

ABB MEASUREMENT & ANALYTICS | 2105552MNAE

Remote Modular Controller User Manual RMC-100



Measurement made easy

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Additional information

Additional free publications are available for download at <u>www.abb.com/upstream</u> or by scanning this code:



RMC-100 product website

Table 0-1: Document links

RMC documents	Document number
RMC-100 Data sheet	2101126
RMC-100 Quick Start Guide	2107023
RMC-100 Safety and Compliance	2107022
RMC-100 Startup guide	2105551
Wiring diagrams	
RMC Generic pinout User Drawing	2105617
RMC-100 AI to ABB 2600 T pressure transmitter User Drawing	2105593
RMC-100 COMM (RS-485) to ABB XMV (267/269CS/266J) W/RTD User Drawing	<u>2105579</u>
RMC-100 to ABB FCB Coriolis meter User Drawing	2105592
Related documents	
TFIO Module User Manual	2101226
I/O Interface Application Guide	2107012
Network Communication Guide	2107013
XIO Interface Application Guide	<u>2107011</u>
Ethernet-Serial Passthrough Application Guide	2107010
MQTT Configuration Guide	2106521
Digital Oilfield User Manual	2106300

Compliance

Cyber security

This product is designed to be connected, and communicate information and data, via a network interface. All ABB products should be connected to a secure network. It is the customer's sole responsibility to provide, and continuously ensure, a secure connection between the product(s) and the customer network as well as a secured and controlled physical access to the hardware equipment, or any other network (as the case may be). The customer shall establish and maintain appropriate measures (such as, but not limited to, the installation of firewalls, the application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the products, the network, its system and its interfaces against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Inc. and its affiliates are not liable for damages and/or losses related to security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Although ABB provides functionality testing on the products and updates it releases, the customer should institute its own testing program for any product updates or other major system updates (to include, but not limited to: code changes, configuration file changes, third party software updates or patches, hardware change-out, etc.) to ensure that the security measures that the customer has implemented have not been compromised and that the system functions in the customer's environment as expected.

Waste Electrical and Electronic Equipment (WEEE)

EU Directive 2012/19/EU

ABB Industrial Automation, Measurement and Analytics is committed to actively protecting the environment. Do not dispose of WEEE as unsorted municipal waste. Collect WEEE separately. Participation in the management of WEEE is critical to the success of WEEE collection.



Do not mix electrical and electronic equipment with general household waste if it displays the crossed-out wheeled bin symbol. Dispose of it correctly at a recycling facility to save valuable resources and prevent potential negative effects on health and the environment. These steps ensure compliance with the Waste Electrical and Electronic Equipment (waste electrical and electronic equipment, WEEE) Directive.

Treat waste electrical and electronic equipment (waste electrical and electronic equipment, WEEE) separately. Use the national collection framework available to customers for the return, recycling, and treatment of WEEE.

Safety

Read these instructions carefully before installation and commissioning. These instructions do not contain all details on all types of products and do not explain all assembly, operating, or maintenance scenarios. Ask the manufacturer for further information.

Observe warning signs on packaging and on the device. Safety symbols are in accordance with IEC 60417 or ISO 7000.

Assign only qualified and authorized specialists for the assembly, electrical connection, commissioning, and maintenance of the equipment. Specialist qualifications include:

- Training or instruction and/or authorization to operate and maintain devices or systems according to safety engineering standards for electrical circuits, high pressures, and aggressive media
- Training or instruction in accordance with safety engineering standards regarding maintenance and use of adequate safety systems



WARNING: According to ISO 9996, use only sufficiently insulated tools for the electrical connection.

Also consider the following regulations:

- The applicable standards and safety regulations concerning the construction and operation of electrical installations
- The regulation on technical working materials (safety guidelines for tools)
- The regulations and recommendations relating to explosion protection
- The recommendations for safe working in the case of installation in a Safety Integrity Level (SIL) loop.
- The regulations that apply in the country of use

Potential safety hazards

The RMC uses voltages in the range of 9-30 Vdc plus some percent of tolerance. There are no hazardous voltages present in the device. However, some optional power sources might convert power from Vac to Vdc.

Pressurized natural gas is present in the measurement pipeline. Natural gas can escape from the pipeline during installation, calibration, or following damage to the pipeline. Only properly trained and authorized personnel should work in hazardous locations.

The device can be operated at high levels of pressure and with aggressive media. Serious injury and/or considerable material damage can be caused if this device is handled incorrectly.



WARNING – Bodily injury. Apply power only after the procedures are complete. Technicians must perform the procedures in order: plan, install, wire, verify the power-on sequence, and configure.



WARNING – Bodily injury. The device can be operated at high levels of pressure and with aggressive media. Serious injury and/or considerable material damage can be caused if this device is handled incorrectly.



WARNING – Bodily injury. Read and follow instructions contained in this guide before and during equipment installation. Failure to do so could result in bodily injury or equipment damage.



WARNING – Bodily injury. Ensure there is no hazardous atmosphere present when performing maintenance on the unit. Do not separate components when energized. This applies to all connectors and connections, cabling and wiring.



NOTICE – Equipment damage or loss of data. Potential electrostatic charging hazard: clean only with a damp cloth.

1 System description

The Remote Modular Controller (RMC-100) provides measurement, automation, monitoring, alarming, asset data management, control, and data logging applications. A single RMC-100 controller can manage automation, liquids and gas measurement, and asset data concentration for very large production and transmission facilities.

1.1 Features overview

The RMC provides backward-compatible functionality based on ABB Totalflow software, communications, and I/O technologies. The existing process foundation and the new enhanced technology manage liquid and gas measurement, automation, and asset data concentration for large-scale production and transmission facilities. It is scalable down to a single-board RTU footprint for smaller systems.

The RMC supports I/O and communication expansion.

The RMC supports dual, backward-compatible TFIO buses, doubling the I/O module capacity to 44 modules.

The table below provides the general specifications for the RMC.

Specification	Description
Operating voltage	12 – 24 Vdc (+/- 20% variation, acceptable input range 9 – 30 Vdc). All voltage
range	output connections of both the onboard and TFIO modules depend on the
	operating power supply voltage connected to the CHARGER/EXT PWR port.
Nominal power	1.5 watts (5 A maximum with external options connection)
Weight	Minimum (no communication modules inserted): 1.708 lbs. (0.775 kg)
	Maximum (both communication modules inserted): 1.816 lbs. (0.824 kg)
Dimensions	Width 7.56 inches (19.20 cm)
	Height 8.31 inches (21.11 cm)
	Depth 1.72 inches (4.37 cm)
	Installed Depth On DIN rail 1.79 inches (4.55 cm)
Input/Output	6 DI/DO, 2 PI, 4 AI, and 1 AO
Maximum battery	30 Ah
capacity	
Mounting	DIN rail mounts on a wall or enclosure that meets the environmental ratings for
	the environment of the location
Operating	-40 °C to 60 °C (-40 °F to 140 °F) when used with battery
temperature	-40 °C to 70 °C (-40 °F to 158 °F) when no battery is used
	Storage temperature of -40 °C to 85 °C (-40 °F to 185 °F)
Electromagnetic	Emissions (Other):
compatibility	FCC CFR 47, Part 15, Subpart B, Class A (FCC Emissions)
	IECS-03, Issue 4, CAN/CSA-CEI/IEC CISPR 11 Class A (Canada ITE Emissions)
	AS/NZS CISPR 11, Class A (Australia/New Zealand)
EMC Directive	Emission EN 61326-1: Radiated and conducted Class A
2004/108/EC	Immunity EN 61326-1 to:
	EN 61000-4-2, ESD, 8 kV Air, 4 kV Contact
	EN 61000-4-3, RFI, 10 V/m
	EN 61000-4-4, EFT, 2 kV to DC, 1 kV to Signals
	EN 61000-4-6, Conducted, 0.15-80 MHZ, 3 Vrms
	According to standards for the second of fundamental asfatic requirements in
	the United States of America:
(North America)	III No. 61010 1. "Safaty Dequirements for Electrical Equipment for
(North America)	Use No. 61010-1. Safety Requirements for Electrical Equipment for
	Medsurement, Control, and Laboratory Use - Part 1: General Requirements
	ANSI/ISA 12.12.01: Non-incentive Electrical Equipment for Use in Class I and
	II, DIVISION 2 and Class III, DIVISIONS 1 and 2 Hazardous (Classified) Locations."
	ANS1/UL 600/9-0: Explosive Autospheres - Part 0: Equipment - General
	Requirements ANST/UL 60070 1Et "Evaluative atmospheres - Dart 1Et Equipment protection by
	ANSI/OL 00079-15: EXPlosive autospheres - Part 15: Equipment protection by
	LUNA FOR "Enclosures for Electrical Equipment, Environmental
	OL NO. SUE: "Enclosures for Electrical Equipment, Environmental

Table 1-1: General specifications

Specification	Description
	Considerations"
	According to CSA standards for the assurance of fundamental safety requirements in Canada:
	C22.2 No. 61010-1:12: "Safety Requirements for Electrical Equipment for
	Measurement, Control, and Laboratory Use - Part 1: General Requirements"
	C22.2 No. 0-10: "General Requirements"
	C22.2 No. 213-M1987: "Non-incendive Electrical Equipment for Use in Class I,
	Division 2 Hazardous Locations Industrial Products"
	C22.2 No. 60079-0:11: "Explosive Atmospheres-Part 0: Equipment-General
	Requirements"
	C22.2 No. 60079-15:12: "Explosive Atmospheres-Part 15: Construction, test
	and marking of type of protection 'n' electrical apparatus"
	C22.2 No. 94-2: "Enclosures for Electrical Equipment, Environmental
	Considerations"
	C22.2 No. 60529:05: "Degrees of protection provided by enclosures (IP Code)"

2 Physical Description

2.1 RMC-100 housing

A DIN rail mountable plastic housing packages the RMC electronic board and its components.



IMPORTANT NOTE: The RMC must be installed on an interior wall, or in an enclosure that meets the environmental ratings for the location. See section 2.1.2 for information about ABB enclosures. See section 3.1.1 for information about third-party enclosures.

The housing consists of an interlocked top cover and a base.

<u>Figure 2-1</u> identifies the housing top cover and the accessible components. The cover has labels that identify ports. It provides access to the communication ports, I/Os, security switch, battery backup switch, reset button, LCD display, and four navigation buttons. The cover is removable for part replacement, if necessary. Four release clips on each corner of the top cover easily interlock with or detach from slots on the base.

Figure 2-1: RMC-100 housing cover exterior



Legend for Figure	2-1: RMC-100	housing	cover	exterior
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ID	Description	ID	Description
1	Battery connection (BAT)	13	Reset button
2	Charger input when battery-powered, or external power supply when not battery- powered (CHARGER/EXT PWR)	14	Security switch
3	Pulse input (Pulse Input, PI)	15	Lithium battery switch
4	DIN rail release clip	16	TFIO B I/O module interface
5	COMM 1 connector	17	Analog output (Analog Output, AO)
6	COMM 2 connector	18	Analog input (Analog Input, AI)
7	Clip to hold the top to the housing base	19	Digital input/output (DI/DO)
8	RMC I/O expansion connector (future use)	20	Micro SD card holder (future use)
9	LCD display assembly and 4 directional buttons	21	MMI port (MMI)
10	Vents	22	Ethernet 1 and 2 ports
11	TFIO cover	23	USB Type B port
12	TFIO A I/O module interface	24	COMM Expansion (future use)
		25	COMM 1 and COMM 2 plug-in module slot covers

The base holds the electronic board in its interior. Screws secure the board to the base, and the mounting clips are accessible on the exterior. <u>Figure 2-2</u> identifies the exterior of the housing base.





Legend for Figure 2-2: RMC-100 housing base exterior

ID	Description	ID	Description
1	Housing slot (secures top cover)	4	Horizontal DIN rail slot
2	Spring release clip	5	Grounding slot
	(secures RMC to DIN rail)		(for the electronic board grounding clips)
3	Vents		

IMPORTANT NOTE: The RMC has grounding clips attached to the bottom of the electronic board. The grounding clips fit through the base grounding slots to contact the DIN rail when mounted. Be sure to ground the DIN rail.

2.1.1 LCD display

1

The display assembly consists of the graphic LCD display and the directional buttons that navigate through the display groups and associated variables. The display parameters are read-only.

The LCD size measures approximately $1\% \times 2\%$ inches, with 128×64 pixels for display status and configuration data. <u>Table 2-1</u> provides the LCD display characteristics and <u>Figure 2-3</u> shows the display.

Table 2-1: LCD display characteristics

Characteristic	Display
Number of lines on the display	8 lines
Maximum number of characters per line	21

Characteristic	Display
Character font size	8 x 6 pixels
Number of items displayed at one time	2 items (each item uses 2 lines to display)
Annunciator font size	16 x 12 pixels
Annunciator position	Lines 7 and 8
Annunciator position control	Fixed
Annunciator and plots	Displays both at the same time
Number of plots displayed at one time	2

Each display item has two lines as the data scrolls up the screen. The name of the item is on the first line. The measurement value and unit display on the second line. A blank line displays between the two items. The plot for the item displays on the right side of the display.

Figure 2-3: LCD Display



Four directional buttons control and display items from the LCD interface. The button directions are: up, down, left (previous) and right (next). Use the up and down buttons to view individual display items for a display group. Use the left and right buttons to view the display groups. By default, the first annunciator displays the selected group. The directional buttons do not allow any data entry.

2.1.2 Enclosures

The RMC can be purchased already installed in an enclosure. ABB offers the Xcore enclosures described in <u>Table 2-2</u>. For more information and complete specifications see <u>www.abb.com/upstream</u>.

Table 2-2: Xcore enclosures available

Part number	Size	Weight
2424	24 x 24 x 12 inches (61 x 61 x 30 cm)	45 pounds maximum
		(Fully loaded system)
3630	36 x 30 x 12 inches (91 x 76 x 30 cm)	75 pounds maximum
		(Fully loaded system)

Figure 2-4: Xcore 3630 medium size enclosure (front view)



Figure 2-5: Xcore 2424 small size enclosure (internal view displays installed RMC)



2.2 Electronic board

<u>Table 2-3</u> provides the electronic board component specifications. All RMC input and output connections have snap-in connector terminals.



DANGER – Serious damage to health / risk to life. Explosion Hazard: Do not connect or disconnect connectors or their terminations while energized unless the area is known to be non-hazardous.

Table 2-3:	RMC-100	electronic	board o	specifications
	KINC TOO	electionic	board a	specifications

Component	Description
Core processor	Cortex A8 processor
Operating speed	300 MHZ, or 720 MHZ option at time of purchase
Memory	256 Mbyte mDDR
-	Application data and configuration files permanently stored in eMMC

Component	Description
	Flash.
	Factory-supplied registry (MAC address) is stored in 256-byte E2PROM
LCD interface	Parallel 128 x 64 graphic LCD with backlight
Directional button	Dedicated 4 button interface: up, down, left, and right
interface	
Communication ports	2 software-configurable RS-232/RS-485/RS-422 hot-swappable serial
	ports with 2 communication modules
	1 USB 2.0 device interface
	3-port 10/100 Mbps Ethernet switch: 2 external ports available for
	operator use, 1 internal port (not available for operator use)
	1 MMI port backward compatible with XSeriesG4 and XSeriesG5 MMI
	port
Digital input/output	6 open/drain outputs, each pin configurable as input or output
Analog inputs	4 single-ended channels, 0-30 Vdc or 4-20 mA loop
Analog output	1 four-wire analog output 4-20 mA (non-isolated, 4-20 mA)
Analog to digital	24-bit maximum resolution (0.00038% FS)
resolution	24-bit nominal resolution (0.0015% FS)
Pulse inputs	2 dedicated pulse inputs with configurable debounce
	(With no debounce: 0 to 20 KHz; with debounce: 0 to 550 Hz)
I/O scan rate	Configurable up to 4 times per second
I/O expansion interfaces	2 interfaces for TFIO modules (handled by independent buses)
	1 RMC IO expansion interface (available for future use)
	1 Type A USB COM expansion (available for future use)
Power	Battery mode: 12 Vdc SLA battery input
	External power mode: 9 – 30 Vdc external power source (no battery)
Charger	Solar: Nominal 12 Vdc charger controller; solar panel maximum 20
	watts (60 $^\circ$ C); Maximum 30 Ah SLA battery when using integrated
	charger controller
	Alternate charger: Power source, 14.5 Vdc to 15.5 Vdc
Security switch	On/Off supported in combination with two configurable security code
	levels
Lithium battery switch	On/Off supported with two configurable security code levels
Time-based stability	± 7.5 ppm (parts per million)

2.2.1 Processor and memory

The RMC processor is available in two speeds, 300 MHZ or 720 MHZ, depending on the embedded software on the purchased system. The RMC standard system runs at 720 MHZ with full application support. The RMC-LITE system runs at 300 MHZ and supports a lesser number of applications. To determine the speed of your system or details on the embedded software part numbers, see section <u>8.4 Update device software</u>. <u>Table 2-4</u> indicates the memory components of the electronic board.

Table 2-4: Memory components

Component	Description
Flash	32-bit flash (flash device software image, configuration and measurement data)
RAM	256 MB RAM storage
Clocks	TCXO 32.768 k Oscillator to ensure accurate clocks (+/- 5 ppm accuracy, 5 ppm drift over time). Standard 50 ppm Oscillator at 25 MHZ to generate the core and peripheral clocks

2.2.2 Communication ports

Communication ports provide communication between the RMC and host systems or external devices. Factory preconfigured ports support typical communication scenarios. The ports support several available communication protocols.

Ports configured for local communication (direct connection) support either local access from a host system, or connection to external devices or peripherals (measurement transmitters, additional automation or control equipment, flow computers or analyzers).

Ports configured for remote communication connect the RMC to a communication network and allow remote access or management over that network.

The RMC has six communication ports. The design allows communication expansion to support future external communication modules. <u>Figure 2-6</u> identifies the ports and communication expansion interfaces.

Figure 2-6: Communication ports



Legend for Figure 2-6: Communication ports

ID	Port name	Connector type	Data transfer rate (port speed)	Use (connections)
1, 2	COMM 1, COMM 2	Removable terminal connector (9 POS), screw termination. Wire gauge 12 AWG to 22 AWG	Baud Rate: 2,400 to 115,200 bps (Manually configurable from the user interface)	Remote or local serial communication configurable for either RS-232, RS-422 or RS-485
3	MMI	Proprietary	Baud Rate: 2,400 to 115,200 bps (Manually configurable from the user interface)	Local serial communication (RS- 232) Available only on external weatherproof circular military- type connector on ABB Xcore enclosures (MMI-to-military cable required: Part number 2101412- 001)
4, 5	ETHERNET 1, ETHERNET 2	RJ-45	100 Mbps or 10 Mbps full duplex (Supports auto- negotiation, uses standard or straight- through Ethernet cable)	 Local communication (high-speed TCP/IP-based local operator interface) Remote communication using TCP/IP connections over a network (management port) Connect other Totalflow equipment (for example, additional RMCs, flow computers, transmitters) Connect Ethernet-to-serial devices
6	USB	USB Type B	Supports USB 2.0 full speed mode and high- speed mode	Local communication (high-speed serial local operator interface)

ID	Port name	Connector type	Data transfer rate (port speed)	Use (connections)
7	COMM EXPANSION	Proprietary	(Future use)	For future serial communication modules to expand serial port capacity

2.2.2.1 Serial communication ports

The COMM 1 and COMM 2 slots each contain a 40-pin connector to support a hot-swappable serial communication module (Figure 2-7). This module is software-configurable for serial (RS-232, RS-485, or RS-422) communication between the RMC and external measurement equipment such as pressure or temperature transmitters, or communication equipment such as radio systems.



DANGER – Serious damage to health / risk to life. Explosion Hazard: Do not connect or disconnect connectors or their terminations while energized unless the area is known to be non-hazardous.

Figure 2-7: Hot-swappable communication module



The configured interface type and the distance between the RMC and the connected external device determine maximum serial communication speed. Supported port speed ranges from 2,400 bps to 115,200 bps.

2.2.2.2 USB port

The USB Type B port provides high-speed serial communications between the RMC and equipment, host systems or computers with USB interfaces. The port supports local operator access through PCCU32.

The USB port has two speed modes: full speed and high speed. The RMC automatically negotiates data transmission rates with the host system.

2.2.2.3 Ethernet ports

The RMC has an embedded managed Ethernet switch. It has two Ethernet ports (E1 and E2) for communication between the RMC and external devices. <u>Table 2-5</u> indicates the uses of the external Ethernet ports.

Port name	Data transfer rate (port speed)	Use
ETHERNET 1 (E1)10/100 Base-T: 100 Mbps oror10 Mbps full duplex	 Local communications (high-speed TCP/IP-based local operator interface) 	
ETHERNET 2 (E2)	RNET 2 (E2) 10/100 Base-1. 100 Mbps of 10 Mbps full duplex RNET 2 (E2) (supports auto-negotiation and uses standard or straight-through Ethernet cable)	 Remote communication using TCP/IP connections over a network (management port) Connect other Totalflow equipment (for example, XIOs, additional RMCs, flow computers, etc.): Connect third-party Ethernet-to-serial devices.

Table 2-5: Ethernet ports

The RMC supports 2 modes for Ethernet port configuration:

- 1 Network mode (E1 + E2): Configures both Ethernet ports into a single LAN (2-port switch) and combines network traffic on both ports. This is the RMC's default Ethernet configuration.
- 2 Networks mode (E1, E2): Configures Ethernet ports into two separate and independent LANs. This separates network traffic for each port. This option isolates network traffic on one port from the other. Communication between these two networks requires an external router. Each Ethernet interface must have its own IP parameter configuration.

Ethernet mode selection depends on field configurations, cybersecurity requirements, type of ABB devices connecting to the RMC, and available network equipment. The 1 Network mode can simplify device management and IP configuration. For more complex applications, the 2 Network mode may be required.



IMPORTANT NOTE: For additional details on Ethernet connections click **Help** on the Networking tab when connected to the device with the user interface (PCCU32).

2.2.2.4 MMI port

The onboard MMI port provides an RS-232 (EIA/TIA – 232) serial interface. MMI access or direct connection from a PC or laptop is only available on the port on the enclosure. Direct connection to the onboard MMI port requires a special cable adaptor not shipped if the RMC is ordered for a standalone installation. Weatherproof MMI connectors are available on all Xcore enclosures.

The port is factory-configured to support local operator access using PCCU32. The supported port speed ranges from 2,400 bps to 115,200 bps.



IMPORTANT NOTE: The MMI interface is included in the RMC design to support legacy systems. Connections to the enclosure's military-type connector require cable adapters to support RS-232 interfaces on older PCs or laptops. Legacy systems with traditional DB-9 serial interfaces require DB-9 to military-connector cables. Newer PCs or laptops do not have legacy RS-232 interfaces. Therefore, additional cable adaptors or converters are still necessary (DB-9 to USB converters, for example). The Digi[®] Edgeport[®]/1 converter is recommended and can be purchased from ABB (part number 1801382-001). Contact technical support to order, or for more details.

Enclosures include Ethernet and USB ports, which provide faster and more convenient local access options than traditional RS-232. If possible, use the USB or Ethernet ports.

2.2.3 Inputs/Outputs

Inputs allow you to read and monitor signals transmitted from external devices. Outputs send signals to control external devices. The following I/Os are available on the RMC board:

- 6 Digital Inputs and Outputs (DI/DO)
- 4 Analog Input (AI)
- 1 Analog Output (AO)
- 2 Pulse Inputs (PI)

The I/Os operate in failsafe mode during communication loss, power loss, restore, or processor reset. The failsafe mode maintains the last input or output values when an event occurs.

Figure 2-8: Inputs and outputs identifies the inputs and outputs.

Figure 2-8: Inputs and outputs



Legend for Figure 2-8: Inputs and outputs

ID	Port name	Terminal type
1	PI	Removable terminal connector (4 POS), screw termination. Wire gauge 12 AWG to 22 AWG.
2	AO	Removable terminal connector (4 POS), screw termination. Wire gauge 12 AWG to 22 AWG.
3	AI	Removable terminal connector (12 POS), screw termination. Wire gauge 12 AWG to 22 AWG.
4	DI/DO	Removable terminal connector (12 POS), screw termination. Wire gauge 12 AWG to 22 AWG.

2.2.3.1 Analog input

The RMC provides four analog inputs. Each port consists of a power source input pin, input signal pin, and input ground pin. For specific pinout information, see section <u>3.5.5.1</u> <u>Analog input pinouts</u>.

Each of the four analog inputs (AI) consists of an analog input point capable of handling voltage or current inputs. The voltage range is 0-30 Vdc. The current range is 4-20 mA.

Table 2-6 provides the analog input specifications.

Table 2-6: Analog input specifications			
Electrical specification (each point)	Description	Value	
AI mode	Each AI point supports voltage or current mode operation, configurable from the user interface.	Voltage / Current	
AI input voltage	Input voltage range	0 – 30 Vdc	
AI input current	Input current range when configured for current mode	0 – 20 mA	
AI input impedance (voltage mode)	Resistance to ground on AI in voltage mode	90 kΩ typical	
AI input impedance (current mode)	Resistance to ground on AI in current mode	255 Ω typical	
AI current source max Isrc	A current limited voltage-sourcing pin provides a sourcing loop current for 4-20 mA current loops.	25 mA dc max	
AI resolution	Analog to digital converter (Analog to digital	24 bits	

Electrical specification (each point)	Description	Value
	converter, ADC) resolution for the input	
AI input protection Vtvs	Each AI input has TVS protection, typical V threshold level to begin conducting.	32 Vdc typical

2.2.3.2 Analog output

The RMC provides a single (1) analog output. The AO has a voltage-sourcing diode input voltage pin, a current sinking pin, a current sourcing pin, and a ground pin. The AO can provide 4-20 mA output through the sink and source pins. Calibrate the AO from the user interface. For specific pinout information, see section <u>3.5.5.2</u> <u>Analog output pinouts</u>. <u>Table 2-7</u> provides the analog output specifications.

Table 2-7: Analog output specifications

Electrical specification (each point)	Description	Value
AO output current	Current that the sinking and sourcing pins can drive	0 – 24 mA dc
AO sink to source resistance	Resistance in the loop on the RMC	154 Ω
AO voltage sourcing (Vaosrc)	Voltage provided at Pin 1	V input to RMC – 0.6 V (typical)
AO current sourcing (Iaosrc)	Current range provided at Pin 1	0-24 mA dc
AO output resolution	Digital to analog converter (Digital to analog converter, DAC) resolution for the output	16-bit resolution
AO output protection (Vtvs)	Each AO has onboard TVS protection, typical V threshold level to begin conducting.	32 Vdc typical

2.2.3.3 Pulse input

The RMC provides two pulse inputs (Pulse input, PI). Each PI can accept a variety of input types: 0-5 Vdc TTL input, Open-Collector (Open-Collector, OC), Open-Drain (Open-Drain, OD), or dry switch type contact. A Schmidt Trigger type gate provides input hysteresis for improved noise protection. Each PI has a debounce filter configurable from the user interface. For specific pinout information, see section 3.5.5.3 Pulse input pinouts. Table 2-8: Pulse input specifications provides the pulse input specifications.

Electrical specification (each point)	Description	Value
PI open circuit Voc	PI open circuit voltage	5 Vdc
PI pull up resistance	10 k Ω nominal through a diode to input	10 kΩ
PI input capacitance in low pass filter mode	Capacitance to ground applied to input gate	0.1 µF
PI input frequency range with debounce enabled	Frequency range of input (50% duty cycle, OC)	0-550 Hz
PI input frequency range with debounce disabled	Frequency range of input (50% duty cycle, OC)	0-20 kHz
PI Vhighmin	High input detection voltage threshold minimum	2.4 Vdc (TTL level)
PI Vlowmax	Low input detection voltage threshold maximum	0.8 Vdc (TTL level)
PI supported inputs	PI supports: open collector, open drain, dry switch, 5 V TTL type inputs	Not applicable

Table 2-8: Pulse input specifications

2.2.3.4 Digital input and output

The six (6) RMC DI/DO support the configurable input or output modes of operation.

The digital input mode handles up to 30 Vdc. The configurable built-in pull-up resistor reads signals from devices with dry contact and open collector/drain output types.

The digital output mode provides a MOSFET open drain (OD) type output that sinks up to 2 Adc current.

<u>Table 2-9</u> provides the digital input and output specifications. For specific pinout information, see section <u>3.5.5.4</u>, <u>Digital input and output pinouts</u>.

Electrical specification (each point)	Description	Value or range
DI/DO voltage	Voltage range for both input and output modes	0 – 30 Vdc
DI Vlow threshold	Maximum voltage threshold for detecting a closed input configurable in system	0.8 Vdc default, configurable (0-30 Vdc)
DI Vhigh threshold	Minimum voltage threshold for detecting an open input configurable in system	2.4 Vdc default, configurable (0-30 Vdc)
DI Vpullup	Open circuit voltage on input with DI 10 K pull-up enabled	3.4 Vdc +/- 0.3 Vdc
DI Iminsink	Minimum external sinking current required to detect closed input with DI 10 k Ω pull-up enabled	0.2 mA
DI/DO Rinput	Input impedance to GND of DI/DO with DO open	75k Ω nominal
DI/DO Ileakage	Short circuit leakage current with DI 10 $k\Omega$ pull-up enabled	450 µA typical
DI/DO shielding	Shielded signal pairs, shielded to prevent spurious signals	Not applicable
DI/DO Vtvs Each DI/DO point has onboard TVS protection, typical V threshold level to begin conducting.		32 Vdc typical
DO type	Output type	FET open drain (OD)
DO Vdoutoc	Open circuit voltage	0 Vdc
DO Idoutcont	Maximum continuous sink current	2 Adc
DO Idoutpulsed	Maximum pulse current	3 Adc for 5 seconds
DO RdoutmaxON	Max on resistance of MOSFET OD output to GND	0.1 Ω

Table	2-9:	Digital	input and	output	specifications
Iable	2-2.	Digital	iliput allu	υαιραι	specifications

2.2.4 TFIO expansion interfaces

The RMC provides expansion interfaces to add modular I/O. The RMC has two TFIO interfaces, TFIO A and TFIO B. Each TFIO interface supports up to 22 TFIO modules (44 total).

The RMC uses two independent buses to communicate with the modules. ABB Totalflow devices have an I/O protocol to exchange information with the modules. The buses operate in a master/slave mode, with the main device board acting as master.

The TFIO modules are DIN rail mountable and employ contact technology for field wiring. The modules interconnect with each other to provide the necessary power and interface signals along the bus.



IMPORTANT NOTE: The RMC does not support the TFIO CIM module. The RMC supports the modules labeled for use with 24 Vdc.

All modules have four LED lights, a manual reset button, and a selectable address from zero through seven (Figure 2-9). On the faceplate of each module is:

- Type of module
- LED light panel
- Reset button
- Module address selector

For additional information, refer to the TFIO Module User Manual. See <u>Additional information</u> for a link to the manual.

Figure 2-9: TFIO module



2.2.5 Power ports

The RMC has two ports supporting two power connection options or modes. Select one of the following modes:

- Battery mode: a 12 volt Seal Lead Acid (SLA) battery with a charger supplies power.
- External power mode: an external power source supplies power.

<u>Table 2-10</u> provides the power port or terminal specifications and <u>Figure 2-10</u> shows the ports on the RMC. The BAT port connects to a battery. The CHARGER/EXT PWR connects to either a charger or an external power source, depending on the power mode.

Table 2-10: Power connector specifications

Port name	Terminal type
BAT	Removable terminal connector (2 POS), screw termination. Wire gauge 12 AWG to 22 AWG
CHARGER/EXT PWR	Removable terminal connector (2 POS), screw termination. Wire gauge 12 AWG to 22 AWG

IMPORTANT NOTE: Select wire gauges based on the voltage and current requirements of the circuitry and the expected length of the wires. The gauge differs for each application.

Figure 2-10: Power ports

1



Figure 2-11 illustrates an example of the connections for the battery mode when a solar panel is the charger. The battery connects to the BAT port, and the solar panel connects to the CHARGER/EXT PWR port. In this configuration, the solar panel powers the controller during daylight hours and recharges the battery when the battery power is low. During nighttime hours, the battery supplies the power.



IMPORTANT NOTE: The charger controller is a component on the RMC electronic board that controls the battery charging process. The charger controller's design optimally controls the charge and hold cycle for the battery. It prevents overcharging or complete draining of a battery. It supports the three charge states: high current bulk charge, controlled over-charge, and a float charge.





<u>Figure 2-12</u> illustrates the external power mode connection where an external power source supplies the power to the RMC at the CHARGER/EXT PWR port. In this configuration, the external power supply is the sole source of power to the controller.

Figure 2-12: External power mode



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IMPORTANT NOTE: If you do not use ABB-approved power sources, verify that customersupplied power sources meet these requirements. For additional details about requirements, see section <u>3.1 Site planning and requirements</u>.

Table 2-11: Power source	e requirements	per	mode
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Power mode	Source type	Requirement	Description
Battery mode (Battery and charger)	Battery charger: solar panel	Nominal: 12 Vdc, 20 W or less	The solar panel charger provides power to the RMC during daylight hours and recharges the battery when the battery power is low.
	Battery charger: alternate charger	Power source: 14.5 Vdc to 15.5 Vdc, 1.65 A	The charger provides power to the RMC and recharges the battery when the battery power is low.
	Battery	Nominal: 12 Vdc SLA, 30 Ah	Use Seal Lead Acid (SLA) batteries only. The battery supplies 12 Vdc at the BAT port.
External Power mode	External power supply	Power source: +9 Vdc to 30 Vdc, 5 A maximum	The external power supply is the sole supplier of power to the RMC in this mode. The battery cannot be connected when using an external power source.

Table 2-12 and Table 2-13 provide the battery port (BAT) and CHARGER/EXT PWR port specifications.

 Table 2-12: Battery port specifications

Electrical specification	Description	Value or range
Battery voltage	Valid battery voltages for SLA	9.0 - 15.5 Vdc
Charging battery current range	Maximum charge current	0.05 - 1.65 A
Maximum battery capacity	Maximum recommended SLA battery	30 Ah

Table 2-13:	Charger/	/External	power	port	specifications
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Electrical specification	Description	Value or range
Voltage	Voltage range of input	9-30 Vdc
Current (minimum)	Minimum configuration RMC,	125 mA at 13.4 Vdc
	300 MHZ clock rate	
Current (typical)	Minimum configuration RMC,	150 mA at 13.4 Vdc
	720 MHZ clock rate	
Typical load current	Maximum configuration RMC,	5 A at 13.4 Vdc
	720 MHZ clock rate	
	2 amperes output power	
	(1 A for each of the two COMM modules)	
	AO delivering max current	
	Two TFIO module banks operating	

2.2.6 Security switch

The RMC has a security switch located between the TFIO A and B connectors (Figure 2-13). Lift the cover over TFIO A and TFIO B to access the switch. When the security switch is in the ON position, PCCU requires security codes to connect with the device. For security information see section $\underline{6}$ Configure security (recommended).

Figure 2-13: Security switch



2.2.7 Reset button

The RMC has a reset button located between the TFIO A and B connectors (Figure 2-13). Lift the cover over TFIO A and TFIO B to access the reset button. Press the reset button to restart the RMC with the running (warm) configuration.

2.2.8 Lithium battery switch

The lithium battery maintains the real time clock. It operates continuously in the controller in case power is lost or removed. Enable the battery backup with the lithium battery backup switch to ensure that the continuity of the date and time is accurate for recordkeeping. The switch is located between the TFIO A and B connectors (Figure 2-13 above). Lift the cover over TFIO A and TFIO B to access the switch.

2.2.9 Super capacitor

The RMC design includes an onboard super capacitor (Super CAP) that serves as a short-term power reservoir. In the event of a loss of power or a reset, the charged capacitor prevents the supply voltage from falling to zero for 2.5 seconds. This delay allows the system time to save data, such as trending files, and restart configuration. The capacitor charges automatically when the controller is powered on for the first time, or after the controller is powered off for several hours or longer. The capacitor remains charged as long as the controller is powered on. The capacitor takes two minutes to charge.

2.3 Embedded software and data

The RMC non-volatile memory contains the software required for operation and provides storage space for customer data.

The embedded software has the following components:

- Operating system: Required for system boot, operation, and execution of all applications
- Applications: Totalflow applications that define the RMC functions for the required scenarios
- Configuration: Files that contain factory default and user-defined settings and parameters required by the applications active on the RMC

The stored customer data consists of all the data generated by each of the active applications, such as the measurement data from the gas orifice application (AGA-3 tube). Stored data depends on the configured applications for the specific site requirements.

2.3.1 Operating system

The RMC uses a thread-priority preemptive real-time operating system (Linux-based OS). The software architecture prioritizes real-time functionality (measurement and control applications) before executing non-real-time functions (post measurement data processing and file system access). The RMC OS supports:

- Execution of the entire XSeries^{G4} and XSeries^{G5} suite of applications
- Backward-compatible protocol transactions for all applications
- Battery condition metering
- Improved real-time performance metrics

The OS file system has a RAM file system and an eMMC (embedded multimedia card) data journaling file system. The applications access the RAM file system, which provides increased performance. The RAM file system is backed up into the eMMC file system at the following triggers:

- Once a minute at the fourth second of each minute
- Prior to all warm restarts (triggered from PCCU Station Setup, terminal mode, the device loader, or the reset button)

2.3.2 Applications

The RMC supports all XSeries^{G4} and XSeries^{G5} applications. All applications have real-time performance metrics that monitor the overall health of the system.

2.3.2.1 Supported applications on the RMC

Table 2-14 identifies the applications for use in the United States (US) or internationally (SU).



IMPORTANT NOTE: The US and SU identifiers indicate units of measurements for the United States and the International System respectively. Please note that sometimes applications will have different names in the Application and Licensing Management **Add App** or **App Info** lists depending on what units are active in the system. Factory configurations tailor a system for either SU or US units and the system displays the appropriate app name for that configuration. For example, when the device is configured for US units, the name of the app is "AGA-3 Measurement". When the device is configured for SU units, the name shows as "Gas Orifice SU". Names on the application lists may change once they display on the PCCU navigation tree after they are instantiated.

To view the most up-to-date RMC supported applications:

- 1. Connect the laptop or PC to one of the local ports on the RMC.
- 2. Launch PCCU and click Entry to connect with the controller in Entry mode.

3. Click **Application/License Management>Credit/App Info**. Click **Help** for additional information.

Application	US	SU
System applications		
System	Х	X
Display XSeries (LCD display)	Х	X
Measurement Tube applications		
AGA-3 Measurement	Х	
Gas Orifice SU		X
AGA-7 Measurement	Х	
Gas Turbine SU		X
V-Cone Measurement	Х	
V-Cone SU		Х
Coriolis SU	Х	X
API Liquid SU	Х	Х
Nozzle SU	Х	Х
NIST14 Gas SU	Х	X
NIST14 Liquid SU	Х	X
Wedge Gas SU	Х	Х
Advanced Control Applications		
Gas Lift	Х	Х
Oil Transfer Measurement	Х	X
Pad Controller	Х	Х
PID Controller	Х	X
Valve Control	Х	X
Plunger Control	Х	
Plunger SU		X
Shutdown System	Х	X
Other applications		
Alarm System	Х	X
Analysis Trend File	Х	X
Batch Log	Х	X
Host Interface	Х	X
Holding Registers	Х	X
Operations	Х	X
Station	Х	X
Units Conversion	Х	X
I/O applications		
I/O Interface XSeries (I/O System)	Х	Х
Pulse Accumulator	Х	Х
Communication applications		
Communications	Х	Х

Table 2-14: Applications available with RMC

Application	US	SU
Coriolis Interface (Gas)	Х	Х
ENRON Interface	Х	Х
LevelMaster	Х	Х
Liquid Coriolis Interface	Х	Х
NGC Client	Х	Х
Pump Interface	Х	Х
Therms Master	Х	Х
Therms Slave	Х	Х
Wireless Remote I/O	Х	Х
XIO Interface	Х	Х
XMV Interface	Х	Х

2.3.2.2 Application licensing (credit key)

The RMC must have sufficient available licensing credits to add (instantiate) and activate new applications. Each application requires one or more credits of a specific type.

Add or remove applications from the licensed applications list as needed. Four (4) general credits are included in the RMC. Purchase additional license credits for additional applications as needed. These credits run the various applications available.



IMPORTANT NOTE: Click **Help** on the Application/License Management tab for additional information.

To determine if you must purchase additional credits:

- 1. Insert the credit key into your laptop's USB port.
- 2. Launch PCCU and click **Entry** to connect with the controller in Entry mode.
- 3. Click the top item on the navigation tree, then click **Application/License Management**. The Application/License Management tab displays.
- 4. Click **Credit/App Info** to display the Applications Credits Information screen. Locate the application on the list. Then view and take note of the required credit type for that application.
- 5. Click **Close**. The Application/Licensing Management tab displays again.
- 6. View available and surplus credits in the Device Credits window.
- 7. View available credits in the Key Credits window.



IMPORTANT NOTE: If the credits on the device or the key are insufficient or not of the required type, call **1-800-442-3097** and choose **Option 1** to purchase additional credits. Request the specific type of credit you need, and the number of credits. See the last page of this manual for contact information.

2.3.3 Configuration files

The configuration files contain the configuration or settings required for the operation of the RMC and its applications. Configuration files can include initial (factory-defined) or user-defined settings or parameters. The RMC contains the following configuration files:

- Factory configuration is the ABB default factory configuration, or a customer-specific configuration programmed into the factory folder during final assembly. The factory configuration is read-only and stored in persistent memory. It can only be updated at the factory.
- Startup (cold) configuration is used for a cold restart of the device or when a configuration
 package is sent to the device by the PCCU loader. The startup configuration is stored in the
 tfCold directory and can be modified or updated as needed.
- Running (warm) configuration is used by the device during normal operation. The running configuration is stored in the tfData directory and can be modified or updated as needed.

2.3.4 Customer data collection files

The data collection files contain all the measurement and calculation data the RMC generates. These data files are in the tfData directory with the running configuration files. The type and amount of collection data depend on the number and type of applications active on the controller.



IMPORTANT NOTE: The tfData directory also contains trend data for the applications and calibration files if the controller has been field-calibrated.

2.3.5 Log files

The event, change, alarm, and system logs are in the tfData directory with the running configuration data. These files provide status, errors or warning messages that help manage access and changes to the controller.

2.4 User interface

The PCCU32 software running in a Windows[®] environment is the main user interface to the controller. PCCU32 supports several view levels and can be configured to provide role-based secure access to the controller for the following tasks:

- Initial configuration and commissioning (setup)
- Monitoring the controller operation and performance
- Adding, configuring and optimizing applications (configuration)
- Calibration
- Data collection

2.5 Secure service access interface

The Secure Shell (SSH) and Secure File Transfer Protocol (SFTP) on the RMC allow secure login access and file transfer capability for advanced service access. SSH provides an encrypted communication channel, which requires private key authentication for access to the controller. Secure access is available for troubleshooting purposes only and is reserved for advanced users and ABB technical support or development personnel. See section <u>6 Configure security (recommended)</u> for additional details on secure access to the RMC.

3 Installation

This chapter provides information for RMC installation and setup. Follow all instructions and advisories for safe and trouble-free installation.



IMPORTANT NOTE: Read the installation chapter and review user drawings before beginning installation.



WARNING – Bodily injury. Although there might be alternate methods of installation and commissioning of the RMC, ABB recommends that technicians perform the procedures in the order presented: plan, install, wire, then apply power, verify power-on sequence, and configure.

3.1 Site planning and requirements

RMC installation requires that customer-supplied enclosures, power sources, wiring, and location comply with the specifications described in this section.



WARNING – Bodily injury. Carefully review the specifications in this section to select compliant equipment. Failure to comply with these specifications might create unsafe conditions, resulting in bodily injury and equipment damage.

3.1.1 Enclosure requirements

The RMC must be installed in an enclosure that complies with the following specifications:

- The enclosure protects the RMC-100 against shock and impact.
- For Class I, Division 2, or other outdoor installations, the RMC is installed in an enclosure rated at least Type 3R, according to the environment.
- For Class I, Zone 2 installations, the RMC is installed inside an enclosure tested for IP54 in accordance with IEC 60529 and IEC 60079-15.

3.1.2 Battery and charger requirements

Comply with the following specifications when powering the controller with a battery (battery mode). Battery specifications:

- Nominal 12 Vdc Sealed Lead Acid

- RMC rating for ambient temperature with battery is Ta = -40 °C to +60 °C (-40 °F to 140 °F) Battery charger specifications:

- Solar panel must be nominal 12 Vdc, 30 W or less, or
- Power source: 14.5 Vdc to 15.5 Vdc, 1.65 A

3.1.3 External power supply requirements

Comply with the following specifications when powering the controller with an external power source (external power mode):

External power mode operation is +9 Vdc to 30 Vdc, 5 A maximum.

RMC rating for ambient temperature without battery is Ta = -40 °C to +70 °C (-40 °F to 158 °F).



NOTICE – Equipment damage. A battery cannot be used when the RMC is in EXT PWR mode.

3.2 Location specifications and design

Install an RMC standalone on a DIN rail on an interior wall, in an Xcore enclosure, or in a customersupplied enclosure. Xcore enclosures meet the requirements in section <u>3.1.1</u> <u>Enclosure requirements</u>, Verify that any non-Xcore customer-suppled enclosures also meet these requirements.

3.2.1 General requirements

The installation location should:

- Allow access to the enclosure, RMC, power sources, cables and connections
- Be at a distance that does not exceed the maximum or recommended field wiring lengths for connections to peripherals or external equipment. Field wiring requirements depend on the type of connection. See section <u>3.3 Wiring requirements</u>.

If you use a solar panel to provide power, select where and how to install the solar panel outdoors. Do not place the solar panel where it is in shadow for any part of the day.

3.2.2 Mounting requirements

Mounting surfaces or walls require sufficient strength to support the hanging weight of the RMC (maximum of 1.816 pounds), the enclosure, and associated equipment to meet the requirements of IEC715.

3.3 Wiring requirements

Field wiring must meet the following requirements:

- All wiring connections and the screw terminals for power, input/output, and communications support 12 AWG to 22 AWG. Select the wire gauge according to the voltage and current requirements of the circuitry. The gauge differs for each application.
- Follow local electrical codes to select the appropriate wire gauge and type based on the load current, voltage, signal type, and indoor or outdoor environment.



NOTICE – Equipment damage. Field installation cable and conductors must be rated greater than 70 °C (158 °F) when installed in an ambient temperature greater than 60 °C (140 °F).

3.4 Unpack and inspect

The RMC and additional parts ship in a specially designed shipping carton with a Quick Start Guide, Safety and Compliance Sheet, and packing list.



IMPORTANT NOTE: If there is any damage to the shipping carton, keep it and the packing materials until the contents are inspected and found to be free of damage.

To unpack the RMC and inspect for damaged, missing, or incorrect parts:

- Inspect the shipping carton for damage.
- Carefully remove items from the carton.
- Keep all shipping materials to return any parts.
- Compare the packing list with the materials received. Check for any missing or incorrect parts.

- Inspect each item for damage: RMC exterior, LCD display, optional equipment if purchased.

If there are any missing, incorrect, damaged parts or noticeable defects, call the ABB main office number on the last page of this manual.

3.5 Basic hardware installation

This is an overview of a typical hardware installation. For different installations, call the ABB main office number on the last page of the manual.



NOTICE – Equipment damage. Perform all the procedures in the order presented in this section before powering the RMC.



DANGER – Serious damage to health / risk to life. Do not allow the RMC components to contact a non-insulated tool or be without a proper grounding device. This could create a static electric discharge resulting in bodily injury and damage to the electronic components. Use properly insulated tools and wear a grounding strap to eliminate static electricity when connecting or disconnecting wires.

3.5.1 Ground the controller

The RMC must be mounted on a grounded DIN rail to ground it.



NOTICE – Equipment damage. The DIN rail on which the controller is mounted must be bonded to an earthing terminal. The bonding conductor must have a cross sectional area of at least 4 mm2 (12 AWG).

To ground the DIN rail:

- 1. Screw the DIN rail onto the mounting surface.
- 2. Attach a grounding wire to the DIN rail.
- 3. Attach the other end of the wire to an electrical ground.

3.5.2 Standalone mounting

To mount the RMC:

- 1. Position the RMC on the DIN rail.
- 2. Push the RMC onto the DIN rail until it snaps into place (Figure 3-1).

Figure 3-1: Mount the RMC



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IMPORTANT NOTE: To remove the RMC, insert a slotted screwdriver into the access slot of the DIN rail and release the clip to loosen. See section <u>8.8.3 Remove the RMC from the DIN rail</u>.

3.5.3 Mounting when using an enclosure

The Xcore enclosure has tags for wall-mounting (<u>Figure 3-2</u>). Mount the enclosure per field specifications. The RMC is usually already mounted on an internal DIN rail inside the enclosure. To use non-ABB enclosures, follow the vendor's mounting instructions.

Figure 3-2: Xcore enclosure top mounting tags and interior view



Legend for Figure 3-2: Xcore enclosure top mounting tags and interior view

ID	Name
1	Тад
2	RMC installed
3	DIN Rail

3.5.4 Wire serial communication ports

Wire the RMC serial communication (serial communication, COMM) ports to communicate with and power external devices. The type of serial interface the external device requires determines the wiring for communication. Wire for power if there is no external supply powering the external device.

This section provides wire length specifications per serial interface type, port pinouts and generic instructions for field wiring. There are also two scenarios of serial communication.

Table 3-1	: Serial	communications	specifications

	-	
Communication type	Maximum wire length	Termination
RS-232	50 ft (15 m)	Terminal connector (9 POS), screw termination
RS-485 or RS-422	4000 ft (1220 m)	and pluggable COMM module
		Active when communication module is inserted

Table 3-2 identifies the RS-232, RS-422, and RS-485 communication pinouts for COMM 1 and COMM 2.

PIN	RS-232	RS-422	RS-485
1	Voltage out (VOUT)	Voltage out (VOUT)	Voltage out (VOUT)
2	Ground (GND)	Ground (GND)	Ground (GND)
3	Switched voltage (Sw VOUT)	Switched voltage (Sw VOUT)	Switched voltage (Sw VOUT)
4	Operate (OPER)	Operate (OPER)	Operate (OPER)
5	Remote request to send (RRTS)	Remote request to send (RRTS)	Remote request to send (RRTS)
6	Request to send (RTS)	Transmit Bus + (TBUS+)	Transmit/Receive (BUS+)
7	Transmit data (TX)	Transmit bus – (TBUS-)	Transmit/Receive (BUS-)
8	Request to send (RX)	Receive bus + (RBUS+)	Not Used
9	Clear to send (CTS)	Receive bus – (RBUS-)	Not Used

Table 3-2: COMM	1 and COMM 2 seria	l communication	port pinouts
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To wire the serial communication port:



IMPORTANT NOTE: RMC user drawings display COMM wiring details for specific external devices. See the

Additional information section.

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NOTICE – Equipment damage. Pin 1 (VOUT) or pin 3 (Sw VOUT) can power an external device on both COMM1 and COMM2. The external power supply connected to the CHARGER/EXT PWR port determines the output voltage at these pins.

Verify that the device is compatible with the input voltage at the CHARGER/EXT PWR port before connecting to these pins. Connection to an incompatible device can result in damage to the device.

- 1. Pry the terminal connector off the electronic board with a slotted screwdriver.
- 2. Trim the wire covering back 1/4 inch (0.635 cm) on each wire.
- 3. Loosen the terminal connector screws for the correct pin according to <u>Table 3-2</u> COMM 1 and COMM 2 serial communication port pinouts.
- 4. Insert the wires into the required pins if you power the device from the COMM port:
 - Use pin 1 (VOUT) and pin 2 (GND) to provide constant voltage.
 - Use pin 3 (Sw VOUT) and pin 2 (GND) to provide switched voltage
- 5. Tighten the terminal connector screws.



NOTICE – Equipment damage. Do not overtighten the terminal connector screws. This can damage the wire.

- 6. Insert the terminal connector back onto the COMM port if it was removed.
- 7. Insert the communication module in the appropriate slot (Figure 3-3). The communication module pushes the port cover downward when inserted.

Figure 3-3: COMM terminals and modules



3.5.4.1 Wire remote communications equipment (radio)

The controller serial communication (COMM) ports can be wired with remote communication equipment, such as a radio. <u>Figure 3-4</u> shows the connection between radio equipment and one of the COMM ports. In this example, the COMM port is configured as an RS-232 port, which provides point-to-point communication.



Figure 3-4: Serial communication with radio equipment

3.5.4.2 Wire multiple peripheral measurement devices

The controller serial communication (serial communication, COMM) ports can connect to peripheral measurement devices, such as multivariable transmitters. <u>Figure 3-5</u> shows the connection between one of the COMM ports and two multivariable transmitters. In this example, the COMM port is configured as an RS-485 port, which provides either point-to-point or multi-point communication. The example shows the two connected transmitters that connect to the controller for communication and power.



Figure 3-5: COMM 1 for RS-485 communication with multiple devices

3.5.5 Wire input and output

Wire the RMC I/O ports to monitor, control and power external devices. Wire for power if the external device has no external power supply.

To wire the I/O port:

IMPORTANT NOTE: Refer to the RMC user drawings for I/O wiring details for specific external devices. See the

Additional information section.



NOTICE – Equipment damage. An external device can be powered from pin 1 (PWR) on any of the AIs (<u>Table 3-3</u>) or from the AO (<u>Table 3-4</u>). The output voltage at the PWR pin depends on the external power supply that connects to the CHARGER/EXT PWR port.

Before connecting to these pins, verify that the external device is compatible with the input voltage at the CHARGER/EXT PWR port. Connection to an incompatible device can result in damage to the device.

- 1. Pry the terminal connector off the electric board with a slotted screwdriver.
- 2. Trim the wire covering back 1/4 inch (0.635 cm) on each wire.
- 3. Loosen the terminal connector screws for the correct pin according to I/O tables.
- 4. Insert the wires in the required pins. If powering the device from the AI or the AO:
 - Use pin 1 (PWR) and pin 3 (GND) for devices attached to the AI.
 - Use pin 1 (PWR) and pin 4 (GND) for devices attached to the AO.
 - Tighten the terminal connector screws.



NOTICE – Equipment damage. Do not overtighten the terminal connector screws. This can damage the wire.

5. Insert the terminal connector into the I/O if it was removed.

3.5.5.1 Analog input pinouts

Table 3-3 and Figure 3-6 identify the AI pinouts.



NOTICE – Equipment damage. Before connecting to pin 1 (PWR), ensure that the external device is compatible with the input voltage at the CHARGER/EXT PWR port. Connection to an incompatible device can result in damage to the device.

Table 3-3: Analog input pinouts

Input	Pin	Description	Input	Pin	Description
1	1	PWR-power	3	1	PWR-power
	2	A1-input signal		2	A3-input signal
	3	GND-input ground		3	GND-input ground
2	1	PWR-power	4	1	PWR-power
	2	A2-input signal		2	A4-input signal
	3	GND-input ground		3	GND-input ground

Figure 3-6: Analog input pinouts



3.5.5.2 Analog output pinouts

Table 3-4 and Figure 3-7 identify the AO pinouts.



NOTICE – Equipment damage. Before connecting to pin 1 (PWR), verify that the external device is compatible with the input voltage at the CHARGER/EXT PWR port. Connection to an incompatible device can result in damage to the device.

Table 3-4: Analog output pinouts

Output	Pin	Description	
	1	PWR-loop power input	
1	2	SNK-current sink input	
	3	SRC-current source output	
	4	GND-ground	

Figure 3-7: Analog output pinouts



3.5.5.3 Pulse input pinouts

Table 3-5 and Figure 3-8 identify the PI pinouts

Table 3-5: Pulse input pinouts

PI	Pin	Description
1	1	INP-PI 1 input
	2	GND-ground
2	1	INP-PI 2 input
	2	GND-ground
Figure 3-8: Pulse input pinouts



3.5.5.4 Digital input and output pinouts

Table 3-6 and Figure 3-9 identify the DI/DO pinouts.

DI/DO	PIN	Description	DI/DO	PIN	Description
1	1	SIG-Signal DI/DO 1	4	1	SIG-Signal DI/DO 4
	2	GND-ground		2	GND-ground
2	1	SIG-Signal DI/DO 2	5	1	SIG-Signal DI/DO 5
	2	GND-ground		2	GND-ground
3	1	SIG-Signal DI/DO 3	6	1	SIG-Signal DI/DO 6
	2	GND-ground	-	2	GND-ground
3	2 1 2	SIG-Signal DI/DO 3 GND-ground	6	<u>1</u> 2	SIG-Signal DI/DO 6 GND-ground

Table 3-6: Digital I/O pinouts

Figure 3-9: Digital I/O pinouts



3.6 Connect expansion modules

3.6.1 Connect additional devices with Ethernet

Multiple external devices such as an XFC, XRC, analyzer, or an additional RMC can connect to the RMC Ethernet port.



IMPORTANT NOTE: Each device that connects to an Ethernet port requires a valid IP address for TCP/IP communications. If the devices do not each have a valid IP address, they cannot communicate over the network. For additional information on Ethernet connection scenarios see section 10, Ethernet connectivity scenarios.

Figure 3-10 illustrates how Ethernet port 2 supports connecting to multiple RMCs.





Figure 3-11 illustrates how an Ethernet port supports connecting other ABB equipment.

Figure 3-11: Connect RMC to other ABB devices



Never connect Ethernet 1 and Ethernet 2 to the same Ethernet switch (<u>Figure 3-12</u>). Connecting both ports to the same switch disables both ports.

Figure 3-12: Wrong Ethernet connection



3.6.2 Connect TFIO modules

The RMC has two TFIO ports. Each port requires a TFIO installation kit that includes the cable to connect the TFIO modules to the RMC. For additional information, refer to the TFIO Module User Manual under Additional information.

NOTICE – Equipment damage. When the TFIO interface is disabled, the modules remain powered. Remove the power from the RMC before connecting or disconnecting additional TFIO modules or the TFIO cable. Failure to power down the RMC can result in damage to the module. The procedure in this section assumes the controller is powered off.

<u>Table 3-7</u> identifies the different module types available with the RMC that support 9 volts to 30 volts operation. The RMC does not support the TFIO CIM module, part number 2100421.

TFIO module	Part number	TFIO software version
Valve Control Combo I/O	2100412	2100576-007
4-20 mA Analog Output	2100415	2100715-006
Type II Analog Input	2100418	2100575-006
Combo Digital	2100543	2100563-009
Thermocouple Input	2100869	2101024-001
RTD Input	2101018	2101027-001

Table 3-7: TFIO modules

NOTICE – Equipment damage. The maximum voltage to operate legacy TFIO modules (not labeled as M2) is 12 Vdc. More than 12 Vdc damages legacy TFIO modules. Only the TFIO M2 modules support voltages higher than 12 Vdc.

To connect the TFIO module(s):



NOTICE – Equipment damage. The output voltage at the following pins depends on the external power supply connected to the CHARGER/EXT PWR port:

- J2-1, J4-1 and J4-3 (on the TFIO valve control interface module) and
- J1-1, J2-1, J3-1, J4-1 (on the TFIO analog output module)

Before connecting to these pins, verify that the external device is compatible with the input voltage at the CHARGER/EXT PWR port.

- 1. Attach the TFIO module to the DIN rail.
- 2. Attach the TFIO interface cable to the first TFIO module.
- 3. Attach the next TFIO module to the DIN rail.
- 4. Position it beside the previously attached module and snap them together.
- 5. Repeat steps 3 and 4 to attach the additional TFIO modules as required.



IMPORTANT NOTE: Each port supports a maximum of 22 modules. The TFIO A port does not have to be full before using TFIO B.

- 6. Attach the 9-pin connector of the TFIO interface cable to the TFIO A port on the RMC.
- 7. Using the second TFIO interface cable, repeat steps 1 through 5 for the TFIO B port.
- 8. Attach the 9-pin connector of the TFIO interface cable to the TFIO B port.
- 9. Loosen the terminal connector screws for the correct pin.
- 10. Insert the wires in the required TFIO pins.
- 11. Tighten the terminal connector screws.

To configure the TFIO, see section 4.10.

<u>Figure 3-13</u> shows the pinouts of a TFIO module. For additional information, refer to the TFIO Module User Manual listed under <u>Additional information</u>.

Figure 3-13: TFIO module pins



3.6.3 Connect third-party serial modules

Third-party Ethernet-to-serial modules add serial communication ports to connect additional external devices such as XMVs and transmitters. For instructions about using MOXA[®] modules, the third-party modules used to expand serial capacity to the controller, see section <u>10 Serial port expansion with</u> <u>MOXA® modules</u>.

3.7 Power the RMC

This section describes two modes for powering the controller. Select one mode:

- Battery mode: a 12 volt battery with a charger supplies power (see section <u>3.7.2</u>).
- External power mode: an external power source supplies power (see section <u>3.7.3</u>).

Follow the instructions for the appropriate power mode, then continue to section <u>3.8</u>, <u>Enable lithium</u> <u>battery backup</u>.



NOTICE – Equipment damage. The maximum input voltage for legacy TFIO modules is 12 Vdc.

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IMPORTANT NOTE: Externally fuse the power input for the load. This consists of the equipment, plus any external devices powered by the RMC. The wire gauge should be appropriate (in some applications a minimum of 16 AWG gauge is advisable).

3.7.1 Power-on sequence

The RMC power-on sequence initiates when power is connected. The LCD displays the following information as the controller completes its startup:

- ABB TOTALFLOW RMC-100 identifies the controller name and model
- BOOT 2105412-XXX indicates the version of the boot software
- OS 2105411-XXX indicates the version of the operating system
- Super CAP Charged indicates if the super capacitor is charged (see section 2.2.9)
- APP 2105457-XXX indicates the version of the flash

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IMPORTANT NOTE: The displayed items scroll at varying durations. When the DATE/TIME displays, the power-on sequence is complete.

The RMC design has a super capacitor (Super CAP) that is a short-term power reservoir (see section 2.2.9 for more details). The first time the unit powers on, or if the RMC is left powered off for several hours or longer, the boot time is approximately two minutes to allow charging of the super capacitor. The boot time is considerably less once the capacitor is fully charged.

3.7.2 Power with battery and charger

This powering mode requires a 12 volt (SLA) battery and a charger to recharge the battery. The following instructions describe the typical installation of a battery and a solar panel system as the charger. Adapt these instructions to alternate installations.



IMPORTANT NOTE: Verify the battery and charger meet the specifications in section <u>3.1.2</u>, <u>Battery and charger requirements</u>.

3.7.2.1 Connect the battery (dc power)

This procedure describes the connection of the battery to the BAT port or terminal. Remove the BAT terminal connector to wire the battery cable before connecting the battery to the board.

The hardware required for a battery installation is:

- One 12 volt SLA battery
- One battery cable (included with ABB-approved batteries)

Before installation, inspect the battery cable and connectors for breakage where they terminate on the battery.

To install and connect the battery:

1. Install and secure the battery at the appropriate location.



WARNING – Bodily injury. Bodily injury and property damage. Do not allow the battery terminals to contact any metal surface. When the positive and negative battery terminals contact a conductive material, it creates a short circuit that could result in sparks, property damage, and possible explosion.

- 2. Pry the BAT port removable terminal connector (green connector) off the electronic board with a slotted screwdriver.
- 3. Trim back the covering on the battery cable wires ¹/₄ inch (0.635 cm) on each wire.
- 4. Loosen the terminal connector screws.
- 5. Insert the wires into the required pins (Figure 3-14). Observe the polarity (+ and -).



WARNING – Bodily injury. Bodily injury and property damage. Complete all wiring of peripheral or external devices to the controller before applying power (connecting the battery).

Connect the battery before connecting the charger cable.

Figure 3-14: Connect a 12 Vdc SLA battery



- 6. Connect the other end of the battery cable to the battery terminals. Observe the polarity (+ and -).
- 7. Insert the wired terminal connector back into the BAT port.
- 8. Observe the power-on sequence information on the LCD to confirm that the battery is supplying power to the RMC (see details in section <u>3.7.1</u>). When the DATE/TIME displays, the sequence is complete.
- 9. Press **Reset** if the power-on sequence fails to initiate or complete.

3.7.2.2 Connect the solar panel

The RMC uses a 10 or 20 Watt solar panel with nominal 12 Vdc output voltage. Mount the solar panel on a two-inch pipe, or on the top or side of a meter house.

Remove the CHARGER/EXT PWR terminal connector to wire the charger cable before connecting the charger to the board.

IMPORTANT NOTE: Call the ABB main office number on the last page of this manual for information about mounting the solar panel on the top or side of a building.

i

Do not place the solar panel where it is in shadows for any part of the day.

Exercise caution when handling the solar panel to avoid damaging it.

Mount the solar panel facing up from the horizon at a 50° angle. For northern hemispheres, position the solar panel facing south. For southern hemispheres, position the solar panel facing north.

Clean the solar panel on a regular basis to ensure maximum charging.

The hardware required to connect the solar panel to the RMC is:

- One solar panel with an integrated cable
- One solar panel mounting kit



NOTICE – Equipment damage. Always connect the battery to the BAT port before you connect the solar panel or alternate charger cable to the RMC.

To connect the solar panel charger:

1. Verify that the solar panel is operating properly before installation:

- a. Verify the solar panel's polarity and output voltage with a digital voltmeter. Voltage varies depending on the amount of sun and angle to sun.
- b. Continue with the installation if the measured output voltage is within the manufacturer's specification, per the specification sheet supplied with the panel.
- c. Call the ABB main office number on the last page of the manual if the measured voltage is out of specification.
- 2. Pry the CHARGER/EXT PWR port removable terminal connector off the electronic board with a slotted screwdriver.
- 3. Trim back the covering on the end of the charger cable that connects to the controller ¼ inch (0.635 cm) on each wire.
- 4. Loosen the terminal connector screws.
- 5. Insert the wires in the required pins. Observe the polarity (+ and -).
- 6. Insert the wired terminal connector back into the CHARGER/EXT PWR port (Figure 3-15).

Figure 3-15: Connect the charger (solar panel)



Continue to section <u>3.8</u>, Enable lithium battery backup, to continue the installation.

3.7.3 Power with external power source

The controller can receive power from an external power supply (9 to 30 Vdc). Remove the CHARGER/EXT PWR terminal connector to wire the power cable before connecting the power supply to the board.



WARNING – Bodily injury. To prevent injury only permit a licensed electrician to install Vac wiring.



IMPORTANT NOTE: The external power supply must meet the specifications in section <u>3.1.3</u>.

All wiring must comply with national and local electrical codes and applicable ABB certification drawings to maintain system certification.



NOTICE – Equipment damage. A battery cannot be used when the controller is in EXT PWR mode.

To wire an external power source to the RMC:

- 1. Follow the manufacturer's instructions supplied with the external power supply to install and connect the power source.
- 2. Pry the CHARGER/EXT PWR port removable terminal connector off the electronic board with a slotted screwdriver.
- 3. Trim back the covering on the end of the power cable that connects to the controller $\frac{1}{4}$ inch (0.635 cm) on each wire.
- 4. Loosen the terminal connector screws.
- 5. Insert the wires in the required pins. Observe the polarity (+ and -).
- 6. Insert the wired terminal connector back into the CHARGER/EXT port (Figure 3-16).

Figure 3-16: Connect the external power supply



- 7. Apply power to the external power supply.
- 8. Observe the power-on sequence information scrolling on the LCD to verify that the RMC is receiving power. See details in section <u>3.7.1</u>. When the DATE/TIME displays, the sequence is complete.
- 9. Press **Reset** if the power-on sequence fails to initiate or complete.
- 10. Proceed to section 3.8 to continue the installation.

3.8 Enable lithium battery backup

The lithium battery retains operation of the real time clock. The lithium battery backup switch is located between the TFIO ports and is accessible through a slot in the housing. Lift the cover over the TFIO ports to view the switch settings. The two settings are:

 Enable: The switch is on. The lithium battery backs up the real time clock. If power is lost or disconnected, the real time clock continues to operate until the lithium battery is depleted.

- Disable: The switch is off. The lithium battery does not back up the real time clock.

To enable the lithium battery, insert a small screwdriver into the slot and move the switch to the ENABLE position (Figure 3-17).

Figure 3-17: Lithium battery setting



4 Startup

This chapter describes the setup and configuration procedures to activate a newly installed RMC system. Complete the RMC configurations through the Windows[®]-based interface software PCCU32.



IMPORTANT NOTE: Click **Help** on any of the screens used for configuration. Online help topics are available for each PCCU screen.

4.1 Configure the RMC using PCCU32

4.1.1 Install the PCCU32 interface



IMPORTANT NOTE: The RMC equipment requires PCCU32 version 7.57 or newer. Previous versions of PCCU32 are not compatible. PCCU32 must be installed in the PC or laptop used to configure the RMC.

PCCU32 software operates in a Windows® environment.

To install with a PCCU32 installation file downloaded from the ABB website:

- 1. Locate the downloaded file on the PC or laptop. The file downloaded is compressed.
- 2. Un-compress the downloaded file.
- 3. Display File Explorer, then locate and open the PCCU32 folder.
- 4. Double-click setup.exe to run the installation program. Follow the screen prompts during installation.
- 5. Click Finish when installation completes.

4.2 Establish local communication

Connect the laptop to the USB, Ethernet, or MMI ports to establish local communication with the controller. These ports are configured at the factory for local operator access. Configure PCCU to use any of these ports. To configure the controller, connect to the preferred port, establish a connection to the controller with PCCU, and proceed to section <u>4.3</u>.



IMPORTANT NOTE: External weatherproof local communication connectors (USB, Ethernet or MMI) are available on Xcore enclosures, if purchased. Use external ports to connect locally if the RMC is inside an enclosure. If the RMC is a standalone device, use the USB or Ethernet ports. The MMI port has a proprietary connector requiring a cable adapter not shipped with the standalone unit.

Do not use external enclosure connectors for permanent field connections. These connectors are only for local access during configuration or maintenance.

4.2.1 Using the USB port

The following instructions apply to USB port connections. <u>Table 4-1</u> provides cabling details to connect to the USB port.

Table	4-1:	USB	cablin	g
-------	------	-----	--------	---

Host system interface type	Required cabling termination (connectors) or adaptors	ABB part number
USB 2.0 Type A receptacle	USB 2.0 Type B plug to USB 2.0 Type A plug cable (referred as USB PCCU32 cable)	1801800-xxx

Figure 4-1 illustrates USB communication between a host system and the RMC through direct connection.

Figure 4-1: USB port for local operator access



To set up communication using the USB port:

- 1. Power on the RMC and the laptop or PC.
- 2. Connect the USB cable. An annunciator in the LCD displays a lower case "u" for local USB connection.
- 3. Launch PCCU.
- 4. Click **Setup** on the PCCU32 toolbar menu. The System Setup window displays (Figure 4-2).

Figure 4-2: PCCU system setup (USB communication)

tup Directory Path	s Misc Macro	o Setup			
Communications				Toolbar Buttons	
	PCCU	Connect Method:		Connect	
Serial port	TCP/IP	ActiveSync (NGC)	Bluetooth	V Disconnect	
-Connection parar	neters		0000	NGC Operate	
		Level 1-2 Security	Code: 0000	Tentry	
PCCU Com. Port:	COM4:	•		Monitor	
				Teminal	
Initial Baud:	2400	•		Calibrate	=
M	2400			Collect	
Max Baud:	2400	•		V File Transfer	
Ctop Dite:	2			Valve Control	
Stop bits.	2	•		Remote Protocol	
Timeout (ms):	3000			Remote Communications	
ninoodi (ino).	3000			TFModbus	
Retry Limit:	3			32 Bit X-Series Loader	
				VGC Startup Wizard	
				Laptop File Utilities	

- 5. Select Serial port under PCCU Connect Method.
- 6. Select the computer USB port that the cable connects to from the PCCU Com. Port drop down list.
- 7. Click Close.
- Click Entry on the PCCU32 toolbar to connect to the device. When the connection is successful, the PCCU32 Entry screen displays. If the RMC calendar clock does not match the laptop's date and time, a message displays to synchronize the date and time (Figure 4-3).

Figure 4-3: Synchronize date and time



- 9. Click Yes. The RMC calendar clock synchronizes with the laptop date and time.
- 10. Configure the RMC.
 - To use Ethernet, complete steps in the following section.
 - To use USB, remain on the current USB connection and proceed to section <u>4.3.1 Configure</u> the station.

4.2.2 Using the Ethernet ports

The startup configuration of the RMC requires first-time local communication. Establish a connection between a PC or laptop and the device over Ethernet after installation and power-on sequence is complete.

The Ethernet ports auto-configure to adapt to the Ethernet cable type. <u>Table 4-2</u> displays the cabling specifications for Ethernet ports.

Table 4-2: Ethernet cabling

Supported device (with Ethernet 10/100 BaseT ports)	Required cabling termination (connectors) or adaptors	ABB part number
Host system (operator laptop or computer)		1681011
Network device (Ethernet hub, switch or router)	Straight-through Ethernet CAT 5 - cable with RJ-45 connectors at	Maximum distance:
Other Totalflow devices: additional RMCs, flow computers, and analyzers	both ends.	100 meters (328 feet)

Local TCP/IP communication over Ethernet requires correct IP configuration and addressing. The RMC Ethernet factory default configuration supports initial connection with pre-configured IP parameters for convenience.

The RMC is configured as a 2-port Ethernet switch from the factory. Figure 4-4 shows the default Ethernet mode as viewed from PCCU. Ethernet is configured in 1 Network mode, therefore devices connected to either port communicate on the same subnet. A single default IP address (169.254.0.11) is ready for initial local communication using either of the 2 ports. To use either port, set the Ethernet State to **Enable**.

RCCU32 - [Entry]		- 🗆 X
Operate View Window Help		_ 8 ×
10 🛅 🔼 💽 🕅 🎽 🏈	· 🛄 🔍 🤌	
E-RMC-100	Communication Setup Services Networking	
- Communications - Totalflow/TCP		^
Totalflow/USB	Device Name: RMC-100-RE2004618-00010841	
Totalflow/COM0: Totalflow/COM0:	Enterprise Network	
	moue. <u>1 Network</u>	
LevelMaster XIO_01 COM3	Port: E1+E2	
ABBService	State: Enable	
I/O System Env Measurement	Status: Ready	
Setup	Restart	
- Analysis	DHCP: Enable	
Digital Outputs	Default Interface:	
- Adv Setup	TP Addresser 169 . 254 . 0 . 11	
Speed of Sound	255 255 0 0	
Display Trend System	Subnet Masic	
	Gateway: 0.0.0.0	
	DNS Server: 0 . 0 . 0 . 0	
	Advanced	
	Rx Rate Limit:	
	Off 🗸	
	Tx Rate Limit:	
	Off 🗸	
	Statistics	
	KX IX Natural Linear 97 - 0.000 0.023	
	Packets/sec:	
	Data Bytes/sec: 285	
	Drop Packets/sec: 0 0	
	Error Packets/sec: 0 0	
	Re-read Monitor Statistics Restore Factory Settions Send Close	Help
		· · · · ·
Ready	#Polls: 34 #Errors: 0 Connected to RMC-100	Login: user v7.68 : 1397

1

Figure 4-4: Factory default Ethernet configuration (PCCU Networking tab)

IMPORTANT NOTE: Initial communication with the RMC assumes that the factory default configuration of the device is still intact. If unable to establish connection with Ethernet at first-time connection, verify that Ethernet is enabled. To enable or verify the Ethernet configuration see section <u>4.2.2.1</u>.

Figure 4-5 illustrates Ethernet connections between a host system and the RMC. For first-time communication, connect directly to any of the Ethernet ports or to the local network switch if one is used. The example shows the RMC's default IP address (168.254.0.11). The laptop shows an example of a compatible IP address. Use the default RMC IP address as the target address for connection setup using PCCU.

Figure 4-5: First-time local connection with RMC-100 using Ethernet (2-port switch mode)





IMPORTANT NOTE: If the device is configured for network communication (connected to the corporate network or the field network), a valid IP configuration for the field network must replace the factory IP configuration default. Local access to devices on a network is still supported after the default configuration is replaced, but the operator laptop must have an IP configuration compatible with the non-default addresses assigned to the devices. See section <u>4.5 Configure</u> Ethernet network communication.

4.2.2.1 Enable Ethernet

Ethernet ports should be enabled if they are the preferred local connection option.

This procedure requires local connection with the RMC using either the USB or MMI ports. Establish a connection per section 4.2.1 Using the USB port, before you start this procedure. Skip this procedure if the Ethernet ports are already enabled.

To enable Ethernet:

- 1. Launch PCCU and click **Entry**. The navigation tree displays.
- 2. Click **View** > **Expert** to display PCCU in Expert Mode.
- 3. Click Communications>Networking.
- 4. Select the State **Enable** checkbox (Figure 4-6).
- 5. Click Send.
- 6. Click **Restart**. Click **Yes** to confirm restart.

Figure 4-6: Enable Ethernet for local communication using default IP configuration

Bu PCCU32 - [Entry]		– 🗆 X
Operate View Window Help		_ 8 ×
fi 🛅 🖾 💽 🕅 🎬) 🛄 💑 🧇	
- RMC-100 - Communications	Communication Setup Services Networking	
Totalflow/TCP Totalflow/USB	Device Name: RMC-100-RE2004618-00010841	î.
Totalflow/COM0:	Enterprise Network	
XIO Interface XIO_01	Mode: 1 Network	
XMV Interface XIO_01 COM2	Port: E1+E2	
LevelMaster XIO_01 COMs	State: VE Enable	
H-1/0 System	Party	
Flow Measurement	Status: rocky	
Setup	Restart	
Analysis	DHCP: Enable	
Digital Outputs	Default Interface:	
Adv Setup		
- Speed of Sound	IP Address: 169.254.0.11	
⊞- Display	Subnet Mask: 255.255.0.0	
i≟- Trend System	Gateway: 0.0.0.0	
	DNS Server: 0.0.0.0	
	Advanced	
	KX Kate Limit:	
	Ty Date Limit:	
	off ~	
	Statistics Rx Tx	
	Network Usage%: 0.000 0.023	
	Particular Concerning	
	Packets/sec:	
	Data Bytes/sec: 0 285	
	Drop Packets/sec: 0 0	
	Error Backets foar: 0 0	
	Re-read Monitor Statistics Restore Factory Settings Send Close	Help
		~
Ready	#Polls: 34 #Errors: 0 Connected to RMC-100 Login	n: user v7.68 : 1397

4.2.2.2 Configure the host system

If the laptop is configured to automatically obtain the IP address, do not change the TCP/IP configuration. If the laptop has a static TCP/IP configuration, configure it for dynamic IP addressing and private addressing (Figure 4-7). See Figure 4-8 for Windows[®] 7 system examples.

Figure 4-7: IP for host system

Internet Protocol Version 4 (TCP/IPv4) Properties	Internet Protocol Version 4 (TCP/IPv4) Properties
General Alternate Configuration	General Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.	If this computer is used on more than one network, enter the alternate IP settings below.
	 Automatic private IP address
Obtain an IP address automatically	O User configured
O Use the following IP address:	IP address:
IP address:	Subnet mask:
Subnet mask:	Default gateway:
Default gateway:	
Obtain DNS server address automatically	Preferred DNS server:
Use the following DNS server addresses:	Alternate DNS server:
Preferred DNS server:	Preferred WINS server:
Alternate DNS server:	Alternate WINS server:
Validate settings upon exit Advanced	Validate settings, if changed, upon exit
OK Cancel	OK Cancel

4.2.2.3 Set up PCCU32 and connect

To configure PCCU32 for TCP/IP communication:

- 1. Power on the RMC and the laptop or PC.
- 2. Connect the Ethernet cable.
- 3. Launch PCCU.
- 4. Click Setup on the PCCU32 toolbar menu. The System Setup window displays.
- 5. Click **TCP/IP**.
- 6. Type the default IP address (169.254.0.11) into Network ID or IP under Connection Parameters (Figure 4-8).

Figure 4-8: PCCU setup for local Ethernet communication

📑 System Setup			x
Setup Directory Paths	s Misc Macro Setup		
Communications Serial port Connection paran Network ID or IP: Packet Size: Block Size: Initial Timeout: Timeout (ms): Retry Limit: Show Comm S	PCCU Connect Method: TCP/IP ActiveSync (N neters 169254011 8192 1024 15000 3000 10 Rats on Status Bar	IGC) Bluetooth Level 1-2 Security Code:	Toolbar Buttons ♥ Connect ♥ Aremote Protocol ♥ Remote Protocol ♥ Remote Communications ♥ Thodbus ♥ 32 Bt X-Series Loader ♥ Archive Unitities ♥ Archive Unitities ♥ Archive Unitities ♥ Configuration File ♥ ID Manager
Auto Connect None	Collect	Initial Connect	
Use default Ro	ole Based Access Control credentials		
Default Role E	Based Access Control Usemame Tech		
Default Role B	Based Access Control Password		
			Close Help

- 7. Click Close.
- 8. Click **Entry** on the PCCU32 menu bar to connect to the device. The device's Entry screen displays when a connection is successful.
- 9. Configure the controller according to section <u>4.3.1</u>.

4.2.3 Using the MMI port (when using enclosures)



IMPORTANT NOTE: A circular military (MIL-C-26482) weatherproof connector is available on the Xcore enclosure only. Use the external MMI connector for local communication. Use either the USB or Ethernet port for direct connection if the RMC has been installed standalone.

Use the USB port and a RS-232-to-USB adapter for laptops without legacy DB-9 RS-232 ports. ABB recommends and sells the Digi® Edgeport®/1 converter (part number 1801382-001). Contact technical support to order or for more details.

Table 4-3 provides the cabling specifications for the MMI port.

Table 4-3: MMI cabling specifications

Host system serial port	Required cabling termination (connectors) or	ABB part
type	adaptors	number
Legacy serial (RS-232) interface, DB-9 (9-PIN, male connector)	Serial DB-9 (9 POS, female connector) to circular military cable (referred to as PCCU32 Cable)	2015240

To set up communication using the MMI port:

- 1. Power on the RMC and the laptop.
- 2. Connect the MMI cable. An annunciator in the LCD displays an uppercase "L" for MMI connection.
- 3. Launch PCCU.
- 4. Click **Setup** on the PCCU32 toolbar. The System Setup window displays.
- 5. Click **Serial port** under Communications>PCCU Connect Method.
- 6. Select the port from the PCCU Com. Port drop-down list.
- 7. Click Close.
- 8. Click **Entry** on the PCCU32 toolbar to connect to the device. The PCCU32 Entry screen displays when the connection is successful. If the RMC calendar clock does not match the laptop's date and time, a message displays to synchronize the date and time.
- 9. Click **Yes**. The RMC calendar clock synchronizes with the laptop date and time.
- 10. Configure the RMC.
 - To use Ethernet, complete steps in section <u>4.2.2 Using the Ethernet ports</u>.
 - To use USB, remain on the current MMI connection and proceed to section <u>4.3.1 Configure</u> the station.

4.3 Configure basic parameters

This section covers basic setup and configuration of the RMC after the local connection is established.

4.3.1 Configure the station

To configure the station:

- 1. Click Entry to display the Entry screen.
- 2. Click the station ID at the top of the navigation tree. The Station Setup tab displays.
- 3. Set up the basic settings identified in <u>Table 4-4</u>.

Table 4-4: Required station setup

Required entry	Format	Description
Station ID	10-digit alphanumeric	The station identifier code uniquely identifies each station. The station ID is the same for all tubes on a multiple tube station. If it is blank on a single tube device, the station ID is the same as the device ID.
Device ID/	10-digit	The identifier uniquely identifies each device. For a single tube
Application ID	alphanumeric	device, the ID identifies the device and is the same ID as the Station ID.
Location	24-digit	The identifier describes the location, such as the county name or
	alphanumeric	road number.
Date/Time	MM/DD/YYYY	Date and time must agree with the collection equipment if
	HH:MM:SS	measurement tubes are instantiated.
	(24-hour clock)	

4. Verify that the Lithium Battery Status displays OK (<u>Figure 4-9</u>). If the status is Low Voltage or Not Connected, the field has a red bar.

Figure 4-9: Station Setup screen

ation Setu	Applications	App Licensing	Selectable Units Setup	Battery Inform	mation	Resources	System Log	Security Log	Registry	
		Des	scription				Value			Т
0.0.4	Station ID T			TOTAL	FLOW				ľ	
0.0.5	Location				Measu	rement an	d Control			*
0.9.0	Date/Time				11/17/20	15 14:16:57	1			*
0.9.0	Set Device wi	th PCCU Date/T	ime		No					······
	Security									
0.0.6	Security Code	e Level 1								
0.0.7	Security Code	e Level 2								-
0.7.3	Security Swite	ch Status			On					
	Configuration	on for Low Pov	ver Use							
0.10.2	Remote Com	m Cutoff Voltag	je		11.90					
0.10.3	Sleep Mode E	ntry Voltage			10.90					4
0.8.8	Sleep Mode H	old-off Time (s	ec)		120					
0.9.11	Wake Up Time	•			02:00:00					-
0.7.14	Wake Up Time	Mode			Time fr	om Start o	f Sleep			
	Lithium Bat	ttery Status								······
0.7.10	Lithium Batte	ry Status			ок					
Re-read	Monitor		Pri	nt Screen	Save	Send	Close	Help	X Help	

5. Change any other settings in the Station Setup tab as necessary. Leave PCCU open to the Station Setup tab.



IMPORTANT NOTE: Additional fields in WinCCU uniquely identify the meter, including fields for the lease holder, producer, operator, and buyer. Edit these fields on the host computer in the ID manager, not on the RMC.

4.3.2 Change the LCD display

The factory configuration has a default date and time display format. The display configuration is backward-compatible with the XSeriesG4 and XSeriesG5.

To change the display to preferred settings on the Station Setup tab:

1. Scroll down to the LCD Display Date/Time Format (Figure 4-10).

Figure 4-10: LCD display date and time format

	LCD Display Date/Time Format	
0.7.15	Date/Time Format	mmddyy hhmmss
0.7.16	Date Separator	Slash /
0.7.17	Time Separator	Colon hh:mm:ss

- 2. Select a Date/Time Format (mmddyy or yymmdd) from the drop-down list.
- 3. Select a Date Separator (slash, dash, or period).
- 4. Select a Time Separator (colon or period).
- 5. Click **Send** to save the station settings.

4.4 Configure serial communications

4.4.1 Configure serial communication ports

Configure COM 1 and COM 2 communication ports to connect one or more peripheral serial devices. These ports are software-configurable to support RS-232, RS-422, and RS-485.

To configure the port:

1. Verify that the power LED on the COM module is on (green).

- 2. Click **Communications** on the PCCU navigation tree. The Communications Setup tab displays (Figure 4 11).
- 3. View the list of ports and identify a COM port. In first-time installations, both COM ports display as unused. Neither port has a default factory configuration.
- 4. Add communication application to a COM port (Figure 4-11):
 - a. Select the COM port. If both ports are wired to external devices require configuration, select the correct port for each. The attached external device type determines the configuration.
 - b. Click Add New Device/Application.

Figure 4-11: Add application to COMM port configuration

Communicatio	n Setup Network		
	Port	Description	
	COM0:	Totalflow/COM0:	
	COM1:	(Unused)	
	COM2:	(Unused)	
	USB1:	Totalflow/USB	
	Ethernet	Totalflow/TCP	
	•		P
	Add New D	evice/Application	

The Add/Modify Communication device and applications window displays (Figure 4-12). Figure 4-12: Add/Modify Communication devices and applications

Add/Modify Communication devic	es and appli	cations	x
Select Application		Assign a port to this application	
Generic Com App 🔹	COM0:	Ethernet	
Select Protocol	OM1:	O USB	
Modbus Slave(ASCII)	© COM2:		
		ок с	ancel

5. Click a port (**COM1** or **COM2**).

6. Select the appropriate application from the Select Application drop-down list.



IMPORTANT NOTE: The applications are for specific products. If the external device is not an ABB product, select **Generic Com App.**

7. Select the appropriate protocol from the Select Protocol drop-down list.



IMPORTANT NOTE: The protocol for radio or modem communication is Totalflow Remote.

- 8. Click **OK**. The port settings display.
- 9. Type a description of the port into Port Description.
- 10. Configure the Serial port settings to match the settings of the external device.



IMPORTANT NOTE: The interface setting for a modem is RS-232 Modem.

Select the appropriate register format if the protocol in the Add/Modify Communication device and applications window is MODBUS®.

- 11. Select the **Bus Termination** checkbox if the RMC is the last device on the RS-422 or RS-485 communication bus.
- 12. Change the default values for timeouts and delays as needed. Review the communication equipment specifications before changing the settings.
- 13. Click **Send** to send changes to device. The new port name displays under Communication on the navigation tree.

The four LED lights are PWR, RTS, TXD, and RXD. The LED lights on the top of the communication module indicate that data is transmitting to (TXD) and received by (RXD) the RMC. The PWR LED light is on if the RMC is powered on.

<u>Figure 4-13</u> provides a communication configuration example to connect an ABB Totalflow product, such as a multivariable transmitter or XMV. The XMV interface application supports this type of connection.

Figure 4-13: Seria	l communication po	ort configuration to	o connect XMVs
--------------------	--------------------	----------------------	----------------

Modbus Host(R	RTU) ▼	Parity: Data bits:	9600 • None •
: XMV Interface) Parity: Data bits:	None •
: XMV Interface		Data bits:	8
: XMV Interface	5		-
		Stop hits:	1
0		Stop bits.	
U		Interface:	RS485 -
		Bus Terminat	tion 📃
	Timeouts & Dela	ys	
	Xmit	t key delay (ms): 5
elav (ms):	0 Unk	ev delav (ms):	5
		-,, -, -, -, -, -, -, -, -, -, -, -,	
meout 1	100		
N	Iodbus Format Set	ttings	
mat: 32 bit	↓]1	Trailing Pad:	lone 🔻
gs Help: Click	on any port par	ameter to di	splay help o
	lelay (ms): imeout mat: <u>32 bit</u> ngs Help: Click	Timeouts & Dela Xmit lelay (ms): 0 Unk imeout 100 Modbus Format Set mat: 32 bit T ngs Help: Click on any port par	Timeouts & Delays Xmit key delay (ms): imeout 100 Modbus Format Settings rmat: 32 bit Trailing Pad: Mage Help: Click on any port parameter to di

Figure 4-14 provides a communication configuration example to connect equipment for remote communication such as a radio. Generic Com App supports this type of connection.

Port	Description	Port description:	TF Remote/	COM1	Serial port	settings
COM0:	Totalflow/COM0:				Jaud: 96	500 🔻
COM1:	TF Remote/COM1	Protocol: Tota	Iflow Remote	▼ F	Parity: N	one 🔻
COM2:	(Unused)	RBAC: Disat	ble	•	Data bits: 8	
USB1: Ethernet	Totalflow/USB Totalflow/TCP	Port used by: Unk	nown	5	Stop bits: 1	•
(Unassigned)	Coriolis Interface		Listen cycle:	4 v I	interface: R	S232 🔻
			Time	outs & Delays		
		Ack timeout (s):	10	Xmit ke	y delay (ms):	420

Figure 4-14: Serial port configuration for remote communication

4.4.2 Enable serial port switched output power

When powering external devices from the communication ports, use switched power to supply voltage to those devices only when needed. Wire the external devices to the Sw VOUT pins to support this feature.

To enable switched power:

- 1. Click **I/O System** on the navigation tree.
- 2. Click **Auxiliary I/O** on the navigation tree.
- 3. Click **Digital** (Figure 4-15). The Digital tab displays.

Figure 4-15: Enable communication switched power

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💷 Operate View Window H	elp						
1 📅 🔁 💽 📊 🔤 🖓 🗯 🖃 🕨 🖓							
	Analan Dir	nital					
Communications	Analog						
Totalflow/TCP							
Totalflow/USB		Description	Value				
Totalflow/COM0:	7.2.13	Security Switch	Off				
Communications-4	7.2.14	PCCU Connect	No				
Communications-5			•				
💮 Coriolis Interface	7.2.12	Low Lithium	NO				
Auxiliary I/O	7.2.8	Switched VOUT 1	On				
TFIO-A Modules							
TFIO-B Modules	7.2.9	Switched VOUT 2	Off				

- 4. Click the Value cell on the Switched VOUT line to **On** for the correct port.
 - Switched VOUT 1 for COMM 1
 - Switched VOUT 2 for COMM 2
- 5. Click Send.

4.5 Configure Ethernet network communication

To configure the RMC for network communication, determine the required network topology first. If the RMC is used in conjunction with an XIO, review additional configuration options and connection scenarios in the Network Communication Guide (See <u>Additional information</u> for a link to this guide).



IMPORTANT NOTE: Plan Ethernet connections carefully to protect your device and peripherals from unauthorized or malicious access. The device should only connect to a firewall-protected private network, never directly to the Internet. For security guidelines and recommendations, see section <u>6 Configure security (recommended)</u>. Follow your company policies and guidelines for cybersecurity.



IMPORTANT NOTE: Never use an external port for permanent connections, such as to peripherals or additional equipment. The external port on an RMC enclosure is reserved for local communication (configuration or maintenance only). Connect additional equipment to the RMC internally following required guidelines for cable length and cable routing/management. The illustrations in this section show the RMC as a standalone device. Adapt instructions for connections when enclosures are involved.

4.5.1 Network modes

The embedded Ethernet switch on the RMC can be configured to support a single network or two networks. In 1 Network mode, both Ethernet ports are assigned to one network. In 2 Network mode, each Ethernet port is assigned to a separate network. Consider the following:

- In 1 Network mode, you can use one Ethernet port for the uplink connection to the corporate WAN (through a local or field network switch), and the other port to connect additional devices on the field network (in daisy-chain fashion). This configuration forms a logical LAN where a network switch, an RMC, and an additional device communicate on a single network. Each of the devices on this network must have a unique and valid IP address with the same subnet number. The network traffic on one port is visible on the other. To manage devices remotely, establish a remote TCP/IP connection with the RMC and, through the RMC, to the attached device(s). The RMC switches between the network and the device. See section <u>4.6 Configure the RMC for 1 Network mode (2-port switch)</u>.
- In 2 Network mode, you can define two networks. These networks are separate and therefore traffic on one is not visible on the other. If one port is used to connect to the corporate WAN, and the other port to a field network, the field network traffic is isolated from the corporate network traffic. Remote access to the RMC will require the IP address assigned to the Ethernet interface used to connect to the WAN. Remote access to the devices directly connected to the RMC will not be possible without an external router at the field. The external router is required for communication between the two separate networks. See section <u>4.7 Configure the RMC for 2 Network mode</u>.

IMPORTANT NOTE: If the RMC is inside an XCore enclosure, then only Ethernet port 1 is accessible on the outside of the enclosure (the outside Ethernet connector is connected to the onboard Ethernet port 1 from the factory). Access to Ethernet port 2 requires internal access to the enclosure.

If Ethernet port 1 must be available for local communication, plan the use of the Ethernet port 2 carefully if you connect to a network and additional equipment. Never connect both ports to an external Ethernet switch at the same time (Figure 4-16). When two ports connect to the same switch they are both disabled, and any existing Ethernet connections to the device are lost.

4.5.2 IP addressing

1

Enabling network communication between the RMC and other field devices requires unique IP addresses for each device. The default IP addresses from the factory are not unique and should not be used if the Ethernet interfaces are configured for network connection. The RMC Ethernet interface supports static (manual) or dynamic (DHCP) IP addressing. Static addressing is recommended.

Configure the RMC with a valid public IP address or an address from the well-known private address ranges reserved by Internet authorities. If conserving IP addresses, a private address can be used if port forwarding is available on the node with the uplink to the customer WAN. A router or an XIO in port-forwarding mode can perform this function.

The number of IP addresses required for the RMC depends on the Ethernet mode:

- 1 Network mode requires only one IP address.
- 2 Network mode requires two IP addresses if both interfaces will be in use.

For full configuration, follow the procedure that applies to the required topology and Ethernet mode. See sections <u>4.6 Configure the RMC for 1 Network mode (2-port switch)</u> or <u>4.7 Configure the RMC for 2 Network mode</u>.



IMPORTANT NOTE: The RMC default Ethernet mode is 1 Network (2-port switch mode). The Ethernet ports are disabled by default.

i

IMPORTANT NOTE: If you are connected to one of the Ethernet ports to configure the RMC-100, changing the Ethernet configuration and restarting the interface will cause you to lose connection. Make sure to configure your laptop with an IP address compatible with the new IP address assigned to the RMC. Re-establish connection using the new RMC IP address after the device restarts.

4.6 Configure the RMC for 1 Network mode (2-port switch)

The RMC supports switching capability and can behave as a 2-port switch. This mode of operation is the factory default and is displayed as: 1 Network, in the Mode field on the PCCU Networking tab screen.

The 1-Network mode simplifies IP parameter configuration, especially in installations with multiple ABB devices. The local field LAN switch, the RMC-100, and any additional devices, can be configured for and communicate through a single subnet. This mode supports remote and local access to both the RMC and attached devices without the need of additional routing equipment on the field.



IMPORTANT NOTE: When the RMC is in 1 Network mode (2-port switch), never connect the Ethernet ports to an external Ethernet switch at the same time (Figure 4-16). Connecting to the same switch in this mode causes loss of connections to the device. Connect only one port to the switch.

Figure 4-16: Incorrect connection of RMC (in 2-port switch mode) to a network switch



DO NOT SET UP THIS CONNECTION

4.6.1 Remote access to RMC by host (connections)

<u>Figure 4-17</u> shows remote access through the customer wide area network. Use either Ethernet port to connect the RMC to the field network switch. The RMC's IP address is a non-default generic number as an example. The subnet address the RMC is configured for is represented by "ZZZ". The address remains the same whether the RMC is connecting using Ethernet port 1 or 2.

Figure 4-17: Remote access by host to an RMC-100 in 2-port switch mode



4.6.2 Local access to RMC by host (connections)

<u>Figure 4-18</u> shows local access with an RMC that has been configured for connection to the customer wide area network. Local access to the RMC using Ethernet does not require disconnecting the RMC from the network. You can connect to the unused Ethernet port while leaving the connection to the network intact.



IMPORTANT NOTE: When the RMC is configured for network connection, the default IP address is no longer available. The laptop must have an IP address compatible with the new non-default address assigned to the RMC.



Figure 4-18: Local access to an RMC-100 with non-default IP address

4.6.3 Daisy-chain connection support for other devices

The RMC in 1 Network (2-port switch) mode supports daisy-chain connections with other devices.

Additional devices in the field can connect to a local network switch (star topology) or to the RMC for the uplink to the wide area customer network (daisy-chain topology). Figure 4-19 shows an example of a daisy-chain of multiple XIOs and an RMC. Because the XIOs have multiple ports, they can also support additional devices. To simplify device management and configuration, daisy chained XIOs are also in switched mode. Ethernet interfaces connected through the chain are combined into a single network; their assigned IP addresses have the same common subnet (in the example the generic subnet is represented by "ZZZ", and each device has a unique IP address on that subnet).

An RMC in 1 Network mode forwards traffic between the network and daisy-chained devices transparently. <u>Figure 4-19</u> shows an example of daisy-chain connection support with two XIOs. The local network switch is not shown (The local switch may have a limited number of ports and support only the RMC and the uplink connection). RMC port E1 connects to the customer network and port E2 daisy-chains to the XIOs (in 4-port switch mode for this example).

Figure 4-19: RMC-100 daisy-chain connection support for additional devices (example: XIOs)



Legend for Figure 4-19: RMC-100 daisy-chain connection support for additional devices (example: XIOs)

1	XIO (4-port switch mode)	3	RMC: 1 Network Mode (2-port switch)
2	XIO (4-port switch mode)	4	Customer wide area network (WAN)



IMPORTANT NOTE: The RMC supports connection with single-port devices, but the daisy-chain is limited to two devices as the single-port device does not have additional ports to connect other devices. With multi-port devices such as other RMCs or XIOs, the daisy-chain can include more than 2 devices.

4.6.4 Procedure to configure 1 Network mode

To configure the RMC-100 as a 2-port switch (1 Network mode):

- 1. Connect the Ethernet cable from the RMC to the network communication equipment (hub, switch, router, etc.).
- 2. Verify the Ethernet port LED is green (the network Ethernet link is on).
- 3. Start PCCU on the laptop.
- 4. Configure the network parameters:
 - a. Select **Communications** on the PCCU navigation tree. The Communications Setup tab displays.
 - b. Select the **Networking** tab (Figure 4-20).
 - c. Verify that the Ethernet Mode is set to **1 Network** (default).
 - d. Verify that the Ethernet interface State is set to **Enable**.
 - e. If using DHCP for dynamic addressing, set DHCP to **Enable**.
 - f. If using static addresses (recommended), type each of the parameters: IP Address, Default Gateway, and Subnet Mask.

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11 🖻 🖪 🚱 🏹 🌃 🛞	🛄 🤰 🛷			
BMC-100				
	Communication Setup Service	es Networking		
Totalflow/TCP				^
Totalflow/USB	Device Name:	RMC-100-RE2004618-00010841		
Totalflow/COM0:		Enterprise Network		
XIO Interface XIO_01	Mode:	1 Network \checkmark		
XMV Interface XIO_01 COM2	Port:	E1+E2	-4	
LevelMaster XIO_01 COM3	States	- Canble		
ABBService	State.	[∞] Enable		
Elow Maggirement	Status:	Ready		
Setup		Restart		
Analysis	DHCD			
Digital Outputs	Ditor.	L Enable		
- RS and No Flow	Default Interface:			
Adv Setup	IP Address:	10 . 27 . 100 . 85		
Speed of Sound				
Display	Subnet Mask:	255 . 255 . 255 . 0		
⊡. Trend System	Gateway:	0.0.0.0		
	DNS Server:	0.0.0.0		
		Advanced		
		Rx Rate Limit:		
		Off ~		
		Tx Rate Limit:		
		off		
		Statistics		
		RX IX		
	Network Usage%:	0.000		
	Packets/sec:	0 0		
	Data Butas (ass)			
	Data Bytes/sec:			
	Drop Packets/sec:	0 0		
	Error Packets/sec:	0 0		
	Re-read	Monitor Statistics	Restore Factory Settings Send	Close Help V
	<			>
Ready	,		#Polls: 27 #Errors: 0 Connected to RMC-100	Login: user v7.68 : 1397

Figure 4-20: Network communication setup for 1 Network mode

- 5. Click **Send**. The device saves the updated configuration.
- 6. Click **Restart**. A warning displays to confirm.

Figure 4-21: Warning before interface restart

PCCU32		×
?	Sending the changes will restart the current network and would cause any existing network connection to disconnect. Are you sure you want to send changes now?	
	Yes No]

- 7. Click Yes.
- 8. Click OK.
- 9. Verify that the configuration is correct. If DCHP is enabled, ensure the RMC has obtained its required IP parameters (the IP parameter fields must be automatically populated after the restart).
- 10. Ping the device from the WAN or field network. The RMC should reply to the ping from the network.
- If connecting another device to the RMC-100 in daisy chain fashion, configure the device with a unique IP address in the same subnet as the IP address configured on the RMC.
 Verify that you can reach the connected device by pinging its IP address.

4.7 Configure the RMC for 2 Network mode

The RMC in 2 Network mode separates the two Ethernet interfaces into two logical networks (VLANs). This mode of operation is displayed as: 2 Networks, in the Mode field on the PCCU Networking tab screen.

The 2-Network mode isolates traffic on each of the RMC Ethernet ports. Isolating or routing traffic depends on your field requirements and available network equipment. Obtain valid IP parameters for configuration.

IMPORTANT NOTE: The configuration to support routing between the networks is not detailed in this manual. If an external router is used, ensure its IP address is also configured (Gateway parameter). The examples shown in this section assume no external routing between subnets.



If there are any XIOs at the field site, consider using an XIO in port forwarding mode. This function allows isolation of the field network from the WAN connection, while allowing the traffic to specific TCP ports on field devices to flow from the WAN. For more information on the XIO port forwarding feature, see the XIO User Manual or the Network Communication Guide. (Links to documents provided in Additional information.)

4.7.1 Remote access to RMC by host (logical diagram)

The 2 Network mode supports remote access to the RMC (through the port used for the network uplink) but does not support access to any devices attached to the other port. Attached devices remain isolated unless an external router is installed to provide communication between the two subnets.

Figure 4-22 shows the two logical subnets resulting from the 2 Network mode: E1-LAN and E2-LAN. Establish a remote connection to the RMC using the IP address assigned to the Ethernet port used for the corporate network uplink (in this example, E1). Additional ABB devices (in this example, XIO 1 and XIO 2) are daisy-chained to the RMC through port E2. The host cannot access those devices since the RMC isolates these devices from the WAN. IP addresses assigned to the XIOs are not reachable from the host.

Figure 4-22: Remote access to RMC in 2 Network mode



Legend for Figure 4-22: Remote access to RMC in 2 Network mode

1	Host system with PCCU
2	Customer Wide Area Network (WAN)
3	RMC (2 Networks mode): E1-LAN
4	RMC (2 Networks mode): E2-LAN

4.7.2 Local access to RMC/daisy chained devices (logical diagram)

Figure 4-23 shows access to the RMC and daisy-chained devices. Connect to the RMC and daisy-chained devices through the subnet associated with port E2 (E2-LAN).

Figure 4-23: Local access to RMC and daisy chained devices



Legend for Figure 4-23: Local access to RMC and daisy chained devices

1	Customer Wide Area Network (WAN)
2	RMC (2 Networks mode): E1-LAN
3	RMC (2 Networks mode): E2-LAN
4	Operator laptop

4.7.3 Procedure to configure 2-Networks mode

Figure 4-24 shows an RMC supporting daisy-chain connection to a couple of XIOs. While physical connections are the same as for 1 Network mode, the logical networks resulting from this mode are not the same. Port E1 and E2 are each associated with a different network [E1 LAN (5) and E2 LAN (6) in the callout]. The XIOs connected on RMC port E2 are no longer part of the network associated with RMC port E1. Each of the RMC Ethernet interfaces requires an IP address on a different subnet. The figure shows generic IP addresses for each of the RMC Ethernet interfaces in two different subnets ("ZZZ" for E1 and "AAA" for E2).



IMPORTANT NOTE: The XIOs daisy-chained to RMC-E2 (6) are in 4-port switch mode and therefore each require a single IP address on the same subnet ("AAA"). For additional information on configuration for different XIO modes, refer to the Network Communications Guide or the XIO User manual. See <u>Additional information</u> for links to these documents.



Figure 4-24: RMC daisy-chain connection support (2-Networks mode)

Legend for Figure 4-24: RMC daisy-chain connection support (2-Networks mode)

1	XIO (4-port switch mode)	4	Customer Wide Area Network (WAN)
2	XIO (4-port switch mode)	5	RMC-E1 (LAN E1)
3	RMC (2 Network Mode)	6	RMC-E2 (LAN E2)

To configure the RMC for 2 Network mode:

- 1. Connect the Ethernet cable from the RMC to the network communication equipment (hub, switch, router, etc.).
- 2. Verify the Ethernet port LED is green (the network Ethernet link is on).
- 3. Configure the Ethernet mode.
 - a. Select Communications on the PCCU navigation tree. The Communications Setup tab displays.
 - b. Select the Networking tab (Figure 4-25).
 - c. Verify that the Ethernet Mode is set to 2 Networks. The screen displays parameter fields for two interfaces since each port will be assigned to a separate network.
- 4. Configure Ethernet interfaces for the appropriate subnet. For each interface:
 - a. Verify that the Ethernet interface State is set to: Enable.
 - b. If using DHCP for dynamic addressing, set DHCP to: Enable.
 - c. If using static addresses, type each of the parameters: **IP Address**, **Default Gateway**, and **Subnet Mask**.

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an 🚟 🚟 💫 Yaa 🚾 🔊	📷 🤉 📣					
	🚟 🥵 sētup 🔍					
B-RMC-100	Communication Setup Services	Networking				
Totalflow/TCP						^
Totalflow/USB	Device Name: RM	C-100-RE2004618-0001084	41			
Totalflow/COM0:	Ent	terorise Network				
- XIO Interface XIO_01	Mode: 21	Networks	~			
XMV Interface XIO_01 COM2	Port:	E1	E2			
	State:	Enable	Fnable			
H- HODService		Off	Off			
- Flow Measurement	Status:					
Setup		Restart	Restart			
Analysis	DHCP:	Enable	Enable			
Digital Outputs	Default Interface:					
Adv Setup		40 400 400 75	460 054 000 400	1		
- Speed of Sound	IP Address:	10 . 128 . 100 . 75	169 . 254 . 200 . 100			
Display	Subnet Mask: 2	255 . 255 . 255 . 0	255 . 255 . 255 . 0			
🗄 Trend System	Gateway:	0.0.0.0	0.0.0.0			
	DNS Server:	0.0.0.0	0.0.0.0			
	Adv	vanced		1		
		Rx Rate Limit:	Rx Rate Limit:			
	0	ff ~	Off ~			
		Tx Rate Limit:	Tx Rate Limit:			
	0	iff ~	Off ~			
	Sta	tietice				
	518	Rx Tx	Rx Tx			
	Network Usage%: 0	0.000 0.000	0.000 0.000			
	Packets/sec: 0	0	0 0			
	- detempted					
	Data Bytes/sec:	0	0			
	Drop Packets/sec: 0	0	0 0			
	Error Packets/sec:	0	0 0			
	Re-read	Monitor Statistics		Restore Factory Settings	Send Close	Help
	<					¥
						7.60 4007
Keady			#Polls	s: 27 #Errors: 0 Connecte	d to KMC-100 Login: user	v7.68:1397

Figure 4-25: Network communication setup for 2 Network mode

- 5. Click **Send**. A message advises you to warm-start or reset the device for the changes to take effect.
- 6. Click **Restart**. A warning displays to confirm.

Figure 4-26: Warning before interface restart



- 7. Click **Yes**.
- 8. Click **OK**.
- 9. Verify that the configuration is correct. If DCHP is enabled, ensure the RMC has obtained its required IP parameters (the IP parameter fields must be automatically populated after the restart).
- 10. Ping the device from the WAN or field network. The RMC should reply to the ping from the network.
- 11. If connecting another device to the RMC-100 in daisy chain fashion, configure the device with a unique IP address in the same subnet as the IP address configured on the RMC.
- 12. Verify that you can reach the connected device by pinging its IP address.



IMPORTANT NOTE: Any TCP/IP connection is lost when the RMC IP address changes and the interface restarts. Reconfigure the laptop or PC with an IP address compatible with the new RMC IP address to reestablish connection.

4.8 Expand serial communication capacity

The RMC supports serial communication expansion through ABB XIOs or third-party Ethernet-to-Serial devices. Connection with this type of equipment requires networking communication over Ethernet. Ensure all devices have valid and unique IP addresses. Static IP addressing for devices is recommended. See section <u>4.5</u> <u>Configure Ethernet network communication</u>.

4.8.1 Expand with ABB's XIO

The RMC supports serial port expansion through ABB's Extendible IO devices (XIOs). The RMC-XIO combination provides an integrated solution designed to transparently handle devices on XIO remote ports as if they were local ports on the RMC. The RMC can obtain measurement data from peripherals, such as measurement transmitters, connected to XIO COM ports. The following applications are used to increment serial port capacity:

- The XIO Interface Application on an RMC: Supports RMC application access to serial communication applications interfacing with remote devices connected to an XIO. Applications on the XIO are exported to the RMC and are visible from there as if local to the RMC.
- The Ethernet-Serial Passthrough Application on an XIO: Supports transparent Ethernet-serial communication conversion or TCP Gateway functions. The XIO behaves as converter/tunnel for serial communication over TCP connections.

XIOs can be co-located with an RMC on the same cabinet or be in their own enclosure at a distance from the RMC in the same field. RMC-XIO communication is over Ethernet. For additional details, refer to the **XIO User Manual**, or the individual guides for each application: The **XIO Interface** or **Ethernet-Serial Passthrough** Application Guides. See <u>Additional information</u> for the links to these documents.



IMPORTANT NOTE: The two configuration options for connection with the XIO (XIO Interface and Ethernet-serial passthrough) provide complete and integrated statistics for monitoring and troubleshooting. The XIO supports PCCU as the configuration interface for a fully integrated and seamless solution.

4.8.2 Expand with third-party Ethernet-serial devices

The RMC also supports serial port expansion through third party Ethernet-serial devices. The RMC can obtain measurement data from peripheral devices such as measurement transmitters connected to the third-party devices performing Ethernet-serial passthrough. For an example of connection to a third-party converter see section <u>10 Serial port expansion with MOXA® modules</u>.



IMPORTANT NOTE: Using a third-party Ethernet-serial device does not provide any integrated monitoring or troubleshooting capabilities as is provided when using ABB's XIOs. The configuration of the device requires the vendor's user interface which is separate from ABB's PCCU. In addition to Ethernet-Serial conversion, the XIO also provides full controller capabilities, which third-party converters may not support. The XIO is recommended when seamless integration and flexibility is required.

4.9 Configure input and output

Configure I/O settings in PCCU32 Expert view mode. Select I/O System on the navigation tree.

4.9.1 Change the view option

The default view is Advanced. Change from Advanced to Expert view to configure the I/O.

To change the view option:

1. Click **View** on the menu bar and select **Expert** from the drop-down list. (Figure 4-27).

Figure 4-27: PCCU32 Expert view



4.9.2 Analog input configuration

To configure the analog input:

1. Click **I/O System** on the navigation tree. The Analog Inputs tab displays (Figure 4-28).

Figure 4-28: Analog input configuration

Ar	Analog Inputs Analog Output Digital I/Os Pulse Inputs									
		Description	Value	Signal	Calibration	Bias	Engr Low	Engr High		
	7.4.0	AI 1	0.020	0-30Volt	Factory	0.000	0.000	100.000		
	7.4.1	AI 2	0.020	0-30Volt	Factory	0.000	0.000	100.000		
	7.4.2	AI 3	0.020	0-30Volt	Factory	0.000	0.000	100.000		
	7.4.3	AI 4	0.020	0-30Volt	Factory	0.000	0.000	100.000		

- 2. Click the **Signal** field and select 0-30 Volt or 4-20 mA from the drop-down list.
- 3. Click Send.

4.9.3 Analog output configuration

This configuration defines the AO value as a percentage of the full scale, or in engineering units. The engineering units depend on the type of external device that connects to the AO.

Calibrate the AO before defining non-default engineering units for the first time. Define engineering units from the AO Calibration screen after calibration is complete. These defined engineering units automatically display on the Analog Output tab (<u>Figure 4-29</u>).

Figure 4-29: Analog output configuration

Ar	nalog Input	s Analog Output	Digital I/Os	Pulse In	nputs	
Ē.						
	Description					Value
	7.3.200 AO % of Full Scal		le		0	
	7.3.204	AO Engineering	Units		4	

See section 7.2 Analog output calibration.

4.9.4 Digital input and output configuration

The six (6) DI/DO ports support configurable input or output modes of operation.

Configure input thresholds in input mode for an input voltage range of 0 to 30 Vdc. Configure the built-in pull-up resistor to read signals from devices with dry contact and open collector/drain output types.

In output mode, a MOSFET Open Drain (OD) type output can sink up to 2 amps (direct current).

To configure each digital input or output:

- 1. Click **I/O System** on the navigation tree.
- 2. Click the **Digital I/Os** tab (Figure 4-30).

Figure 4-30: Digital input and output configuration

A	Analog Inputs Analog Output Digital I/Os Pulse Inputs											
ſ												
		Description	Туре	Value	State	Initial Value						
	7.2.36	Digital I/O 1	Digital Input (Voltage)	0	Open							
	7.2.37	Digital I/O 2	Digital Input (Voltage)	0	Open							
	7.2.38	Digital I/O 3	Digital Input (Voltage)	0	Open							
	7.2.39	Digital I/O 4	Digital Input (Voltage)	0	Open							
	7.2.40	Digital I/O 5	Digital Input (Voltage)	0	Open							
	7.2.41	Digital I/O 6	Digital Input (Voltage)	0	Open							

- 3. Select the Type from the drop-down list (Digital Input is the default).
- 4. Configure each Digital I/O:
 - Digital input mode: select the low and high threshold voltage.
 - Digital output mode: select the current value and the initial value.
- 5. Click Send.

4.9.5 Pulse input configuration

Each pulse input has a debounce filter. Without debounce, the PI operates at a frequency range of 0 to 20 kHz. With debounce the frequency range is 1 to 550 Hz.

To configure the pulse input:

- 1. Click **I/O System** on the navigation tree.
- 2. Click **Pulse Inputs** (Figure 4-31).

Figure 4-31: Pulse input configuration

alog Input	ts Analog Output Digital I/Os Pulse In	nputs
	Description	Value
	Current Pulse Count	
7.0.100	PI 1	0
7.0.101	PI 2	0
	Previous Pulse Count	
7.0.104	PI 1	0
7.0.105	PI 2	0
	Total Pulse Count	
7.0.108	PI 1	0
7.0.109	PI 2	0
	Raw Pulse Count	
7.0.120	PI 1	0
7.0.121	PI 2	0
	Debounce	
7.2.27	PI 1	Off
7.2.28	PI 2	Off

3. Click the Value field for PI 1 or PI 2 under Debounce and select **On** from the drop-down list.

Figure 4-32: Value field

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- TOTALFLOW - Communications - Totalflow	Analog Inpu	ts Analog Output Digital I/Os Pulse I	nputs				
Totalflow/USB		Description	Value				
Totalflow/COM0:		Current Pulse Count					
🐨 XMV Interface	7.0.100	PI 1	0				
E- I/O System	7.0.101	PI 2	0				
TEIO-A Modules							
- Flow Measurement		Previous Pulse Count					
🖶 AGA3-1	7.0.104		0				
ia. AGA3-2	7.0.104						
	7.0.105	P12					
		Total Pulse Count					
	7.0.108	PI 1	0				
	7.0.109	PI 2	0				
		Raw Pulse Count					
	7.0.120	PI 1	0				
	7.0.121	PI 2	0				
		Debounce					
	7.2.27	PI 1	Off 🗸				
	7.2.28	PI 2	Off				
			On				
	•		Þ				
	Re-read	Monitor Print	Screen Save Send Close Help XHelp 🕷				
Ready #Polls: 131 #Errors: 0 Connected to 10.127.185.175 L							

- 4. Repeat this process for each PI port that requires debounce.
- 5. Click Send.

4.9.6 Expand I/O capacity with the ABB XIO

The RMC supports I/O expansion through ABB's Extensible IO devices (XIO). The RMC can poll and write from/to peripherals connected to TFIO Modules installed on the XIO. The RMC's XIO Interface application is designed to handle communication transparently with the TFIO modules as if the modules were directly connected to the RMC.

XIOs, and directly attached TFIO modules, can be co-located with an RMC on the same cabinet or be in their own enclosure at a distance from the RMC in the same field. RMC-XIO communication is over Ethernet. For additional details, refer to the XIO user manual and the I/O Interface Application guide. See <u>Additional information</u> for links to the documents.

4.10 Configure directly attached TFIO interfaces

To scan and transmit data using the TFIO modules, the RMC TFIO interfaces must be enabled. Connected TFIO modules are detected only when the interfaces are enabled. This procedure describes how to enable the TFIO interfaces on the RMC.

Refer to the I/O Interface application guide for additional details to configure and troubleshoot communication with TFIO modules. See the <u>Additional information</u> for a link to the guide.



IMPORTANT NOTE: The TFIO-A interface is enabled by default. The TFIO-B interface is disabled by default.

PCCU32 version 7.68 and later support TFIO module hot swap. Additional configuration and troubleshooting options are not available on earlier versions of PCCU.



NOTICE – Equipment damage. When the TFIO interface is disabled, the modules remain powered. Remove power from the RMC before connecting or disconnecting the TFIO modules or the TFIO cable. Power down the RMC to avoid damage to the modules.

To verify or enable communication with TFIO modules:

1. If modules were installed in TFIO-A, select TFIO-A Modules on the navigation tree. The TFIO Module Setup tab displays (Figure 4-33).

Figure 4-33: TFIO-A Modules Setup

🔩 PCCU32 - [Entry]				– 🗆 X
Operate View Window Help				- F ×
	C ZING			
	Setup			
■ RMC-100	TFIO Module S	etup TEIO Module List TEIO Module State TEIO Module Info TEIO Statistics		
- Communications				
- Totalflow/USB		Description	Value	
	7.255.19	LED Enable	Yes	
XIO Interface XIO_01	7.255.22	Discovery Start Default State	Online	
XMV Interface XIO_01 COM2 LevelMaster XIO_01 COM3	7.255.23	Discovery Scan Interval (seconds)	1	
- ABBService	7.255.24	Save Committed Module State	No	
⊨- I/O System				
Auxiliary I/O		Restore Configuration/Calibration on Replace		
TFIO-A Modules	7.255.36	DI/DO II	Yes	
TFIO-B Modules	7.255.68	DI/DO I	Yes	
Setup	7.255.84	AO	Yes	
- Analysis	7.255.116	Al	Yes	
Digital Outputs	7.255.132	RTD/TC	Yes	
- Adv Setup	7.255.164	CIM	N/A	*Note: CIM modules are not supported on this device
Speed of Sound	7.255.196	vc	Yes	
i Display				
		Bus Enable		
	7.245.0	TFIO-A Bus	Enabled	
	<			>
	Re-read	Monitor Show editable fields	Print S	koreen Save Send Close Help X Help 🍋
Ready		#Polls: 32	#Errors: 0 (Connected to RMC-100 Login: user v7.68 : 1397

- 2. Click the TFIO Module List tab (Figure 4-34):
- 3. Verify all TFIO modules are connected and their type listed.

Figure 4-34: TFIO-A Module List

PCCU32 - [Entry]								
Operate View Window Help								_ 8 ×
1 🖾 🔁 🚱 🖬 🖾 🖤	<mark>10</mark> 2	7 up						
	TFIO Module	e Setup TFIO Module List TFIO Mod	dule State TFIO	Module Info 1	FIO Statistics	i		
Totalflow/USB		Module Count	Total	Available	Online	Offline		
Totalflow/COM0:	7.255.0	Number of Modules	2					
XIO Interface XIO_01	7.255.1	Number of VC Modules	1	1	0	0		
XMV Interface XIO_01 COM2 August Master XIO_01 COM2	7.255.2	Number of AO Modules	0	0	0	0		
ABBService	7.255.3	Number of Al Modules	0	0	0	0		
- I/O System	7.255.4	Number of DI/DO I Modules	1	1	0	0		
Auxiliary I/O	7 255 5	Number of DI/DO II Modules	0	0	0	0		
IIC Statistics	7.200.0		•	•	•	•		
	7.255.6	Number of RTD/TC Modules	U	U	0	0		
TFIO-B Modules	7.255.7	Number of CIM Modules	0	0	0	0	*Note: CIM modules are not supported on this of	device
- Flow Measurement								
Setup								
- Analysis								
···· Digital Outputs								
- RS and No Flow								
Speed of Sound								
- Display								
Trend System								
	-							
	Re-read	Monitor Show editable fie	lds		Pr	int Scree	en Save Send Close Help X	Help 🧶
Ready				#Polls: 5	2 #Errors:	0 Con	nected to RMC-100 Login: user v7.	.68 : 1397

4. If modules were installed in TFIO-B, select TFIO-B Modules on the navigation tree. The TFIO Bus Enable tab displays (Figure 4-35).

eq PCC032 - [Entry]			
Operate View Window Help			_ 8 ×
fi 🛅 🛅 💽 🐼	Setup 🤗		
	TEIO Bus Eachla		
Communications	IF10 bus chable		
Totalflow/TCP	Description	Malua	
Totalflow/USB	Bus Fashla	Value	
A VIO Interface VIO 01			
M XMV Interface XIO_01 COM2	7.245.1 TFIO-B Bus	Disabled	
LevelMaster XIO 01 COM3			
Auxiliary I/O			
IIC Statistics			
Elow Measurement			
Setup			
Analysis			
Digital Outputs			
RS and No Flow			
Adv Setup			
Speed of Sound			
Display Tran d Custom			
⊞- Trend System			
	Re-read Monitor Show editable fields Print Screen Save Sen	nd Close	Help X Help 🧶
Ready	#Polls: 29 #Errors: 0 Connected to R	RMC-100 Lo	ogin: user v7.68 : 13

Figure 4-35: TFIO-B Bus Enable tab (bus disabled by default)

- 5. Select the **TFIO-B Bus** field to change to **Enabled**.
- 6. Click **Send**. The TFIO Bus Enabled screen clears and the navigation tree refreshes.
- 7. Select TFIO-B Modules from the navigation tree. The TFIO Module Setup tab displays (Figure 4-36).

Figure 4-36: TFIO-B Module Setup

PCCU32 - [Entry]				– 🗆 X
Operate View Window Help				_ <i>8</i> ×
f 🛅 😇 💽 🕅 🖾 🖉	D Setup	🧶		
■- RMC-100 □- Communications	TFIO Module Se	TFIO Module List TFIO Module State TFIO Module Info TFIO Statistics		
Totalflow/TCP				
- Totalflow/USB		Description	Value	
Totalflow/COM0:	71.255.19	LED Enable	Yes	
XIO Interface XIO_01 XMU(Interface XIO_01	71.255.22	Discovery Start Default State	Online	
- LevelMaster XIO 01 COM2	71.255.23	Discovery Scan Interval (seconds)	1	
B- ABBService	71.255.24	Save Committed Module State	No	
iii- I/O System				
Auxiliary I/O IIC Statistics		Restore Configuration/Calibration on Replace		
TFIO-A Modules	71.255.36	DI/DO II	Yes	
E- TFIO-B Modules	71.255.68	DI/DO I	Yes	
Flow Measurement	71.255.84	AO	Yes	
■- Trend System	71.255.116	AI	Yes	
	71.255.132	RTD/TC	Yes	
	71.255.164	CIM	N/A	*Note: CIM modules are not supported on this device
	71.255.196	vc	Yes	
		Bus Enable		
	7.245.1	TFIO-B Bus	Enabled	
	<			
	Re-read	Monitor Show editable fields	Print Scr	reen Save Send Close Help XHelp 🗮
Peedy #Polls: 132 #Errors: 0 Connected to RMC-100 Login: user v7.68:1397				

- 8. Click the TFIO Module List tab.
- 9. Verify all TFIO modules are connected and their type listed (Figure 4-37).
Figure 4-37: TFIO-B Module List

							-		
PCCU32 - [Entry]								-	
Operate View Window Help									- 8 ×
fi 🖻 🖫 💽 🕅	ED Zu	, 🧇							
	TTIO Modula	TEIO Module List TETO Madu			TO Challen				
- Communications	TPIO Module	Setup II 10 Module List IF10 Modu	le State TFIOR		-10 Statistics				
i. Totalflow/TCP		Madula Count	7-4-1	Ausilable	Online	Offline	1		
I otalflow/USB T = 100 (CON 10)	74.055.0	Module Count	lotai	Available	Unine	Unine			
Iotalfiow/COMU: VIO Interferen VIO 01	71.255.0	Number of Modules	2						
XMV Interface XIO_01	71.255.1	Number of VC Modules	1	1	0	0			
I evelMaster XIO_01 COM3	71.255.2	Number of AO Modules	0	0	0	0			
ABBService	71.255.3	Number of Al Modules	0	0	0	0			
⊨-I/O System	71.255.4	Number of DI/DO I Modules	1	1	0	0			
Auxiliary I/O	71 255 5	Number of DI/DO II Modules	0	0	0	0			
IIC Statistics	11.200.0		-	-	-	•			
TFIO-A Modules	71.255.6	Number of RTD/TC Modules	0	0	0	0			
Elow Measurement	71.255.7	Number of CIM Modules	0	0	0	0	*Note: CIM modules are not	supported on th	iis device
Setup									
Analysis									
Digital Outputs									
RS and No Flow									
Adv Setup									
Speed of Sound									
🖶 - Display									
i - Trend System									
	Re-read	Monitor Show editable field	s		Prin	Screen	Save Send Close	Help	X Help 🥘
Ready				#Polls: 74	#Errors:	0 Conn	ected to RMC-100 Logi	n: user v	/7.68 : 1397

10. For specific module setup, expand either TFIO-A Modules or TFIO-B Modules on the navigation tree and select the desired modules for further configuration.



IMPORTANT NOTE: Click **Help** on specific TFIO module screens for additional information and parameter description. The I/O Interface has online topics that explain configuration options available on the PCCU screens.

5 Advanced setup

Customize the RMC to meet individual site needs. Complete these steps in PCCU Expert view. Click **View** on the PCCU32 menu and select **Expert** from the drop-down list.

5.1 Configure the LCD backlight

The RMC LCD backlight is configurable. Change default settings (<u>Figure 5-1</u>) on the Station Setup tab:

- Select one or more triggers that enable the backlight.
- Select the trigger that turns the backlight on.
- Define the number of seconds per timeout. The backlight remains on for display activity during the timeout period.

LCD Backlight Status is a read-only field that shows whether the backlight is off or on. The backlight is always off if it is disabled.

To set up the backlight:

1. On the Station Setup screen, scroll down to LCD Backlight (Figure 5-1). Click **Help** for additional information about the Station Setup tab.

Figure 5-1: LCD backlight default settings

	LCD Backlight	
0.7.37	LCD Backlight Status	Off
0.7.36	LCD Backlight Enable	Off
0.7.38	LCD Backlight Trigger	Off
0.8.16	LCD Backlight timeout (seconds)	60

- 2. Select Off or On from the LCD Backlight Enable drop-down list.
- 3. Select an option from the LCD Backlight Trigger drop-down list: On, Off, Always On, On for Local Connections, or On for Push Buttons.

- 4. Type into LCD Backlight timeout the number of seconds the backlight remains lit during inactivity before it turns off.
- 5. Click **Send** to save the station settings.

5.2 Configure low power use

This procedure defines RMC sleep mode settings. The RMC goes into sleep mode when the power source drops below a specified voltage for a specified period of time. This prevents the battery from becoming so depleted that the RMC does not function properly. Sleep mode preserves the historical data the RMC collected before going to sleep. The RMC does not calculate new flow measurements during sleep mode.



IMPORTANT NOTE: Launch PCCU and connect to the RMC to wake it up from sleep mode. The RMC stays awake while PCCU is connected. If the battery voltage is below the specified voltage when PCCU closes, the RMC returns to sleep mode after the time specified in Sleep Mode Hold-off Time (sec).

To define low power use settings:

- Display the Station Setup screen and scroll down to Configuration for Low Power Use (Figure <u>5-2</u>).
- 2. Type the voltage that initiates communication cut-off into Remote Comm Cutoff Voltage.

Figure 5-2: Low power use default settings

	Configuration for Low Power Use	
0.10.2	Remote Comm Cutoff Voltage	11.90
0.10.3	Sleep Mode Entry Voltage	10.90
0.8.8	Sleep Mode Hold-off Time (sec)	120
0.9.11	Wake Up Time	02:00:00
0.7.14	Wake Up Time Mode	Time from Start of Sleep

IMPORTANT NOTE: The RMC uses a specified voltage to shut down the communication ports and communication equipment (radio) that it powers. This reduces power consumption, so the battery can recover.



Except for the remote communications, the RMC still functions when the RMC power level stays at the specified voltage.

Leave RMCs with a 12-volt SLA battery at the default Remote Comm Cutoff Voltage setting of 11.9 volts. RMCs powered with higher voltages, for example with a 24-volt power supply, can have a higher cutoff voltage.

Communication resumes when the voltage level returns to or exceeds the specified shut-down voltage.

3. Type the voltage for the RMC to enter sleep mode into Sleep Mode Entry Voltage.

IMPORTANT NOTE: The RMC uses a specified voltage to enter sleep mode.



Leave the default Sleep Mode Entry Voltage setting of 10.9 volts for RMCs with a 12-volt SLA battery. RMCs powered with higher voltages, for example with a 24-volt power supply, can have a higher sleep mode voltage setting.

In sleep mode, the RMC no longer functions. It only saves the last data values.

The RMC resumes function after a specified time.

- 4. Type the number of seconds the RMC has low power before it enters sleep mode into Sleep Mode Hold-off Time (sec).
- 5. Type into Wake Up Time the hours, minutes and seconds of delay before the RMC reactivates. Or, click the up and down arrows to increase or decrease the time.
- 6. Click **Wake Up Time Mode** and select an option (**Time from Start of Sleep** or **Time of Day**) to end sleep mode.

5.3 Configure low charger alarm

An alarm displays on the LCD when Low Charger Alarm is enabled and the voltage from the charger is 0.4 volts below the battery voltage. If Low Charger Alarm is disabled, the alarm does not display.

Low Charger Alarm State is read-only and displays the current state: Not in Alarm, or In Alarm.

To enable the alarm:

- 1. Launch PCCU and click **View** on the menu bar. Then click **Expert** to enter Expert view.
- Click the station ID (the top item on the navigation tree) to display the Station Setup screen. Scroll down to the Low Charger Alarm Enable section (<u>Figure 5-3</u>). Click the Low Charger Alarm Value column and select **Enabled** from the drop-down list.

Figure 5-3: Low charger alarm

1	Station Setu	P Applications	App Licensing	Battery Information	Resources	System Log	Security Log	Registry	
ľ									
			Des	cription				Value	
		Low Charg	er Alarm Enabl	e					
	0.7.22	Low Charger	Alarm			Enabled	1		
	0.7.0	Low Charger	Alarm State			In Alar	m		

3. Click Send.

5.4 Customize the LCD display

The maximum number of characters per row on the display is 21 (X location with a range 0 to 20). The size of a character is 8×6 pixels.

The maximum number of lines on the display is 8 (Y location). Lines 3 and 6 are separator lines. Lines 7 and 8 are reserved for the annunciators. Two pairs of lines are reserved for the display items with data, units, annunciators, and plot (optional): lines 1 (Y=0), 2 (Y=1), and 4 (Y=0), 5 (Y=1). For both pairs, the top line has a Y location of 0. The second line has a Y location of 1. These locations indicate position relative to the pair, not the entire height of the LCD (Figure 5-4).

Figure 5-4: LCD display items



During operation, the LCD continuously scrolls through the operating parameters. <u>Table 5-1</u> shows the parameters that typically display. The display is customizable.

Table 5-1: RMC	display	item	options
----------------	---------	------	---------

Display item	Default format	Description	Notes
DATE/TIME	MM/DD/YY HH:MM:SS	Current Date and Time	24-hour clock
YEST DP LO	NN PERCENT	Yesterday's Percent DP Low Limit	Percent time below DP Low Set Point
YEST DP HI	NN PERCENT	Yesterday's Percent DP High Limit	Percent time above DP High Set Point

Display item	Default format	Description	Notes
FLOWRATE	NNNNNN.N SCF/HR	Current Flow Rate	Programmable SCF or MCF or MMCF
ACCUM VOL	NNNNNN.NN MCF	Total Accumulated	Programmable SCF or MCF or MMCF
		Volume	
BATTERY	NN.N VOLTS	Battery Voltage	Volts
DIFF PRESS	NNN.N IN. H2O	Differential Pressure	Inches H2O
PRESSURE	NNN.N PSIA	Static Pressure Absolute	PSIA
FLOW TEMP	NN.N DEG. F	Flowing Temperature	°F
YEST VOL	NNNN.N MCF	Yesterday's Volume	Programmable SCFM or MCF or MMCF
PERIOD VOL	NNNN.N SCF	Previous Period Volume	Last volume calculation period
CHARGER	NN.N VOLTS	Charger Voltage	Volts
Orifice Dia.	NNNN.NNNN	Orifice Diameter	Inches
	INCHES		

The RMC has a factory default display group. Create and define additional groups as necessary. Program the display groups and display items per <u>Table 5-1</u>.

By default, each display item remains on the display for five seconds. Change the display duration to any value from 1 to 255 seconds, or zero (0) so the item does not display. Also change the engineering units and data format for the display, if necessary.

The annunciators are programmable. Assign the annunciator to an application to display specific alarms on the LCD (<u>Table 5-2</u>).

Table 5-2: Annunciator indicators

Indicator	Description
System	
(Blank LCD)	No annunciators display. There is no power to the RMC.
۲L	Low lithium battery alarm. When LL (low lithium) displays, the lithium battery voltage is below 2.5 Vdc. A new lithium battery measures approximately 3.6 Vdc.
۲C	Low Charger displays if the RMC battery charging voltage is (+) 0.4 Vdc, or is less than or equal to battery voltage
?	Exception Alarm Processing
Display App	lication
1	The number that represents the Display Group.
1	The value above the Data High Limit value on the Display Item Setup screen.
\downarrow	The value below the Data Low Limit value specified on the Display Item Setup screen.
Communicat	tion Protocols
\rightarrow	Transmitting Data: sending a response
←	Receiving Data: processing a response
!	Nak: Negative acknowledgement with packet list
+	Positive acknowledge of receipt of request
<u></u>	Waiting for Acknowledgement: waiting for response after transmission
¥	ID Recognized. The ID is recognized but is awaiting sync.
ŧ	Listen Cycle flashes when the remote port is active and running Totalflow Remote Protocol. Flashes are in sync with the listening cycle that occurs at 1, 2 or 4 second intervals.
R	LevelMaster Protocol: LevelMaster protocol is the port assigned to this annunciator.
L	This displays when the device is connected to an MMI port.
U	This displays when the device is connected to a USB port.
¥	The Totalflow Packet Protocol selected on this port.
MODBUS®	
M	The MODBUS® ASCII protocol for the port assigned to this annunciator.
Valve Contro	ol
V	The Valve Control option is on Expanded I/O board (plug-in RTU). Other valve
	control symbols do not apply.
+	The request was received.
=	The valve control option is installed. Process value (Process value, PV) is within the user-assigned dead band.
<u> </u>	The valve is in full open position.
	The valve is in full closed position.

Indicator	Description
1	The valve is opening. (The open signal is going to the valve actuator.)
\downarrow	The valve is closing. (The close signal is going to the valve actuator.)
Ö	The valve RMC override conditions are met (DP/SP override set point or Low
	Battery).
L	Local Lock-out is initiated.
Measureme	nt Application
н	This displays when the HOLD flag is active. It also displays when:
	PCCU32 is being calibrated.
	The A to D converter cannot be read.
Z	Zero Flow Condition. This is only visible when Flow Rate displays.
Α	Alarm Condition: View the alarm. Compare the application limits to current values to
	determine where the alarm condition is.
AD	A to D Failure. This displays if A to D Converter Absolute Differential Pressure,
	Absolute Static Pressure or temperature readings exceed maximum counts or are
	less than minimum counts.
BF	Back Flow Condition. This is visible only when a DP variable displays.
Pump Contr	ol
<u> </u>	Pump control, MODBUS® fault
<u>P</u>	Pump control disabled
<u>R</u>	Pump control Run
S	Pump control Stop
X	Pump control, External Control
Other Proto	cols
С	Local console protocol
<u> </u>	Local terminal protocol or TESORO® tank gauge
а	ADP protocol
b	Bluetooth® listen
n	Network listen
S	ScaData protocol
x	X-Frame host annunciator

5.4.1 Configure the number of display groups

This procedure configures the number of display groups for the LCD.

A display group defines a group of variables. The RMC displays them on its LCD so they are viewable without using PCCU.

The RMC ships with a standard or a custom configuration. Either configuration might include a factory default display group for basic station parameters display. Figure 5-5 shows an RMC with a single display group configured. In this example, the default display group is named Factory Default (other configurations use Station as the group's name). This group shows 7 display items with specific assignments. The LCD displays the values of these parameters. Three Spare items are unassigned, but configurable. The LCD only displays a value for these items when they are defined.

PCCU32 - [Entry]		
Operate View Window Help		_ & ×
10 🙋 🖫 💽 💽 🕅 🏭	🏾 🌃 🚳 Archive 🛄 😪 🧇	
	Setup Annuncistam Displaya Plata Conuna	1
Communications	Annunciators Displays Plots Groups	
	Description	Value
	8.0.0 Number of Display Groups	1
🚊 AGA3-2		
- Factory Default	8.5.0 Scroll Lock Timeout	00:00:30
DateTime		
RMC-100 Part Number:		
OS Part Number:		
System Voltage:		
Charger/Ext Power:		
Spare		
Spare		
Spare		
⊕ Operations		
Trend System		
	Re-read Monitor	Print Screen Save Send Close Help XHelp 🕷
Ready	, #Polls:	477 #Errors: 0 Connected to RMC-100 Login: user

Figure 5-5: Factory default Display setup (Advanced view)

IMPORTANT NOTE: This procedure changes the number of display groups to two. The factory default group is intact. A new display group is configured to display application-specific values in section <u>5.4.3</u> Configure a display group. Configure additional display groups for your scenario as required.

To establish the number of display groups:

1. Click **Display** on the navigation tree to display the Setup tab.

Figure 5-6: Default Display setup

1

PCCU32 - [Entry]	
I Operate View Window Help	_ <i>8</i> ×
10 🛅 🛅 💽 💽 🕅	
	Setup Assurgistan Displaye Data Groups
Communications	Allinanciators Displays nots dioups
Elow Measurement	Description Value
AGA3-1	8.0.0 Number of Display Groups 1
dGA3-2	
Display	00:00:30
Factory Default	
DateTime	
OS Part Number:	
System Voltage:	
Charger/Ext Power:	
Battery Voltage:	
Spare	
Alarm System	
. Operations	
ian Trend System	
	Re-read Monitor Print Screen Save Send Close Help 🗶 Help 🕷
Ready	#Polls: 477 #Errors: 0 Connected to RMC-100 Login: user

2. Type into Number of Display Groups the number of the groups to scroll and display on the LCD. In this example, type **2** into the field (Figure 5-7).

3. Click the two-digit time group (hours, minutes, or seconds) in Scroll Lock Timeout and type the time. Or click the up and down arrows to set the scroll lock time.

Figure 5-7: Change default Display Setup

E PCCU32 - [Entry]		
Operate View Window Help		_ 8 ×
i 🖾 🖾 💽 🖬 🛃		
□- RMC-100 □- Communications	Setup Annunciators Displays Plots Groups	
Totalflow/TCP		
Totalflow/USB	Description Value	
Totalflow/COM0:	8.0.0 Number of Display Groups 2	
i I/O System		
- How Measurement - A CA2 1	8.5.0 Scroll Lock Timeout 00:00:30	
ΔGA3-2		
E- Display		
- Factory Default		
DateTime		
RMC-100 Part Number:		
OS Det Number:		
Battery Voltage:		
Spare		
Spare		
Spare		
Alarm System		
Trend System		
	Re read Monitor Print Screen Save Send Close Help	K Help 🥘
Ready	#Polls: 888 #Errors: 0 Connected to RMC-100 Login:	user

4. Click **Send** to save the changes. The Setup screen displays the new number of display groups (Figure 5-8).

Figure 5-8: Display setup for two display groups

PCCU32 - [Entry]		
Operate View Window Help		_ 8 ×
📶 🛅 🖫 💽 💽 🕅		
■- RMC-100	Setup Annunciators Displays Plots Groups	
Totalflow/TCP		
Totalflow/USB	Description Value	
Totalflow/COM0:	8.0.0 Number of Display Groups 2	
i∎- AGA3-1	8.5.0 Scroll Lock Timeout 00:00:30	
Display Alarm System		
Operations		
in Trend System		
	Re-read Monitor Print Screen Save Send Close Help	X Help 🍋
Ready	#Polls: 1025 #Errors: 0 Connected to RMC-100 L	ogin: user

5. Expand Display on the navigation tree. The navigation tree displays the new group with a default name: Display Group 2 (Figure 5-9).

Reg. PCCU32 - [Entry] Derate View Window Help - 8 × | f 🕅 🛅 🖫 💽 💽 🏹 i 🚮 💹 🖉 🍏 🖾 🛄 🔍 🐊 - Communications Setup Annunciators Displays Plots Groups Totalflow/TCP Description Value Totalflow/USB 8.0.0 Number of Display Groups Totalflow/COM0: 2 I/O System - Flow Measurement 00:00:30 8.5.0 Scroll Lock Timeout 🛓 AGA3-1 - AGA3-2 📋 Display Factory Default ⊕ Display Group 2 Alarm System . Operations Re-read Monitor Print Screen Save Send Close Help X Help 🥘 #Polls: 752 #Errors: 0 Connected to RMC-100 Login: user Ready

Figure 5-9: New display group - default name

6. Expand **Display Group 2**. The group displays two default display items: DATE/TIME and Spare (<u>Figure 5-10</u>). DATE/TIME displays the RMC current date and time. Spare is undefined.

Figure 5-10: Default display group and items

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RMC-100 Dommunications	Setup Annunciators Displays Plots Groups	
iu- I/O System		
E- Flow Measurement	Description Value	_
⊕ AGA3-1	8.0.0 Number of Display Groups 2	
Display		
- Factory Default	8.5.0 Scroll Lock Timeout	
Display Group 2		
Spare		
- Alarm System		
Operations		
Irend System		
	Reread Monitor Print Screen Save Send Close Help X Help	
Ready	#Polls: 134 #Errors: 0 Connected to RMC-100 Login: user	

7. Configure the new group in section 5.4.3 Configure a display group. For more information, click **Help**.

5.4.2 Assign annunciators

An annunciator is a display item on the LCD that indicates the status of a variable. Assign an annunciator to an instantiated application on the RMC. The default display configuration might already have annunciators assigned, as in <u>Figure 5-11</u>. The LCD displays the indicators that apply to the

applications, as in <u>Table 5-2</u>. Keep or change those assignments; or use unassigned annunciators to add other applications.

This procedure assigns one of the unassigned annunciators to one of the measurement applications instances, AGA3-1.



IMPORTANT NOTE: Assign up to eight annunciators to the applications. An application must be instantiated before assignment. If there are not enough available annunciators, reassign default ones, as necessary.

Figure 5-11: Default annunciator assignments

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	Setup Annunciators Displays Plots Groups	
- Totalflow/USB	Annunciator Application	
Totalflow/COM0:	8.6.0 A1 Display	-
	8.6.1 A2 System	-
GA3-1	8.6.2 A3 I/O Interface-1	
	8.6.3 A4 Totalflow/USB	
⊡ Display	8.6.4 A5 Totalflow/TCP	
	8.6.5 A6 Totalflow/COM0:	
• Operations	8.6.6 A7 Unassigned	
in Trend System	8.6.7 A8 Unassigned	
	Re-read Monitor Print Screen Save Send Close Help X Help 3	
Ready	#Polls: 134 #Errors: 0 Connected to RMC-100 Login	ι. _d

To assign the applications to an annunciator:

- 1. Click **Display** on the navigation tree.
- 2. Click **Annunciators**. The current annunciator assignments display (Figure 5-12).

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Figure 5-12: Annunciator assignments

3. Click the Application field for an unassigned annunciator and select an application from the dropdown list. Repeat this step until you complete all necessary annunciator assignments.

Figure 5-13: Assign annunciator to application



4. Click Send to save the changes.

5. Observe annunciators on the LCD. An annunciator provides status or an alarm information. For more information, click **Help**.



IMPORTANT NOTE: Assign only necessary applications. The system requires more storage for more applications, groups and items.

5.4.3 Configure a display group

This procedure describes how to configure a non-default name for a display group, define the number of group display items, and enable the group display on the LCD.



IMPORTANT NOTE: This procedure describes the configuration of the new group created in section <u>5.4.1 Configure the number of display groups</u>. The existing factory default group is intact.

The RMC stores the display group setup in a file, identified as the Group File Name (Figure 5-14). This file name is Grp0000n.dg, where n is the number of the group. This number increases incrementally for each additional group.

<u>Figure 5-14</u> shows a display group created after the default group. The group file name is Grp00002.dg and the default group description is Display Group 2. Change this to reflect the types of values under that group. The group description identifies the group on the navigation tree.

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	Group Setup	
- Communications Total/flow//TCD		
Totalflow/USB	Description	Value
Totalflow/COM0:	8.1.0 Group File Name	Grp00002.dg
	8.1.4 Group Description	Display Group 2
E Flow Measurement	8.0.1 Number of Displays	2
	8.2.15 Include in Scroll List	Yes
🖃 Display	8.2.15 Allow Keypad Entry	Yes
Factory Default		
• Operations		
⊕ Trend System		
	Re-read Monitor Print S	creen Save Send Close Help XHelp 🗶
Ready	#Polls:	1655 #Errors: 0 Connected to RMC-100 Login: u

Figure 5-14: Default Group setup

To change the new group's default configuration:

1. Click the Display Group number on the navigation tree to display the Group Setup tab. The default configuration for the groups displays (<u>Figure 5-15</u>).

Figure 5-15: Display Group Setup tab

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En RMC-100 	Group Setup	
Totalflow/TCP	Description	
Totalflow/COM0:	8.1.0 Group File Name Grp00002.dg	
∎- I/O System	8.1.4 Group Description Display Group 2	
Flow Measurement	8.0.1 Number of Displays 2	
Display Factory Default	8.2.15 Include in Scroll List Yes	
Display Group 2	8.2.15 Allow Keypad Entry Yes	
Alarm System		
Trend System		
	Re-read Monitor Print Screen Save Send Close Help	X Help 🥘
Ready	#Polls: 448 #Errors: 0 Connected to RMC-1	.00 Login: u

- 2. Type a description of the group into Group Description (Figure 5-16). In this example, the new description uses the name of one of the RMC's measurement application instances AGA3-1 to display values from that application.
- 3. Type the number of items to display for the group into Number of Displays (<u>Figure 5-16</u>). In this example, the number is 4, which adds two additional displays to the default 2.
- 4. Click **Include in Scroll List** and select **Yes** to include the group in the scroll list (Figure 5-16).

Figure 5-16: Change default group setup

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	Group Setup	
⊖ Communications		
Totalflow/USB	Description	Value
Totalflow/COM0:	8.1.0 Group File Name	Grp00002.dg
I/O System	8.1.4 Group Description	AGA3-1
Flow Measurement	8.0.1 Number of Displaye	
AGA3-1	0.0.1 Number of Displays	Yes
H. AGA3-2	0.2.15 Include in Scroll List	100 V
Factory Default	8.2.15 Allow Keypad Entry	NO Yes
Display Group 2		
and a state and a		
Operations Trand Sustant		
	Re-read Monitor Print S	Screen Save Send Close Help X Help 💓
Ready	#Polls:	1655 #Errors: 0 Connected to RMC-100 Login: u

- 5. Click Send.
- 6. Expand Display on the navigation tree. The new group displays with the new name ($\frac{\text{Figure}}{5-17}$).

Figure 5-17: Display group with user-defined name

Operate View Window Help Operate View Help Operate View Window Help Operate View View Help Operate View View Help Operate View View Help Operate View View View View View View View Vie	PCCU32 - [Entry]		
Image: Second System Image: Second System B. Trend System Comparison B. Trend System B. Monitor B. Monitor B. Monitor B. Monitor B. Monitor	🔝 Operate View Window Help		_ <i>6</i> ×
Communications Contalflow/TCP Totalflow/COM0: U/O System Flow Measurement	📶 🛅 🖫 💽 💽 🦓 🏭	🛛 🌃 🚳 🏠 🖾 🖉	
Communications - Totalflow/CDM0: - Totalflow/COM0: - Totalflow/COM0: - Flow Measurement - AGA3-1 - AGA3-2 - Display - Factory Default - AGA3-1 - AGA3-1 - Display - Trend System - Trend System		Group Setup	
Image: Construction of the second	Communications Totalflow/TCP		
Image: Totalflow/COM0: B.1.0 Group File Name Grop0002.dg B-1/O System Flow Measurement B.1.4 Group Description AGA3-1 B-AGA3-2 Display Encloy Default B.2.15 Include in Scroll List Yes B-Adm System Operations B.1.7 Allow Keypad Entry Yes B- Trend System Monitor Print Screen Save Send Close Help X Help Image	Totalflow/USB	Description	Value
 IVO System Flow Measurement GAGA3-1 AGA3-2 Display Factory Default AGA3-1 B.1.4 Group Description AGA3-1 B.0.1 Number of Displays 4 B.2.15 Include in Scroll List Yes B.2.15 Allow Keypad Entry Yes Yes Parent System Operations Trend System Reread Monitor Print Screen Save Send Close Help 	Totalflow/COM0:	8.1.0 Group File Name	Grp00002.dg
B. AGA3-1 B. AGA3-2 Display B. Factory Default B. AGA3-1 B. Display B. Construction B. Trend System Coperations B. Trend System Image: Comparison of the system <t< td=""><td>ia. I/O System</td><td>8.1.4 Group Description</td><td>AGA3-1</td></t<>	ia. I/O System	8.1.4 Group Description	AGA3-1
AGA3-2 Display -Factory Default AGA3-1 AGA3-1 AGA3-1 Operations D'Trend System Reread Montor Print Screen Save Send Close Help XHelp	AGA3-1	8.0.1 Number of Displays	4
Display Factory Default AGA3-1 AGA3-1 Operations Display Operations Frend System Montor Print Screen Save Send Close Help XHelp XHelp		8.2.15 Include in Scroll List	Yes
AGA3-1 Afarn System Operations Derado System Reread Monitor Print Screen Save Send Close Help XHelp Immediately	i⊟- Display	8.2.15 Allow Keypad Entry	Yes
	AGA3-1 Operations Trend System	Reread Monitor Print S	Screen Savel Send Close Help X Help 💓

7. Click the new display group on the navigation tree to expand the folder. The items defined for the group display on the navigation tree (Figure 5-18). In this example four items display. Configure the Spare items as necessary.

PCCU32 - [Entry] I Operate View Window Help _ 8 × 💽 💽 🌆 🛃 🜃 🚳 🛱 🛄 🔬 🧇 fi 🖻 Group Setup Communications Totalflow/TCP Description Value Totalflow/USB - Totalflow/COM0 8.1.0 Group File Name Grp00002.dg I/O System 8.1.4 **Group Description** AGA3-1 Flow Measurement 8.0.1 4 Number of Displays AGA3-1 8.2.15 Include in Scroll List Yes - AGA3-2 - Display 8.2.15 Allow Keypad Entry Yes E- Factory Default AGA DATE/TIME Spare Spare Spare Alarm System • Operations • X Help 🧶 Re-read Monitor Print Screen Save Send Close Help #Polls: 589 #Errors: 0 Connected to RMC-100 Ready Login: u

Figure 5-18: Number of group display items

8. Configure each item per section <u>5.4.4</u>.

For more information, click **Help**.

5.4.4 Configure group display items

This procedure describes how to configure group display items.

Basic item configuration defines the name of the item, the register number to obtain the value of the item, and its display interval. This procedure accepts the default values for all other parameters.

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IMPORTANT NOTE: This procedure configures a spare item in the display group created in section 5.4.3.

The display item name can be an application variable, constant or parameter name. Determine the RMC register address that stores the value for that parameter. The Display application obtains the value from that register and displays it on the LCD. Match item names with actual application parameter names provided the number of characters does not exceed the maximum supported by the LCD. Shorten parameter names as necessary.



IMPORTANT NOTE: Each item uses two lines on the LCD display. The first line is the item name. The second line is the value and unit of measurement.

To configure each display item:

- 1. Decide which parameter to assign to the spare item.
 - a. Click the application assigned to the display group on the navigation tree. In this example, click AGA3-1 under Flow Measurement. The Current screen displays (Figure 5-19).
 - b. Determine the parameter required. This example uses Volume Flow Rate for AGA3-1 to configure the spare display item.

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IMPORTANT NOTE: This example determines the parameter to display from the Current screen. You can select any parameter from this screen or other screens for the application. All application screens display the register address for each parameter on that screen.





- 2. Determine the application register that stores the value of the parameter.
 - a. Hover the mouse over the Volume Flow Rate's value on the Current screen. Hold the cursor in place until the register address bubble displays (Figure 5-20). Take note of the register address. In this example, the address is 11.7.19.



Figure 5-20: Obtain register address from the application current value screen

IMPORTANT NOTE: Register addresses for current values are also available on the Current Value screen (Figure 5-21).

Figure 5-21: Determine register addresses for the application's Current Values

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	Ceneral	Constants Water Constant	Eactors	Limits Depoity Com	mande
	General	Log Capacity	Current Values	Last Calc Values	inditus
Totalflow/TCP					
Totalflow/COM0:		Description	Value	Units	
	11.3.0	Static Pressure	14.730	PSIA	
- Flow Measurement	11.7.0	Diff. Pressure	0.000	InH2O	
⊖ AGA3-1	11.3.3	Temperature	60.000	Deg F	
- Analysis	11.7.19	Flow Rate	0.000	MCF/DAY	=
Digital Outputs	11.3.73	Energy Rate	0.000	MMBTU/Day	-
RS and No Flow	11.7.68	Mass Rate	0.000	lbm/Hour	
⊕ AGA3-2		Today'a Values			
	11.42.31	Volume	0.00000	MCF	
i⊟- AGA3-1	11.42.33	Mass	0.00000	lbm	
DATE/TIME	11.42.34	Energy	0.00000	MBTU	
Spare					
Spare		Yesterday's Values			
	11.42.35	Volume	0.00000	MCF	
. Operations	44 40 07	**	0.00000	IL	-
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Ready		#Polls: 10	005 #Errors: 0	Connected to RMC-100 Lo	igin: usi 💡

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3. Click the group name on the navigation tree to expand the folder. Then click a Spare group item The Item Setup tab displays (Figure 5-22).

Figure 5-22: Spare default Item Setup

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	Item Setup	Plot		
Communications Totalflow/TCP				
Totalflow/USB		Description	Value	
Totalflow/COM0:	8.1.1	Name of Display Item	Spare	
	8.4.0	Register	0.0.4	1
⊡- Flow Measurement	8.2.0	Display Interval (Seconds)	0	
Setup	8.1.2	Units		
Analysis Disited Outputs	8.2.1	X Location For Name	0	_
	8.2.2	Y Location For Name	0	=
Adv Setup	8.2.3	X Location For Units	10	
Speed of Sound	8.2.4	Y Location For Units	1	
⊡- Display	8.2.5	X Location For Data	0	
Factory Default	8.2.6	Y Location For Data	1	
AGA3-1	8.1.3	Data Format	9.3	
	8.3.0	Data Scale Factor	0	
Spare	8.3.1	Data High Limit	0	
	8.3.2	Data Low Limit	0	
Operations	042	Enumeration Array	000	*
Trend System				
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Ready		#Polls:	1013 #Errors: 0 Connected to RMC-100 Log	in: use 🔡

- 4. Click the **Name of Display Item** field in the Value column and type the display item's new name. In this example, Flow Rate (Figure 5-23)
- 5. Click the field in the Register's Value column. Type the item's Register address. Use the value obtained in step 2, in this example: **11.7.19**.
- 6. Type the number of seconds for the item to display into the Display Interval field. The Display Interval default is zero (0). This example sets the interval to 5 seconds.
- 7. Type the unit of measurement for the item's value into the Units field.

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	Item Setup	Plot			
- Communications	·				
- Totalflow/USB		Description		Value	<u> </u>
Totalflow/COM0:	8.1.1	Name of Display Item	Flow Rate		
	8.4.0	Register	11.7.19		
Every Heasurement	8.2.0	Display Interval (Seconds)	5		
- Adas-1	8.1.2	Units	MCF/DAY		
Analysis	821	X Location For Name	0		
Digital Outputs	822	X Location For Name	0		=
RS and No Flow	0.2.2	Y Location For Marite	40		
Adv Setup	8.2.3	X Location For Units	10		
Im AGA3-2	8.2.4	Y Location For Units	1		
	8.2.5	X Location For Data	0		
Factory Default	8.2.6	Y Location For Data	1		
GA3-1	8.1.3	Data Format	9.3		
	8.3.0	Data Scale Factor	0		
	8.3.1	Data High Limit	0		
Spare	8.3.2	Data Low Limit	0		
Alarm System	042	Enumeration Array	<u></u>		-
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m. Herid System	Re-read	Monitor Print	Screen Save Send	Close Help XHel	p 🍋
Ready		#Polls:	1013 #Errors: 0	O Connected to RMC-100 Lo	gin: use 🔬

Figure 5-23: Basic display item configuration

- Click Send to save.
 Click Re-read to refresh and update the screen with the changes. The new display item name displays on the navigation tree. In this example, the display item reflects the name configured in the Item Setup screen, Flow Rate (Figure 5-24).

Figure 5-24: Configured display item

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	Item Setup	Plot		
Communications		TIOC		
		Description	Value	
Totalflow/COM0:	8.1.1	Name of Display Item	Flow Rate	
	8.4.0	Register	11.7.19	-
Flow Measurement	820	Display Interval (Seconds)	5	-
i⊒- AGA3-1	0.2.0			
	0.1.2			
Digital Outputs	8.2.1	X Location For Name	0	=
RS and No Flow	8.2.2	Y Location For Name	0	
Adv Setup	8.2.3	X Location For Units	10	
Speed of Sound	8.2.4	Y Location For Units	1	
	8.2.5	X Location For Data	0	-
Factory Default	8.2.6	Y Location For Data	1	-
AGA3-1	8.1.3	Data Format	9.3	
DATE/TIME	830	Data Scale Factor	0	
- Flow Rate	9.2.1	Data High Limit	0	-
	0.3.1		•	
⊕ Alarm System	8.3.2	Data LOW LIMIT	U	- -
Operations	A 2	Enumeration Array	1000 •	
🗓 - Trend System				
	Re-read	Monitor Print S	Screen Save Send Close Help X Help	۲.
Ready		#Polls:	1017 #Errors: 0 Connected to RMC-100 Log	in: use 🔡

10. Verify that the LCD displays the parameter, its current value and units. The value must match the value displayed on PCCU. If no value is displayed or the displayed value is incorrect, verify the register address. Incorrect register definition will yield the wrong value. You can also verify the application configuration.

11. Repeat steps 1 to 10 to customize additional spare display items. For more information, click **Help**.



IMPORTANT NOTE: To decrease the number of groups and display items, type a lower number into the Number of Display Groups field on the Display Setup tab. If the number decreases by 1, the last item on the list no longer displays. If the number decreases by 2, last two items on the list no longer display, and so on. To remove items at the top of the list, remove all items, then re-add the items you intend to keep. You cannot delete a group or item out of order.

5.4.5 Configure the plot for a display item (optional)

The plot view for a display item is optional. Configure the plot after adding the display item. The plot displays simultaneously with the display item. Two options are available for the plot size (Figure 5-25). Use a shorter display item name, since longer names can overwrite the plot display on the LCD.

IMPORTANT NOTE: This procedure configures the plot for the display item defined in section <u>5.4.4 Configure group display items</u>.



Figure 5-25: Plot sizes

To set up an item's plot:

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1. Click a display item on the navigation tree.

Figure 5-26: Select display item

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	Item Setu	Plot		
Totalflow/TCP				
Totalflow/USB		Description	Value	<u> </u>
Totalflow/COM0:	8.1.1	Name of Display Item	Flow Rate	
	8.4.0	Register	11.7.19	
Elow Measurement	8.2.0	Display Interval (Seconds)	5	
Setup	8.1.2	Units	MCF/DAY	
Analysis	8.2.1	X Location For Name	0	
Digital Outputs	8.2.2	Y Location For Name	0	Ε
- Adv Setup	8.2.3	X Location For Units	10	
Speed of Sound	8.2.4	Y Location For Units	1	
ir AGA3-2 □ Display	8.2.5	X Location For Data	0	
	8.2.6	Y Location For Data	1	
AGA3-1	8.1.3	Data Format	9.3	
Flow Rate	8.3.0	Data Scale Factor	0	
Spare	8.3.1	Data High Limit	0	
Spare	8.3.2	Data Low Limit	0	
	0 4 7	Enumeration Array	000	*
Trend System				
	Re-rea	d Monitor Print S	Screen Save Send Close Help XHelp	۲.
Ready	,	#Polls:	1017 #Errors: 0 Connected to RMC-100 Logi	n: usi 🔡

2. Click **Plot** to display the Plot tab (Figure 5-27).

Figure 5-27: Display item Plot screen

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⊡- RMC-100	Item Setup	Plot		
Totalflow/TCP				
Totalflow/USB		Description	Value	
Totalflow/COM0:	8.2.9	Annunciators or Plot	Annunciators 🔹	
∎. I/O System	8.2.7	X Location	20	
Flow Measurement AGA3-1	8.2.8	Y Location	0	
Setup	8.2.11	Plot Type	Current	
Analysis	8.2.10	Scroll Direction	Left->Right	
Digital Outputs	8.2.12 Line Width		2	
Adv Setup	8.2.13 Left Border		Yes	
Speed of Sound	8.2.13 Right Border N		No	
in AGA3-2	8.2.13	Top Border	No	
E Factory Default	8.2.13	Bottom Border	Yes	
⊟- AGA3-1	8.4.1	Array Register	0.0.0	
DATE/TIME			Å	
Spare				
Spare				
⊕ · Operations	• • • • • • • • • • • • • • • • • • •			
i ⊕- Trend System	Reread Monitor Print Screen Save Send Close Help XHelp 🔍			
Ready #Polls: 1033 #Errors: 0 Connected to RMC-100 Login: usi				

 Click Annunciators or Plot and select 16X24 Plot or 8X48 Plot from the drop-down list to set the plot size (Figure 5-28).

Figure 5-28: Select plot size

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AGA3-1 GAGA-1 GAGA-2 Display GAGA-1 GAGA-1 GAGA-2 Display Factory Default AGA3-1 GAGA-1 GAG	Item Setup Plot Item Setup Plot 8.2.9 Annunciators or Plot 8.2.10 Scroll Direction 8.2.11 Plot Type 8.2.10 Scroll Direction 8.2.11 Left Border 8.2.13 Left Border 8.2.13 Top Border 8.2.13 Bottom Border 8.4.1 Array Register	Value Annunciators 46x24 Plot 8x48 Plot Current Left->Right 2 Yes No No Yes 0.0.0
	Reread Monitor Print S	creen Save) Send Close Help XHelp 🐌
Ready	#Polls:	143 #Errors: 0 Connected to RMC-100 Login: usr

- 4. Click Plot Type and select one of the following from the drop-down list:
 - Current: live data
 - Array: previously collected data
 - Vertical Bar: current data displays in a vertical bar plot
 - Horizontal Bar: current data displays in a horizontal bar plot

Table 5-3: Plot types and sizes

Plot type	8 x 48 Plot size	16 x 24 Plot size
Current	WAL	himthe
Array	htm.	<u>623</u>
Horizontal bar		
Vertical bar		L

Figure 5-29: Select plot type

PCCU32 - [Entry]					
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RMC-100 Gorden Communications Totalflow/TCP Totalflow/COM0: Totalflow/COM0: I/O System Flow Measurement AGA3-1 AGA3-2 Display Factory Default AGA3-1 DATE/TIME Flow Rate Spare Spare Spare Alarm System Operations Trend System	Main Main Setup Setup Item Setup Plot Description 82.9 Annunciators or Plot 82.9 Annunciators or Plot 82.7 X Location 82.8 Y Location 82.11 Plot Type 82.12 Line Width 82.13 Left Border 82.13 Top Border 82.13 Bottom Border 84.11 Array Register	Value 16x24 Plot 20 0 Current Array Vertical Bar Horizontal Bar No No Yes 0.00			
		Carren Carad Chara Hala V Hole 🌤			
	Heread Monitor Print Screen Save Send Close Help				
Ready	#Polls:	143 #Errors: 0 Connected to RMC-100 Login: use			

5. Click **Scroll Direction** and select an option (**Left** or **Right**) from the drop-down list (<u>Figure</u> <u>5-30</u>).

Figure 5-30: Select plot scroll direction

PCCU32 - [Entry]			
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10 🛅 🖫 💽 💽 Im 🛃	MB 🦉	🕅 🖧 🛄 🚺 Setup	
	Item Setup	Plot	
Totalflow/USB		Description	Value
Totalflow/COM0:	8.2.9	Annunciators or Plot	16x24 Plot
Elou: Massurement	8.2.7	X Location	20
and AGA3-1	8.2.8	Y Location	0
	8.2.11	Plot Type	Current
	8.2.10 Scroll Direction Left->Right		
AGA3-1	8.2.12	8.2.12 Line Width Left->Right	
DATE/TIME	8.2.13	Left Border	Right->Left res
Flow Rate	8.2.13 Right Border No		No
Spare	8.2.13	8.2.13 Top Border No	
	8.2.13	8.2.13 Bottom Border Yes	
Operations Trand System	8.4.1	Array Register	0.0.0
	Re-read	d Monitor Print S	Screen Save Send Close Help XHelp 💓
Ready		#Polls:	143 #Errors: 0 Connected to RMC-100 Login: use

6. Click **Line Width** and type a number into the field or select one from the drop-down list (Figure <u>5-31</u>). The larger the line width number the thicker the graph line.

Figure 5-31: Select plot line width

PCCU32 - [Entry]		
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1 📅 🖾 💽 💽 🖬	🚾 🚳 Krahiye 🔛 🐼	
RMC-100 Communications Totalflow/TCP Totalflow/COM0: I/O System Flow Measurement AGA3-1 AGA3-2 Display Factory Default AGA3-1 AGA3-2 Display Factory Default AGA3-1 AGA3-2 Display AITE/TIME AGA3-1 AGA3-1 AGA3-1 ATE/TIME AGA3-1 AGA3-1 AGA3-1 AGA3-1 AGA3-1 AGA3-2 Display AGA3-1 AGA3-2 Display AGA3-1 AGA3-2 Display AGA3-2 Display AGA3-2 Display AGA3-1 AGA3-2 Display AGA3-2 Display AGA3-1 AGA3-2 Display AGA3-1 Display AGA3-2 Display Display AGA3-2 Display Display Di	Item Setup Plot Description 8.2.9 Annunciators or Plot 8.2.1 Y Location 8.2.11 Plot Type 8.2.12 Line Width 8.2.13 Left Border 8.2.13 Bottom Border 8.4.1 Array Register	Value 16x24 Plot 20 0 Current Left->Right 2 3 4 5 6 7 8 9
	Re-read Monitor Print	Screen Save Send Close Help XHelp (
Ready	#Polls:	143 #Errors: 0 Connected to RMC-100 Login: usi

7. Click the following fields and select Yes or No from each drop-down list (Figure 5-32):

- Left Border
- Right Border Top Border ٠
- •
- Bottom Border •

Figure 5-32: Configure plot border display

PCCU32 - [Entry]					
🗈 Operate View Window Help 📃 🖉					
📶 🛅 🛅 💽 💽 🕅 🏭	M B 1	🕅 💯 💭 🤣			
	Item Setu	n Plot			
Communications Tatalflow/TCD	Tem beta				
		Description	Value		
Totalflow/COM0:	8.2.9	Annunciators or Plot	16x24 Plot		
	8.2.7	X Location	20		
Flow Measurement	8.2.8	Y Location	0		
	8211	Plot Type	Current		
⊡- Display	8 2 10 Scroll Direction Left Dight				
🖶 Factory Default	0.2.10				
AGA3-1	0.2.12	8.2.12 Line width 2			
DATE/TIME	8.2.13	8.2.13 Left Border Yes			
Spare	8.2.13	8.2.13 Right Border No			
Spare	8.2.13	8.2.13 Top Border No			
	8.2.13	8.2.13 Bottom Border Yes			
Operations	8.4.1	Array Register	0.0.0		
⊞- Trend System					
	Re-read Monitor Print Screen Save Send Close Help XHelp 🗼				
Ready		#Polls:	143 #Errors: 0 Connected to RMC-100 Login: us		

- 8. Type the register location for the array into the Array Register field if the Plot Type is Array.
- 9. Click **Send** to save.
- 10. Verify that the plot displays on the LCD.
- 11. Repeat steps 1 to 10 to configure plots for additional display items, if necessary.



IMPORTANT NOTE: The shape of a plot differs based on the type of value and how the value fluctuates over time. Constant values, or values with little variation, are straight lines. Values with greater fluctuation have plots with greater contrast.

5.5 Enable SSH/SFTP

SSH/SFTP servers require a private key for authentication. The keys are in a protected storage location in the firmware (flash) and remain unchanged by any software updates.

Customer access to the SFTP is read-only. SSH access is not available to the customer. Customers can copy files from the RMC but cannot write or send files to the RMC.

The following folders are available to copy or download:

- Crash dumps
- Firmware: Main Totalflow application (App), factory startup (cold) configuration, and startup (cold) configuration
- Logs: System and device loader log files
- tfData: Running (warm) configuration files



IMPORTANT NOTE: SSH/SFTP services are disabled by default for security. Perform this procedure only if required and you are an advanced user. Before enabling, see section <u>6 Configure security</u> (recommended), or contact technical support.

SSH/SFTP access is TCP/IP based. Enable and configure Ethernet with valid IP parameters

To enable the SSH/SFTP services on the RMC:

- 1. Click **Communications** on the navigation tree.
- 2. Click Network to display the Network tab.
- 3. Click SSH/SFTP Service (Port: 9696) to enable the services.
- 4. Click **Send** to save the configuration.
- 5. Click the **Ethernet** tab.
- 6. Click **Network Adapter** to enable Ethernet.
- Type valid network parameters into each of the fields (IP Address, Default Gateway, and Subnet Mask). See section <u>4.4.2 Enable serial port switched output power</u> for more information.
- 8. Click **Send** to save the configuration.
- 9. Click **Help** to display the Ethernet Tab topic for more information to establish a read-only SFTP connection.

5.6 Application credits (credit key)

ABB provides a secure USB flash drive containing four credits to activate application licenses. If this is not enough to activate all required applications, call the ABB main office on the last page of this manual to purchase additional credits.

Credit key actions include:

- Add more credits to the credit key.
- Transfer credits from an ABB Totalflow device to the credit key.
- Transfer credits from the credit key to an ABB Totalflow device.
- Move credits from one credit key to another credit key.
- Move credits from one ABB Totalflow device to another ABB Totalflow device.

The only program that can write to or read the USB flash drive is PCCU32.

If the RMC runs an unlicensed application, this appears on any generated reports. The RMC logs unlicensed use in the Event Log at the top of each contract day. Unlicensed applications also cause the RMC to connect more slowly than normal.

At the Station Setup screen, click the App licensing tab and click **Help** for information about maintaining the credit key.

5.7 Verify the applications

To verify that the purchased applications are instantiated:

- 1. Click the station ID name at the top of the navigation tree. The Station Setup tab displays.
- 2. Click **Application/License Management** to display the Application/License Management tab.
- 3. Verify that the application names display on the Type list.
- 4. Click **Add App** to add missing applications, as necessary. The Add New Application dialog displays (Figure 5-33).

Figure 5-33: Applications list

PCCU32 - [Entry]		
Derate View Window Help		- 8 ×
10 🛅 🚾 💽 🕅 🗗	3 🕅 🚳 🌾 🛄 🤐 🦛	
TOTALFLOW Ommunications	Station Setup Application/License Management Battery Information Resources System Log Security Log Registry	
Totalflow/TCP	Key Credits Device Credits	
Totalflow/USB	Transfer to Key Credit Type Used Surplus/Deficit	
Totalflow/COM0:	Credit Type Amount Type General(non-removable) 1 5	
Elow Measurement	General(removable) 0 0 =	
Setup	Amount COC(NIST) 0 0	
Analysis	(spare)	
Digital Outputs	Load Transfer	
Speed of Sound	App# Type Revision Station Directory License Status Restart De	lete App
	0 System 2105252-004 Dir = \ Enable	
	1 Communications 2101348-005 Dir = \Comm-1 Enable	
	2 Communications 2101340-005 Dir = \Comm-2 En Add New Application	
	3 Communications 2101340-005 Dir = 1Comm-3 Ent	
	7 I/O Interface XSeries 2105253-001 Dir = \TFIO-A Ent App number Application to add	
	11 AGA-3 Measurement 2101306-007 Dir = VAGA3-1 En: 31 V Communications V	
	Override recommended app number	
	OK Cancel	
	< III	•
	Re-read Add App Credit/App Info Send	Close Help
Ready	#Polls: 24 #Errors: 0 Connected to 10.127.185.17	5 Login: user

- 5. Click **Application to Add** and select the application from the drop-down list. Then click **OK**.
- 6. Click **Send** to save the application.

5.8 Enable RMC for MQTT support

MQTT supports connection of the RMC-100 to a service provider or private cloud. It may require authentication certificates for the device. Consult with your IT administrator for configuration options or requirements when using certificates.



NOTICE – Cybersecurity risk. The RMC-100 is not an internet-facing device. Do not connect directly to the Internet. An MQTT gateway is required between the Digital Oilfield and the RMC. If the customer's corporate network firewall is compromised, the RMC-100 would be at risk without the MQTT gateway.

Enable MQTT and the REST (MQTT configuration interface):

1. On the PCCU Entry mode navigation tree, select **Communications**>**Services** (Figure 5-34).

Figure 5-34: RMC-100 Services

🖳 PCCU32 - [Entry]	-	
Operate View Window Help		- 8 ×
10 📅 🖪 👀 🖓 🖼 🚳	🛄 👽 🖓	
RMC-100 Communications Totalflow/TCP Totalflow/COM0: XMV Interface XIO_01 XMV Interface XIO_01 COM2 UevelMaster XIO_01 COM3 ABBService I/O System Flow Measurement - Setup - Analysis - Digital Outputs - RS and No Flow - Adv Setup - Speed of Sound Display D- Trend System	Communication Setup Services Networking Device Name Network ID RMC-100-RE2004618-00010841 Services Services SSH/SFTP Service (Port: 9696) Auto Discovery Service MQTT Service Totalflow Software Update Service MQTT REST Service Re-read Send Close EPolls: 32 #Errors: 0 Connected to RMC-100 Login use	Help
neauy	#Polis: 52 #Enois: 0 Connected to RIVIC-100 Login: use	V7.00

- 2. Select the MQTT Service checkbox. The MQTT REST Service activates.
- 3. Select the MQTT REST Service checkbox. This allows access to the MQTT configuration interface from a web browser. Once configuration for MQTT is complete, the REST service can be disabled for security.

Figure 5-35: Enable MQTT Service and REST Service on the RMC-100

PCCU32 - [Entry]	-	
Derate View Window Help		_ 8 ×
RMC-100 Communications Totalflow/USB Totalflow/USB Totalflow/COM0: ABSErvice V/O System Flow Measurement -Setup -Analysis -Digital Outputs -RS and No Flow -Adv Setup -Speed of Sound Digitaly -Trend System	Communication Setup Services Device Name Network ID RMC-100-RE2004618-00010841 Services SSH/SFTP Service (Port: 9696) Auto Discovery Service MQTT Service MQTT REST Service Re-read Send Close	Help
Keady	#Polls: 34 #Errors: 0 Connected to RMC-100 Login: user	v7.6

- 4. Click Send.
- 5. Refer to the How to Configure MQTT guide for further configuration details. See Additional information for a link to the document.

6 Configure security (recommended)

To secure access to the RMC, review the security features implemented.

6.1 Access points

Totalflow user interfaces and host products support connection with the RMC through several types of communication ports, protocols, and services. These constitute points of entry that could be subject to inexperienced, unauthorized or malicious access through a point-to-point connection or a connection established over a network. Physical access to the ports must be controlled to protect local and remote access. Enable on-board security or enforce authentication before establishing a connection with any of the ports.

This section lists the communication ports, services, protocols, and the open Transmission Control Protocol (Transmission Control Protocol, TCP) ports that need to be considered when securing devices.

6.2 Communication interfaces

The table below lists the default communication ports available in the RMC with standard configuration. These ports are pre-configured from the factory. When enabled, these ports are ready for use, but are not secured.

Unprotected ports make the full functionality of the device available to any user. Configure security passcode or role-based authentication to prevent indiscriminate access.

Table 6-1: Default communication ports on the RMC

Wired connections communication ports, default names	Default state	Default protocol	Security feature available
MMI, port name: MMI Serial - COM0	Enabled	Totalflow Local (Read-only)	Bi-Level Security code authentication or Role-base Authentication (Role-base Authentication, RBAC)
USB, port name: Totalflow - USB	Enabled	Totalflow Local (Read-only)	Bi-Level Security code authentication or Role-base Authentication (Role-base Authentication, RBAC)
Ethernet 1 and 2, port name: Totalflow – TCP	Disabled	Totalflow/TCP (Read-only)	Bi-Level Security code authentication or Role-base Authentication (Role-base Authentication, RBAC)
COMM1, port name: TF - Remote	Enabled	Totalflow Remote (Configurable)	Bi-Level Security code authentication or Role-base Authentication (Role-base Authentication, RBAC)



IMPORTANT NOTE: The Ethernet ports on the RMC might connect to a Network and peripheral devices. If the peripheral devices send real-time measurement data to the RMC, configure connections correctly to prevent loss of this data due to network issues.

IMPORTANT NOTE: The RMC does not have native wireless support. Access to the RMC from a Bluetooth client is supported with the use of a Bluetooth-to-USB dongle. The table below indicates the default port name and security feature available to protect the device.

Table 6-2: Non-native Bluetooth support on the RMC

Wireless connections communication interfaces	Default state	Protocol	Security feature available
Bluetooth via USB Dongle, Port Name: Bluetooth	Disabled	Totalflow Local	Role-Based Authentication (RBAC)

6.2.1 User-enabled services

Services are software processes that run on the RMC device. The table below lists user-enabled services that open access to the embedded software file system. Unauthorized or malicious use of these services can cause file corruption and render a device inoperable.

Service Name	Default state	Description	Security feature available
SSH/SFTP Service	Disabled	Serves connection requests for secure login shell and file transfer. Supports connection requests from third-party SSH/SFTP clients	Authentication based on private-public key pairs, passphrase-protected keys
Totalflow Software Update Service	Enabled	Enables or blocks the ability of the device loader to update the embedded software.	None specific to the service. Must use Bi- level security passcode or Role-Based Authentication (Role-Based Authentication, RBAC)

Table 6-3: User-enabled services on the RMC

6.2.2 Open Transmission Control Protocol (TCP) ports

The table below lists the open TCP ports on the RMC. These ports are used for all TCP/IP based connections which are supported by the Ethernet ports.

Protocols over TCP can be standard like SSH, or proprietary like Totalflow (Remote or Local).

		-	
Default TCP port	User- configurable	Protocol using the port	Description
9999	Yes	Totalflow/TCP	Assigned to connections used for device monitoring, configuration and data collection or polling. PCCU, WinCCU, TDS and third-party SCADA systems request these connections.
65535	No	Device Loader/TCP	Assigned to the device loader connections for device software update. PCCU requests this type of connection.
9696	No	SSH/TCP	Assigned to secure shell (SSH/SFTP) connections. Third-party SSH/SFTP clients request these connections.
502	Yes	Modbus /TCP	Assigned to connections between the RMC and external Modbus devices for communication and data transfer

Table 6-4: Open TCP ports on the RMC

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IMPORTANT NOTE: For connections with user-configurable ports, use the default value or assign a different port number from the range of 1024 to 65534. Connections using non-default TCP ports are handled by additional Totalflow/TCP communication or Modbus TCP applications configured with different TCP ports. For example, the figure below shows an additional Totalflow/TCP application (named ControlGroup) with a different TCP port (10001).

Figure 6-1: Totalflow/TCP application instance with non-default TCP port

L PCCU32 - [Entry] L Operate View Window Help Image: Comparison of the second se	Belup		 		
Totalflow/TCP		Description	Value		
Totalflow/COM0:	0.4.5	Port Name	ControlGroup		
ControlGroup	4.0.6	Protocol	Totalflow/TCP		
Bluetooth	4.3.3 Port		10001		
. XMV Interface	4.1.10	Response Delay	40		
GC Client	1.0.8	Ask Timeout (seconds)	10		
⊕ 1/0 Interface	4.8.9999	G3 Translator Enable	Disable		
- Display	4.0.37	Authentication	Disable		
Holding Registers		A	A		
Ready		#Polls: 639 #	Errors: 0 Connected to 10.127.186.107 Login: user		

i

IMPORTANT NOTE: TCP port numbers from 0 to 1023 are universally reserved for well-known ports. Never use these port numbers.

6.3 Denial of Service (DOS) threshold rates

Protection of ports used for TCP/IP communication, such as Ethernet, is very important. Several cybersecurity threats can make a device unavailable for connection.

If the ABB Totalflow device has a Denial of Service (DOS) attack, the device cannot grant requests for connection. It stops responding. The following table provides the DOS threshold rates per packet type. The device stops responding at these thresholds.

Packet type	Description		
Ethernet	5 Mbps (7440 packets/sec)		
ARP	2 Mbps (2976 packets/sec)		
IP	3 Mbps (4464 packets/sec)		
ICMP	4 Mbps (5952 packets/sec)		
UDP	3 Mbps (4464 packets/sec)		
ТСР	1 Mbps (1488 packets/sec)		

Table 6-5: Denial of Service (DOS) threshold rates

6.4 Security guidelines

The following table contains recommended guidelines to secure access to the RMC. Find procedures for secure configuration throughout this manual, and in quick start guides and online PCCU help files.

Recommendation	Description
Secure physical access to the device	Control access to the device, its internal components, and connected peripherals.
Secure access with security switch	Turn the onboard security switch on to enforce authentication through bi-level security codes or RBAC. See section 6.5 .
Configure bi-level security codes	Change default security codes to private codes (the default security code for both level 1 and level 2 is 0000). See section 6.5 .
Enable Role-Based Access Control (RBAC)	Configure RBAC. See section <u>6.6</u> . Enable role-based access and enable authentication for each of the communication ports. Change the default RBAC passwords and security codes.
Secure network connection	The device only connects to a firewall-protected private network. Do not connect to the Internet.
Secure Bluetooth® access	Enable Bluetooth only when required. Enable RBAC authentication on the port. See section <u>6.6</u> .
Secure SSH/SFTP access	Enable the SSH/SFTP service only when required. Change the default SSH/SFTP private keys for all accounts. The SSH/SFTP private keys should always be passphrase-protected. See section <u>6.7</u> .

Table 6-6: RMC security guidelines

Recommendation	Description
Secure software updates	Enable the Totalflow Software Update service only when required. Use RBAC to limit the ability to enable/disable this service.
Manage credentials	Store all private credentials, keys, and security codes in safe locations. Share private credentials, keys, and security codes only with properly trained and authorized personnel. Change or update private credentials, keys, and security codes as needed.

6.5 Configure bi-level security with security switch

This procedure activates secured access to the RMC by changing the default (OFF) position of the security switch and configuring bi-level security codes.



IMPORTANT NOTE: After this procedure is completed, connection to the RMC is restricted to users with the correct security codes.

This procedure requires access to the RMC security switch. If the RMC is installed inside an enclosure, access to the interior of the enclosure is required.

To enable security:

- 1. Open the enclosure door (if the RMC is installed inside one).
- 2. Locate and lift the cover over TFIO A and TFIO B.
- 3. Locate the security switch between the TFIO A and TFIO B connectors. See the figure below.

Figure 6-2: RMC security switch



- 4. Verify that the security switch is OFF.
- 5. Display the Station Setup tab and verify that Security Switch Status is Off.

🖳 PCCU32 - [Entry]		
Operate View Window Help		_ @ ×
1 🔁 🔽 💽 🕅 🛃] 🌍 🏥 🛄 🔬 🥏	
Communications	Station Setup Application/License Management Battery Information Resource	s System Log Security Log Registry
Totalflow/USB	Description	Value 🔺
Totalflow/COM0:	0.9.0 Set Device with PCCU Date/Time	No
ian Flow Measurement In Setup	Security	
Analysis	0.0.6 Security Code Level 1	E
Digital Outputs	0.0.7 Security Code Level 2	
	0.7.3 Security Switch Status	Off
Speed of Sound	Configuration for Low Power Use	
	0.10.2 Remote Comm Cutoff Voltage	11.90
	0.10.3 Sleep Mode Entry Voltage	10.90
	0.8.8 Sleep Mode Hold-off Time (sec)	120
	0.9.11 Wake Up Time	02:00:00
	0.7.14 Wake Up Time Mode	Time from Start of Sleep
	Lithium Battery Status	
	0.7.10 Lithium Battery Status	ОК
	Reread Monitor Print Screen Save Send	Close Help XHelp 💓
Ready	#Polls: 24 #Errors: 0	Connected to 10.127.185.175 Login: use

Figure 6-3: Station Setup tab – Security switch status

- 6. Type a four-digit security code into Security Code Level 1 (Level 1 access grants read only access to the device).
- 7. Type a four-digit security code for Security Code Level 2 (Level 2 access grants read and write access to the device).



IMPORTANT NOTE: Record the security codes. They are not visible on the Station Setup tab after you save them.

8. Click Send.

9. On the RMC, set the security switch to **ON**.

10. On the Station Setup tab, click **Re-read**. Verify that the security switch status is On. Enforcement of the security codes is in effect.



IMPORTANT NOTE: PCCU32 requires the security codes the next time it attempts to connect to the device.

The security codes in PCCU32 version 7.57 or later or in WinCCU do not prevent MODBUS® access to the RMC.

6.6 Configure Role-Based Access Control (RBAC)

Role Based Access Control (Role Based Access Control, RBAC) is a feature within PCCU32 that allows an administrator to designate roles and control access levels to various applications and processes in the flow computer. The G5 and newer flow computers and NGC devices support RBAC security files. Each security file is configurable for the specific device type.

When designing an RBAC security system, consider all required user-access to the system. Create the users and an administrator and assign a default role to each.

RBAC security configuration restricts or disables any unapproved applications and functions for the current user. Restricted applications and restricted functions are not visible on the PCCU32 navigation tree. The Send button is also grayed out on applications with read-only functionality.

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NOTICE – Security override: After RBAC is implemented it overrides the device-enforced bi-level security and PCCU32-enforced security. When RBAC is enforced, it replaces all other security and specifically implements on a port-by-port basis.

6.6.1 Default access roles

Default roles are automatically available in PCCU32:

- Administrator
- Expert
- Advanced
- Basic
- File Admin

The Administrator role has the highest-level access rights to all functions. Administrators add users, define roles, and save security configuration files to a PC. Expert, Advanced, and Basic roles have decreasing levels of access rights. The File Admin role has the access rights of the Basic role plus minimum rights required for sending and reading RBAC security files to and from G5 and newer devices. The security files can upload to multiple flow computers for implementation.

6.6.2 Set up and create a new RBAC security control file

To set up a new RBAC security system:

- Create a security control file.
- Create an administrator account.
- Create individual user accounts and assign default roles.
- Create customized roles if necessary.
- Configure communication ports.
- Save the security file.
 - 1. Launch PCCU32 and click **Operate** > **Security** > **Role Based Access Control** > **Role Administration** on the top menu bar.

Figure 6-4: Configure Role Administration



Figure	6-5:	Security	Editor	screen
--------	------	----------	--------	--------

Security Editor - C:\PCC	CU7.54\RBAC\tfsrf.rba					×
Description		Securit	/ Key <mark>n/a</mark> .	will be ge	enerated on save	
Users		Role D	efinition			
Add User	Change Password	Role	Administrat	or 🔻 .	Device G4/G5/R	MC 🔻
User	Role		Functio	on	Access	*
		Adn	inistrator		Yes	
		Entr	y View		Expert	Ε
		Colle	ection		Yes	
		Cali	oration		Yes	
		File	Utilities		Yes	
		Ren	ote Protocol		Yes	
		Mon	itor		Yes	
		Sav	e and Resto	re	Read/Write	
		Con	munication F	Ports	Read/Write	
Delete Lleer	Dearma Liear	Flov	/ Measurem	ent	Read/Write	
Delete User	Rename user	1			D	*
Port Configuration						
COM0 En	able by Security Switch 🔹]	USB1	Enable b	y Security Switch	•
COM1 Dis	sable 👻]	Bluetooth	Disable		•
COM2 Dis	sable 🔹	Ne	work Ports	Disable		•
Read	Send New	Open	Save As.		Close He	lp

- 2. Create the RBAC first:
 - a. Verify that Role displays Administrator.
 - b. Click **Add User**.
 - c. Type the user name into Name.
 - d. Type the password into Password.
 - e. Click OK.
- 3. Follow the procedures detailed in section <u>6.6.4</u> Create a new user account to create user accounts with standard roles. Then proceed to Step 4.
- 4. To define or customize a role, see section <u>6.6.4</u> Create a new user account. Return here when complete.
- 5. To assign RBAC security to a communication port, see section <u>6.6.5</u> Enable RBAC authentication on communication ports.
- 6. Type a description of the security file into Description.
- 7. Click **Save As** to save the new security control file.
- 8. Type a password for the security file and click **OK**. The Save Security File dialog displays.
- 9. Navigate to the appropriate folder, then rename the file as necessary. Click **Save**.



IMPORTANT NOTE: The Security Key displays at the top right corner of the Security Editor dialog. This key displays "n/a will be generated on save" before the security file is saved for the first time, or after changes. After saving, a new security key is assigned and logged into the Security Log. A copy of the security file is saved to the PC connected to the device. The previous key disappears after any modification, and a new one replaces it. The new key and the security control file are automatically logged and saved to the PC. The security control file saves to the PCCU > RBAC folder on the PC and has a default file name tfsrf.rba.

6.6.3 Edit the security file

To edit an existing security control file:

- 1. Display the Security Editor dialog.
- 2. Click **Open** to display the Open Security File navigation dialog.
- 3. Browse to **PCCU** > **RBAC** > [file name.rba]. Click **Open**.

- 4. Make the necessary changes.
- 5. Click **Save As**. The Security File Password dialog displays.
- 6. Type a password for the security file. Click **OK**.
- 7. Navigate to the appropriate folder, then rename the file as necessary. Click **Save**.

6.6.4 Create a new user account

To add a new user to the RBAC security system:

- 1. Display the Security Editor dialog and click Add User.
- 2. Type the user name into Name.

Figure 6-6: User Name and Password dialog box

ers Add Us	er Ch	ange Password	Role Definition Role Administrat	or 🔻 1	Device G4/G5/RM	IC
Use	r	Role	Functio	on	Access	
Admin	Admini	strator	Administrator	Yes	\$	
Ana	Advan	ced	Entry View	Exp	ert	
Jeanie	User Name a	nd Password			×	L
Jackson						
Jesse	Name:	Robert				
	Password:	*******				
					e	
		ОК	Cancel		e	
Delete I	loor	U.S.	Curreer		e	
Delete u	iser .	tendine obei	Louisen			
ort Configurati	on					
CON	0 Enable by Secu	rity Switch	LICE 1	Enable by Ser	urity Switch	•
CON		incy switch i	0301		concy owner	
COM	11 Disable	•	Bluetooth	Disable		•
CON	12 Disable	•	Network Ports	Disable		-

- 3. Type the user password into Current Password. Click **OK**. The new user account displays on the list of users.
- 4. Click **Role** beside the new user account and select the appropriate role from the drop-down list.



IMPORTANT NOTE: During the initial setup, no customized roles exist. Create at least one additional user account before creating a customized role. Then, assign the new role to a new or existing user account.

Figure 6-7: User role assignment

sers		Role Definition	
Add User	Change Password	Role Administrator 🔻	Device G4/G5/RMC
User	Role	Function	Access
Admin	Administrator	Administrator	Yes
Ana	Advanced	Entry View	Expert =
Jeanie	Expert	Collection	Yes
Jackson	Basic	Calibration	Yes
Jesse	File Admin	File Utilities	Yes
Robert	Basic 🗸	Remote Protocol	Yes
	Basic	Monitor	Yes
	Advanced	Save and Restore	Read/Write
	File Admin	Communication Ports	Read/Write
	Administrator	Flow Measurement	Read/Write
Delete User	Rename User	C	Teeday.a.
ort Configuration			
COM0 Enal	ble by Security Switch 👻	USB1 Enab	le by Security Switch 🔹
COM1 Disable		Bluetooth Disab	ole 🔻
COM2 Disable		Network Ports Digat	vle 🔹

- 5. Repeat steps 1 through 4 for each user account.
- 6. Click **Save As**. to save and name the new security control file.
- 7. Type a password for the security control file in the Current Password field and click **OK**.

6.6.5 Enable RBAC authentication on communication ports

Enabling RBAC authentication on communication ports secures access to the device. Connection to the ports requires authentication with correct credentials. Select one of the methods described in this section. Review the authentication options in Table 6-7.

Table 6-7: Per-port RBAC authentication options

Port security setting	Functionality
Disable	Do not perform any RBAC security functions on the port.
Enable	Enable full security over the port to RBAC. Keep records of access credentials and safeguard them. If the administrator name or password are lost, you must reset the device with the factory default configuration to access it. If you restore the factory defaults it deletes all data and the running configuration. See section <u>8.5.8</u> for additional details.
Enable by Security Switch	Enable security over the port to RBAC but allow the electronic board security switch to override RBAC security. If the administrator name or password are lost or forgotten, use the security switch to disable the RBAC. If the switch is OFF, log in and reconfigure the security access. No data is lost. See section <u>6.6.5.2</u> .

6.6.5.1 Enable authentication from the RBCA security editor

1. Select the preferred authentication option for each port (Figure 6-8).

Figure 6-8: Enable port authentication from RBAC security editor

Port Configuration			
COM0	Enable by Security Switch 👻	USB1	Enable by Security Switch
COM1	Disable 💌	Bluetooth	Enable by Security Switch 🔹
COM2	Disable 👻	Network Ports	Enable 🔹

- 2. Click **Save As** to save changes to the security control file.
- 3. Type the password for the security control file into Current Password and click **OK**.

6.6.5.2 Enable authentication from the Entry mode

Enable one port at a time to enable RBCA authentication.

To use entry mode in Advanced or Expert view to configure or override communication port security:

1. Launch PCCU and click Entry. The navigation tree displays.



- 2. Click the communication port on the navigation tree.
- 3. Select **Enabled** or **Enable by Security Switch** from the Authentication drop-down list. (Figure <u>6-9</u>).
- 4. Click Send.
- 5. Repeat steps 1 through 4 for each of the communication ports.

Figure 6-9: Enable communication port authentication - Entry mode

📴 PCCU32 - [Entry]						
Operate View Window Help						
1 📅 🛅 💽 🚳 📖 🦚 🛄 🦑						
E-TOTALFLOW						
Advanced						
Totalflow/TCP						
Totalflow/USB		Description	Value			
Totalflo - /COM0:	0.4.3	Port Name	Totalflow/USB			
TF Remote - COM1:	2.0.6	Protocol	Totalflow Remote			
	2.3.3	Port	USB1:			
Setup	2.0.2	Baud Rate	9600			
Analysis	2.0.37	Authentication	Disable 🗸			
Digital Outputs		-	Enable			
KS and No Flow			Disable			
Adv Setup			Enable by Security Switch			
ia Display						
Ready #Polls: 56 #Errors: 0 Connected to TOTALFLOW Login: user						

6.6.6 Use default RBAC credentials

A login screen requests the user name and Password whenever PCCU connects to a flow computer through an RBAC-enabled port.
Figure 6-10: Login dialog box

please enter a user name and pas	sword to continue.
Jser name	ОК
Password	Cancel
Save as default user for Bole F	Based Access Control

Set the user name and password as default credentials in PCCU, if necessary. The User Name and Password fields autofill with the default credentials on subsequent logins.

To create, change or disable the RBAC credentials in PCCU:

- 1. Click **Setup** on the toolbar or click **Operate** > **Setup** > **System Setup**.
- 2. Set the defaults in the Auto Connect section (<u>Figure 6-11</u>):
 - a. Select Entry, **Collect**, or **Initial Connect**. Click **Help** for additional details.
 - b. Select Use Default Role Based Access Control credentials.
 - c. Type the user name into Default Role Based Access Control Username.
 - d. Type the password into Default Role Based Access Control Password.

Figure 6-11: System Setup Auto Connect and RBAC credentials

tup Directory Pat	hs Misc Ma	cro Setup		
© Serial port Connection para PCCU Com. Por Initial Baud: Max Baud: Stop Bits: Timeout (ms): Retry Limit:	PCC TCP/IP ameters :: COM5: 2400 9600 2 3000 10	U Connect Method: Active Sync (N	IGC) Bluetooth Level 1-2 Security Code:	Toolbar Buttons
Auto Connect None Use default I Default Role Default Role	Entry Role Based Acces Based Access (Based Access (Collect ess Control credentials Control Usemame Tech Control Password	Initial Connect	Translate C dare

3. Click **Close** to exit PCCU connection setup.

6.7 Secure the SSH/SFTP service

RMC devices implement the Secure Shell (Secure Shell, SSH) and Secure File Transfer Protocol (Secure File Transfer Protocol, SFTP) service. This provides secure shell login access and file transfer capability from a client PC or laptop.

SSH and SFTP provides secure access, instead of the unsecured access of Telnet and FTP in earlier device generations.

SSH/SFTP communication is client-server based. The SSH/SFTP server is implemented in the Totalflow device. The SSH/SFTP client is implemented in third-party software on the computer that communicates with the device.

When the SSH/SFTP service is enabled, the SSH/SFTP server initializes and enters listening mode. When the server is in listening mode, it can process requests for connection from SSH/SFTP clients. The service grants connections only to properly authenticated clients.

6.7.1 Supported SSH/SFTP accounts

The table below lists the three SSH/SFTP accounts. Customers can access the Totalflow-user account, which is read-only. The developer and tech-support accounts are only available to ABB personnel for service and troubleshooting, or to advanced users and cybersecurity managers who want to generate private keys to replace factory default keys.



IMPORTANT NOTE: Call ABB Customer Support on the last page of this manual to request Totalflow-user account default private keys. See the SSH and SFTP service overview topic in PCCU online help for instructions to establish read-only SFTP connections.

Account Name	Access privileges	Default keys	Access
Totalflow- user	Only SFTP access	Totalflow-user private key	The following folders and their contents are available for download:
	(Read-only)		 Crash Dumps
			 Flash: Main Totalflow application (App), Factory configuration, Startup (cold) configuration
			 Logs: System and device loader log files
			 tfData: Running (warm) configuration files
Developer	Full SSH/SFTP access (Read-write)	Developer private key	All file system
Tech support	Full SSH/SFTP access (Read-write)	Tech support private key	All file system

Table 6-8: Security keys

6.7.2 SSH/SFTP authentication

Session keys encrypt the communication between the client and the SSH/SFTP server to provide security. Authentication requires specific private-public key pairs for the type of access. ABB provides default private keys and passphrases to customers upon request. ABB stores the default public keys at the factory in a protected storage location on the device's flash. They remain unchanged by updates of any of the device software components.

To request a connection to the SSH/SFTP service, provide the private key and passphrase. The service compares the private key with the public key stored in the Totalflow device. If the keys pair correctly, the connection is successful.



IMPORTANT NOTE: Private keys do not ship with the product or user interface software. ABB keeps the keys and credentials safely stored. Request keys for SSH/SFTP access. Enable the service only if necessary.

6.7.3 Update default SSH/SFTP keys

ABB Totalflow generates default keys, but customers must generate their own private keys for security reasons. To update the private key, first update the corresponding public key stored on the RMC device. This procedure describes how to regenerate a private key and update its corresponding public key on the device.



IMPORTANT NOTE: Only permit an authorized expert user to perform this procedure. This procedure requires developer or tech-support access. Failure to follow the procedure in its entirety locks access to the SSH/SFTP service. To obtain default keys for this type of access, call ABB Customer Support at the number on the last page of this manual.

6.7.3.1 Update requirements

The key update requires third-party software.

Obtain the following before update:

- Third-party software, such as PuTTYgen, to generate new keys. Download PuTTYgen as part of a
 putty package or as a standalone utility.
- Third-party SFTP client software to establish SFTP connections with the device (FileZilla).
- Latest PCCU from ABB. Download PCCU from www.abb.com/upstream.
- The private keys for developer or tech support accounts, and their respective passphrases for SFTP. To change the keys for the first time, request the default keys from ABB. Otherwise, use previously updated keys.



IMPORTANT NOTE: There are other options for the third-party software. PuTTYgen and FileZilla are examples. The update procedure is similar with other software

6.7.3.2 Generate private-public key pair

This procedure generates and saves a new private-public key pair. The private key, passphrase and public key are stored safely on the user's laptop or PC. The public key must also be saved in the RMC device. The new private key and its passphrase are necessary to access accounts after update of a device's corresponding public key.

To generate new keys:

- 1. Download and install the latest version of PuTTYgen from the link in section <u>6.7.3.1</u>, Update requirements.
- Launch the PuTTYgen application. In the PuTTYgen Key Generator window, verify that the "Type of key to generate" is set to SSH-2 RSA, and "Number of bits in a generated key" is set to 2048. Click Generate.

😴 PuTTY Key Generator	X
File Key Conversions Help	
Key	
No key.	
0-11	
Actions	
Generate a public/private key pair	Generate
Load an existing private key file	Load
Save the generated key	Save public key Save private key
Parameters	
Type of key to generate: SSH-1 (RSA)	SSH-2 DSA
Number of bits in a generated key:	2048

Figure 6-12: PuTTYgen Key Generator

3. Move the mouse to the Key blank field, per the image below. Hold the mouse over that field to prevent delays in key generation.

Key Conversions	Help		
(ey			
Please generate some ra	indomness by moving the	e mouse over the blan	k area.
-			
Actions			
Actions Generate a public/private	key pair		Generate
Actions Generate a public/private Load an existing private k	key pair ey file		Generate
Actions Generate a public/private Load an existing private k Save the generated key	key pair xey file	Save public key	Generate Load Save private key
Actions Generate a public/private Load an existing private k Save the generated key Parameters	key pair ey file	Save public key	Generate Load Save private key
Actions Generate a public/private Load an existing private k Save the generated key Parameters Type of key to generate:	key pair tey file	Save public key	Generate Load Save private key

Figure 6-13: PuTTYgen Key Generator Key blank field

4. Allow the program to generate the new key. The progress bar reaches 100%. The Key field displays the new public key.

Figure 6-14: New public key

PuTTY Key Generator				
File Key Conversions Help				
Key Public key for pasting into OpenSSH authorized_keys file:				
ssh-rsa AAAAB3NzaC1yc2EAAAABJQAAAQEAjEP3LHC1eFzj0Xcsy5NeOb3lyE0Qduf3kDf4pV WEUaHrZyJy4E3nwTkQ/TLWJfYodMfn5bPTHZ/EMx0GfJUwTJ +uChtugbRsT8M5VCucyEmn6FK7xi5Rjyu72wBid7dU/1JUGoETU +s9KrUFI1igkuXIKjgRSpaG7XzKaG/8nXJH46L+A				
Key fingerprint:	ssh-rsa 2048 2b:64:a0:0	db:cd:da:0d:11:0a:ce:9)7:ae:b2:a9:09:5f	
Key comment:	rsa-key-20190627			
Key passphrase:				
Confirm passphrase:				
Actions				
Generate a public/priva	ite key pair		Generate	
Load an existing private	e key file		Load	
Save the generated ke	у (Save public key	Save private key	
Parameters				
Type of key to generate SSH-1 (RSA)	e:	© SSH	-2 DSA	
Number of bits in a gen	erated key:		2048	

- Accept the key description in Key comment or type a new one into the field.
 Create a strong private passphrase and type it into Key passphrase and Confirm passphrase.

Figure 6-15: Nev	v private key	comment and	passphrase
------------------	---------------	-------------	------------

😴 PuTTY Key Generato	pr	×			
File Key Conversion	ns Help				
Key					
Public key for pasting i	Public key for pasting into OpenSSH authorized_keys file:				
ssh-rsa AAAAB3NzaC1yc2EAAAABJQAAAQEAjEP3LHC1eFzj0Xcsy5NeOb3lyE0Qduf3kDf4pV WEUaHrZyJy4E3nwTkQ/TLWJfYodMfn5bPTHZ/EMx0GfJUwTJ +uChtugbRsT8M5VCucyEmn6FK7xi5Rjyu72wBid7dU/1JUGoETU +s9KrUFI1igkuXlKjgRSpaG7XzKaG/8nXJH46L+A					
Key fingerprint:	ssh-rsa 2048 2b:64:a0:db:cd:da:0	d:11:0a:ce:97:ae:b2:a9:09:5f			
Key comment:	rsa-key-20190627				
Key passphrase:	•••••				
Confirm passphrase:	•••••				
Actions					
Generate a public/priv	ate key pair	Generate			
Load an existing privat	e key file	Load			
Save the generated key Save public key Save private key					
Parameters					
Type of key to generat SSH-1 (RSA)	e:	💿 SSH-2 DSA			
Number of bits in a ger	nerated key:	2048			

7. Click **Save private key** (Figure 6-16).



IMPORTANT NOTE: The PuTTY Key Generator generates the private key but does not display it on the screen.

Figure 6-16: Save private key and passphrase

2	PuTTY Key Generato	r		×
Fi	le Key Conversior	is Help		
	Кеу			
	Public key for pasting in	to OpenSSH authorized	d_keys file:	
	ssh-rsa AAAAB3NzaC1yc2EA WEUaHrZyJy4E3nwTi +uChtugbRsT8M5VCu +s9KrUF11igkuXIKjgRS	AAABJQAAAQEAjEP3L <q tlwjfyodmfn5bp1<br="">cyEmn6FK7xi5Rjyu72w jpaG7XzKaG/8nXJH46</q>	HC1eFzj0Xcsy5NeOb3 HZ/EMx0GfJUwTJ Bid7dU/1JUGoETU L+A	lyE0Qduf3kDf4pV
	Key fingerprint:	ssh-rsa 2048 2b:64:a0	db:cd:da:0d:11:0a:ce:	97:ae:b2:a9:09:5f
	Key comment:	rsa-key-20190627		
	Key passphrase:	•••••		
	Confirm passphrase:	•••••		
	Actions			
	Generate a public/priva	ate key pair		Generate
	Load an existing private	e key file		Load
	Save the generated ke	y	Save public key	Save private key
	Parameters			
	Type of key to generate SSH-1 (RSA)	e:	⊚ SSH	I-2 DSA
	Number of bits in a gen	erated key:		2048

Navigate to the correct folder and type the file name into File name. The private key file has a 8. .ppk extension. Use this new private key and its passphrase to access the accounts after an update to the public key.

Figure 6-17: Select location to save private key file

↓ Libraries ►	Documents 🕨	-	🕶 🍫 Search Docu	ments	
Organize New folder			Ē	-	8
Downloads A Recent Places	Documents library Includes: 2 locations		Arrange by:	Folder 🔻	
RandD	Name	Date modified	Туре	Size	
ConeDrive - ABB	👢 Visual Studio 2015	1/2/2019 1:23 PM	File folder		
b SharePoint	📕 Visual Studio 2013	10/25/2018 3:21 PM	File folder		
🛆 ABB	🐌 Visual Studio 2010	2/21/2017 2:05 PM	File folder		
	🐌 Visual Studio 2005	3/27/2015 8:05 AM	File folder		
E Desktop	🐌 Virtual Machines	4/23/2014 11:30 A	File folder		
📜 Libraries	🐌 USB-IF Test Suite	6/14/2017 10:07 A	File folder		
Documents	👢 Umlet	4/7/2017 8:54 AM	File folder		
📗 My Documents 👻 🖌		III			۴
File name:					
Save as type: PuTTY P	Private Key Files (*.ppk)				
Hido Foldors			Save	Cancel	_

- Click Save. The file browser closes.
 Right-click the text in Public key for pasting into OpenSSH authorized key file. Click Copy (Figure 6-18).

Figure 6-18: Copy public key from the Key field

PuTTY Key Generator					
File Key Conversions Help					
Key					
Public key for pasting in	Public key for pasting into OpenSSH authorized_keys file:				
ssh-rsa AAAAB3NzaC1yc2EA JW/UWjAMgr0HbfwB	ssh-rsa AAAAB3NzaC1yc2EAAAABJQAAAQB7/ZEUDpw/YSaphK/r0qBtaS3zePD6Vn2CNEK				
duZJ/m4NOWi1aGrW yc6TWsPAOjBfw7NN	/0f82QW4+S/0F +Jyzt	Undo			
Key fingerprint:	ssh-rsa 2047 4a	Cut			
Key comment:	rsa-key-201906	Сору			
Key passphrase:	•••••	Paste			
Confirm passphrase:	•••••	Delete			
Actions		Select All			
Generate a public/priva	ate key pair	Right to left Reading order			
Load an existing private	e key file	Show Unicode control char	racters		
Save the generated ke	Since the accounted law Insert Unicode control character				
Parameters	Parameters				
Type of key to generat RSA	Type of key to generate:				
Number of bits in a gen	erated key:	2	048		



IMPORTANT NOTE: If the public key text is not highlighted, right-click the text and click **Select All** (<u>Figure 6-19</u>). Then click **Copy** to copy the key.

Figure 6-19: Select generated public key text

PuTTY Key Generator					
File Key Conversions Help					
Key					
Public key for pasting into OpenSSI	Public key for pasting into OpenSSH authorized_keys file:				
ssh-rsa AAAAB3NzaC1vc2EAAAAB.IQAAA	DB7/7EUDpw/YSaphK/r0gBtaS3zePD6Vp2CNEK				
JW/UWjAMgr0HbfwBRByTzs2DV duZJ/m4NOWi1aGrW0f82QW4+S	Undo				
ycoliwsrAOjbiw/Inin+Jyzi	Cut				
Key fingerprint: ssh-rsa 204	Сору				
Key comment: rsa-key-201	Paste				
Key passphrase:	Delete				
Confirm passphrase:	Select All				
Actions	Right to left Reading order				
Generate a public/private key pair	Show Unicode control characters				
Load an existing private key file	Insert Unicode control character				
Save the generated key Save public key Save private key					
Parameters					
Type of key to generate: RSA DSA	Type of key to generate: ● RSA				
Number of bits in a generated key:	2048				

IMPORTANT NOTE: Do not click Save public key on the PuTTY Key Generator dialog (Figure 6-20).

i

PuTTY Key Generato	r	? ×		
File Key Conversion	s Help			
Key				
Public key for pasting in	to OpenSSH authorized_keys file:			
ssh-rsa				
JW/UWjAMgr0HbfwBl	RByTzs2DV3JVvO9r7cOatXHC0I0zaCNmibkV1sil	k3BdvdX8vmx		
duZJ/m4NOWi1aGrW yc6TWsPAOjBfw7NN-	0f82QW4+S/0RZahBx1P3PHt1llzdGpv6UU7pMS ͱJyzt	7cR750tpyHc		
Key fingerprint:	ssh-rsa 2047 4a:42:4c:c4:24:e3:cc:55:f6:d6:b6:ef:56:2a:02:07			
Key comment:	rsa-key-20190628			
Key passphrase:	•••••			
Confirm passphrase:	•••••			
Actions				
Generate a public/priva	ate key pair	Generate		
Load an existing private	e key file	Load		
Save the generated ke	Save public Key	ave private key		
Parameters				
Type of key to generate RSA OD	e: ISA 💿 ECDSA 💿 ED25519	SSH-1 (RSA)		
Number of bits in a gen	erated key:	2048		

Figure 6-20: Do not save public key from the PuTTY Generator dialog

- 11. Create a new text file on your laptop or PC and paste the copied public key contents into this file.
- 12. Save the text file. Use one of following file names based on the account type:
 - userkey.txt: A key with this name appends to the available Totalflow-user public keys in the device. The Totalflow user account is accessible after the key update operation, either with the newly created private key or the previous set of private keys for the Totalflowuser account.
 - rootkey.txt: A key with this name appends to the available developer and tech-support
 public keys in the device. The developer and tech support accounts are accessible after the
 key update operation with either the newly created private key or the previous set of
 private keys for developer and tech-support accounts.

The key generation is complete. A key file with the .ppk extension stores the new private key. A corresponding public key text file has one of the two names, above.



IMPORTANT NOTE: Follow steps 1 through 12 for each key to generate new user and root keys.

6.7.3.3 Update public keys on device

This procedure saves the new public key on the RMC device. The new key appends to an existing key. This procedure requires a TCP/IP-based connection with the device. Verify that the device has a valid IP configuration. The valid IP configuration depends on the type of connection. You can use an Ethernet network or point-to-point connection for this procedure.

To save the public key:

 Download and install the latest version of FileZilla from the link provided in section <u>6.7.3.1</u>, Update requirements.

- 2. Connect to the device's MMI or USB port.
- 3. Launch PCCU and click **Entry** on the toolbar. The navigation tree displays.
- 4. Click **Communications**. Then click **Network**.
- 5. Select **SSH/SFTP service**.

Figure 6-21: Enable the SSH/SFTP service

陆 PCCU32 - [Entry]	
Operate View Window Help	
📶 🛅 🔂 💽 🙀 🚳 🔤	Archine IIII Setup 🤣
Communications Totalflow/TCP Totalflow/CDW Totalflow/USB Totalflow/COM0: Flow Measurement Setup Analysis Digital Outputs RS and No Flow Adv Setup Speed of Sound Readyr	Cation Setup Network Ethernet Device Name Network ID RUC-100 **Used as Ethernet Host Name, Bluetooth Name and Wi-Fi SSID Services SSH/SFTP Service (Port: 9696) SSH/SFTP Service (Port: 9696) Image: Port Port Port Port Port Port Port Port
incody	

- 6. Click Send.
- Click **Ethernet** to display the Ethernet tab and enable, verify, or configure IP parameters. Use a valid IP configuration to access the device over a network. Configure the device to use a local point-to-point to connection, as necessary. Click **Help** for additional details or see section <u>4.5</u>.
- 8. Click **Send** to save any changes.
- 9. Connect the RMC device to the network or to the laptop or PC (if the Ethernet connection is local). Keep the serial or USB connection open.
- 10. Launch the FileZilla application.
- 11. Click **Open the Site Manager**. The Site Manager dialog displays (Figure 6-22).
- 12. Configure the General tab parameters:
 - Host: Type the device's IP address.
 - Port: Type **9696**.
 - Protocol: Select SFTP- SSH File Transfer Protocol from the drop-down list.
 - Logon Type: Select **Key file** from the drop-down list.
 - User: Type root.
- 13. Click **Browse** to select the current private key. If this is the first time the keys are changed, use ABB's default developer or technical support private key.
- 14. Click **Connect**. If the private key is passphrase-protected, a window displays and requests the passphrase before granting the connection (Figure 6-23).

Site Manager	8
Select Entry:	General Advanced Transfer Settings Charset
My Sites	Host: 10.127.186.76 Port: 9696 Protocol: SFTP - SSH File Transfer Protocol Image: Comparison of the second se
	Logon Type: Key file
	Key file: C:\Users\usprbat\Desktop\ssh ti Browse
	Background color: None Comments:
New Site New Folder	A
New Bookmark Rename	
Delete Duplicate	
	Connect OK Cancel

Figure 6-22: FileZilla Site Manager connection setup

- 15. Type the passphrase into Password. (Figure 6-23). Use the passphrase provided by ABB or update the key and create your own passphrase.
- 16. Click **OK**. The laptop issues a warning the first time it tries to connect to the device (Figure 6 23).

Figure 6-23: Type private key passphrase (password)

Enter password	×
Please enter a password for this server:	
Host: 10.127.186.76:9696	
User: root	
Challenge:	
Passphrase for key "imported-openssh- key" in key file "C:\Users\usprbat\Desktop \ssh test\rootusr.ppk"	*
	Ŧ
Password:	
Remember password until FileZilla is close	ed
OK Cancel	

Figure 6-24: Unknown host key warning

Unknow	n host key	
1	The server's host k the computer you	ey is unknown. You have no guarantee that the server is think it is.
	Details	
	Host:	10.127.186.76:9696
	Hostkey algorith	im: ssh-ed25519 256
	Fingerprints:	SHA256: c3+Ar0XsjFUA++OVIZ38a4IUbvG2kRwCZ6E8hg/QkRQ= MD5: a1:8c:fb:16:a5:40:7b:cf:67:45:c1:54:c4:d5:7c:69
	Trust this host and	l carry on connecting?
	🔲 Always trust thi	s host, add this key to the cache
		OK Cancel

Click **OK**. The connection with the device is successful when FileZilla displays the file directories of the laptop or PC (Local Site, on the left) and the device (Remote site, on the right) (Figure <u>6-25</u>).

Figure 6-25: FileZilla New Site window

🔁 New site - s	ftp://root@10.127.186.76:9696 - File	Zilla			l	
File Edit Vie	ew Transfer Server Bookmarks	Help New version avail	ablel			
111 -		1/ = 🔍 🤗 🧥				
Host:	Username:	Password:	Port:	Quickconnect -		
Status: Status: Status:	Retrieving directory listing Listing directory /root Directory listing of "/root" suc	cessful				* 11
Local site: C:\	Users\usprbat\		✓ Remote site:	/root		
	usprbat	4	← <mark> · ·]</mark> roo	ot		
Filename	^		 Filename 	~		Filesiz
 Documents Downloads Favorites go Links 			 	ry ory out		21 17
Local Settin Logs Mbox MJ_workspa Music My Docume	ace ents		bash_prof	file		16
15 61	III		4		2	•
15 files and 52	directories. Total size: 26,035,703 b	/tes	4 files and 1 c	directory. Total size: 550 byte:	s	
Server/Local fi	le Direction R	emote file		Size Priority	Status	
Queued files	Failed transfers Successful	transfers (3)			• •	The second se
					nd 🕐 Queue: emp	ty ••

- 18. Navigate to the directory containing the newly created public key text file (on the left) and open it.
- 19. Navigate to the /Flash/AppData/.ssh/ directory on the Totalflow device (on the right) and open it. The device updates the keys only if it finds them in them in the specified directory.

🔁 New site - sft	p://root@10.127.186.76:9696 -	FileZilla			
File Edit View	v Transfer Server Bookmar	ks Help New version avail	lable		
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Figure 6-26: Open the /Flash/AppData/.ssh/ directory

20. Right-click on the new public key file in the Filename window and select Upload from the dropdown list.

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Figure 6-27: Upload public key from laptop to device

21. Verify that the file copied to the /Flash/AppData/.ssh/ directory. The name of the file displays under that directory when the upload is complete.

Figure 6-28:	Verify	public ke	y upload	is complete
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Filename	<u>^</u>	Filesize	Filetype	Filename	Filesize	Filetype	Last modified	Permis
userkey.txt		397	Text Document	update.sh	511 397	Shell Script Text Docu.	1/23/2019 2:43: . 6/27/2019 11:1	rwxrw -rw
•				•				4
Selected 1 file. To	otal size: 397 bytes			Selected 1 file. To	otal size: 511	bytes		
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- Restart the device to activate the public key update (<u>Figure 6-29</u>).
 Launch PCCU and click **Entry** to display the Entry Mode screen. The navigation tree displays.
 Click **View>Expert**. Then click **Yes** to close the warning dialog that displays.
- 25. Click the Station ID at the top of the navigation tree. The Station Setup tab displays.
- 26. Scroll down and click the **System Shutdown/then Reset** Value field. Select **Yes** from the drop-down list.
- 27. Click **Send**. The device restarts and the FileZilla STFP connection closes.

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Setup		
Analysis	Backup	
- Digital Outputs	0.21.0 Update Cold Start Configuration	No Operation
- Adv Setup		
	System Startup/Shutdown	
	0.9.5 Last System Boot Date/Time	04/25/16 13:10:14
	0.7.4 System Shutdown	No
	0.7.5 System Shutdown / then Reset	Yes 🗸
	Warm Start Status	
	0.9.21 Start Log Time	04/25/16 13:10:17
	0.9.20 Zero Warm Start Counters	No
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Figure 6-29: Restart Totalflow device after public key update

With the key upload complete, a new private-public key pair is available for authentication. Test the authentication with these new keys next.

6.7.3.4 Verify authentication with new private-public key pair

Verify that the public key update successfully established a new FileZilla SFTP connection with the new key and passphrase.

To verify:

- 1. Restart FileZilla.
- 2. Click **Open the Site Manager**. The Site Manager window displays.
- 3. Configure the General tab:
 - Host: Type the device's IP address.
 - Port: Type **9696**.
 - Protocol: Select SFTP- SSH File Transfer Protocol from the drop-down list.
 - Logon Type: Select **Key file** from the drop-down list.
 - User: Type the user required per account type (For the Totalflow user account, type **totalflow**. For the developer or tech-support accounts, type "**root**".)
- 4. Click **Browse** to locate and select the newly created private key.
- 5. Click **Connect**.
- 6. Type the private key passphrase into the passphrase prompt. FileZilla displays the device's file system directories.



IMPORTANT NOTE: Keep private key files stored in a safe location accessible only to authorized personnel and security managers.

7 Calibration

Calibrate the controller onboard analog inputs and outputs to support different types of external devices, measurement ranges, and engineering units.



WARNING – Bodily injury. Remove power from the RMC to disconnect and reconnect external devices and calibration equipment. Failure to remove power can cause bodily injury or equipment damage. Review warnings in Potential safety hazards. Plan the calibration procedures carefully if you must perform several calibrations. You might be required to remove and reapply power to the RMC several times.

7.1 Analog input calibration

The calibration for analog input (analog input, AI) can be a 3-point or 5-point calibration. Table 7-1 below lists the points for each type of calibration.

Table 7-1: AI calibration points

Type of calibration	Points
3-point	Low, 50%, and 100%
5-point	Low, 25%, 50%, 75% and 100%

Typical external devices include 4-20 mA or 1-5 V transmitters. Use the values in Table 7-2 for the signal (voltage or current) values for calibration points for these types of devices.

Table 7-2: Typical calibration point values

Available calibration points	Current (in mA) for 4-20 mA range	Voltage (in volts) for 1-5 V range
Low	4	1
25%	8	2
50%	12	3
75%	16	4
100%	20	5



IMPORTANT NOTE: To properly calibrate the AI, determine the measurement range and signal type of the external device.

7.1.1 Connect calibration equipment

A calibrator simulates the external device attached to the controller AI during analog input calibration. The calibrator applies the signal (voltage or current) values that would otherwise come from the external device.



NOTICE – Equipment damage. Verify that the voltage or current values from the calibrator do not exceed the acceptable analog input ranges. Verify that the signal is the same type as the AI configuration. Do not turn the calibrator on until the AI is configured for the correct input signal type.



NOTICE – Tainted results. The wire length from the external device to the AI affects the calibration. Use only wires with the correct length from the RMC to the external device to connect the calibrator. Or place the calibrator at the location where the external device is installed.

To prepare and connect the calibration equipment:

- 1. Power off the RMC.
- 2. Disconnect the wires from the external device.
- 3. Turn on the calibrator and set it to the same signal type (voltage or current) as the AI configuration.
- 4. Turn the calibrator off.
- Connect the calibrator to the external device's wire ends. Observe the polarity and connect to the correct wire: positive probe to the signal wire, and negative probe to the negative or ground wire.
- 6. Connect or apply power to the RMC when the calibrator is connected.

Figure 7-1 shows the setup of equipment to calibrate an AI with voltage or current.

Figure 7-1: AI calibration equipment connection



7.1.2 Analog input calibration (voltage mode)

To calibrate the analog input:



IMPORTANT NOTE: This procedure describes a three (3) point calibration. Available target values for this option display in the calibration window and become active in calibration order: Low Cal Point, 100% Cal Point, and 50% Cal Point. Adapt these instructions for a five (5) point calibration. With a 5-point calibration, five pressure points display in calibration order: Low Cal Point, 75% Cal Point, 50% Cal Point, and 25% Cal Point.

For illustrative purposes, the AI 1 is calibrated for an external device with a measurement range of 0 to 1500 PSI and an output signal range of 1 to 5 Vdc. Set the calibrator to voltage values within this signal range to simulate the external device. Apply voltage values of 1 Vdc, 3 Vdc, and 5 Vdc for the 3-point calibration as shown in Table 7-2.

- 1. Connect the PC or laptop with PCCU32 to the controller.
- 2. Launch PCCU32 and click the Entry icon on the toolbar.
- 3. Verify that the signal to the analog input is voltage:
 - a. Click I/O System on the navigation tree. The Analog Inputs tab displays (Figure 7-2).
 - b. Verify that the Signal field is set to 0-30 Volt for the AI calibration (see AI 1 in Figure 7-2).

Figure 7-2: AI 1 set to voltage mode

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Used - COM2	7.4.1	AI 2	0.020	0-30Volt	Factory	0.000	0.000	100.000
	7.4.2	AI 3	0.020	0-30Volt	Factory	0.000	0.000	100.000
<mark>I/O System</mark>	7.4.3	AI 4	0.020	0-30Volt	Factory	0.000	0.000	100.000
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- 4. Turn on the calibrator.
- Click the **Calibrate** icon on the PCCU toolbar. The calibration Checks screen displays with a request to take an application out of hold (<u>Figure 7-3</u>). This example shows the request for AGA3-2.



IMPORTANT NOTE: The calibration mode automatically places active measurement applications on hold. This is not required for I/O calibration. The calibration navigation tree in <u>Figure 7-3</u> shows four AGA3 applications. The checkmark indicates that they are all in Hold mode. Pop-ups display to remove applications from hold. Accept them all. These requests display one at a time until the last application is out of hold.

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Calibration Sp Dp Tf Texting fights Analog Dutput Sp Dp Tf Texting fights-2 out of HULD, Press Out oc nitinge.	
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Figure 7-3: Calibration request to take application out of hold mode

- 6. Click **OK** to take each application out of hold. The calibration dialog stops displaying after the last application is out of hold.
- Click the **Onboard I/O** folder on the navigation tree to expand it. Then click Analog Inputs. The Analog Input 1-tab displays (<u>Figure 7-4</u>).

Figure 7-4: Analog Input 1 default calibration values



- 8. Click another Analog Input tab, if necessary, to calibrate.
- 9. Select either **3 Point** or **5 Point** calibration from the Calibration drop-down list (Figure 7-5).
- 10. Verify that only the Zero Input and Low Cal Point buttons are enabled and highlighted. The system enables the buttons in the required order for the calibration.

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Figure 7-5: Analog Input 1 3-point calibration

11. Click **Range**. The Analog Input 1 Range dialog box displays (<u>Figure 7-6</u>). **Figure 7-6: Analog Input 1 Range entry**

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12. Type the external device measurement range into the entry field (1500 for this example) and click **OK** (Figure 7-7).

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Figure 7-7: User-defined Analog Input 1 range value

The values in the Target column of the table update to reflect the user-defined range (<u>Figure 7-8</u>). **Figure 7-8: 3-point calibration target values for user-defined range**

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- 13. Adjust the calibrator to apply the low value of the signal range. For example, if the signal range of the external device is 1 to 5 Vdc, apply 1 Vdc.
- 14. Click Low Cal Point. The Enter Low Calibration Value dialog box displays (Figure 7-9).
- 15. Wait for the Current Reading field value to stabilize. This value should match or be close to the signal value from the calibrator (~ 1 Vdc).



IMPORTANT NOTE: The Current Reading value is also displayed in the Current Value field. The term "current" used in these fields do not reflect values for electrical current. Before calibration is complete, these fields display voltage values. Current means real-time. Fields display values detected at the time the calibrator supplies the voltage to the AI.

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Figure 7-9: Low value current reading verification

16. Keep the default target low value of 0 (Figure 7-10) or type an appropriate value for your scenario. This example uses 0 for a 0-1500 PSI measurement range. A voltage value of 1 Vdc represents 0 PSI.

Figure 7-10: Default low calibration value for measurement range



17. Click **OK**. The Reading column updates to reflect the signal value associated with the low value of the range (<u>Figure 7-11</u>).

Figure 7-11: Low calibration value reading

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- 18. Adjust the calibrator to apply the high value (100%) of the signal range. For example, if the signal range of the external device is 1-5 Vdc, apply 5 Vdc. 19. Click **100% Cal Point.** The Enter 100% Calibration Value dialog box displays (Figure 7-12).
- 20. Observe the value in the Current Reading field. When it stabilizes this value should match or be close to the signal value from the calibrator (~ 5 Vdc).
- 21. Type the high range value in the field (1500 for this example) and click **OK**.

Figure 7-12: User-defined high value

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The Reading column updates to reflect the signal value associated with the high value of the range (Figure 7-13).

Figure 7-13: High calibration value reading

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- 22. Adjust the calibrator to apply the 50% value of the external device signal range. For example, if the signal range of the external device is 1-5 Vdc, apply 3 Vdc.
- Click **50% Cal Point**. The Enter 50% Calibration Value dialog box displays with the target midvalue automatically calculated. In <u>Figure 7-14</u>, the box displays 750.000. This is the mid-value of 1500.
- 24. Wait for the value in the Current Reading field to stabilize. This value should match or be close to the signal value from the calibrator (~ 3 Vdc).

Figure 7-14: User-defined mid calibration value

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25. Click **OK**. The Calibration Complete message displays (Figure 7-15).

Figure 7-15: Calibration complete message



 Click **OK**. Verify that the Entry and Reading values update, and that the Current Value field displays the calibrated value based on the defined range (<u>Figure 7-16</u>).

i

IMPORTANT NOTE: After calibration is complete the Current Value field displays range values, not voltage values.

Figure 7-16: Calibrated AI 1 example (voltage mode)



27. Remain in the calibration screen and keep the calibrator connected to the AI.

28. To verify the calibration, proceed to section $\underline{7.1.4}$, Verify analog input calibration.

7.1.3 Analog input calibration (current mode)

IMPORTANT NOTE: This procedure describes the calibration procedure for a 3-point calibration. Available target values for this option display in the calibration window and become active in calibration order: Low Cal Point, 100% Cal Point, and 50% Cal Point. Adapt these instructions for a five (5) point calibration. With a 5-point calibration, five pressure points display in order: Low Cal Point, 100% Cal Point, 75% Cal Point, 50% Cal Point, and 25% Cal Point.

As an example, the AI 2 is calibrated for an external device with a measurement range of 0 to 1500 PSI and an output signal range of 4 to 20 mA. Set the calibrator at current values within this signal range to simulate the external device. Use voltage values of 4 mA, 12 mA, and 20 mA for the 3-point calibration as shown in <u>Table 7-2</u>.

To calibrate the analog input with 3 points:

1

- 1. Connect the calibrator to the AI, per section <u>7.1.1</u>, Connect calibration equipment.
- 2. Connect the PC or laptop running PCCU32 to the controller.
- 3. Launch PCCU32 and click the Entry icon on the toolbar.
- 4. Change the signal type for the analog input:
 - a. Click I/O System on the navigation tree. The Analog Inputs tab displays (Figure 7-17).
 - b. Click the Signal field for the AI that is calibrating and select **4-20mA** from the drop-down list (see AI 2 in Figure 7-17). The default signal value for all AIs is 0-30Volt, which is voltage mode.

Figure 7-17: Change default AI 2 signal mode

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5. Click **Send**. AI 2 Signal updates to 4-20mA (Figure 7-18).

Figure 7-18: AI 2 set to current mode

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- 6. Turn on the calibrator.
- Click the Calibrate icon on the PCCU toolbar. The Analog Input 1-tab displays a request to take an application out of HOLD (<u>Figure 7-19</u>).



IMPORTANT NOTE: The calibration mode automatically places active measurement applications on hold. This is not required for I/O calibration. The calibration navigation tree in Figure 7-19 shows four AGA3 applications. The checkmark indicates that they are all in Hold mode. Pop-ups display to remove each application from hold. Accept them all. Requests display for each application, one at a time, until the last application is out of hold.



Figure 7-19: Calibration request to take application out of hold mode

- 8. Click **OK** for each of the applications on hold. The calibration dialog stops displaying after the last application is out of hold.
- 9. Click the **Analog Input 2** tab. The Analog Input tab screen displays with default values (<u>Figure</u> <u>7-20</u>).

Figure 7-20: AI 2 default calibration values

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- 10. Click **Calibration** and select **3 point** or **5 point** from the drop-down list (Figure 7-21).
- 11. Verify that only the Zero Input and Low-Cal Point buttons are enabled and highlighted. The system enables the buttons in the order required for the calibration.

Figure 7-21: Analog Input 2 tab with default values

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12. Click **Range**. The Analog Input 2 Range dialog displays (Figure 7-22).

Figure 7-22: Default Analog Input 2 Range

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TOTALFLOW AGA3-1 AGA3-2 AGA3-3 AGA3-3 AGA3-4 Onboard I/O Analog Inputs Analog Output XMV	Analog Input 2 Analog Input 3 Analog Input 4 7.4.1 Analog Input 2 Range Update Cal UK Cancel Reading Target UK Cancel Reading Target Cancel Reading Target Cancel Ca	
	Reasonability Checks Close Help	
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13. Type the external device measurement range into the entry field. In this example, 1500 (Figure $\frac{7-23}{2}$).





14. Click **OK**. The values in the Target column of the table update to reflect the new range (Figure 7-24).

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	M Reasonability Crecks						
			Updating Curre	nt Values			

Figure 7-24: Target values for user-defined range

15. Click **Low Cal Point**. The Enter Low Calibration Value dialog displays the default target low value of zero (0.000 PSI) (Figure 7-25). The Current Reading field displays a voltage value of approximately 0 which indicates that the calibrator has not applied any signal to the AI.

IMPORTANT NOTE: The Current Reading field value (Figure 7-25) does not reflect the value for the electrical current applied to the AI. The RMC displays the voltage value detected across the AI's internal resistance (or impedance). The internal resistance is approximately 250 Ω (See analog input specifications for current mode AIs in Table 2-10). For the required 3-point current calibration values of 4, 12 and 20 mA, the displayed voltage should be approximately 1, 3 and 5.0 Vdc respectively. To determine voltage values for different current inputs, multiply the current value by 250 (V=I*R).

The term "current" in the Current Reading and Current Value fields in the calibration screens, means real time. The value displayed is what the AI detects as soon as the external device supplies the signal. Voltage values display before calibration completes. After calibration, values from the user-defined range display.



Figure 7-25: Low calibration value entry



- 16. Adjust the calibrator to apply the low value of the signal range. For example, if the signal range of the external device is 4 to 20 mA, apply 4 mA.
- 17. Observe the value in the Current Reading field (Figure 7-26). The expected voltage value for a 4 mA input is approximately 1 Vdc (0.004 * 250 = 1 Vdc).
- 18. Accept the default low range value of 0.

Figure 7-26: Low calibration value reading

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Ready	Reasonability Checks #Polls: 411 #Errors: 0	Close Help Connected to 10.127.185.175 Login: user

19. Wait for the Current Reading to stabilize and click **OK**. The Reading column updates with the reading for the user-defined low range value (<u>Figure 7-27</u>).

Figure 7-27: Analog Input 2 low value reading

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- 20. Click 100% Cal Point. The Enter 100% Calibration Value box displays (Figure 7-28).
- 21. Type the range high value into the entry field. (1500.000 in this example).

Figure 7-28: High (100%) Calibration value entry field



- 22. Adjust the calibrator to apply the high value (100%) of the signal range. For example, if the signal range of the external device is 4 to 20 mA, apply 20 mA.
- 23. Observe the value in the Current Reading field (Figure 7-29). The expected voltage value for a 20 mA input is approximately 5 Vdc (0.02 * 250 = 5 Vdc).

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Reasonability Checks	Liose
Ready #Polls: 457 #Errors: 0	Connected to 10.127.185.175 Login: user

Figure 7-29: High (100%) calibration value reading

24. Wait for the Current Reading value to stabilize. Then click **OK**.25. Verify that the Reading value column updates for the high range value (<u>Figure 7-30</u>).

Figure 7-30: Analog Input 2 High (100%) range value reading

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	✓ Reasonability Checks					Close	Help
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- 26. Click **50% Cal Point**. The Enter 50% Calibration Value dialog displays with the target mid value automatically calculated. For example, 750.000 for the range value of 1500 (Figure <u>7-31</u>).
- 27. Adjust the calibrator to apply the mid-range value (50%) of the signal range. For example, if the signal range of the external device is 4 to 20 mA, apply 12 mA.
- 28. Observe the value in the Current Reading field (Figure 7-31). The displayed voltage value for 12 mA is approximately 3 Vdc When the value stabilizes, click **OK**.

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Figure 7-31: Mid (50%) calibration value

29. Click **OK** when the Calibration Complete message displays (Figure 7-32).

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Figure 7-32: Calibration complete

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30. Verify that the Entry, Reading, and Target values update, and the Current Value field displays the calibrated value based on the defined range (<u>Figure 7-33</u>). In this example the input signal from the calibrator is 12 mA. This value represents 750 PSI.

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Figure 7-33: Calibrated AI 2 example (current mode)

31. Remain on the Calibrate screen and keep the calibrator connected to the AI.

32. To verify the calibration, proceed to section <u>7.1.4</u>, Verify analog input calibration.

7.1.4 Verify analog input calibration

After calibration completes, the Current Value field displays the calibrated values based on the defined range. Continue to use the calibrator to apply different input signal values to the AI and verify that the value in the Current Value field reflects the expected calibration range values.

The instructions in this procedure apply to both current and voltage modes. The example in these instructions is current mode.



IMPORTANT NOTE: Perform this procedure immediately when calibration completes for each AI. Verify that the calibrator is set to the correct signal type.

To verify the analog input calibration:

- 1. Adjust the calibrator to apply the minimum (low) value of the signal range. Wait for the value in the Current Value field to stabilize (Figure 7-34).
- Verify that Current Value displays a value equal or close to the target range low (0%) value (Figure 7-34).

Figure 7-34: Low range value verification

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- Adjust the calibrator to apply the high (100%) value of the signal range.
 Wait for the value in Current Value to stabilize (Figure 7-35).
 Verify that Current Value displays a value equal or close to the target range high (100%) value (Figure 7-35).

Figure 7-35: High range value verification

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- 6. Adjust the calibrator to supply additional input values, if necessary.
- 7. Calibrate the next AI or click **Close** to exit the Calibration screen.
- 8. Proceed to section $\underline{7.1.5}$ and repeat calibration if there are errors.
- 9. Remove power from the controller, remove the calibrator, and reconnect the external device when calibration successfully completes for all AIs.

7.1.5 Repeat calibration in case of errors

The calibration might not be correct if the displayed values are invalid or do not stabilize. Perform this procedure before recalibrating.

To set the AI back to default factory values:

- 1. Click **Close** to exit calibration.
- 2. Click the Entry icon on the PCCU toolbar.
- 3. Click I/O System on the navigation tree. The Analog Inputs tab identifies the user-calibrated inputs (see AI 1 and AI 2 with calibration status set at Field (Figure 7-36).

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Used - COM2	7.4.1	ALZ	-311.050	4-2011A	Field	0.000	0.000	10
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⊡ I/O System	7.4.3	AI 4	0.020	0-30Volt	Factory	0.000	0.000	10
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Figure 7-36: Analog inputs 1 and 2 after calibration

4. Select **Factory** from the Calibration drop-down list for the appropriate AI (Figure 7-37). Figure 7-37: Reset AI calibration back to factory defaults

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TF Remote - COM1	7.	.4.1	AI 2	-377.058	4-20mA	Field	0.000	0.000	1500.000
MV Interface	7.	.4.2	AI 3	0.020	0-30Volt	Bias	0.000	0.000	100.000
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- Click Send.
 Repeat the calibration procedure in section <u>7.1.2</u>, Analog input calibration (voltage mode), or section <u>7.1.3</u>, Analog input calibration (current mode).

7.2 Analog output calibration

Calibration of the analog output (Analog Output, AO) ensures that the output signal matches the requirements of the external device. External devices can connect to the AO in sink or source mode. AO calibration measures the output signal for either mode of connection and assigns the appropriate engineering units to the signal range.

Figure 7-38: AO connection modes



IMPORTANT NOTE: Verify that the signal type of the external device is compatible with the controller AO. The AO can provide 4-20 mA output through the sink and source pins. For more details on the AO specifications, see section <u>2.2.3.2 Analog output</u>.

7.2.1 Connect the calibration equipment

The calibration requires only an ammeter or multimeter capable of measuring electrical current in milliamps (mA). The AO signal is measured with or without the external device attached to the AO.

When the AO has no external device (no load) the ammeter connects based on the mode, either across the source and ground pins, or across the sink and ground pins.

Connect the ammeter in series with the device to measure the AO with the external device attached (with load).



IMPORTANT NOTE: The procedures in this manual describe the calibration for the no-load option. Contact technical support to calibrate with the external device attached.

7.2.1.1 No load connected to the AO

To connect the ammeter or multimeter only:

- 1. Power off the RMC.
- 2. Disconnect all the wires from the external device.
- 3. Connect the ammeter or multimeter to the external device's wire ends (Figure 7-39). Observe the polarity and connect to the correct wire: positive probe to the source (SRC) or sink (SNK) signal wire, and negative probe to the negative or ground (GND) wire.

Figure 7-39: AO measurement for calibration



Source mode ouput

Sink mode output

- 4. Connect or apply power to the RMC.
- 5. Verify that the multimeter is set to measure current in mA.
- 6. Turn on the ammeter or multimeter and proceed with calibration.

7.2.2 Analog output calibration with no load

Follow this calibration procedure when the external device is not connected to the AO. This applies to both the sink and source connection modes.

To calibrate the AO:

- 1. Connect the PC or laptop running PCCU32 to the controller. Launch PCCU32 and click the Entry icon on the toolbar.
- Click the Calibrate icon on the toolbar. The Analog Input 1 screen displays with a request take an application (tube) out of HOLD (See Calibration dialog box in <u>Figure 7-40</u>).



IMPORTANT NOTE: The displayed screen after entering calibration mode depends on the last I/O calibration type. This procedure assumes first-time analog input calibration was completed prior to analog output calibration. Analog Inputs display as default.

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	Bias 75% Cal Point Image: State of the

Figure 7-40: Calibration request to take application out of hold mode

3. Click **OK**. The calibration dialog box repeats the request for the next application. In this example, the AGA3-3 tube (Figure 7-41).

Figure 7-41: Calibration request to take additional application out of hold mode

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4. Click **OK** for this and all additional requests. The calibration dialog stops displaying after the last application is out of hold.

5. Click **Onboard I/O**, then **Analog Output** in the navigation tree. The Analog Output screen displays in Auto Mode.

Figure 7-42: Analog Output auto mode

6. Click **Manual Mode** (Figure 7-43). The Calibration and Engineering Units buttons activate.

Figure 7-43: Analog output manual mode

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7. Click **Low** in the Calibration (mA) column. The Enter Measured Value dialog displays.

Figure 7-44: Display low AO measured value entry box

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	Initial 0.000 Bias 0.000 Auto Mode Manual Mode Close Help	
Ready	Updating Current Value#Polls: 186 #Errors: 0 Connected to 10.127.185.175 Login: user	

8. Check the reading on the ammeter. The value should be approximately 4 mA.

9. Type the ammeter's measured value into the entry field (Figure 7-45).

Figure 7-45: Type low AO measured value

1	Enter Measured Value (~4 ma)
	3.880
	OK Cancel

10. Click **OK**. The Calibration Low value field displays the measured value.

Figure 7-46: Updated low AO measured value

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Ready #Polls: 278 #Errors: 0 Connected to 10.127.185.175 Login: user

11. Click **High** in the Calibration (mA) column. The Enter Measured Value dialog displays (<u>Figure</u> <u>7-47</u>).

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Figure 7-47: Display high AO measured value entry box

- Check the ammeter reading. The displayed value should be approximately 20 mA.
 Type the ammeter's measured value into the entry field (Figure 7-48).

Figure 7-48: Type high AO measured value

Enter Measured Va	alue (~20 ma)
20.	590
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14. Click **OK**. The Calibration Complete message displays (Figure 7-49).

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Figure 7-49: Analog Output calibration complete

15. Click **OK**. The Eng. Units, %FS, and mA fields should display full scale values (Figure 7-50). The mA field displays the high value of the AO signal. This is 20 mA or 100% of the output signal.



IMPORTANT NOTE: The Eng. Units field value matches the mA field value when the Engineering unit range is the default, 4 -20 mA. With non-default ranges (see section 7.2.3 Define engineering unit range) the Eng. Units field value is different from the AO signal value.

Close Help

Figure 7-50: Calibrated AO example

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Ready #Polls: 3703 #Errors: 0 Connected to 10.127.		Analog Output Hold: 7.3.204 Eng. Units %FS 20.000 100.000 20.000 100.000 Calbration (ma) Engineering Units Low 3.880 Low 4.000 High 20.590 High 20.000 Initial 0.000 Bias 0.000 Auto Mode @ Manual Mode #Polls: 3703 #Errors: 0 Con	e Help

- 16. Type different values into the %FS or mA fields to verify the calibration. The controller produces the specified current output at the AO. For example:a. Select the **mA** field. The Enter Value for AO (mA) box displays (Figure 7-51).

Figure 7-51: Display Enter Value for AO (ma) entry field

b. Type a value from the 4 mA to 20 mA range. For example, 8 mA (Figure 7-52).

Figure 7-52: Type new value for AO current in mA



c. Click **OK**. The mA field updates to reflect the typed value and the RMC produces 8 mA at the AO (Figure 7-53).

Re PCCU32 - [Calibrate] Operate View Window Help _ 8 × Archive 🔟 🎐 🧇 🔁 🏹 🏭 1 MB 寬而」 Ĩ€Ĩ 122 . TOTALFLOW Analog Output 🗌 AGA3-1 Hold: 7.3.204 AGA3-2 AGA3-3 AGA3-4 Onboard I/O Analog Inputs Analog Output Eng. Units %FS mΑ 🗄 - XMV Trend 8.000 25.001 8.000 XMV-1 V Update Calibration (ma) Engineering Units 4.000 3.880 Low Low 20.000 20.590 High High 0.000 0.000 Bias Initial Auto Mode Manual Mode Close Help Ready #Polls: 736 #Errors: 0 Connected to 10.127.185.175

Figure 7-53: AO current value set to 8 mA

- d. Verify that the measured value on the ammeter matches or is approximately the typed value in the mA field.
- e. Re-verify with additional values, if necessary.
- 17. Proceed to section <u>7.2.3</u>, Define engineering unit if the AO must reflect different engineering units.
- 18. If keeping the default engineering unit range (4-20 mA) click **Auto Mode** and **Close** to exit calibration.

IMPORTANT NOTE: Auto Mode takes the AO out of hold to resume normal operation.

7.2.3 Define engineering unit range

The engineering units fields permit a scale that is different from the default 4-20 mA range. This means that the AO values do not display in electrical current values, but in user-specified units. The values represent engineering units scaled across the 4-20 mA range. For example, the default output range can represent a pressure measurement value range of 0 to 100 PSI where 4 mA represents 0 and 20mA represents 100. The engineering units and range associated with the analog outputs depend on the external device specifications or the application driving the AO.



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IMPORTANT NOTE: Define the engineering units after calibration and while the analog output screen is still in manual mode. This procedure defines an engineering unit range of 0-100 PSI. Different applications might require different ranges or units. Use values that are appropriate for your specific scenario and the external equipment specifications.

To define the engineering unit range:

- 1. Click Manual Mode.
- 2. Click Low in the Engineering Units column. The Enter Low Value dialog displays (Figure 7-54).

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Image: Contract of the second seco	Help
Updating Current Values	

Figure 7-54: Engineering unit range low value entry field

3. Type the value that represents zero (0) or the low end of the range. In this example the low value is 0 PSI (Figure 7-55).

Figure 7-55: Type engineering unit range low value



- 4. Click **OK**.
- 5. Click **High** in the Engineering Units column (Figure 7-56). The Enter High Value dialog displays.

te, PCCU32 - [Calibrate]	
Operate View Window Help	_ 8 ×
Image:	
Analog Output AGA3-1 AGA3-2 AGA3-3 AGA3-4 Onboard I/O Analog Output XMV XMV-1 XMV-1 Hold: 7.3.204 Fig. Units %FS mA 20.000 100.000 20.000 Figineering Units Calibration (ma) Engineering Units Low 3.880 Low 0.000 High 20.590 High 20.000	
Initial 0.000 Auto Mode Manual Mode OK Cancel	Clase Help
Ready #Polls: 1234 #Errors: 0 Connec	cted to 10.127.185.175

Figure 7-56: Display engineering unit range high value entry field

6. Type the value that represents the full scale, or the high end of the range into the entry field. In this example the high value is 100 PSI (<u>Figure 7-57</u>).

Figure 7-57: Type Engineering unit range high value



7. Click **OK**. The Engineering Unit values update to the user-defined range (Figure 7-58).

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Image: TotALFLOW AGA3-1 AGA3-2 AGA3-3 AGA3-4 Onboard I/O Analog Output Eng. Units * Analog Output Image: TotALFLOW AGA3-3 AGA3-4 Onboard I/O Analog Output * Analog Output Eng. Units %FS * Analog Output Calibration (ma) Engreering Units * XMV XMV-1 Iow 3.880 I low 3.880 Iow 0.000 High 20.590 High 100.000 Initial 0.000 Bias 0.000 @ Auto Mode @ Manual Mode Cose	Help
Updating Current Values	

Figure 7-58: AO example user-defined engineering unit range

- 8. Type different values into the %FS or mA fields and verify that the Eng. Units field reflects values based on the defined range. For example:
 - a. Click the **%FS** field. The Enter Value for AO (%FS) dialog displays (<u>Figure 7-59</u>).

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TOTALFLOW AGA3-1 AGA3-2 AGA3-3 AGA3-4 Onboard I/O Analog Output Analog Output Analog Output XMV XMV-1	Dutput : 7.3.204 Eng. Units %FS mA 100.000 100.000 20.000 Calibration (ma) Engineering Units Low Enter Value for AO (%FS) 0.0 High 0K Cancel 0.0 Auto Mode Manual Mode	Trend Vupdate D00 D00 Close Help
Ready	Updating Curren#p6albues2530 #Errors: 0 Cor	nnected to 10.127.185.175 Login: user

Figure 7-59: AO full scale percentage (%FS) entry field

b. Type **50** to produce 50% of the AO full scale current value (Figure 7-60).

Figure 7-60: Type 50% of full scale AO

En	iter Value for AO (%FS)
	50
	OK Cancel

9. Click **OK**. The %FS field reflects 50% and the Eng. Units field reflects the half scale value of the 0-100 PSI range (50 PSI) (Figure 7-61).



IMPORTANT NOTE: The AO current value at 50% of the full scale is 12 mA (see mA field in <u>Figure</u> <u>7-61</u>). For AO current values at other percentages of full scale, see <u>Table 7-2</u>.

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TOTALFLOW Aralog Output Hold: 7.3.204 Hold: 7.3.2
Ready #Polls: 2699 #Errors: 0 Connected to 10.127.185.175 Login: user

Figure 7-61: Eng. Units at 50% of full AO scale

- 10. Type additional values if necessary.
- 11. Click **Close** to exit the Calibration screen.

7.2.4 Drive the AO from a register

Use one Periodic option from the Operations application to drive analog outputs from a register. One of the Periodic options is (R1 -> Out). The value in the register, specified by R1, writes to the Out register at a specified time interval. For the R1 register, specify a register that contains the data to drive the AO. For the Out register, use the AO register. The AO register displays in the upper-left corner of the AO Calibration screen. From Entry mode, the AO register is the Engineering Units register on the Analog Output screen. For more information about configuring the controller to drive the AO from a register or another application, contact technical support at the phone number on the last page of this manual.

8 Service and maintenance

The Service and maintenance chapter provides:

- Standard maintenance procedures, including software backup, restoration and upgrade
- Instructions to remove and install spare parts for the RMC
- Additional procedures that are required before or after a maintenance procedure



DANGER – Serious damage to health / risk to life. Do not perform maintenance when an explosive atmosphere is present.



WARNING – Bodily injury. Remove power from the RMC if unit servicing requires removal or disconnection of cables or wires. Failure to remove power during service can cause bodily injury or equipment damage. Review warnings in Potential safety hazards.



NOTICE – Loss of data. Collect the measurement data and back up the configuration before performing any service on the controller. Failure to collect data and save the configuration can result in a loss of measurement data and require a complete system configuration.

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IMPORTANT NOTE: When the controller is powered by a battery with a solar panel charger, it is very important to keep the face of the solar panel clean. Dirt and debris that cover photovoltaic cells reduce the charging ability of the panel. Develop a regularly scheduled maintenance program and maintain a selection of spare components to minimize downtime.

NOTICE – Equipment damage. The external power/charger and battery connections must be removed before removing all other cables, boards, and field connections. Connecting or disconnecting cables and wires on the RMC while power is applied can damage the electronic components.

Do not reconnect the external power/charger and battery connections until all other cables, boards and field connections have been reconnected.

8.1 Preserve data and configuration

It is very important to preserve data and configuration files before performing any maintenance procedure or software upgrade. Follow the procedures in this section to ensure that backups of the data and device configuration are available in a location separate from the controller. You can move collected data files to other systems for safekeeping or import into customer databases as necessary.

Saved configuration files preserve the configuration of all the applications operating in the controller. Save the configuration in a location separate from the controller to restore or reuse. This can save a considerable amount of time if configurations are complex and avoids having to configure a controller from scratch.

The procedure includes:

- Collect data
- Update startup (cold) configuration
- Save startup (cold) configuration

8.1.1 Collect data

This procedure collects and saves the measurement data to a file on a PC or laptop so the measurement data in a controller that has been in operation is not lost.



IMPORTANT NOTE: Before collection, select from the several output types for the collected data, including displaying the data on the screen. Regardless of the output type selected, the system automatically creates a file containing the collected data and saves it in the PC or laptop performing the collection. The default location of this file is the **pccudata** folder in the PCCU32 installation directory. The name of the collection file is the controller station ID. Data or laptop files contain the collected data.

To collect the data from the controller:

- 1. Connect the PC or laptop to the controller (local communication) and launch PCCU32.
- Click the **Collect** icon on the PCCU toolbar (<u>Figure 8-1</u>). The Collect screen displays (<u>Figure 8-2</u>).

Figure 8-1: Collect icon



- 3. Click one or more applications on the navigation tree to select them for data collection.
- 4. Click **Help** on the Collect screen for additional information.

Figure 8-2: Collect screen



- 5. Click one or more output types from the Outputs list to send the data to other locations in addition to the laptop. The option to display the data on the screen is automatically selected.
- 6. Select the range of data to be collected.
- 7. Click **Collect**.
- 8. Click **Close** to close the output screen if it displays.
- 9. Click **Close** to exit the Collect screen.
- 10. Navigate to the collected data file on your laptop.



IMPORTANT NOTE: The data file might be in a default or user-defined location based on the PCCU directory path setup (Figure 8-3). The path for collected data is the Data File Path. The default location for data or laptop files is the pccudata directory in PCCU the installation directory.

Figure 8-3: Data file path

System Setup		X
Setup Directory Paths Misc Macr	o Setup	
Data File Type	Directory	
ID Database Path	C:\Program Files\ABB Totalflow\PCCU7_65\deviceid\	
Device Config Database Path	C:\Program Files\ABB Totalflow\PCCU7_65\devconfi	
Alarm Config Database Path	C:\Program Files\ABB Totalflow\PCCU7_65\alrmfile\	
Device Config Export Path	C:\Program Files\ABB Totalflow\PCCU7_65\devexprt\	
Archive File Dir Path	C:\Program Files\ABB Totalflow\PCCU7_65\archfile\	
Long Term Database Path	C:\Program Files\ABB Totalflow\PCCU7_65\lotermdb\	
Mainframe (ASCII) File Path	C:\Program Files\ABB Totalflow\PCCU7_65\ascifile\	
Spreadsheet File Path	C:\Program Files\ABB Totalflow\PCCU7_65\spreadsh\	
Report Format Path	C:\Program Files\ABB Totalflow\PCCU7_65\rptdir\	
Trend Config File Path	C:\Program Files\ABB Totalflow\PCCU7_65\trends\	
Data File Path	C:\Program Files\ABB Totalflow\PCCU7_65\pccudata\	
Coastal Flow CFX Output Path		
Coastal Flow CFX7 Output Path	C:\Program Files\ABB Totalflow\PCCU7_65\CFX7\	
Coastal Flow CFX8 Output Path	C:\Program Files\ABB Totalflow\PCCU7_65\CFX8\	
Role Based Access Control File Path	C:\Program Files\ABB Totalflow\PCCU7_65\RBAC\	
Station Logs File Path	C:\Program Files\ABB Totalflow\PCCU7_65\StationLogs\	
		Close Help

- a. Open File Explorer.
 b. Navigate to the data file path (Figure 8-4).
 c. Locate the data file. The data file is named with the device's station ID.

Computer Local Dis	k (C:) 🕨 Program	Files 🕨 ABB Totalfl	low > PCCU7_65	▶ pccudata		✓ 4 Search pcc
File Edit View Tools Help						
Organize 👻 Include in library 👻	Share with 🔻	New folder				i 🕶 🗖 🔞
PCCU_D780	 Name 	^	Dat	e modified	Туре	Size
🔒 alrmfile	_ тот.	ALFLO.W_I	6/3/	2019 4:25 AM	W_L File	215 KB
archtile						
CalReports						
CFX7						
CFX8	=					
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Figure 8-4: Locate laptop file (collected data)

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IMPORTANT NOTE: PCCU creates a new laptop file the first time it collects data from a device. PCCU overwrites the data on the existing laptop file in subsequent collections from the same device. If you wish to preserve the laptop file for each collection, move and store the file in a safe location as soon as you complete a collection.

8.1.2 Save the device configuration

The following procedures are required to save the configuration of the Totalflow device for backup purposes. The device stores a running (warm) and a startup (cold) configuration that contain configuration files for all enabled and active applications. Any configuration performed after the device starts for the first time continues to run in the running configuration. The startup configuration does not automatically update to reflect those configuration changes.

To perform a backup of the most up-to-date configuration, you must update the startup configuration first, and then save it on a laptop or PC.

You can use backup configuration files to restore service in the event of equipment failure, part replacement, or to replicate the configuration in other devices.



IMPORTANT NOTE: tfData and tfCold, warm and cold, are terms used to refer to the running and startup configuration respectively.

8.1.2.1 Update the startup (cold) configuration

This procedure saves the running (warm) configuration to the startup (cold) configuration. With this procedure both the startup and the running configuration reflect the most current configuration. A cold restart event with the most-up-to-date configuration resumes device operation without the need to reconfigure the device. The update is a manually triggered action.



IMPORTANT NOTE: This procedure only updates the startup configuration on the controller. It does not create a configuration package in a separate location from the controller.

Perform this procedure whenever there are configuration changes so that the startup configuration always contains the most up-to-date configuration.

The running (warm) might contain calibration files. These files also save to the startup configuration during the update. Calibration files link with the device's electronic board serial number and do not apply to any other device.

To update the startup configuration:

- 1. Launch PCCU32 and click the Entry icon on the toolbar.
- 2. Click the top item on the navigation tree. The Station Setup tab displays.
- 3. Scroll down to the Backup section (Figure 8-5).

Figure 8-5: Update cold start configuration

Sta	ation Setu	P Applications	App Licensing	Battery Information	Resources	System Log	Security Log	Registry		
lc.										
[De	scription				Value		-
Backup										
	0.21.0	Update Cold St	tart Configura	tion		Delete a	and Re-Create	TfCold	-	

- 4. Click the **Update Cold Start Configuration Value** cell and select **Delete and Re-create TfCold** from the drop-down list.
- 5. Click **Send**.
- 6. Click **Close** to exit the Station Setup screen and Entry Setup mode.
- 7. Click **Close** to disconnect PCCU32 from the controller.
- 8. Proceed to section 8.1.2.2, Save the startup (cold) configuration to the PC or laptop.

8.1.2.2 Save the startup (cold) configuration to the PC or laptop

This procedure saves the startup (cold) configuration from the device to a laptop or PC using the 32-Bit Loader. This requires a separate connection established from the loader, not from entry mode.



IMPORTANT NOTE: If calibration files are in the startup configuration, they are automatically in the configuration package.

The saved calibration files link to the device's electronic board serial number and do not apply to any other device.

To save the device configuration:

- 1. Verify that PCCU32 is not connected to the controller. If it is still connected, click the Disconnect icon on the toolbar.
- 2. Click the **32-Bit Loader** icon in the toolbar (Figure 8-6). A message box displays (Figure 8-7).

Figure 8-6: 32 Bit Loader icon



Figure 8-7: Warning to collect data and update configuration



3. Click **Yes**. The Connection Setup dialog displays (<u>Figure 8-8</u>).

Figure 8-8: Device loader connection setup

Connection Setup	× ×
Connection Type	Serial/USB 🔹
Port	COM4:Totalflow 32 Bit X-Series
Security Code	0000
(Required if securit	y switch is on.)
	Connect Exit Help

4. Verify or type the connection setup parameters and click Connect. When the controller connects, the main loader screen displays (<u>Figure 8-9</u>).



IMPORTANT NOTE: Click **Help** on the 32-Bit Loader screens for additional details.

Figure 8-9: Device loader

Recu32	
II Services Help	_ <i>8</i> ×
Package Location	Connection
	Browse Network 10.127.185.175
Package	Device
	Device Information
	Board Part Number: 2105023-001
	Serial Number: RE2004618-00010841
	OS: Production OS
	Version: 2.0.4-3
	<mark>Part Number: 2105411-029</mark>
	- Package Size: 11.92 (MB)
	HPD: GRMC Source
Loader Status Logs	
	Send Abort Close Help
Ready	#Polls: 0 #Errors: 0 Connected to 10.127.185.175 Login: user

5. On the loader screen, click **Services** on the menu bar. Then click **Save...** (<u>Figure 8-10</u>). The Save Software From Device dialog displays (<u>Figure 8-11</u>).

Figure 8-10: Device loader Save service

E PCCU32	
E Services Help	_ 8 2
Save	Connection
Restart >	Browse Network 10.127.185.175
Package	Device
	Device Information
	Device Type: RMC
	Board Part Number: 2105023-001
	- Serial Number: RE2004618-00010841
	Usersion 2 8 Ja 2
	Part Number: 2105411-029
	Package Size: 11.92 (MB)
	App: G5RMC Source
Loader Status Lo	ogs
	Send Abort Close Help
	#Polls: 0 #Errors: 0 Connected to 10.127.185.175 Login: user

Figure 8-11: Save Software from Device Dialog

RCCU32				
🔝 Services Help				_ 8 ×
Package Location		Connection		
	▼ Browse	Network	10.127.185.175	
Package	Device			
Loader Status Logs	Save Software From Device Select Package(s) ØS: Production OS Version: 2.0.4-3 Part Number: 2105411-029 Package Size: 11.92 (HB) ØAp: 65RHC Source Version: 2.0.5-2 Part Number: 2105457-026 Package Size: 5.29 (HB) ØConfig: Startup (Cold) Package Size: 72.57 (KB) Start	Configuration Close Sen	Help d Abort Close	- Help
Ready		#Polls: 0 #Error	rs: 0 Connected to 10.127.185.	175 Login: user

6. Click the **Config** checkbox. Clear the other checkboxes (Figure 8-12).

Figure 8-12: Save the startup (cold) configuration from the loader

Save Software From Device
Select Package(s)
OS: Production OS
Version: 2.0.4-3
Part Number: 2105411-029
Package Size: 11.92 (MB)
App: G5RMC Source
Version: 2.0.5-2
- Part Number: 2105457-026
Packanp Size: 5.29 (MR)
Packane Size: 72 57 (KD)
Tackaye Size. 72.57 (ND)
Start Ohort Close Help

7. Click **Start**. The Save As window displays.

Figure 8-13: Default destination folder to save configuration (PackageDir)

🖳 Save As						×
O V V Progr	am Files 🕨 ABB Totalflo	w 🕨 PCCU7	65 🕨 PackageDir	- ∮ j	Search PackageDir	٩
Organize 🔻 New f	older				:== :==	• 🕡
🐌 OneDriveTem	ιp	≜ Na	ame	<u>^</u>	Date modified	Туре
📗 Program Files	5					
🍌 ABB				No items match y	your search.	
🌗 ABB Totalfl	ow					
PCCU_D7	80					
PCCU7		=				
PCCU7_4_	_13_build					
PCCU7_7_	_62_B					
PCCU7_7_	_65					
PCCU7_6!	5					
🔋 📗 alrmfile						
🔋 📗 archfile						
📗 ascifile						
🌗 CalRepo	orts					
📗 CFX7						
CFX8						
🌗 devcon	fi					
📗 devexpr	t					
DeviceI	D					P.
File name:						-
Save as type: *.	okg					-
Alide Folders					Save	Cancel

8. Type the file name and click Save. The loader assigns the .pkg extension automatically. The default location is the PackageDir folder in the PCCU installation directory.

9. View the Loader Status Logs field for status messages. When the configuration is successfully saved several messages display to indicate that the configuration came from the device and that it successfully copied to the correct destination folder.

PCCU32		23
I Services Help		a ×
POCU32 Services Help Package Location Sav Package Docation Sav Package Docation Sav Docader Status Logs Do(03/2019 06:13:19 Operation canceled as file path is r 06/03/2019 06:13:19 Copyright C:Program Files/ABB Tota 06/03/2019 06:13:19 Copyright C:Program Files/ABB Tota 06/03/2019 06:13:37 Getting D:Program Files/ABB Tota 06/03/2019 06:13:37 Getting D:Program Files/ABB Tota 06/03/2019 06:13:45 Toperation canceled as file path is rio 06/03/2019 06:13:45 Toperation canceled as file path is rio 06/03/2019 06:13:45 Toperation canceled as file path is rio 06/03/2019 06:13:45 Toperation canceled as file path is rio 06/03/2019 06:13:45 Toperation canceled as file path is rio 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Getting D:Copyright File/ABB Total 06/03/2019 06:15:01 Gett	<pre>ve Software From Device ve Software From Device Select Package(5) Package Size: 11.92 (HB) Package Size: 11.92 (HB) Package Size: 11.92 (HB) Package Size: 11.92 (HB) Package Size: 5.29 (HB) Config: Startup (Cold) Configuration Package Size: 72.57 (KB) Noosen by user! PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65Upload(TempPkg.pkg to C: Program Files\ABB Totalflow PCCU2_65VPackageDir* PCCU2.65VPackageDir* PCCU2.65VPa</pre>	
06/03/2019 06:20:15 Copying C: Program Files V&B Totalflow/ 06/03/2019 06:20:15 Copied C: Program Files V&B Totalflow/p	PCCU7_65Upload(TempPkg.pkg to C: Program Files)ABB Totalflow PCCU7_65PackageDir(SSRMC Config.pkg PCCU7_65Upload(TempEkg.pkg to C: Program Files)ABB Totalflow PCCU7_65PackageDir(SSRMC Config.pkg Send Abort Close Help	
Ready	#Polls: 0 #Errors: 0 Connected to 10.127.185.175 Login: user	

Figure 8-14: Loader status logs – config file save successful

- 10. Click **Close** on the Save Software From Device window to return to the loader main screen.
- 11. Click **Close** to exit the device loader.
- 12. Locate the saved package in the destination folder. The file name format is <user-defined-name>.pkg (Figure 8-15).

Organize 🔻 New folder		:== •	• • • •
	GSRMC Config.pkg	Date modified 6/3/2019 6:15 AM	Type PKG File
pecudata	÷ (11	,
File name: Save as type: *.pkg			•

Figure 8-15: Locate the saved configuration (default directory)

8.2 Restore the device configuration

Use the device loader to restore the configuration on the controller with a previously saved configuration package. Verify that the configuration package originated from the same unit. Then restore the device in the event of file corruption or other problems.



NOTICE –Loss of data. When you restore the configuration, the loader sends the configuration package to replace the controller's existing startup configuration. The controller automatically uses the new startup configuration to restart (cold restart) and removes the previous startup configuration.

Before restoring the configuration on the controller, perform the procedure in section $\underline{8.1.1}$ Collect data to collect the measurement data and avoid data loss. It might be necessary to preserve the existing configuration if technical support needs to troubleshoot configuration issues. If necessary, perform the procedures in section $\underline{8.1.2.1}$ Update the startup (cold) configuration and section $\underline{8.1.2.2}$ Save the startup (cold) configuration to the PC or laptop.

To restore the device configuration file:

- 1. Verify that PCCU32 is not connected to the controller. If it is still connected, click the Disconnect icon on the toolbar.
- 2. Click the 32 Bit Loader icon in the toolbar. A warning dialog to collect data displays.
- 3. Click **Yes**. The Connection Setup dialog displays.
- 4. Verify, select or type the connection setup parameters into the entry fields and click **Connect**. The main loader screen displays when the controller connects.
- 5. Click Browse.
- 6. Locate and select the configuration file package, then click **Open**. The package details display in the Package field (Figure 8-16).

Figure 8-16: Loader screen configuration package to restore

E PCCU32	Partneystic				
Services Help					
Package Location	Connection				
C:\PCCU\PackageDir\RMC1.pkg	Serial/USB	COM6:Totalflow 32 Bit X-Series			
Package Device					
Package Information Package Size: 1.83 (KB) Package Size: 1.83 (KB) Package Size: 1.52 (KB) Package Size: 1.52 (KB) Package Size: 1.52 (CB) Package Package Package Package Package Package Package Package Package Package Package Package Package Package Package Package Package Package Package	Device Information Device Type: RMC Board Part Number: 2105023 Serial Number: S14450012 OS: Production_OS Uersion: 1.0.0-1 Part Number: 2105411-015 Package Size: 11.09 (MB) App: RMC-100 Uersion: 1.0.0-1 Part Number: 2105457-015 Package Size: 8.93 (MB) Config: Config Package Size: 70.08 (KB)				
Loader Status Logs					
	Send	Abort Close Help			
Ready	#Polls: 0 #Errors:	0 Connected to COM6:Totalflow Login: user			

7. Click the **Config package** checkbox if it does not already contain a checkmark.

8. Click **Config: Config** if the configuration file contains calibration files.

NOTICE – Tainted results. Do not select the calibration configuration in the Package field if the configuration package came from another RMC. Calibration files from a different device corrupt the last calibration records and skew the results. Only restore calibration files to the unit that created them.

- 9. Click Send.
- 10. View the status messages in the Loader Status Logs. When the configuration file upload is successful, messages display to indicate the package was sent, the system restarted, and the new configuration is active. The "Device info updated" message displays when the configuration update successfully completes.
- 11. Verify that the Device field displays the new configuration package information.

8.3 Use the configuration from another RMC

This procedure uses the device loader to copy a configuration saved from one controller to another unit. Use this procedure when the configuration in several controllers is similar.



IMPORTANT NOTE: Do not use calibration data in a configuration package that was generated from another controller. Calibration data is specific to each device and links to a device's electronic board serial number.

To send the device configuration:



IMPORTANT NOTE: Loss of data. When the loader replaces the controller's existing package with the configuration package from another unit, the controller automatically uses the new startup configuration to restart (cold restart). It removes the previous startup configuration.

Perform the procedures in section <u>8.1</u>, Preserve data and configuration, to collect the measurement data before sending a new configuration to the controller. This avoids loss of the data and the need for a complete system reconfiguration.

- 1. Verify that PCCU32 is not connected to the controller. If it is still connected, click the Disconnect icon on the toolbar.
- 2. Click the 32 Bit Loader icon in the toolbar. A warning dialog to collect data displays.
- 3. Click Yes. The Connection Setup dialog displays.
- 4. Verify, select, or type the connection setup parameters into the entry fields and click Connect. The main loader screen displays when the controller connects.
- 5. Click Browse.
- 6. Locate and select the configuration file package then click **Open**. The package details display in the Package field (Figure 8-17).

Figure 8-17: Loader screen configuration package from another RMC

Recuise the	-		
Package Location		Connection	E' ×
C: PCCU PackageDir (KMC 1. pkg	Browse	26LI91/02R	CUMO:TOTAl+IOW 32 Bit X-Series
Package	Device		
Package Information ↓ Config: Config ↓ Package Size: 1.83 (KB) ↓ Config: Calibration for SN S14450012 ↓ Package Size: 1.52 (KB)	Device Information Device Type: RMC Board Part Number: 2105023 Serial Number: S14450012 OS: Production_OS Version: 1.0.0-1 Part Number: 2105411-015 Package Size: 11.09 (MB) App: RMC-100 Version: 1.0.0-1 Part Number: 2105457-015 Package Size: 8.93 (MB) Config: Config Package Size: 70.08 (KB)		
		Sen	d Abort Close Help
Ready		#Polls: 0 #Errors	: 0 Connected to COM6:Totalflow Login: user

- 7. Verify that the Config: Config checkbox contains a checkmark.
- 8. Clear the calibration files checkbox so only Config: Config is selected.



- 9. Click **Send**.
- 10. View the status messages in the Loader Status logs to verify that the package was sent successfully, the system restarted, and the new configuration is active. The "Device info updated" message displays when the configuration update successfully completes.
- 11. Verify that the Device field displays the new configuration package information.

8.4 Update device software

ABB Totalflow periodically releases software update packages. Use the device loader to update the controller with new software packages when required.

8.4.1 When to upgrade

Software updates occur when:

- New major functionality or applications are added.
- Enhancements to existing application are added.
- Software bugs are fixed.


IMPORTANT NOTE: Devices might not require an update every time a new software package is released. Review the release notes to determine if an update is appropriate for your scenario and application requirements. In the case of critical bug fixes, a technical bulletin might be issued to indicate that an update is required. Technical bulletins identify the product hardware or software versions impacted.

Follow your company policies for the evaluation or testing of software updates before updating devices already in service.

8.4.2 Software update packages for the RMC

Software packages typically contain the main Totalflow application (Totalflow.exe, also referred to as flash in our download sites). If the main application also requires an updated version of the operating system (OS) or boot software, a package also includes the boot and OS software.

Software updates should not affect the configuration of a device. However, always collect data and save the configuration before any updates



IMPORTANT NOTE: If you attempt an application-only (flash) update when an OS/boot update is also required, the loader rejects the update until you use the correct package and select all required items. The loader determines if the flash is compatible with the OS/Boot software currently in the device. See the Loader help topics in PCCU for additional details.

Software packages are available for download at <u>www.abb.com/upstream</u>. Software packages have a base part number followed by 3 digits to indicate the build version of the package. For example, the number of the Standard RMC package containing both OS and Flash is 2105452. A package numbered 2105452-029 reflects (build) version 29 of that package type. Typically, the latest version is the only one available, but if there are additional versions on the site, select the one required after you carefully review the release notes.

Package part numbers are different for the RMC Standard (720 MHZ) or LITE (300 MHZ) options. The (OS+Flash) package numbers are 2105452 for the standard option and 2106260 for the LITE option. Make sure to download the correct package for your system. <u>Table 8-1</u> and <u>Table 8-2</u> show the part numbers included in each package. Note that the Operating System (OS) is the same for both options. These part numbers are also obtained from PCCU when connected to the device.

Table 8-1: Software included in customer	nackage 2105452	(Standard RMC: 720 MHZ	'n
Table 0-1. Soltware included in customer	package 2103452	(Stanuaru Krici 720 miliz	•]

Component	Part number
Operating System (OS)	2106487-xxx
Flash	2105457-xxx

Table 8-2: Software included in custome	r package 2106260	(RMC-LITE: 300 MHZ)
---	-------------------	---------------------

Component	Part number
Operating System (OS)	2106487-xxx
Flash	2106229-xxx



IMPORTANT NOTE: If you have any questions or are unable to locate or download any software update package, call Technical Support. See the last page of this manual for contact information.

8.4.3 Download software from the ABB website

The latest RMC embedded software is available on the ABB product website. To download:

- 1. Go to <u>www.abb.com/upstream</u>
- 2. Scroll down the page to locate the product list and select the **RMC-100**.

Figure 8-18: ABB main product page

Full product offering Automa	tion / Control	Measureme	ent / Metering	Communication / User i	interface
ABB's comprehensive portfolio gr from wellhead to worldwide distribution As a world leading supplier to the oil and industry, ABB provides customers with so to manage operations safely, productively profitably. As a true global supplier, ABB g expertise wherever in the world it is need Customers investing in ABB's upstream p and solutions receive the best technology application expertise in the business.	Des Analyzers <u>C6+</u> analy <u>Single str</u> <u>C7+</u> analy portable 1 <u>Portable 1</u> <u>Portable 1</u> <u>Port</u>	zer eam C6+ Zer Zer NGC Dackages ection ications O – Router itdoor router reless bridge management irreless	Flow computers XECC ⁰⁵ XEC6200EX Flow-X Flow meters FCB400 - Coriolis FCB400 - Coriolis FEP300 - Mag FSV400 - Vortex FSS400 - Swirl DP flow FPD570 -	Level MT5100 - GWR 7100 - Liquid Level LLT100 - Laser Level Multivariable 266 MOBBUS Pressure 266HSH Transmitters Remote controllers XIQ XCOP RMC-100 XRC ¹⁵ Custom solutions Upgrade solutions	Temperature ITH300 – Head-mot TTF300 – Field-mot User interface PCCU WinCCU Totalflow Web Inter Plunger Analysis eXLerate Elow-Xpert Valve control EDP300 – Positione TZIDC200 – Positione TEIP11 – I/P convert

3. Scroll down the RMC page, locate and select the **Downloads** tab.

Figure 8-19: RMC product page - Downloads

	HOME + OFFERINGS + MEASUREMENT & AMALYTICS + FLOW + UPSTREAM OIL AND GAS + FLOW COMPUTERS & REMOTE CONTROLLERS + FLOW COMPUTERS + RMC
=	Overview Downloads
P	The RMC-100 is a new class of controller with backward compatible functionality based on ABB Totalflow software, communications and IO technologies. The RMC-100 is the first in a series of major upcoming steps into a next generation platform. Existing end user knowledge base, work processes and benefits are nimbly brought forward.
	RMC-100 controller features
	 DIN rail mount 9 to 30Vdc 300MHz or 720Mhz purchase option Two port Ethernet switch Onboard IO (4XAI, 6XDI/DO, 2XPI, 1XAO) 2XTFIO busses (up to 44 TFIO modules) 2XCommunications Module Ports RS232, RS485, RS422 software configurable Backward compatible with Totalflow G4 XSeries software applications and protocol suite

4. Scroll down the **Available Documents** navigation tree (left), locate and select **Software**. **Figure 8-20: Locate available RMC software**

			2
Overview Downloads	_		
Downloads for RMC100			
Available documents:		→ Advanced search → Documents	in all language
Movie (2)		FLASH Software DL - RMC-100 LITE FLASH package (2106229-012).	
Presentation (1)	ZIP	Summary: RMC-100 LITE FLASH. Supports XIO Products. Must use PCCU 7.68 or later to supports XIO interfaces. N (Show more) English - 2022-09-02 - 12,73 MB - ▲ For approved users only	± ZIP
Press release (1)		EI ASH Software DL - RMC-100 standard EI ASH package (2105457-038)	
Reference case study (4)	ZIP	Summary: RMC-100 standard FLASH. Note: A hash file for software integrity check of this package is also avail (Show more)	± ZIP
Release note (19)	*	English - 2022-09-02 - 12,/3 MB - ▲ For approved users only	
Security advisory (1)	SHA512	Software DL - Hash file for integrity check of RMC-100 Customer Package: 2105452-041 Summary: Hash file used to check for the integrity of customer package:	 SH4512
Software (76)		2105452-041. Download file and refer (Show more) English - 2022-09-02 - 0,00 MB	- STASIE

5. Locate desired software and select the **ZIP** icon to download on your local PC/laptop.

HOME + OFFERINGS + MEASUREMENT & ANALYT	ICS → FLOW → UPS	TREAM OIL AND GAS + FLOW COMPUTERS & REMOTE CONTROLLERS + FLOW COMPUTERS + RIMC	6 GLOB
Overview Downloads			
ownloads for RMC100			
Available documents:		→ Advanced search → Documents in	all languag
Movie (2)		English - 2022-09-02 - 26,99 MB	
Presentation (1)	ZIP	Software DL - RMC-100 LITE Customer Package (2106260-012). Contains both Flash and OS.	
Press release (1)		Summary: RMC-100 L1 IE customer package 2106260-012. Supports XIO products. Use PCCU 7.68 or later for XIO su (Show more) English - 2022-09-02 - 26,99 MB	± ZIP
Reference case study (4)		Software DL - Hash file for integrity check of RMC-100 Flash Package:	
Release note (19)	SHA512	2105457-038. Summary: Hash file used to check for the integrity of Flash package: 2105457-	• SHA512
Security advisory (1)		038. Download file and refer to (Show more) English - 2022-09-02 - 0,00 MB - <u>▲</u> For approved users only	
Software (76)		Software DL - Hash file for integrity check of RMC-100 LITE Customer	
Web conference material (1)	SHA512	Summary: Hash file used to check for the integrity of customer package:	± SHA512

Figure 8-21: Locate and download RMC software customer package

- 6. Take note of the location of the downloaded software on your local PC/Laptop.
- 7. Unzip file when ready to perform system update.



IMPORTANT NOTE: If you have any questions or are unable to locate or download any software update package, call Technical Support. See the last page of this manual for contact information.

8.4.4 Determine device software part number/version

This procedure describes how to determine the part numbers of the software from PCCU. You might need this information to determine if updates are necessary, or when ABB technical support requests them during troubleshooting.

To determine the current software on the device:

- 1. Connect to the device in PCCU entry mode.
- 2. Select the Station ID at the top of the navigation tree. It displays the Station Setup screen.
- 3. Select the **Registry** tab (<u>Figure 8-22</u>).
- 4. View and take note of the current part numbers and versions in the Value column. Part numbers in this list match the software packages numbers released by ABB. Different numbers may apply for packages that combine more than one component (OS + Flash). Carefully review software release notes to determine what to download.

							-	
PCCU32 - [Entry]					—			×
Operate View Window Help							- é	F X
👬 🛅 🚾 💽 🚳 📗	D	Za 🥏	1					
Communications	S	tation Setup	Application/License Management Battery Information	ation Resources	System Log Security Log Registry Value		^	
Totalflow/COM0:		0.9.10	Software Build Date/ I ime	10/10/22 22:42:4	.0			
Generic Com App XIO Interface XIO_01 XIV Interface XIO_01 XIV Interface XIO_01 COM2		0.0.0	Digital Board Part # Flash Software Part #	2105023 2105457-039				
		0.0.39	Flash Software Version	4.7.0-5				
⊞-I/O System		0.0.18	OS Software Part #	2106487-006				
Flow Measurement		0.0.40	OS Software Version	4.6.1-2				
⊞ A3-1		0.0.2	Software Description	RMC FLASH				
⊞-A3-2 ⊞-Holding Registers		0.0.33	First Stage Boot Loader Part #	2105412-016				
Alarm System		0.0.34	Second Stage Boot Loader Part #					
Host Interface		0.0.50	On-board IO Software Version	4.7.0-5				
⊞-PID Control		0.0.51	On-board IO BL Software Version	1.0.1-6				
-Valve Control		0.0.52	On-board IO BL Part #	2105458-003				
🕀 Plunger								
⊞-Gas Lift			eMMC Device Information					
		0.0.132	Manufacturer Name	Micron-0xte				
		0.0.130	Device Version	4.41				
		0.0.133		05/2016			1	
		Re-read	Monitor Show editable fields	Screen Sav	ve Send Close Help	XHe	ip 🗮	!
Ready			#Polls: 40 #Errors:	0 Connect	ted to RMC-100 Login: us	ser		Λ.,

Figure 8-22: RMC registry tab (Standard RMC-100 system)

5. Scroll down and locate the **System CPU Frequency (MHZ)** to determine the RMC speed. Figure 8-23 shows the standard RMC speed (720 MHZ) and its associated flash part number.

Figure 8-23: Determine RMC processor speed

PCCU32 - [Entry]			- 🗆 ×
Operate View Window Help			_ 8 ×
1 🖻 🖫 💽 🜃 🚳 🛄 🎿	, 🛛 🧇		
Communications	on Setup Application/License Management Batte	ery Information Resources System Log Security Log Registr	у
Totalflow/TCP Totalflow/USP	Description	Value	<u>^</u>
Totalflow/COM0:	0.1 Flash Software Part #	2105457-039	
Generic Com App	0.39 Flash Software Version	4.7.0-5	
XIO Interface XIO 01 0.0	0.18 OS Software Part #	2106487-006	
XMV Interface XIO 01 COM2 0.0	0.40 OS Software Version	4.6.1-2	
-XMV Interface-1 0.0	0.2 Software Description	RMC FLASH	
I/O System			
Flow Measurement 0.0	0.33 First Stage Boot Loader Part #	2105412-016	
⊞-A3-1 0.0	0.34 Second Stage Boot Loader Part #		
⊕-A3-2 0.0	0.50 On-board IO Software Version	4.7.0-5	
Holding Registers 0.0	0.51 On-board IO BL Software Version	1.0.1-6	
Alarm System 0.0	0.52 On-board IO BL Part #	2105458-003	
Irend System			
Host Interface	eMMC Device Information		
Walve Control	0.132 Manufacturer Name	Micron-0xfe	
B Plunger 0.0	0.130 Device Version	4.41	
Gas Lift 0.0	0.133 Manufactured Date	05/2016	
	MAC Address		
0.4	45.005 Enterprise Ethernet Port#1 MAC Addre	ess 00138602E799	
0.4	45.105 Enterprise Ethernet Port#2 MAC Addre	ess 00138602E799	
		+	
0.5	9.34 System CPU Frequency (MHz)	720	~
Re	e-read Monitor 🖌 Show editable fields	Print Screen Save Send Close	Help X Help 🌪
Ready	#Polls: 40 #	#Errors: 0 Connected to RMC-100	Login: user v7.74 : 2

i

IMPORTANT NOTE: Software part number/version information is also available from the loader. The loader screens use "App" to refer to the "flash". Note that the OS part number is the same for both Standard and LITE options (indicated by **OS: RMC/RMC-LT** onscreen). See (Figure 8-24).

E PCCU32				_		>	<
Services Help					-	. 8	×
Package Location		Connection					^
· · · · · · · · · · · · · · · · · · ·	Browse	Serial/USB	COM5:Totalflow	32 Bit	X-Serie		
Package	Device						
	- OS: RMC/RM - Version: - Part Num - Package - App: RMC F - Version: - Part Num - Package - Config: Co	C-LT OS 4.6.1-2 ber: 2106487-006 Size: 14.47 (MB) LASH 4.7.0-5 ber: 2105457-039 Size: 32.19 (MB) pfin			~		
							~
Ready	#Polls: 0	#Errors: 0 Connec	ted to COM5:Totalflow 32	2 Bit X Logi	in: user		١.,

Figure 8-24: RMC software part numbers from the Loader

8.4.5 Load the update software package

The RMC can have a full update (OS and Flash) or a Flash-only update, depending on the changes in a particular software release. Review the software release notes carefully to determine if a full or flash-only update is required. The customer software packages available on the ABB website contain both the OS and Flash, but the loader does offer the option to select only the desired component.

8.4.5.1 Shut down the Totalflow application

System shutdown may be required before loading new software on the RMC. Call technical support if you have questions or need assistance.



NOTICE – Service disruption. The update of the RMC's embedded software requires the shutdown of the Totalflow application (Flash). This will interrupt device operation. If possible, perform upgrade within an authorized maintenance window. Follow your company guidelines for the appropriate process for system shutdown and upgrade.



IMPORTANT NOTE: Ensure device and measurement data are saved or backed up before software updates.

To perform the RMC system shutdown:

- 1. Start PCCU and connect to the device in Entry mode.
- 2. From the top menu, select **View** and then, select **Expert**.
- 3. Click **Yes** to confirm view change.
- 4. On the navigation tree, select the top node or station name.
- 5. On the Station Setup tab, scroll down to the System Startup/Shutdown section.
- 6. Click the value field next to System Shutdown and then, select Yes (Figure 8-25).



Figure 8-25: RMC System shutdown to prepare for software upgrade

- 7. Click **Send** to shut down the Totalflow application.
- 8. Click **Yes** to confirm shutdown.
- 9. Observe the RMC LCD screen. The screen displays: **ABB Device Loader**. This indicates that the device is ready for the upgrade.
- 10. Proceed to section <u>8.4.5.2 Load the update package</u> for the upgrade.

8.4.5.2 Load the update package

This procedure assumes you have downloaded and unzipped the correct software package for your system. Locate the package on the PC/Laptop used to connect to the RMC for the upgrade. To update the RMC software:

- 1. Launch PCCU32 and click the **32-Bit Loader** icon in the toolbar. A message to remind you to back up the data and configuration displays.
- 2. Click Yes.
- 3. Verify or type the connection setup parameters into the entry fields and click **Connect**. The Loader screen displays.
- 4. Click **Browse**. The browser window displays.
- 5. Locate and select the software package and click **Open**. The package details display in the **Package** field (Figure 8-26).

Figure 8-26: Update device software with package information

CUsers/USANANDI/Documents/DOWNLOADS - FLASH/RMC-OS V Browse Serial/USB COM5:Totalflow 32 Bit X-Serial Comparison of the series of the	AUGersiUSANAND1/Documents/DOWNLOADS - FLASH/RMC-OS V Browse Serial/USB COM5:Totalflow 32 Bit X-Serial Comparison of the serial comparison of the serial comparison of the serial comparison of the series o	ackage Location		Connection		
Jackage Device Package Information -05: RMC/RMC-LT 0S Version: 4.6.1-2 Version: 4.6.1-2 Part Number: 2106487-006 Package Size: 14.47 (MB) Package Size: 14.47 (MB) -App: RMC FLASH Version: 4.7.0-5 Part Number: 2105457-039	Device Cackage Information OS: RMC/RMC-LT 0S Uersion: 4.6.1-2 -Version: 4.6.1-2 -Part Number: 2106487-006 -Package Size: 14.47 (MB) -App: RMC FLASH -App: RMC FLASH -Uersion: 4.7.0-5 -Part Number: 2105457-039 -Package Size: 29.49 (MB) -Package Size: 12.19 (MB)	:\Users\USANAND1\Documents\DOWNLOADS - FLASH\RMC-OS \sim	Browse	Serial/USB	COM5:Totalflow 32	Bit X-Seri
Package Information -05: RMC/RMC-LT 0S ✓OS: RMC/RMC-LT 0S -Uersion: 4.6.1-2 -Uersion: 4.6.1-2 -Part Number: 2106487-006 -Part Number: 2106487-006 -Package Size: 14.47 (MB) -Package Size: 14.47 (MB) -App: RMC FLASH -Uersion: 4.7.0-5 -Part Number: 2105457-039	Package Information -05: RMC/RMC-LT 05 Obs: RMC/RMC-LT 05 -Uersion: 4.6.1-2 -Version: 4.6.1-2 -Part Number: 2106487-006 -Part Number: 2106487-006 -Package Size: 14.47 (MB) -App: RMC FLASH -Uersion: 4.7.0-5 -Version: 4.7.0-5 -Part Number: 2105457-039 -Package Size: 29.49 (MB) -Osc and size: 167.87 (KB)	ackage	Device			
Package Size: 29.49 (MB)	pader Status Loos	<pre>ackage Information</pre>	-OS: RMC/R -Version -Part Nu -Package -App: RMC -Version -Part Nu -Package	MC-LT OS : 4.6.1-2 mber: 2106487-006 Size: 14.47 (MB) FLASH : 4.7.0-5 mber: 2105457-039 Size: 32.19 (MB)		
		⊢Package Size: 29.49 (MB) ader Status Logs	-Config: C	onfig Size: 167 87 (KR)		
		⊢Package Size: 29.49 (MB) mader Status Logs	Config: C	onf1g <u>Size: 167 87 (KR)</u>		
		⊢Package Size: 29.49 (MB)	Config: C	onf1g Size. 167 87 (KR)		
		⊢Package Size: 29.49 (MB) wader Status Logs	Config: C	onf1g <u>Siza: 167 87 (KR)</u>		
		└Package Size: 29.49 (MB) bader Status Logs	Config: C	onfig Size. 167 87 (KR)		

- 6. View under **Package Information** to verify that the RMC-100 package version is the required version for the update.
- 7. For full update (OS and Flash):
 - a. Verify that the **OS: RMC/RMC-LT OS** checkbox is selected.
 - b. Verify that the **App: RMC FLASH** checkbox is selected.
- 8. For Flash-only update:
 - a. Verify that the **App: RMC FLASH** checkbox is selected.
 - b. Clear any other unnecessary items in the package.
- 9. Click Send.
- 10. View the status messages in the **Loader Status Logs** field. When the update is complete, the "Device info updated" message displays indicating that the software has been sent and activated successfully.



IMPORTANT NOTE: Updates to the main application (App) might require an update to PCCU32. In these cases, download a new version of PCCU32. Review embedded software and PCCU release notes for details. Select PCCU from the main ABB product website (Figure 8-27) then, locate and download the latest PCCU version (Figure 8-28).

Figure 8-27: PCCU in the main ABB website - Product Listing

	HOME + OFFERINGS + MEASUREMENT & ANALYTICS + FI	LOW → UPSTREAM OIL AND GAS	;		🕥 GLOBAL SITE 🔻
	Full product offering Automation / C	control Measu	rement / Metering	Communication / User in	terface
¢	ABB's comprehensive portfolio goes from wellhead to worldwide distribution As a world leading supplier to the oil and gas industry, ABB provides customers with solutions to manage operations safely, productively and profitably. As a true global supplier, ABB provides expertise wherever in the world it is needed. Customers investing in ABB's upstream products and solutions receive the best technology and application expertise in the business.	Analyzers C6+ analyzer Single stream C6+ C7+ analyzer Portable NGC PGC5000 Analyzer packages Liquid injection Communications 6320/6310 – Router 7320 – Outdoor rour 1410 – Wireless brid Wireless managems WeilTell wireless TaleOS – Unlicensed/License	Flow computers XFC65 WFC6200EX Flow-X Flow meters FCB400- Coriolis FCB100- Coriolis FCB100- Coriolis FCB100- Coriolis FCB100- Softex FEP300- ge Mag Mag Mag SV400- Vortex FSS400- Vortex FSS400- SS400- Vortex FSS400- SS400- SS400- Vortex FSS400- SS5	Level MT5100 – GWR 7100 – Liquid Level LLT100 – Laser Level Multivariable 266 MOBBUS Pressure 266HSH Transmitters Remote controllers XIO Xcore RMC-100 XRC ⁻⁶⁵ Custom solutions Upgrade solutions	Temperature TTH300 – Head-mount TTF300 – Field-mount User interface PCCU WinCCU Totaflow Web Interface Plunger Analysis eXLerate Flow-Xpert Valve control EDP300 – Positioner TZIDC200 – Positioner TEIP11 – I/P converter
			DP flow FPD570 – Wedge		

_	HOME + OFFERINGS + MEASUREMENT & ANALYTICS	S → FLOW → UPS	TREAM OIL AND GAS + HOST SOFTWARE + PCCU	🕤 GLOBAL SITE
₽ ₽	Overview Downloads			
	Downloads for PCCU Available documents:		→ Advanced search → Docur	nents in all languages
	Guideline (1)	ZIP	PCCU 7.74 Summary: PCCU 7.74 English - 2022-09-02 - 300,13 MB	± ZIP
	Manual (22) Movie (2)	ZIP	PCCU 7.73 Summary: PCCU 7.73 English - 2022-04-07 - 299,02 MB - ▲ For approved users only	± ZIP
	Release note (12) Report (1)		PCCU 7.72 Summary: PCCU 7.72 English - 2021-09-29 - 297,12 MB - ⚠ For approved users only	± ZIP
	Service instruction (6) Software (83)	ZIP	PCCU 7.70.2 Summary: PCCU 7.70.2 English - 2021-06-25 - 290,61 MB - ▲ For approved users only	± ZIP

Figure 8-28: Locate and download latest PCCU version from the PCCU product page

8.5 System restart

The RMC has several options for restart. This section provides an overview of those options and the corresponding procedures for manually triggered restarts.



NOTICE – Loss of data. Some of the restart procedures in this section cause customer data, device configuration or calibration data loss. Backup data and configuration is in section <u>8.1</u> Preserve data and configuration.

8.5.1 Restart type overview

There are several ways to restart an RMC. Restarts can be manually triggered, or performed automatically after software updates, power removal, or other system events. Perform manually triggered restarts onboard or from the user interface (PCCU).

<u>Table 8-3</u> describes device restarts. Review the implications of each restart type carefully to select the appropriate method. There might be several methods for the same type of restart.



IMPORTANT NOTE: While there are several methods for the warm and cold restarts, ABB recommends restarts from PCCU32 (Entry mode or device loader).

Table 8-3: Restart types

Restart type	Description	Use	User-triggered restart Procedure
Warm restart	 The device: Shuts down all applications. Backs up the running data, configuration, and logs to persistent memory. Restarts with running (warm) configuration. 	 Automatic trigger: After software update Manual trigger: A warm restart might be required as part of general installation, maintenance or troubleshooting procedures. For example, a warm restart restores operation if the device locks up due to power or communication interruption. 	8.5.2 Warm restart with the RESET button 8.5.3 Warm restart from the device loader 8.5.4 Warm restart from PCCU Entry mode 8.5.5 Warm restart from terminal mode
Cold restart	 The device: Shuts down all applications. Deletes the running configuration and repopulates it using the startup (cold) configuration. Restarts with startup (cold) configuration. 	 Automatic trigger: Following a startup configuration update Manual trigger: Only as part of a service or maintenance procedure or when ABB technical support specifically directs it. A cold restart causes running configuration loss (this might also include calibration files). To back up before restart, follow procedures in section <u>8.4.5 Load the update software package</u>. 	8.5.6 Cold restart from the device loader 8.5.7 Cold restart from terminal mode
Factory restart	 The device: Shuts down all applications. Deletes the running configuration and repopulates it using the factory configuration. Restarts with factory defaults 	 Manual trigger: Use Factory Restart when it is necessary or desirable to return the flow computer to the original configuration as shipped from the factory. For example, do this when the device is relocated, or to start a configuration from scratch after file corruption or failed update. A reset to factory defaults causes data, running, and startup configuration loss (this might also include calibration files). To back up before going back to factory defaults, follow procedures in section <u>8.4.5 Load</u> the update software. 	<u>8.5.8 Restart using factory</u> configuration
Restart due to Power loss	All data logs and configurations within the current minute are lost.	Ensure the Lithium battery is enabled	Power removal is not a recommended method for restart.

8.5.2 Warm restart with the RESET button

The warm restart resets the RMC microprocessor. Use a warm restart to take the RMC out of service for maintenance or troubleshooting. Only use a warm restart when a power or communication interruption causes the microprocessor to lock up.

This procedure uses the RESET button on the RMC to restart the device. It causes the device to restart with the running (warm) configuration. If the RMC is installed inside an enclosure, you must have access to the interior of the enclosure to access the RMC switch.

To complete a warm restart using the reset button:

- 1. Lift the cover over the TFIO ports.
- 2. Press and release the Reset button (Figure 8-29).

Figure 8-29: Reset button



Observe the display. The LCD shows that the unit is shutting down and restarting.



IMPORTANT NOTE: If the RMC seems does not restart, press and hold the **Reset** button for eight seconds.

8.5.3 Warm restart from the device loader

This procedure performs the warm restart from the 32-bit loader. The procedure can be performed while on a local or remote Loader connection.

The procedure causes the device to restart with the running (warm) configuration.

To complete a warm restart from the device loader:

- 1. Launch PCCU.
- 2. Click the **32 Bit Loader** icon in the toolbar. A message box displays.
- 3. Click **Yes**.
- 4. Verify or type the connection setup parameters and click **Connect**. The Loader screen displays.
- Click Services>Restart. Select Restart using Running (Warm) configuration from the drop-down list (<u>Figure 8-30</u>).

E PCCU32		
Services Help		_ & ×
Save	Connection	
Restart >	Restart using Running (Warm) configuration	
	Restart using Startup (Cold) configuration	
Package	Restart using Factory configuration	
Loader Status Lo	ogs	E
•	m	•
	#Polls: 0 #Errors: 0 Connected to 10.127.185.17	75 Login: usi

Figure 8-30: Warm restart with device loader

6. Click **Help** for more information.

8.5.4 Warm restart from PCCU Entry mode

To restart the controller from PCCU Entry mode:

- 1. Launch PCCU32 and click **Entry**.
- 2. Click **View** on the PCCU32 menu and select **Expert** from the drop-down list.
- 3. Click the Station ID at the top of the navigation tree. The Station Setup tab displays.
- 4. Scroll down to System Startup/Shutdown (Figure 8-31).
- 5. Select Yes from the System Shutdown / then Reset drop-down list.
- 6. Click **Send**.
- 7. Click **OK** to confirm.

Figure 8-31: Warm restart on the Station Setup tab (Expert view)

S	Station Setup Applications App Licensing Se		Selectable Units Setup	Battery Information	Resources	System Log	Security Log	Registry			
ſ											
			De	scription			Value		^		
		System Sta	rtup/Shutdow	n							
	0.9.5	Last System Boot Date/Time				16 09:05:23					
	0.7.4	System Shutd	lown		No						
	0.7.5	System Shutd	lown / then Re	set	Yes				-		

8.5.5 Warm restart from terminal mode

This procedure performs the warm restart from the terminal mode. It causes the device to restart with the running (warm) configuration.

Follow this procedure remotely, or while physically connected to the device. Invoke Terminal mode from entry mode or from the PCCU splash (main) screen. This method of warm restart requires you to type a command.

To restart the controller using terminal mode:

- 1. Launch PCCU32.
- 2. Click the **Entry** icon.
- 3. Click **Operate**>**Communications** and select **Terminal** from the drop-down list (<u>Figure 8-32</u>). The Terminal screen displays.

Figure 8-32: Terminal menu option

E PC	CU32 - [Entry] perate View Window Help				
Ť	Open Configuration File		1	Archive	
	Laptop File Utilities Archive File Utilities		tup App	olications	App Licer
	Communications	•	Ma	iin	
	File Utilities	+	Ent	try	
			Ter	rminal	
	Security	•	Co	llection	
	Setup	•	TFI	Modbus	

4. Type the **BOOT=WARM** command at the terminal prompt (->) (Figure 8-33).

Figure 8-33: Terminal mode warm restart

🔄 PCCU32 - [Terminal]										
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ť	Entry 288			177 MB	@				Setup	
TERN ->BO	M DOT=WZ	ARM								

5. Press Enter.

8.5.6 Cold restart from the device loader

This procedure performs the cold start from the 32-bit loader. Follow this procedure on a local or remote Loader connection. However, ABB highly recommends performing the cold restart locally. The cold restart causes the device to restart using the startup (cold) configuration.



NOTICE –Loss of data. Perform the procedures in section <u>8.1</u> Preserve data and configuration before a cold start. This avoids loss of the data and the need for a complete system reconfiguration. If the startup (cold) configuration does not have the latest network connection configuration, the restart causes loss of network connectivity. Updating the startup configuration (tfCold) avoids loss of network connection and reconfiguration.

To complete a cold restart using the startup (cold) configuration:

- 1. Launch PCCU.
- 2. Click the **32 Bit Loader** icon in the toolbar. A message box displays.
- 3. Click Yes.
- 4. Verify or type the connection setup parameters and click Connect. The Loader screen displays.
- Click Services>Restart in the menu bar, and select Restart using Startup (Cold) configuration from the drop-down list (<u>Figure 8-34</u>).

_			
₽ _G	PCCU32		
	Services Help		- 8 ×
	Save	Connection	*
	Restart >	Restart using Running (Warm) configuration	
		Restart using Startup (Cold) configuration	
	Package	Restart using Factory configuration	
	Loader Status Lo	ogs	
1		II	•
		#Polls: 0 #Errors: 0 Connected to 10.127.185.175	Login: use

Figure 8-34: Cold restart using the device loader

6. Click **Help** for more information.

8.5.7 Cold restart from terminal mode

This procedure performs the cold start from the terminal mode. It causes the device to restart using the startup (cold) configuration.

Perform the procedure on either a local or remote connection. However, ABB highly recommends local cold restarts with this method. Invoke Terminal mode from entry mode or from the PCCU splash (main) screen. This method of cold restart requires you to type a command.



NOTICE – Loss of data. Perform the procedures in section <u>8.1</u> Preserve data and configuration before a cold start. This avoids loss of the data and the need for a complete system reconfiguration. If the startup (cold) configuration does not have the latest network connection configuration, the restart causes loss of network connectivity. Updating the startup configuration (tfCold) avoids loss of network connection and reconfiguration.

To restart from terminal mode:

- 1. Launch PCCU.
- 2. Click the **Entry** icon in the toolbar. The Entry screen displays.
- 3. Click **Operate** in the menu bar and select **Communications**>**Terminal** from the drop-down list (Figure 8-35). The Terminal screen displays.

PCCU32 - [Entry] Derate View Window Help **Open Configuration File** f Laptop File Utilities Applications App Lice tup Archive File Utilities Communications Main Þ Entry File Utilities Þ Terminal Security Þ Collection Setup TFModbus

Figure 8-35: Terminal menu option

4. Type the command **BOOT=COLD** at the terminal prompt (->) (Figure 8-36).

Figure 8-36: Terminal screen – cold boot

<mark>ዋቂ</mark> PCCU32 - [Terminal]									
🔝 Operate	View	Window	Help						
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TERM ->BOOT=CO	orp								

5. Press Enter.

8.5.8 Restart using factory configuration

This procedure uses the 32-bit loader to restore the device's startup configuration to its factory defaults. Factory defaults can include a generic base configuration or a custom configuration. Customers can request custom configurations to address specific requirements in addition to the basic configuration.

Restoring to factory configuration on a device already in service causes service disruption and loss of network connectivity.

NOTICE – Loss of data. A restart with factory defaults deletes all data and previous configurations. Current startup and running configurations are lost. Network communication parameters are overwritten with factory defaults as well. Perform the procedures in section <u>8.1</u> Preserve data and configuration before restoring factory defaults. We do not recommend triggering the restart remotely on a network connection because the device might lose connectivity. You must have physical access to the device to reconfigure.

To restore factory configuration:

- 1. Launch PCCU.
- 2. Click the **32-Bit Loader** icon in the toolbar. A message box displays.
- 3. Click Yes.
- 4. Verify the connection setup information and click **Connect**. The Loader screen displays.
- 5. Click **Services**>**Restart** in the menu bar and select **Restart using Factory configuration** from the drop-down list (Figure 8-37).

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Services Help					_ 8 ×
Save			Connection		A
Restart 🕨	Restart using Running (Warn	n) configuration	Network	10.127.185.175	
	Restart using Startup (Cold) (configuration			
Package	Restart using Factory configu	uration			
		— App: G5RM — App: G5RM — Part Nu — Part Nu — Config: C	IC Source n: 2.0.5-2 umber: 2105457-0 e Size: 5.29 (MB config e Size: 0 (Dutos)26 ()	Ξ
Loader Status L	ogs		5120. 0 (bytes	.)	
Loader Status L	ogs				

Figure 8-37: Restart using factory configuration

8.6 Change the clock

When applications are instantiated on the RMC, a change to the clock for daylight savings time, or time drift of the instantiated applications, can affect the time on log period entries. A clock change must preserve the integrity of accounting audit trails. Follow the guidelines for clock changes according to <u>Table 8-4</u>.

Type of clock change	Description
Clock change not crossing an hour boundary	The clock does not change for the next log period entry. Example: If present time is 4:15 p.m. and the clock changes to 4:05 p.m. of the same day, the entry reflects accumulated averages over a 70-minute time- period (15 minutes plus 55 minutes).
Forward clock change crossing an hour boundary	This forces a log period entry for the portion of the hour that accumulated since last hourly entry. The RMC then advances to the newly-defined data flow record boundary and maintains the day's data in the newly defined boundary. Example: If present time is 4:55 p.m. and clock changes to 5:05 p.m. of the same day, the entry reflects only a 55-minute average accumulation. Then a new flow record is written based on a 55-minute accumulation.
Backward clock change crossing an hour boundary	The hourly entry includes the part of the hour that accumulated since the last hourly entry. This is the same as it would be for a forward clock change that crosses an hourly boundary. The RMC advances to a new day's data flow record and maintains the balance of the day's data in the new record. Example: If present time is 5:05 p.m. and clock is changed to 4:55 p.m. of the same day, the log period record entry reflects only a 5-minute average accumulation. Then a new flow record has a 60-minute accumulation.

Table 8-4: Types of clock changes

Make time changes in the Date/Time field on the PCCU Station Setup tab.



IMPORTANT NOTE: A backward clock change uses two records to maintain data integrity to ensure that it does not overwrite previously recorded data. If it is necessary to make small backward time changes of less than one hour, wait until the current hour has progressed far enough to make a change that does not cross an hour boundary.

8.7 Remove and restore power

Remove and restore power in the order that applies to the power mode.



NOTICE – Equipment damage. Remove the external power/charger and battery connections before removing all other cables, boards, and field connections. Connection or disconnection of cables and wires on the electronic board while power is connected can damage the electronic components.

8.7.1 Remove power from the controller

It might be necessary to remove power from a controller for maintenance. This procedure describes the removal of the power port terminal connectors from the RMC. You do not need to remove individual wires.



IMPORTANT NOTE: Do not remove power if the controller does not have the lithium battery enabled or in place. If the lithium battery is not enabled, has failed, or was removed, the clock resets to factory defaults. This requires a change according to section <u>8.6</u>, Change the clock. See section <u>8.8.5</u>, Replace the lithium battery.

Follow the steps based on the type of power mode:



IMPORTANT NOTE: Pry terminal connectors off the electronic board with a slotted screwdriver.

- 1. For battery mode:
 - a. Remove the CHARGER/EXT PWR terminal connector.
 - b. Remove the BAT port terminal connector (green connector).
- 2. For external power mode, remove the CHARGER/EXT PWR terminal connector

8.7.2 Reconnect power to the controller

Follow this procedure to reconnect the power port terminal connectors or the power cables back into the RMC. You do not need to rewire if the connectors are not removed from the cables. This procedure assumes wiring was left intact before terminal connector removal.



NOTICE – Equipment damage. Do not reconnect the external power/charger and battery until all service procedures are complete. This includes reconnecting all wires, plugs, terminations, and peripheral equipment. Otherwise, property damage can result. Do not perform this procedure until instructed to do so.

Follow the instructions based on the type of power mode.



WARNING – Bodily injury. Always connect the battery before connecting the charger.

- 1. For battery mode:
 - a. Reconnect the BAT terminal connector (green connector) on the battery cable into the board.
 - b. Reconnect the CHARGER/ EXT PWR terminal connector on the charger cable into the board.
- For external power mode, reconnect the CHARGER/ EXT PWR terminal connector on the external power source cable into the board.
- Observe the power-on sequence information on the LCD to confirm that the controller is receiving power (see details in section <u>3.7.1</u> Power-on sequence). When DATE/TIME displays, the sequence is complete.

8.8 Part replacement

Follow this procedure to remove and replace parts on the controller. Part replacement might require removal of power and other connections from the unit, so plan any part replacement carefully. Removal of controllers installed in enclosures might require removal of connections to outside ports. Schedule maintenance windows that are appropriate for the procedure.



DANGER – Serious damage to health / risk to life. Do not allow RMC components to have contact with a non-insulated tool or be without a proper grounding device. This could create a static electric discharge resulting in bodily injury and damage to the electronic components. Use properly insulated tools and wear a grounding strap to eliminate static electricity when connecting or disconnecting wires.

WARNING – Bodily injury. Do not separate any energized connectors. This applies to all connectors and connections.



Verify that no hazardous atmosphere is present when performing maintenance on the unit, and that fumes are fully vented.

Determine if field wiring cables and wires are energized from optional power sources other than the RMC. Disconnection of energized cabling or wiring causes a spark that can ignite a hazardous atmosphere, if present.



IMPORTANT NOTE: Pry terminal connectors off the electronic board with a slotted screwdriver for procedures that require removal of terminal connectors from the RMC.

8.8.1 Replacement and spare parts list

Table 8-5 provides the part numbers for spare parts used with the RMC.

Part Name	Part Number	
RMC housing base	2105347-XXX	
RMC housing cover	2105349-XXX	
RMC electronic board	2105023-XXX	
Display assembly	2105041-XXX	
Lithium battery	1487010-XXX	
Communication module	2105236-XXX	

Table 8-5: RMC replacement and spare parts

8.8.2 Return parts for repair

Securely wrap the Totalflow component in protective anti-static packaging before returning it for repair. Call the ABB main office number on the last page of this manual, and ask for a Return Authorization number (RA). Affix the number to the outside of the return package. The customer prepays for shipment.

ABB ships any part not covered by the original system warranty to the customer FOB.

8.8.3 Remove the RMC from the DIN rail

To remove the RMC from the DIN rail:

- 1. Remove terminal connectors from power ports according to section <u>8.7.1</u>, Remove power from the controller.
- 2. Remove terminal connectors from I/O and COMM ports.
- 3. Remove cables from communication ports (USB, Ethernet, or MMI).
- 4. Remove TFIO modules from the TFIO A and B interfaces (if used).
- 5. Insert a slotted screwdriver into the top slot (Figure 8-38) of the DIN rail release clip.
- 6. Push the screwdriver handle down gently to release the clip.
- Detach the top of the RMC gently and hold it to prevent it from snapping back onto the DIN rail.
- 8. Insert the slotted screwdriver into the bottom slot of the DIN rail release clip, if necessary.
- 9. Gently detach the RMC from the DIN rail.

Figure 8-38: DIN rail release clip





8.8.4 Remove the housing cover from the base

Internal parts and lithium battery replacement requires removal of the housing cover.



IMPORTANT NOTE: It is possible to remove the housing cover while the RMC is on the DIN rail. However, ABB recommends that you remove the RMC from the DIN rail for optimal positioning of the RMC and better access to the board and its components.

To remove the housing cover from the base:

- 1. Remove terminal connectors from power ports according to section <u>8.7.1</u>, <u>Remove power from</u> <u>the controller</u>.
- 2. Remove terminal connectors from I/O and COMM ports.
- 3. Remove serial communication modules.
- 4. Remove cables from communication ports (USB, Ethernet, or MMI).
- 5. Remove TFIO modules from the TFIO A and B interfaces (if used).
- Remove the RMC from the DIN rail according to section <u>8.8.3</u>, <u>Remove the RMC from the DIN</u> rail.
- 7. Position the RMC on a flat surface.
- 8. Insert a slotted screwdriver into the corner slot on the RMC. A slot is located on each corner of the RMC.

Figure 8-39: Front View - Remove top housing from base



- 9. Push the handle of the screwdriver away from the body of the RMC to gently pry the clip loose from the two top slots. Then push up. From the two bottom slots, push down.
- 10. Remove the top housing from the base when all four corners are released.

8.8.5 Replace the lithium battery



IMPORTANT NOTE: Perform lithium battery replacement only while the RMC is powered on, so the real time clock continues to run. If the power is off, the real time clock resets to factory defaults and must be changed according to section <u>8.6</u>, <u>Change the clock</u>.

Reconnect the power after removing the cover, and before replacing the battery, to avoid clock reset. Leave the RMC on the DIN rail for ease of access to the power cables in both standalone and enclosure installations.

To replace the lithium battery:

- 1. Test the new battery to verify that it is fully charged. The battery voltage should be no less than 3.6 Vdc.
- 2. Remove the housing cover according to section <u>8.8.4</u>. Do not remove the RMC from the DIN rail.
- 3. Reconnect power to the controller according to section <u>8.7.2</u>.
- 4. Grasp the existing battery on each side and pull from the bracket.
- 5. Insert a new lithium battery into the bracket. Observe the polarity (+/-) of the lithium battery and the battery bracket.
- 6. Remove power from the controller according to section 8.7.1.
- 7. Reinsert the housing cover into the base.
- 8. Reconnect terminal connectors to I/O and COMM ports.
- 9. Reinsert serial communication modules.
- 10. Reconnect cables to communication ports (USB, Ethernet, or MMI).
- 11. Reconnect TFIO modules to the TFIO A and B interfaces (if used).
- 12. Reconnect power to the controller according to section 8.7.2.
- 13. Verify on the LCD that the controller's power-on sequence completes.

Because the battery was replaced with the power off, the clock has reset. To change the clock to current date/time:

- 1. Connect to one of the local communication ports.
- 2. Establish PCCU connection and click on **Entry**.
- 3. A message box displays asking to synchronize the date and time.
- 4. Click **Yes**. The RMC calendar clock synchronizes with the laptop date and time.

8.8.6 Replace the 12 Vdc battery

These instructions describe the removal and replacement of the 12 Vdc battery.



NOTICE –Loss of data. Do not remove the lithium battery from the electronic board (RMC board) when removing the 12 Vdc battery. The lithium battery keeps the real-time clock running.

To replace the 12 Vdc battery:

- 1. Verify that the LL battery alarm does not display on the LCD. Or measure the lithium battery to verify that it registers more than 3.6 V. If the lithium battery is low, replace the lithium battery first according to section <u>8.8.5</u>.
- 2. Remove charger and battery cables from the RMC for the battery mode according to section 8.7.1.
- 3. Remove the battery and battery cable from the existing battery.
- 4. Put a new battery in place.
- 5. Connect the battery cable to the new battery terminals (observing polarity).
- 6. Reconnect battery and charger cables to the RMC, as described for the battery mode in section <u>8.7.2</u>.
- 7. Verify on the LCD that the controller's power-on sequence completes.

8.8.7 Replace the electronic board



NOTICE – Equipment damage. The electronic board inside the RMC housing is susceptible to damage by static electricity or improper handling. Wear a grounding strap when handling the board to prevent this.

A grounding strap is a conductive device that makes a connection between the person handling the board and a high-quality ground point. Wear a ground strap on your body before handling the board, then connect it to a grounded point. This discharges electrical static buildup from the body to the ground and prevents static from discharging to the board.



NOTICE – Loss of data. Perform the procedures in section <u>8.1</u>, <u>Preserve data and</u> <u>configuration</u> before you replace the electronic board. Collect the measurement data and save the device configuration to avoid data loss.

Restore the saved configuration to the RMC and avoid time-consuming manual reconfiguration of the controller. If it requires a full software restoration, the operating system and firmware must be the same as in the replaced board. Verify that all software is included in the backup package (all software is saved, not only the configuration).

To remove and replace the board:

- 1. Perform the procedures in section <u>8.1</u>, <u>Preserve data and configuration</u>. Verify that all the software is saved to the backup package.
- 2. Remove power from the RMC according to section 8.7.1.
- 3. Remove terminal connectors from I/O and COMM ports.
- 4. Remove serial communication modules.
- 5. Remove cables from communication ports (USB, Ethernet, or MMI).
- 6. Remove TFIO modules from the TFIO A and B interfaces (if used).
- 7. Remove the RMC from the DIN rail according to section <u>8.8.3</u>.
- 8. Remove the housing cover according to section <u>8.8.4</u>.
- 9. Remove the screws holding the electronic board to the housing base.
- 10. Remove the existing board.
- 11. Position the new electronic board and replace the screws to hold the board to the housing base. Verify that the board has a lithium battery installed. If you use the lithium battery from the board being replaced, test to verify that the voltage is not less than 3.6 Vdc.
- 12. Reinsert the housing cover.
- 13. Remount the RMC on the DIN rail.
- 14. Reconnect terminal connectors to I/O and COMM ports.
- 15. Reinsert serial communication modules.
- 16. Reconnect cables to communication ports (USB, Ethernet, or MMI).
- 17. Reconnect TFIO modules to the TFIO A and B interfaces (if used).
- 18. Reconnect power to the controller according to section <u>8.7.2</u>.
- 19. Verify on the LCD that the controller's power-on sequence completes.
- 20. Set the lithium battery backup switch to Enable. See section <u>3.8</u>.

To set the factory clock setting to current date/time:



IMPORTANT NOTE: The new board requires calibration of AIs and AOs. Do not use calibration files from the saved configuration for the new board. Follow company policies to determine if calibration is necessary before resetting the clock. Setting the clock affects the time stamps assigned to calibration events and files, as well as collection data.

- 1. Connect to one of the local communication ports.
- 2. Establish PCCU connection and click **Entry**. A message box displays, asking to synchronize the date and time.
- 3. Click **Yes**. The RMC calendar clock synchronizes with the laptop date and time.

To restore the configuration or all of the software on the RMC:



IMPORTANT NOTE: The new board might have a version of the operating system and firmware that is different from the version in the previous board. If the board requires the version from the replaced board, update the software on the new board. A complete software update requires a backup package containing all the software.

- 1. Close the PCCU connection. Remain on the PCCU screen.
- 2. Use the device loader to restore the configuration according to section <u>8.2</u>.

8.8.8 Replace the LCD assembly

The LCD assembly, consisting of the LCD display and 4 key directional buttons, is mounted on the electronic board. Remove the entire display assembly to replace the LCD board. To remove and replace the display assembly:

- 1. Perform the procedures in section <u>8.1</u>, <u>Preserve data and configuration</u>.
- 2. Remove power from the RMC, see section <u>8.7.1</u>.
- 3. Remove terminal connectors from I/O and COMM ports.
- 4. Remove serial communication modules.
- 5. Remove cables from communication ports (USB, Ethernet, or MMI).
- 6. Remove TFIO modules from the TFIO A and B interfaces (if used).
- 7. Remove the RMC from the DIN rail according to section <u>8.8.3</u>.
- 8. Remove the housing cover:
 - a. Remove the four screws holding the display assembly board on the mounting standoffs.b. Lift the display assembly board from the mounted standoffs and gently remove the LCD connector from the connector on the electronic board.
 - c. Press the new LCD connector gently onto the connector on the electronic board.
 - d. Position the new display assembly board and align the screw holes on the board with the standoffs.
 - e. Replace the four screws. Do not over-tighten.
- 9. Reinsert the housing cover on the RMC.
- 10. Connect all I/O connections.
- 11. Reconnect terminal connectors to I/O and COMM ports.
- 12. Reinsert serial communication modules.
- 13. Reconnect cables to communication ports (USB, Ethernet, or MMI).
- 14. Reconnect TFIO modules to the TFIO A and B interfaces (if used).
- 15. Reconnect power to the controller according to section 8.7.2.
- 16. Verify on the LCD that the controller's power-on sequence completes.

8.9 Maintain cleanliness of the RMC

Controllers installed as standalone should be free of dust and other contaminants. A clean LCD ensures that alarms, system messages and programmed data displays are clearly visible.



NOTICE – Equipment damage. Potential electrostatic charging hazard: Clean only with a damp cloth.

When the controller is installed in an enclosure, keep the enclosure door closed and secured except during maintenance or service procedures that require access to the RMC and other components in the enclosure. Inspect the enclosure, door, and access holes regularly to ensure that all seals and gaskets are clean and intact, and that environmental elements have not reached inside of the enclosure.

Regularly inspect connected cabling to ensure that protective coverings are in place and intact. If the installation includes a solar panel, clean the cell surface of the panel regularly to ensure that dust and

debris are not on the cell surface. Dust and debris inhibit the charging ability of the solar panel. Inspect all other peripheral equipment to ensure that it is properly maintained.

9 Troubleshooting support

For support, call the ABB main office number on the last page of this manual.

Before calling:

- Take note of the model and serial number. The serial number is on a label affixed to the back of the base in the DIN rail slot.
- Prepare a detailed description of the problem for the Technical Support representative.
- Prepare a written description of the problem.
- Take note of any alarms or messages as they appear.
- Know the software version, board number and optional part numbers.

10 Serial port expansion with MOXA[®] modules

The RMC has two serial ports (serial communication, COMM) to support peripherals with serial interfaces. If you require more serial ports, external third-party Ethernet-to-serial devices can provide extra ports for both Ethernet and serial connection.

This section describes how to add serial port capacity to the RMC using the MOXA[®] Module, an Ethernet-serial converter. The module connects to the RMC through Ethernet and to the external measurement devices on its serial ports. Serial communication traffic is carried over the Ethernet connection transparently. From the RMC's perspective, communication with the peripherals on MOXA is as if they were connected directly to its COMM ports.

Use the serial ports on the MOXA[®] module to connect with any external serial device, such as radios and measurement transmitters. The number of additional serial ports depends on the MOXA[®] module. Figure 10-1 shows the connections for a MOXA[®] model Nport IA5440AI. This scenario shows a single ABB multivariable transmitter (XMV) connected to the MOXA[®] module. Other scenarios might include multiple XMVs on the same module port.

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IMPORTANT NOTE: The procedures in this chapter show configuration for XMV connections. The RMC and the MOXA[®] module support other ABB and third-party external devices with standard RS-232 or RS-485 interfaces. For additional configuration options, see PCCU online help or contact technical support.

Figure 10-1: Ethernet-to-Serial MOXA[®] Module Connection MOXA



10.1 Configuration overview

The example described in this section includes a MOXA module and an ABB XMV as the measurement transmitter with which the RMC communicates. This scenario assumes:

- RMC COMM 1 and COMM 2 are unavailable or additional serial capacity is necessary.
- The RMC is connected to a network. There is also an available connection for the MOXA module on the same network.
- Valid IP addresses are available for both the RMC and the MOXA module.

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IMPORTANT NOTE: Both the RMC and the MOXA module must have valid IP addresses to communicate. Devices such as the XMV transmit measurement data in real-time, so the TCP/IP connection between the RMC and the Ethernet-to-serial device must be reliable (the IP configuration must remain intact all the time). To prevent loss of IP configuration, configure both devices with static IP addresses.

Static IP address configuration does not depend on network connectivity as dynamic addressing does. Use of DHCP for device IP addressing in this scenario could cause measurement data loss during a network outage or disconnection. Network connectivity should never affect local communication with measurement or control peripherals.

Configuration item	RMC	Ethernet-to-Serial device
Ethernet interfaces	Verify that the Ethernet interface is enabled (In PCCU Entry mode, on the navigation tree, select Communications then the Networking tab): Ensure the State of the interface is set to Enable .	Consult MOXA documentation for details to enable the Ethernet interface on the module.
Network (IP) Parameters	Do not enable DHCP. Change default IP parameters for valid IP parameters and restart the interface. In PCCU Entry mode, on the navigation tree select Communications then the Networking tab. Enter valid IP parameters (obtained from the network administrator). They must be on the same subnet as the Ethernet-to-serial device.	Consult MOXA documentation for details to configure static addressing (ensure DHCP is disabled) and manually configure valid IP parameters (obtained from the network administrator). Must be on the same subnet as the RMC.
Serial interfaces	In PCCU Entry mode, on the navigation tree select Communications , then on the Communication Setup tab, add the communication application appropriate for the serial device type and configure desired serial parameters. Serial port parameters must match those on the MOXA module and serial devices. See section <u>10.3 Configure the RMC Ethernet</u> interface to support MOXA®.	Consult MOXA documentation for serial port configuration. Make sure to match serial interface parameters to the attached serial device.

Table 10-1: Configuration for connection to Ethernet-to-serial devices



IMPORTANT NOTE: For other third-party devices, consult vendor documentation for steps to enable the Ethernet interface, and configure network (IP) and serial port parameters. Details of configuration depend on the implementation of vendors, but standard Ethernet and serial interfaces should be interoperable.

10.2 Configure the MOXA[®] module

This procedure describes how to configure the MOXA[®] module to operate with the RMC. This includes manually setting up the module's IP network parameters (static addressing), the serial port configuration, and the mode of operation.



IMPORTANT NOTE: Some steps in this procedure use the MOXA[®] NPort web console. Screens or options might change based on the user interface and the firmware version in the module. Refer to MOXA[®] documentation for additional configuration options.

To configure the MOXA[®] module:

- Verify that the host system or laptop you use to configure the module has a web browser or the MOXA[®] module user interface shipped with the module (N port device manager).
- Verify that the RMC Ethernet or network adapter is enabled and configured with a valid IP address.
- Obtain RMC-compatible IP parameters for the MOXA[®] module:
 - A valid IP address, subnet mask, and gateway for public addressing.
 - A valid IP address and subnet mask compatible with the RMC factory defaults for private addressing.

To configure the MOXA® module network settings using the web interface:



IMPORTANT NOTE: Complete all configuration before restarting the module. Once configuration changes take effect after a restart, the connection from your laptop to the module will be lost. To reconnect with the module again, configure laptop with a compatible IP address.

- 1. Verify that the module is powered on.
- 2. Configure the laptop with a private IP address that is compatible with the default address on the MOXA® module. The default private IP address of the module is 192.168.127.254.



IMPORTANT NOTE: Choose an IP address from the Internet Assigned Numbers Authority (IANA) reserved address block: 192.168.0.0 to 192.168.255.255. The assigned subnet mask for this block is 255.255.0.0.

- 3. Use an Ethernet cable to connect the laptop Ethernet port to the module's Ethernet port 1.
- 4. Launch the web browser on the laptop and direct the browser to the module's default IP address (192.168.127.254). The main configuration page displays.
- 5. Configure the network parameters:
 - a. Click **Network Settings** on the navigation tree.
 - b. Type the valid IP parameters (IP address, Netmask, Gateway).
 - For private IP addressing: Type an IP address and subnet mask that is compatible with the RMC default IP parameters. You can use private addressing if the RMC is not connected to a network.



IMPORTANT NOTE: Select an IP address from the Internet Assigned Numbers Authority (IANA) reserved APIPA address block: 169.254.0.0 - 169.254.255.255. The assigned subnet mask for this block is 255.255.0.0.

- For public IP addressing: Type a valid address from the network administrator. Use public addressing when the RMC connects to a network and has an IP address to connect to that network.
- 6. Verify that the IP Configuration is set to **Static**.



IMPORTANT NOTE: Do not configure the MOXA[®] module for DHCP. Use a static IP address to ensure RMC-MOXA[®] connections are never disrupted by loss of IP configuration.

- 7. Take note of the IP address. The IP address is a required parameter when configuring the RMC for communication with the module.
- 8. Click Submit.
- 9. Configure each serial port:
 - a. Click Serial Settings on the navigation tree.
 - b. Select the port.
 - c. Select the appropriate configuration for each of the settings. Verify that they match those of the device attached to the port.
- 10. Click Submit.

- 11. Configure operating settings for each port:
 - a. Click **Operating Settings** on the navigation tree.
 - b. Select the port.
 - c. Click the Operation Mode drop-down list and select the TCP server.
 - d. Click the Max connection drop-down list and select the number of devices that connect to the port. Take note of the number. It is required for the RMC configuration.



IMPORTANT NOTE: Each MOXA[®] serial port supports connection with single or multiple devices (up to eight) depending on the serial interface type. A four-port MOXA[®] supports up to 32 devices, but the total number an RMC supports might be less. This number depends on the complexity of the RMC's configuration and the number and type of the enabled applications. Decide what the optimal number is for your specific situation.

Ensure that RMC CPU utilization remains optimal when planning multiple-device connections to avoid performance degradation.

- e. Take note of the Local TCP port number. Unique TCP port numbers are assigned by default to each serial port. This port number is a required parameter when you configure the RMC for communication with the port.
- 12. Click Submit.
- 13. Click **Save/Restart** for all configurations to take effect.
- 14. Disconnect the laptop from the module.
- 15. Use an Ethernet cable to connect the module's Ethernet port 1 to the RMC's Ethernet port 2.
- 16. Reconfigure the laptop with the appropriate network parameters and connect the laptop to the network.
- 17. Verify that the module is connected and responding. Ping the module's new IP address over the network and verify that there is a response.

10.3 Configure the RMC Ethernet interface to support MOXA[®]

The following procedure describes the configuration of the RMC to operate with the MOXA® module. This configuration adds a communication application to handle communication with the external device attached to one of the serial ports on the MOXA® module. The RMC should have a communication application for each MOXA® serial port in use. Add and configure four communication applications for a four-port module.

Choose the application, associated parameters, and protocol based on the type of external device that connects to the serial ports. Multiple devices that connect to a single MOXA[®] serial port must all be of the same type.

There are special purpose communication applications for specific types of ABB equipment. An example is the XMV Interface, the application that communicates with XMVs (ABB multivariable transmitters). If you connect other type of ABB devices, you can use available special purpose applications. A generic communication application is available for third-party devices or ABB devices without specific applications. Select **Generic Com App**. Contact technical support for configuration options.



IMPORTANT NOTE: Do not configure the RMC for DHCP when connecting a MOXA® module. Use a static IP address to ensure RMC-MOXA[®] connections are never disrupted by loss of IP configuration.

To configure the RMC for communication with XMVs through the MOXA[®] module:

- 1. Connect the PC or laptop with PCCU32 to the controller.
- 2. Launch PCCU32 and click the **Entry** icon on the toolbar.
- Click the Station ID (top item) on the navigation tree, then click Application/License Management. The Application/License Management tab displays (Figure 10-2: <u>Application/License Management tab</u>).

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Figure 10-2: Application/License Management tab

4. Click **Add App**. The Add New Application dialog displays (<u>Figure 10-3</u>). **Figure 10-3: Add New Application**



5. Select **XMV Interface** from the Application to Add drop-down list (Figure 10-4).



Figure 10-4: Select application to add

The XMV Interface application displays with the default app number (Figure 10-5).

Figure 10-5: Add the XMV Interface application



- 6. Click OK.
- Click Send. The XMV Interface displays in the application table and the navigation tree (Figure <u>10-6</u>).

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Figure 10-6: XMV Interface on the navigation tree and application table

8. Click **XMV Interface** on the navigation tree to expand it (Figure 10-7).

Figure 10-7: XMV status screen



9. Click **Communications**. The Setup tab displays (Figure 10-8).

10. Configure the following:

a. Type the XMV interface instance name into Device/APP ID. Use a name that identifies the port, such as "XMV Interface MOXA port 1"

- b. Type the number of XMVs attached to the serial port. This number must match the one configured in the MOXA module Max Connection field in the Operation Modes configuration menu.
- Type the MOXA's IP address and the serial port's Local TCP port into Port. Use the following c. format: IP address/Local TCP port. For example, "10.127.185.172/4001". Select **TCP/IP** from the Port Type drop down list. d.
- 11. Click **Send**. The navigation tree displays the new name for the XMV interface and the number of supported XMVs. In this example, only one XMV displays for a single device connection (XMV 1).

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Figure 10-8: XMV Interface Communication Setup

- 12. Configure the XMV:
 - a. Select the XMV instance on the navigation tree, then click **Setup** (Figure 10-9).

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Figure 10-9: XMV instance Setup

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- b. Type a description or name into Description. Or accept the default name.
- c. Select the XMV model from the XMV Type drop-down list (Figure 10-10).

Figure 10-10: Select the XMV type

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d. Select **9600** from the Baud rate drop-down list (Figure 10-11)

Figure 10-11: Select baud rate

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- e. Type the response time (0, 10, etc.) in seconds into the Response delay field.f. Type the Modbus address into the MB Address field. Assign each XMV a unique address. 13. Click Send.
- 14. Select **Enabled** from the Scan drop-down list (Figure 10-12).

Figure 10-12: Select Scan mode

15. Click Send.

Figure 10-13: Verify the XMV Scan Status

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- 16. Verify that Scan status is OK.
- 17. Click **XMV interface > Communications** on the navigation tree (Figure 10-14).
- 18. Click **Packet Log**.

Figure 10-14: XMV Interface Communications Packet Log screen

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- 19. Display the packet logs (Figure 10-15):
 - a. Click the **Monitor** checkbox.
 - b. Select a value from the Log Size drop-down list.
 - c. Verify that communication traffic flows between the RMC and XMV. Arrows on the log point in two directions to indicate requests and responses between the RMC and the XMV.

Figure 10-15: XMV Interface Communications Packet Logs



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IMPORTANT NOTE: A packet log that displays requests from the RMC but not from the XMV, could indicate a baud rate mismatch, or an unpowered or damaged XMV.

When multiple XMVs connect to the RMC and the packet log displays correct communication exchange for some XMVs but not for others, verify connection with the non-responsive XMVs. If the configuration is correct, the XMVs might be unpowered or damaged.



IMPORTANT NOTE: If all serial ports in the MOXA[®] module are in use, four communication applications should be added and configured. Use one application for each port. For example, Figure 10-16 shows an RMC with four XMV Interface applications configured for each of the serial ports on a four-port MOXA[®] module. In this example, ports 1 and 4 connect to a single XMV. Ports 2 and 3 connect to multiple XMVs.

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- XMV Interface MOXA port 1		Communications		
	42.3.3	Port	10.127.185.172/4002	
	42.0.22	Port Type	ТСР/ІР	
XMV Interface MOXA port 2	42.0.6	Protocol	Modbus Host (RTU)	
I XMV1	42.0.12	Register Format	32 Bit	
XMV 2	12.1.10	Personnee Delay (milliseconde)	5	
XMV 3	12.1.10	Timeset (Wissender)		
- XMV 4	+2.1.3	Timeout (milliseconds)	100	
XMV Interface MOXA port 3	42.0.15	Switched V-Batt/Operate	Enable	
4	42.0.13	Retries	0	
XMV 2	42.0.17	Trailing Pad	None	
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Figure 10-16: XMV Interface applications for each MOXA port

11 Product warranty

Before installation, store the equipment in a clean, dry environment, per the Company's published specification. Make periodic checks on the equipment's condition. In the event of a failure under warranty, provide the following documentation to support your claim:

- A list providing evidence of process operation and alarm logs at the time of failure
- Copies of all storage, installation, operating and maintenance records relating to the alleged faulty RMC



ABB Inc.

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