XRC\textsuperscript{G4} panel mount
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 XRC G4 6990 Remote Controller (RTU). Benefits and features of this product include:

- Automation, control, alarming and data logging capabilities
- Base I/O targeted at low-cost, automation projects
- Local display and keypad
- Quick, easy installation
- Flexible communications
- Onboard Ethernet port (accessible on the back of the enclosure)
- Local USB connection for device configuration and data collection (accessible on the front of the enclosure)
- Comprehensive custody-quality math and data history
- 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.

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. The processing and memory capability of this device, allows the user to run more applications faster than ever before. Up to twelve (12) AGA3 measurement applications with full calculations once per second, and twelve (12) 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 five (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 capability. The standard XRC G4 6990 accommodates up to six (6) TFIO modules. The dual controller board model accommodates up to twelve (12) TFIO modules. (six (6) TFIO modules per XRC G4 controller board).

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 are 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.

Multi-tube measurement capability (up to 20 AGA3/ISO5167/ AGA7 applications) is included with each unit and is easily invoked with configuration changes and an interface connection to external transmitters. The transmitters can be either digital or analog.

Each unit can be powered by an internal battery (12 VDC) or directly from any other 12 VDC source. Several charging options are available. The internal battery maintains operational capabilities and data logging in the event of interrupted power supply.

The XRC G4 6990 mounts in a standard 19 inch rack. A standard XRC G4 6990 includes one (1) XRC G4 controller board, display, keypad, and local com ports (RS232 and USB). The XRC G4 6990 is also available with two (2) XRC G4 controller boards, displays, keypads, and local com ports. In this configuration, there are two (2) separate G4 remote controllers, each with their own unique station name and identifier, applications, configuration, communications ports, and I/O; sharing a common enclosure and battery/power supply.

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

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<th>XFC G4 flow computers</th>
<th>XRC G4 remote controllers</th>
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<tr>
<td>AI</td>
<td>2</td>
</tr>
<tr>
<td>DI</td>
<td>2 (DI or PI)</td>
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<tr>
<td>DO</td>
<td>2</td>
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In addition to the local configuration ports, two (2) remote communications ports are supplied with the standard unit. These ports are modular and available as either RS232 or RS485. An additional port may be added using a TFIO Communications Module. One integrated 10Base-T Ethernet port for network connectivity and a USB port for Flash download and local configuration are also available.
Hardware modularity

Hardware functionality of XSeries™ 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)
- Combo DI/PI/DO (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
- Real-time data logger (trending)
- Valve control (feedback controller)
- RAMS (alarming, exception reporting)
- Operators (native math / logic application)
- IEC 6-1131 (ISaGRAF environment)
- Selectable units -AGA3/AGA7/ISO 5167 (user selectable engineering units)
- Display / keypad handler
- I/O subsystem handler
- Tank level application
- Therms master application
- Therms slave application
- XMV (multivariable transmitter) application
- Wireless I/O application
- Plunger lift control application
- PAD controller application
- Safety system application
- Pump interface application
- Pulse accumulator application
- Multiple protocols (Totalflow native low power, Modbus slave (RTU/ASCII), Modbus master (RTU/ASCII), LevelMaster, MotorSaver, ABB 267CS/269CS XMV Multivariable, Altronic 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): may be used as a high speed port for flashing new firmware, local data collection and device configuration
- 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 XRCG4 main electronics board:
  - 5 analog inputs
  - 4 digital inputs (status or hi-speed PI)
  - 4 digital outputs
  - Battery voltage
  - Charger voltage
- Low power design operating as low as 8 mA (<100 mW)
- Aluminum, powder-coated enclosure
- Stable time base (accurate integration)
- Rechargeable, lead acid battery
- Solar, AC or DC charging options
- Dual level security code data protection
- 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
  - Complies with API 21.1 standard for custody transfer measurement devices
  - Flow and energy calculations per AGA3-85, AGA3-92, ISO 5167-2003 and AGA-5
  - Super compressibility calculations per NX-19, AGA8-92
  - Gross or Detail, ISO 12213
  - Meets flow computer requirements as stated in AGA Report No.9, “Measurement of Gas by Multi-path Ultrasonic Meters”
  - 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
  - Zero flow detection
- Real-time clock that continues 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 (both slave and master)
- User-programmable math and logic sequences
- IEC 6-1131 capability (utilizes ISaGRAF environment)
- Valve control and nominations capability
## General specifications

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| Dimensions – Width | 19.00” / 482.60 mm width of face plate  
16.91” / 429.51 mm enclosure width |
| Dimensions – Height | 10.47” / 265.938 mm |
| Dimensions – Depth | 10.21” / 259.334 mm without TFIO modules  
14.72” / 373.888 mm with TFIO modules |
| Weight (w/o battery) | Approx. 12 lbs. / 5.44 kg |
| Max I/O modules | 6 per XRC® controller board  
maximum of (2) XRC® controller boards |
| Max battery capacity | 26/30AH |
| Certification | General purpose |
| Mounting | 19 inch rack |
| Operating temperature (ambient) | -40°F to 140°F (-40°C to 60°C) |
| Humidity | 0-95% non-condensing |
| AGA3/AGA7/ISO5167/Vcone calculations | Calculations are tested and verified to be within  
± 50 parts per million as stated in API 14.3.4 |
XRCG4 specifications

Power
Nominal 12 VDC battery

Charger
Solar or 16 to 18 VDC

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)
1 – 10 Base-T Ethernet port (may be used as high-speed local port or network port)

LCD interface
Dedicated interface for 2 X 24 liquid crystal display (LCD)
1 per XRCG4 board

Keypad interface
Dedicated interface for ABB supplied keypad;
1 per XRCG4 board

I/O expansion
I²C bus Interface for TFIO modules;
1 per XRCG4 board

Security switch
Dual-level security switch onboard;
1 per XRCG4 board

Time base stability
± 7.5 ppm (parts per million)

I/O scan rate
1 time per second (1 Hz)

Analog inputs (onboard)
• 5 single-ended channels
• Voltage mode: 0 - 10 V
• Current mode: 0 - 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.
Analog-to-digital resolution
18 Bit maximum resolution (0.00038% FS)
16 Bit nominal resolution (0.0015%FS)

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 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)
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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