

XRC^{G4} Remote controller



Overview

XSeries^{G4} 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, powerful measurement and control devices, ABB's Totalflow XSeries^{G4} products are available in one of two product families:

- eXtendable Flow Computers (XFC^{G4})
- eXtendable Remote Controllers (XRC^{G4})

This datasheet focuses on the XSeries^{G4} Remote Controllers (XRC^{G4}). The XRC^{G4} is the fourth generation of Totalflow RTUs. Benefits and features of these particular products include:

- Automation, control, alarming and data logging capabilities
- Base I/O targeted at low-cost, automation projects
- Local display and optional keypad
- Quick, easy installation
- Flexible communications
- Onboard Ethernet
- Comprehensive custody-quality math and data history
- Backward compatibility
- Extendable hardware and software

With low power, accuracy and system integrity built-in, these devices are proven daily on thousands of sites. Totalflow products provide users the best opportunity for successful projects – site-by-site or system-by-system.

XRC^{G4}

Remote controller

Description

The XRC^{G4} features a powerful 203Mhz, ARM920T, 32-bit microprocessor and Windows[®] CE operating system. The XRC^{G4} utilizes a unique, engine card design. The engine card contains the processor, application firmware and memory components. This allows the user to move the engine card with all programming intact from one device to another, if necessary. The processing and memory capability of this device, allows the user to run more applications faster than ever before. Up to twenty (20) AGA-3 measurement tubes performing full calculations once a second and twenty (20) advanced Plunger Lift applications may be running in one XRC^{G4}. In it's base configuration, this unit is equipped with standard I/O designed to meet the requirements of many low cost automation and measurement projects. The base I/O includes 5 analog inputs (0 to 10 V DC), four (4) digital outputs and four (4) digital inputs which can be configured as either status inputs or high speed, pulse accumulator inputs.

I/O modules can be added to extend the hardware I/O capabilities.



XFC^{G4} and XRC^{G4} devices are based on the same software environment. Applications available in one are also available in the other, including custody transfer measurement applications. The two significant differences between XFC^{G4} and XRC^{G4} devices concerns their hardware:

- XFC^{G4} devices include an integral multivariable transducer, and XRC^{G4} devices do not.
- There are more base I/O points on XRC^{G4} devices than on XFC^{G4} devices

	XFC ^{G4} XSeries ^{G4} flow computers	XRC ^{G4} XSeries ^{G4} remote controllers
Integral Transducer	Yes	No
AI	2	5
DI	2 (DI or PI)	4 (DI or PI)
DO	2	4

Multi-tube capability (up to 20 tubes) is available in 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.

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

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

In addition to the local configuration port, two serial communications ports are supplied with the standard unit. These ports are modular and user selectable for RS-232 and/or RS-485. An additional port may be added using a TFIO communications module.

One integrated, 10Base-T Ethernet port for network connectivity is standard, and a USB port for Flash download and local configuration is available as an option.

Hardware modularity

Hardware functionality of XSeries^{G4} devices can be extended in a flexible and simple way by adding modular I/O as needed.

Totalflow's TFIO modules are designed to accommodate low power, harsh environments at an economical cost. The system recognizes the module types automatically and configures the I/O 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 RS-232, -485, -422-1 channel)

For more detailed information about TFIO modules, request information on datasheets 2101105 through 2101112.



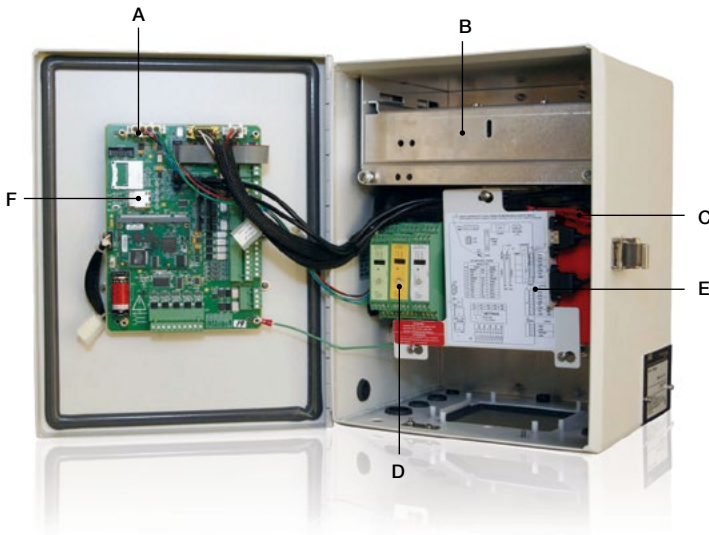
Software modularity

The software design represents significant modularization through the use of object-oriented design principles. This allows a flexible and stable, real-time environment. Totalflow supplied objects (applications) 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 multi-tube measurement. Supported software applications continually grow, but a sample of standard applications include:

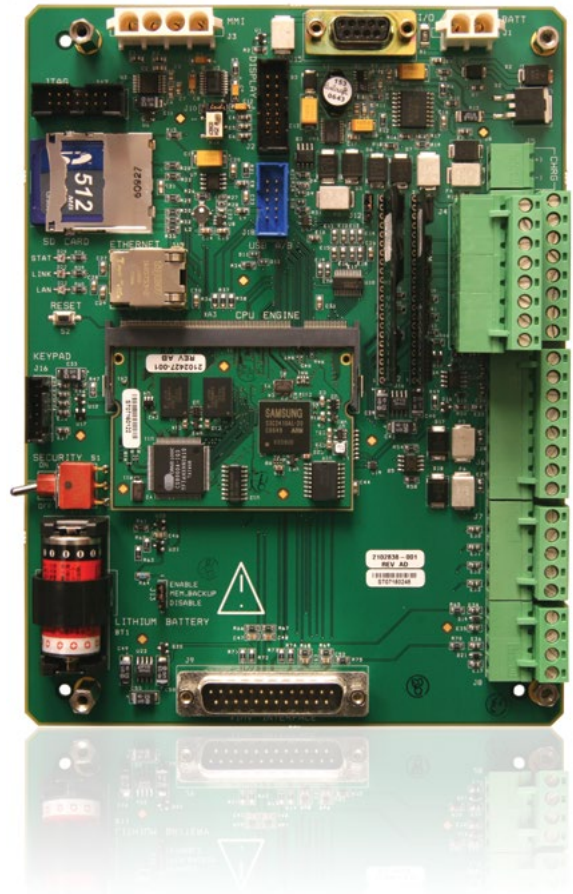
- AGA-3 orifice meter run
- ISO 5167 orifice meter run
- VCone meter run
- AGA-7 meter run (rotary/turbine/ultrasonic)
- Coriolis gas (serial or pulse input)
- PAD controller for multi-well sites
- Advanced plungerlift
- Real-time data logger (trending)
- Valve control (feedback controller)
- RAMS (alarming, exception reporting)
- Operators (simple custom math / logic)
- IEC 61131 (ISaGRAF)
- Selectable units (user selectable engineering units)
- Display / Keypad handler
- I/O subsystem Handler
- Tank level application
- Therms master or slave applications for online chromatograph interface
- Multiple protocols (Totalflow native low power, Modbus slave (RTU/ASCII), Modbus master (RTU/ASCII), LevelMaster, Btu 8000/8001, ABB 267CS/269CS XMV Multivariable, and others).

XSeries^{G4} remote controller features

- 203Mhz, ARM920T, 32-bit microprocessor
- Windows CE operating system (allows for a single software development environment for all G4 products)
- Integrated Ethernet 10Base-T port (full networking capabilities)
- USB host and USB device ports (ver 1.1): used for flashing new firmware and may be used as a high speed local configuration and collection port
- SD card capability (future non-volatile memory expansion)
- 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
- Base I/O on XRC^{G4} main electronics board:
 - 5 analog inputs
 - 4 digital inputs (all can be configured as hi speed PI inputs)
 - 4 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)
- 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
 - 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
- Hazardous Area Certification: CSA C/US, ATEX and IECEx (6895 model: CSA C/US only)
- Real-time clock that continues running on lithium battery (maintains data backup)
- Advanced embedded data logger (trending)
- Programmable alarm filtering
- Exception reporting capability
- Multiple protocol options including Totalflow packet protocol, various Modbus protocols including Enron Modbus 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 control
- Plunger lift (up to 20 applications per unit)



- A. XRC^{G4} board
- B. Communications equipment compartment
- C. Battery compartment
- D. TFIO modules
- E. USB (host & device)
- F. Ethernet port



XRC^{G4}

Remote controller

General specifications


		XRC ^{G4} 6895
Dimensions	Width	24 in. (609.6 mm)
	Height	30 in. (762 mm)
	Depth	13.5 in. (342.9 mm)
Weight		Approx 60 lbs. (27.2 kg)
Max I/O modules		22
Fused power terminals (DIN rail mounted)		20
Mini terminal connections (mini DIN rail mounted)		259
Certification		CSA C/US Class 1, Division 2, Groups C & D T4 -40°F to +140°F (model 6895 does not have ATEX or IECEx Zone 2 Certificates of Conformity)

*Does not support an internal battery



		XRC ^{G4} 6490	XRC ^{G4} 6790	XRC ^{G4} 6890
Dimensions	Width	12.756 in. (324.00 mm)	14.920 in. (379.53 mm)	20.090 in. (510.29 mm)
	Height	17.230 in. (437.64 mm)	21.845 in. (554.86 mm)	28.910 in. (734.32 mm)
	Depth	10.269 in. (260.83 mm)	13.710 in. (348.23 mm)	15.520 in. (394.21 mm)
Installed depth	Pipe mount	11.584 in. (294.23 mm)	14.56 in. (369.82 mm)	16.82 in. (427.23 mm)
	Wall mount	11.019 in. (279.88 mm)	14.00 in. (355.60 mm)	16.26 in. (413.00 mm)
Weight (w/o battery)		Approx. 15 lbs. (6.8 kg)	Approx. 29 lbs. (13.1 kg)	Approx. 45 lbs. (20.6 kg)
Max I/O modules		3	6	14
Max battery capacity		26AH	52AH	140AH

Certification (hazardous location classification)

CSA C/US Class 1, Division 2, Groups C & D T4 -40°F to +140°F ATEX Zone 2, Sira 10ATEX4138X,  II 3G Ex nA IIB T3 Ta = -40°C to +60°C (meets European Union Directive 94/9/EC) IECEx CSA09.0013X, Ex nA IIB T3 (-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

EN55022: 1996 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 22:02, Class B
ITE Emissions
AS/NZS CISPR 22-2004 (Australia/New Zealand)

Immunity: European regions

EN61000-6-1: 2001 Immunity
EN61000-4-2 ESD: 1995 + 8 kV Air, + 4 kV Contact
EN61000-4-3: 2005 RF Immunity, 3/10 V/m
EN61000-4-4 EFT: 2004, 1 kV
EN61000-4-6: 2005, Conducted Susceptibility, 3/10 Vrms
EN61000-4-8: 1994, Power Frequency Magnetic Field 10 A/m

XRC^{G4} specifications

Power

Nominal 12 VDC battery

Charger

Solar or 15 VDC, 30 W maximum

Memory

- Windows CE operating system, application programs and configuration files stored in 32 megabyte Flash memory
- Program execution and data stored in 16 megabyte pseudo static RAM. (lithium battery backup)

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 1.1 host port – optional
- 1 – USB 1.1 device port (may be used as high-speed local configuration port) – optional
- 1 – 10 Base-T Ethernet port

Enclosure

Powder-coated aluminum; Type 3R

LCD interface

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

Keypad interface

Dedicated interface for optional ABB supplied keypad

IO expansion

I²C bus Interface for TFIO modules

Security switch

Dual-level security switch onboard

Time base stability

± 7.5 ppm (parts per million)

IO 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)
 - 5 single-ended channels
 - Voltage mode: 0 to 10 V
 - Current mode: 0 to 20 mA*
 - Maximum voltage mode input before soft over-range: 10.7 V
 - Maximum allowable continuous input current: 22.8 mA
 - Typical input impedance voltage mode: 91.24K Ohms
 - Typical input impedance current mode: 249.3 Ohms
- * For 4 – 20 mA inputs, an external power source may be required if device requires more than 12 VDC.

Digital inputs/pulse inputs (onboard)

- 4 inputs configurable as active or passive with optional software de-bounce.
- Open circuit voltage: 5 VDC (Internally pulled up to 5 VDC nominal)
 - Short circuit leakage current: – 395 uA typical
 - Input capacitance: 0.1 Uf typical
 - Maximum allowable voltage range on input: - 0.5 VDC to 15 VDC
 - 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
 - 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)

- 4 open channel FET transistor switches:
- Open circuit voltage: 0 VDC
- Short circuit leakage current: 0 uA typical
- Output capacitance: 1000 pF typical
- Maximum allowable voltage range on output: - 0.5 VDC to 26.5 VDC
- Open drain FET type
- 'ON' resistance: 0.1 Ω typical (including PTC fuse resistance)
- Maximum pulse current: 3 A for 5 seconds
- Maximum continuous sink current: 2 A

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