 324 mm x 452.76 mm x 260.83 mm	14.92" wide x 21.85" high x 13.71" tall 379.53 mm x 554.86 mm x 348.23 mm
Installed depth (pipe mount)	10.680" / 271.27 mm	11.584" / 294.23 mm	14.560" / 369.82 mm
Installed depth (wall mount)	10.120" / 257.05 mm	11.019" / 279.88 mm	14.000" / 355.60 mm
Approx. weight (w/o battery)	13.5 lbs / 6.13 Kg	15 lbs / 6.8 Kg	29 lbs / 13.1 Kg
Max I/O modules	0	3	6
Max bettery capacity	26AH	26AH	52AH

Custody transfer applications

- Monitors user limits for detection, and reporting of abnormal conditions
- Defaults to 40 days of hourly data and 50 Days of daily data, user configurable.
- Defaults to 200 Events. User configurable.
- Complies with API 21.1 standard for custody transfer measurement devices
- Flow and energy calculations per AGA3-85, AGA3-92, AGA-7, AGA-5 and ISO 5167
- Meets flow computer requirements as stated in AGA Report No. 9, 'Measurement of Gas by Multi-path Ultrasonic Meters'
- Super compressibility calculations per NX-19, AGA8-92 Gross or Detail, ISO 12213
- Smart (temperature and pressure compensated) integral, factory calibrated, multivariable transducer (XIMV)
- All calculations performed once per second (user configurable to longer period)
- Flow retention during user transducer calibration
- Selectable 3 or 5 point user calibration of analog inputs
- User-definable DP, no flow cut-off
- 100 ohm platinum RTD resistance curve fit with user programmable single point offset or 3/5 point user calibration for RTD input
- 100 ohm platinum RTD

Control and Automation applications

- Advanced embedded data logger (trending)
- Programmable alarm filtering
- Exception reporting capability
- Multiple protocol options including Totalflow packet protocol, various Modbus protocols and others
- User-programmable Modbus register maps (both slave and master)
- User-programmable math and logic sequences
- IEC 61131 capability (ISaGRAF)
- Valve control and nominations capability
- PID controller
- Plunger lift control
- Gas lift control
- Advanced embedded data logger (trending)
- Programmable alarm filtering

General specifications

Enclosure

Powder-coated aluminum; Type 3R

Certification (hazardous location classification)

CSA C/US Class I, Div 2, Groups C&D T3 -40° F (-40°C) to + 140° F (+60°C)
ATEX: Sira 10AT EX4138X, II 3G Ex nAc IIB Gc T3 Ta= -40°C to +60°C (European Union Directive 2014/34/EU)
IECEx CSA09.0013X, Ex nAc 11B GcT3 (-40°C ≤ Tamb ≤ +60°C)

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

Emissions - European Regions
EN61326-I:2012 Class B Emissions (Radiated & Conducted)

Emissions - North America regions
CFR 47, Part 15, Subpart B, Class B, FCC Emissions
ICES-003 Issue 4 CAN/CSA-CEI/IEC CISPR 11:2016, Class B ITE Emissions
AS/NZS CISPR 11-2016 (Australia/New Zealand)

Immunity: European regions
EN61326-1:2012 Electrical Control Equipment
EN61000-4-2 ESD: 2008 + 8 kV Air, + 4 kV Contact
EN61000-4-3:2005 RF Immunity, 10 V/m
EN61000-4-4 EFT: 2012, 2kV/1kV
EN61000-6-6:2013, Conducted Susceptibility, 3 Vrms
EN61000-4-8:2009, Power Frequency Magnetic Field 30 A/m

...General specifications

Integral Multivariable (XIMV) Specifications

Temperature limits	
Compensated	-20 to 140°F (-29 to 60°C)
Operational	-40 to 140°F (-40 to 60°C)
Storage	-40 to 185°F (-40 to 85°C)

Analog-to-digital resolution (XIMV & onboard AI's)
18 Bit maximum resolution (0.00038% FS)
16 Bit nominal resolution (0.0015%FS)

Vibration performance
1.5 INW per G (2G maximum) at 1 Hz, decreasing to zero at 1 KHz in straight line mode

Mounting specification
Change from perpendicular (front to back / around X-axis) ≤ 0.5% of URL (can be corrected with calibration)

Reference conditions
Temperature at most recent factory or user calibration;
Static pressure and differential pressure ≤ 100% of URL

Single Seal rated (ANSI/ISA 12.27.01)
PMax = 3000 psi

NACE Materials
Wetted materials meet NACE MR0175/ISO 15156

Temperature

Process range
-80 to +230°F (-62 to 110°C)

Accuracy (as shipped from factory)
± 0.35°F (± 0.2°C) over operating range

Accuracy (after single point field calibration)
± 0.2°F (± 0.12°C) repeatability over operating range

Static pressure

Accuracy (including linearity, hysteresis, & repeatability at reference conditions)
± 0.05% of user calibrated spans from 20% to 100% of URL

Ambient temperature effect within the operational temperature limit
± 0.075% of URL ± 0.06% of reading

Stability (for 12 months)
± 0.1% of URL

Differential pressure

Accuracy (including linearity, hysteresis & repeatability at reference conditions)
± 0.05% of user calibrated spans from 20% to 100% of URL

Ambient temperature effect within the operational temperature limit
± 0.075% of URL ± 0.06% of reading

Stability (for 12 months)
± 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)

Available ranges / AP (psia)								
DP (inches H_2O)	100	150	250	500	1000	1500	2000	3200
250	–	–	–	–	–	–	–	–
400			–		–	–		–
800					–			–

XFC^{G5} specifications

Power

Nominal 12 V DC battery

Charger

Solar or 15 V DC, 30 W maximum

Memory

- Embedded Linux Operating System 256 MB of RAM
- Persistent 64MB for storing configuration and flow data. Persistent 8GB flash storage for applications.

Communications ports

1 – dedicated – PCCU (local configuration port)
2 – RS-232 or RS-485 (via board insertion modules) baud rates up to 115,200
1 – USB 2.0 host port – optional
1 – USB 2.0 device port (may be used as high-speed local configuration port) – optional
1 – 10/100 Base Ethernet port
1 - Wireless access point (Wi-Fi)
1- On-Board Bluetooth

LCD interface

Dedicated interface for 2 X 24 Liquid Crystal Display (LCD)

Keypad interface

Dedicated interface for optional ABB supplied keypad

I/O expansion

I²C bus Interface for TFIO modules

Security switch

On/Off dual-level on-board security switch; also supports enhanced Role Based Access Control (user configurable, multilevel, multi-user security)

Time base stability

± 7.5 ppm (parts per million)

I/O scan rate

1 time per second (1 Hz)

AGA-3/AGA-7/ISO5167/VCone

Calculations are tested and verified to be within ± 50 parts per million as stated in API 14.3.4

Analog inputs (onboard)

18 bit maximum resolution (0.00038% FS);
16 bit nominal resolution (0.0015%FS)
2 single-ended channels*
Open circuit voltage: 0 V DC
Short circuit leakage current: 0 µA typical
Input impedance: 21 kΩ typical (0 to 7.5V)
Measurable input voltage range: - 0.5V to 7.5V
Maximum voltage on input line: 30 V DC
* For 4 to 20 mA inputs, an external power source may be required if device requires more than 12 V DC nominal.

Digital inputs/pulse inputs (onboard)

- 2 inputs configurable as active or passive with optional software de-bounce.
- Open circuit voltage: 5 V DC (Internally pulled up to 5 V DC nominal)
- Short circuit leakage current: – 395 µA typical
- Input capacitance: 0.1 µFd typical
- Maximum allowable voltage range on input: - 0.5 V DC to 15 V DC
- Maximum frequency input 100 Hz @ 50% duty cycle with de-bounce enabled
- Maximum frequency input 20 kHz @ 50% duty cycle with de-bounce disabled
- Dry contact (Form A), open collector or active voltage
- Minimum contact resistance to activate input: 1000 Ω
- Voltage threshold to deactivate the input: 3.1 V (referenced to GND terminal)
- Voltage threshold to activate the input: 0.5 V (referenced to GND terminal)
- Conductor pairs must be shielded to prevent spurious signals

Digital outputs (onboard)

- 2 open channel FET transistor switches
- Open circuit voltage: 0 V DC
- Short circuit leakage current: 0 µA typical
- Output capacitance: 1,000 pF typical
- Maximum allowable voltage range on output: - 0.5 V DC to 26.4 V DC
- Open drain FET type
- ‘ON’ resistance: 0.1 Ω typical (including PTC fuse resistance)
- Maximum pulse current: 3A for 5 seconds
- Maximum continuous sink current: 2A

Application/description chart

ABB's flow computers and RTUs come standard with numerous applications built in. We offer a "credit" system that allows users to choose which applications best suit their needs. Each unit comes with a standard number of credits and more credits can be purchased if necessary.

		No. of credits included with purchase	
		4	4
Application	**Description**	**XFC^{G5}**	**XRC^{G5}**
Operational applications			
Analysis Trend File	Gas composition logs from online GC	$	$
Communications	Used to set up communication	–	–
Conversion Units	Converts units of measure	–	–
Coriolis Data Interface	Communication interface for Coriolis meter	–	–
Display	Controls data shown on LCD display	–	–
Enron Interface	Enron Modbus support of AGA3 and AGA7	–	–
Holding Registers	General purpose data registers	–	–
I/O Interface	Scans all I/O data, onboard and TFIO modules	–	–
Level Master Interface	Interface to the Level Master product	–	–
NGC Client	TCP/IP Modbus interface to NGC	–	–
Operations	Configurable math and logic functions	–	–
Protocol Multiplexer	Interfaces two host systems to one communications channel	$	$
Pulse Accumulator	Scales and accumulates pulse inputs for basic volume totals	–	–
RAMS (Alarm) System	Configurable alarm detection, logging, and reporting	–	–
Therms Master	Gathers and sends gas analysis data via Modbus to Slaves	–	–
Therms Slave	Receives gas analysis data from EFM with Therms Master	–	–
Trend System	Configurable trending functionality	–	–
WLIO Interface	Interface to the WellTell wireless products	–	–
XMV Interface	Communications interface for an external multivariable	–	–
Automation applications			
Gas Lift	Artificial lift for wells with liquid loading problems	$	$
IEC Interface	IsaGraf Custom Logic	$†	$†
Pad Controller	Allows control of multiple wells	$	$
PID Control	Allows the use of PID controllers	–	–
Plunger Lift	Allows control of a plunger on a production well	$	$
Pump Control Interface	Prebulit interfaces for various pumps	$	$
Shutdown System	Shutdown a well or site	–	–
Valve Control (AO/DO)	Allows control of flow / pressure using Valve Control Module	–	–
Measurement applications			
AGA3	Orifice gas measurement	$	$
AGA7	Linear gas measurement	$	$
Coriolis Measurement	Coriolis gas flow measurement	$	$
Liquid Measurement	Linear liquid (API) measurement	$	$
NIST 14 Gas	CO2 measurement	$†	$†
NIST 14 Liquid	CO2 measurement	$†	$†
Nozzle Measurement	Flow nozzle gas and water measurement	$	$
Oil Transfer Measurement	Creates truck load ticket from tanks	$	$
VCone	VCone gas flow measurement	$	$
Wedge Gas	Wedge gas flow measurement	$	$

– = included in purchase
$ = credit required
† = IEC credit

Comparison chart

Description	XFC^{G4}	XFC^{G5} Backward compatible	XRC^{G4}	XRC^{G5} Backward compatible
Integrated sensor	Yes	Yes	No	No
AI	2	2	5	5
DI	2 (DI or PI)	2 (DI or PI)	4 (DI or PI)	4 (DI or PI)
DO	2	2	4	4
Extended PI Option	-	2 (5 V DC threshold)	-	4 (5 V DC threshold)
TFIO	Yes	Yes	Yes	Yes
Processor	ARM920T, 32-bit	AM3358 ARM CortexA8	ARM920T, 32-bit	AM3358 ARM CortexA8
CPU	203Mhz	399Mhz	203Mhz	399 Mhz
Memory		Programs/Applications/Data Storage = 16GB LPDDR RAM Program execution = 256 MB		Programs/Applications/Data Storage = 16GB LPDDR RAM Program execution = 256 MB
Memory backup	Lithium backup	Solid state persistent storage	Lithium backup	Solid state persistent storage
Operating system	Windows CE	Linux	Windows CE	Linux
Lithium battery functionality	Runs real time clock and backup memory	Real time clock only (losing lithium battery will not execute a cold boot). Note 1	Runs real time clock and backup memory	Real time clock only (losing lithium battery will not execute a cold boot). Note 1
Additional real-time clock backup	No	Yes	No	Yes
Onboard serial-com ports	2	2	2	2
USB host/device	1-host 1-device	1-host 1-device	1-host 1-device	1-host 1-device
Local-serial PCCU	1-serial port	1-serial port	1-serial port	1-serial port
Ethernet port	1-10 base-T Half duplex	1-10/100 Base-T Full Duplex	1-10 Base-T Half Duplex	1-10/100 Base-T Full Duplex
WiFi & Bluetooth	N/A	Yes (Access Point) Note 3	N/A	Yes (Access Point) Note 3
Wiring PINOUTs	-	Same as G4	-	Same as G4
Engine card	Yes	No engine card	Yes	No engine card
New cold-boot	No	Yes. See note 1	No	Yes. See note 1
Application limitations	-	Yes. See note 2	-	Yes. See note 2

Notes:
1. The lithium battery maintains operation of the real time clock. The lithium battery backup jumper (JI) is located near the Lithium Battery slot. The real time clock will continue to operate for 24-36 hours under typical conditions in case the lithium battery stops working. After this time, the unit will not cool-boot, and it will keep the last good known time and date.
2. Limiting number of applications (XSeries^{G5} up to 100 Applications running at the same time)
3. The XFC and XRC support Wi-Fi Access Point (AP) functionality. This allows wireless local access for clients with Wi-Fi wireless capabilities. SSID broadcasting and separate logging and IP/Subnet from the Ethernet Port. The XFC and XRC support Bluetooth functionality to allow wireless local access. This procedure enables onboard Bluetooth. Independent name and passcode from other remote connection if require.

Sales Service Software

Notes

Castel Maggiore (BO) 40013
Via Lirone 60/i

e-mail: info@eurotecsrl.com
Tel: +39 051/6321595
Website: www.eurotecsrl.com

C.F.: 04103780377
P.I.: 01596581205

—

ABB Inc.
Measurement & Analytics
Quotes: totalflow.inquiry@us.abb.com
Orders: totalflow.order@us.abb.com
Training: totalflow.training@us.abb.com
Support: totalflowsupport@us.abb.com
+1 800 442 3097 (opt. 2)

Main Office
7051 Industrial Boulevard
Bartlesville, OK 74006
Ph: +1 918 338 4888

Kansas Office
2705 Centennial Boulevard
Liberal, KS 67901
Ph: +1 620 626 4350

Texas Office – Odessa
8007 East Business 20
Odessa, TX 79765
Ph: +1 432 272 1173

Texas Office – Houston
3700 West Sam Houston
Parkway South, Suite 600
Houston, TX 77042
Ph: +1 713 587 8000

Texas Office – Pleasanton
150 Eagle Ford Road
Pleasanton, TX 78064
Ph: +1 830 569 8062

www.abb.com/upstream

—

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB.

© Copyright 2019 ABB.
All rights reserved.

DS/2102718-EN Rev. B 03.2019