ABB MEASUREMENT & ANALYTICS | 2107011MNAB

# XIO Interface application guide

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# Additional information

Additional free publications are available for download at www.abb.com/upstream.

**Table 0-1: Related documentation**

| Documents | Document number |
|---|---|
| XIO user manual | 2106424 |
| Ethernet-Serial Passthrough application guide | 2107010 |
| Network communication guide | 2107013 |
| RMC user manual | 2105552 |
| XSeries$^{G5}$ user manual: XFC$^{G5}$ and XRC$^{G5}$ | 2106026 |

# 1 XIO Interface application

This document describes the XIO Interface application used for communication with ABB Totalflow Extendible IOs (XIOs). The application may not be activated from the factory but, like all Totalflow applications, is available to be added as needed. Basic steps for initial application configuration and verification are provided. This document also provides detailed parameter and function description for the application screens in PCCU (version 7.68 or later).

**IMPORTANT NOTE:** The XIO Interface is an application designed to run on ABB Totalflow host remote controllers or flow computers that connect to XIOs for IO/COM expansion. For implementations that require more than 10 XIOs, the XIO Interface can also reside on another XIO. Unless a specific device is used as an example, this document will use the term "remote controller" or "controller" to refer to the device with the XIO Interface application instantiated.

## 1.1 Overview

The XIO Interface application manages TCP/IP-based communication with an XIO when devices are connected through a network:

- When communication is between a remote controller and the XIO, it allows the extension of the serial and I/O capacity for the devices through that XIO. An XIO Interface application instance running on the remote controller handles that XIO. An application instance is required for every XIO the controller communicates with.
- When the communication is between XIOs, one of the XIOs has the XIO Interface to communicate with the other XIO and acts as an intermediary device for a remote controller or flow computer. This applies to implementations requiring more XIOs than those supported by an individual controller. The XIO with the XIO Interface gathers the data for other XIOs and transfers it to the controller.

Applications running on the controller can control operation or obtain data from devices attached to the XIO I/Os (on TFIO modules) or XIO serial ports. The XIO Interface makes it possible for the controller to manage communication with these devices as if they were directly connected to its own serial ports or TFIO bus. When communication with the XIO is successfully established and maintained, the controller has full visibility of the exported applications running on the XIO.

**IMPORTANT NOTE:** The XIO Interface application runs only on ABB Totalflow products. It does not apply to third-party controllers. For connection of the XIO with a third-party controller, configure the XIO for Ethernet-Serial Passthrough or Modbus communication. See the link to the Ethernet-Serial Passthrough Application Guide in Additional information for details.

## 1.2 Principle of operation

The XIO Interface application supports communication between an ABB Totalflow remote controller and the XIO for automatic compatibility and to ensure a fully integrated solution. It provides several layers of functionality. At the network layer, it supports standard TCP/IP connections. At the higher layers, it manages the flow of packets containing requests from the controller and responses from the XIO.

The application monitors connection status health and statistics for read and write requests. These requests are issued by the controller to obtain data or control devices connected to the XIO. The following sections provide additional details for the major aspects of the XIO Interface application.

**IMPORTANT NOTE:** The following sections show the RMC as an example device communicating with a single XIO. The principle of operation is the same for XIO Interface application communication with multiple XIOs or just between a pair of XIOs. Note that communication with every XIO requires its own XIO Interface instance. The decision to instantiate the XIO interface application on a particular device (RMC, XIO, XSeries$^{G5}$) depends on the site requirements.

### 1.2.1 TCP/IP based connections (network layer)

The XIO Interface supports standard link and network layer protocols to establish communication with the XIO. The connections are TCP/IP based. Both the controller and XIO must have valid IP configurations and be connected to the same network for connection to take place. Using TCP as the protocol allows multiple logical connections over the same physical connection, typically Ethernet.

### 1.2.2 XIO Interface – XIO Server communication (application layer)

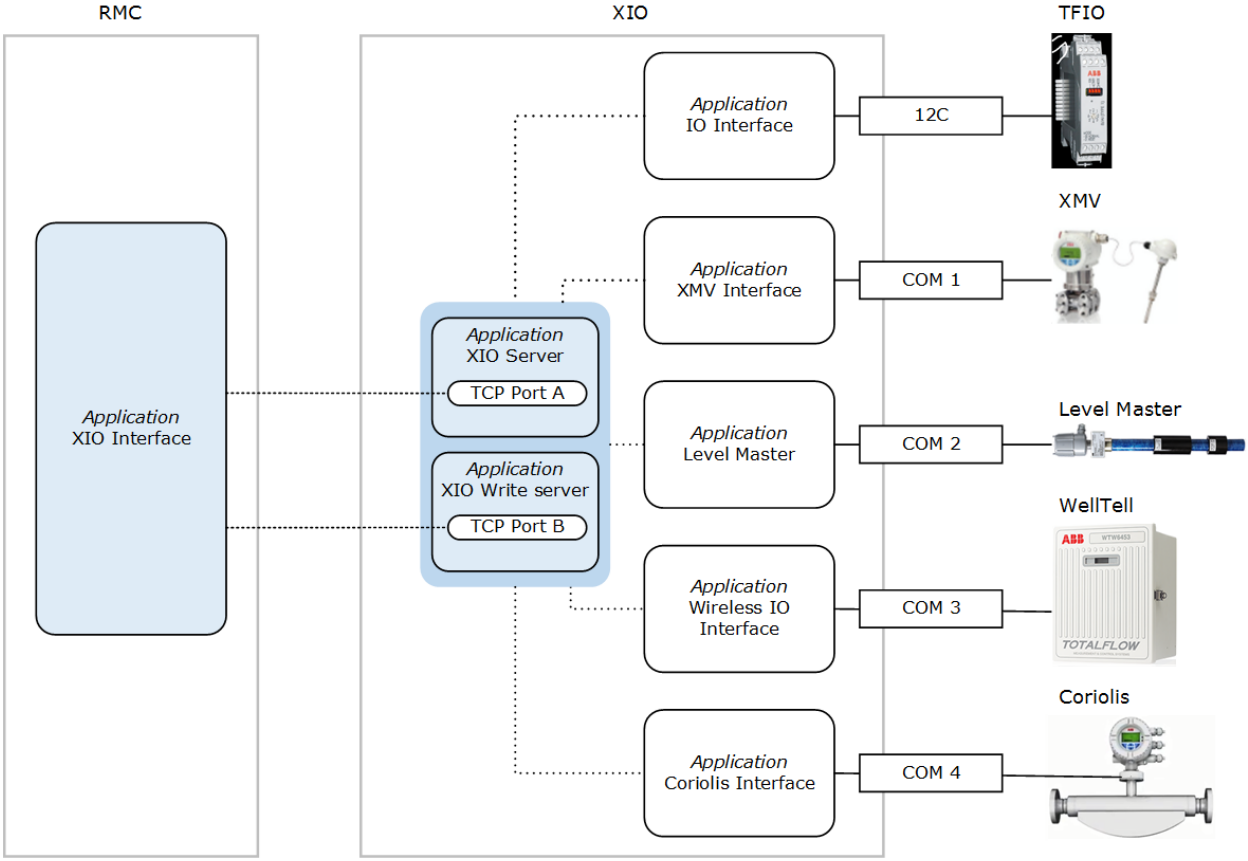
The main aspects of the controller-XIO communication are described in the following section. They provide background to understand the parameters displayed on the screens for monitoring and configuring. The sections below provide a high-level description only. Details on protocol or function implementation are beyond the scope of this document. Call technical support if you need additional information.

#### 1.2.2.1 Client-server based

The figure below depicts a high-level view of the main components of a controller-XIO connection. The communication between the two devices is client-server based. The XIO Interface on the controller (the RMC shown on the left), performs the client role and connects with two server applications on the XIO (shown on the right). The servers on the XIO are applications instantiated by default and specifically designed to receive and grant connection requests from the XIO Interface.

**IMPORTANT NOTE:** The connections shown in the diagram are logical connections only. The physical connection is not shown. The controller and XIO can be directly connected or connected through a field network switch.

**Figure 1-1: XIO Interface implementation (one XIO Interface instance for one XIO)**



#### 1.2.2.2 Client and Server functions

Measurement and control applications on the controller rely on the XIO Interface application to make data from remote devices available or to relay control messages to operate devices remotely. The I/O and communication applications on the XIO handle the communication to the attached devices locally. XIO servers process communication from the controller and pass it on to the respective I/O or communication applications.

The XIO Interface makes each of the remote I/O or communication applications visible from the controller. PCCU displays these applications as part of the navigation tree as if they were local to the controller. The XIO Interface displays only those applications that are exported (application export is user-configurable). The XIO supports the export of up to 16 applications, including its System application.

**IMPORTANT NOTE:** Refresh the remote controller's navigation tree to make sure the exported XIO applications display.

#### 1.2.2.3 Server TCP ports on the XIO

The XIO reserves specific TCP ports on which the servers listen for communication requests from the XIO Interface. Two default values are provided from the factory.

The XIO Interface directs requests for connection to either port, based on the type of request. It establishes two connections: one with the XIO Server (using the read TCP port) and the other with the XIO Write Server (using the write TCP port).

All XIO devices have the same default TCP ports assigned to the servers. You can leave the defaults or use other ports not in use by other applications. Using default ports does not cause any conflict as connection requests specify both the unique IP address of the XIO and the TCP port. This unique IP/TCP combination makes the connection request unique on the network.

#### 1.2.2.4 Reads and Writes

Once the TCP connections are established, the controller can begin to perform reads or writes to obtain data or control the applications and devices on the XIO. Remote controller applications using the communication applications on the XIO perform their normal operation as programmed.

The reads flow on the connection established with the XIO (read) server. The writes flow on the connection established with the XIO Write server. The separation of the flow of these two types of requests allows the XIO Interface to monitor, track statistics, and report events for each type separately. The XIO Interface also monitors communication status for reads and writes separately.

Reads are requests sent by the controller to obtain data from the remote applications/devices. For example, the controller can request new measurement values captured by a multivariable managed by the XMV Interface on the XIO. Reads take place every 1 second.

Writes are requests sent by the controller to configure or control remote application or device functions. For example, the controller can send a write request to change the state of an output channel on an XIO TFIO module connected to a valve actuator. Writes take place depending on the driving applications and their programming. Write requests are issued as needed.

The read and write connections remain established while both devices remain successfully connected to the network, powered on, and there are no connection parameters changes. Once the controller and XIO are configured and successfully connected, the XIO Interface does not need to establish a new connection each time the controller reads from or writes to the XIO. Keeping connections on reduces processing overhead, making communication more efficient.

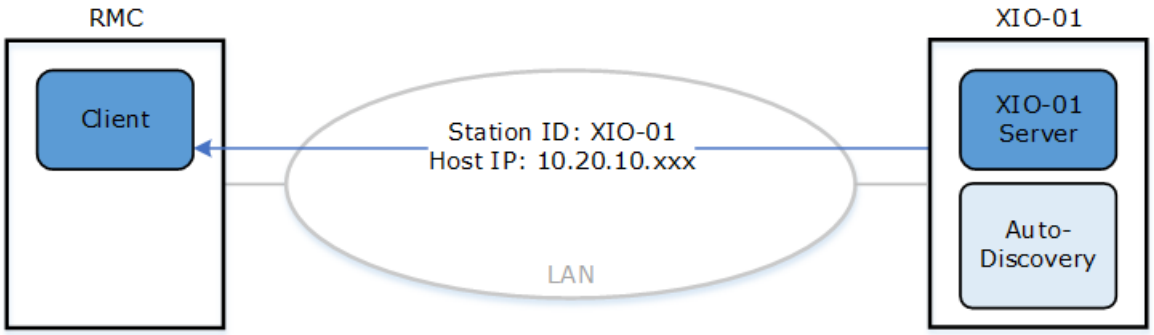
## 1.3 XIO Interface provisioning facilitated by Auto Discovery

The Auto Discovery feature is a service running on ABB Totalflow devices that allows them to detect, advertise services, and respond to each other to facilitate the provisioning of the XIO Interface. Figure 1-2 below shows a simplified diagram of the role Auto Discovery plays on the XIO. In the example, an RMC and XIO are connected to a common network. The XIO advertises its services (XIO server), device ID, and other information such as its IP address on that network. The RMC detects this information and "learns" or processes the presence of the XIO. When configuring communications with the XIO, the XIO services options display on the RMC, making configuration easier and less error

prone. Once the XIO and its service are discovered, the XIO Interface application can then target this detected XIO for connection request.

**IMPORTANT NOTE:** Note that Auto Discovery is supported for XSeries$^{G5}$, RMC and XIO. For simplicity here, it is only shown in the XIO_01. The RMC, or another Totalflow device on the same network, also has the capability to advertise its information when its Auto Discovery service is enabled. The XIO advertises those services that are active and enabled.

**Figure 1-2: Auto Discovery role in provisioning the XIO Interface application**




## 1.4 XIO Interface provisioning in multi-XIO scenarios

Each XIO Interface instance on the controller handles communication with a single XIO. The controller requires additional XIO Interface instances to connect to additional XIOs.

When configuring a controller to communicate with multiple XIOs, it is important to configure a unique name for each XIO Interface to be able to identify the XIO that the instance is associated with. You can change the application's default description to a name that provides easy identification of the XIO it connects with.

**IMPORTANT NOTE:** Changing the XIO ID or other configuration parameters on the XIO does not automatically update those same parameters on the XIO Interface. Changing the XIO ID, IP address, or reserved TCP ports will terminate existing connections with the XIO. To restore connection with a reconfigured XIO, manually update the connection parameters on the XIO Interface.

### 1.4.1 Fewer than 10 XIOs required

The number of XIOs required in the field depends on the specific needs of a site. ABB Totalflow controllers support a maximum of 10 XIOs for optimal performance. To support these XIOs, instantiate an XIO Interface for each. The number of applications managed by each XIO Interface depends on the maximum number of applications the XIO can export and the type of application. See section 1.5 Supported XIO applications. For additional information on performance recommendations or large site planning, call ABB technical support.

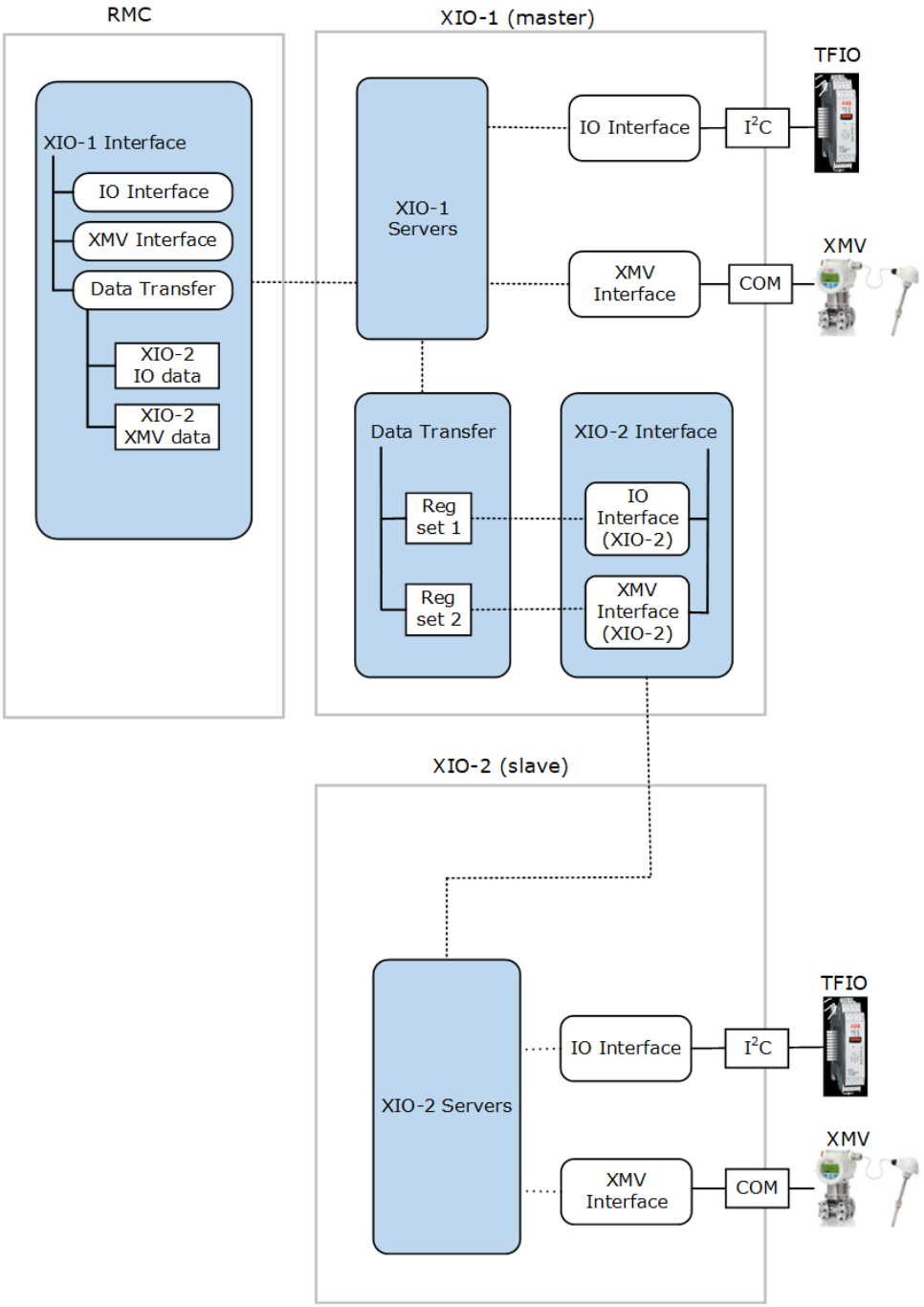
### 1.4.2 More than 10 XIOs required

When the site requires more than 10 XIOs, ABB offers the Data Transfer application, which works in conjunction with the XIO Interface. The Data Transfer application allows the gathering of data from the excess XIOs and the transfer of that data to the top-level controller. This is possible by configuring the XIOs directly managed by the controller to act as conduits for the excess XIOs. The first XIOs are tier-1 XIOs (referred to as masters). The second are tier-2 XIOs (referred to as slaves). The master XIOs use the XIO Interface to communicate with the slave XIOs.

The data from the applications exported from the slave XIO is made available to the top-level controller. On the master XIO, users can manually define the specific registers and data to sync to the controller. On the top controller, users can program operations and indirect registers to sync data to any XIO in the network.

Figure 1-3 shows how to accomplish communications between XIOs in the tiered approach. The master (XIO-1) obtains the slave (XIO-2) data through the XIO Interface application (running on XIO-1). The slave (XIO-2) data is mapped to register sets on the master (XIO-1) Data Transfer application. The XIO-2 application data is available to the RMC through the exported XIO-1 Data Transfer application.

**Figure 1-3: Using the XIO Interface in tiered XIO implementation**




**IMPORTANT NOTE:** For configuration procedures and information on the Data Transfer application, click **Help** from PCCU to display the topic.

## 1.5 Supported XIO applications

The XIO supports a total of 254 applications. Not all these applications are exportable. The XIO can export up to 16 applications including the System application. Therefore, an XIO Interface on a remote controller can handle and display up to 16 applications. Table 1-1 shows the applications supported by the XIO in detail.

**Table 1-1: Totalflow applications supported on the XIO**

| Application | Exportable | Application | Exportable |
|---|---|---|---|
| Alarm System | No | Operations | No |
| AGA3 Measurement | No | PID Controller | No |
| Coriolis Interface | Multiple instances | Plunger Control | No |
| Data Transfer | Single instance | Shutdown System | No |
| Ethernet-Serial Passthrough | No | System | Always exported automatically. Single instance |
| Gas Lift | No | Therms Master | Multiple instances |
| Generic Communication App | No | Trend System | No |
| Holding Registers | No | Wireless Remote IO | Multiple instances |
| IO System | Single instance | XIO Server | Always exported automatically. Single instance |
| LevelMaster | Multiple instances | XIO Write Server | No |
| Liquid Coriolis Interface | Multiple instances | XIO Interface | Multiple instances |
| | | XMV Interface | Multiple instances |

For exportable applications, the XIO can export:

- Only one instance of the System application (always automatically exported)
- Only one instance of the I/O Interface application
- Only one instance of the Data Transfer application
- Multiple instances of the same type of serial communication application (XMV Interface, Wireless I/O Interface, Coriolis Interface, etc.)

For non-exportable applications:

- They can only run locally on the XIO.
- Remote controllers or flow computers cannot manage or use them.

For implementations requiring a large number of applications or XIOs, plan carefully. If you require more applications than those supported, consider using the XIO in Ethernet-Serial Passthrough mode (see link to the Ethernet-Serial Passthrough Application guide in Additional information) or use the Data Transfer Application. Note that with the Data Transfer app, it is possible for a top-level controller to interact with non-exported apps using indirect registers. This method is beyond the scope of this document. For an overview of this type of implementation, see section 1.4 XIO Interface provisioning in multi-XIO scenarios). For details, see the Data Transfer application online help files. For complex scenarios call ABB technical support.

## 1.6 Application screens and configuration options

The XIO Interface application provides several options for communication setup and monitoring of the connection between the controller and the XIO. It also supports the management of applications running on the XIO by making all the remote application screens available on the remote controller. Most of these applications are the communication interfaces used to handle the different types of external devices that can connect to the XIO: multivariable measurement transmitters, Coriolis flow meters, liquid level measurement devices, etc.

The following is a list of the XIO Interface screens and what you can do in each of them. For details, see the procedures sections or the screen-specific help topic.

### 1.6.1 Communications (XIO Interface running on the RMC)

- **Overview**: Obtain quick visual view of RMC-XIO connection status. Monitor and reset main statistics related to read and write requests. See section 6.1.1 XIO Interface Communications: Overview .
- **Setup**: Verify or configure the connection and authentication parameters required to establish and maintain RMC communication with the XIO. Obtain additional details on poll and connection status. See section 6.1.2 XIO Interface Communications: Setup.

- **Status and Statistics**: Monitor several statistics, such as read or write counts, that help determine the performance or health of the communication between the RMC and the XIO. Use the information displayed to help troubleshoot communication errors or failure. See section 6.1.3 XIO Interface Communication: Status and Statistics.
- **Packet Log**: Troubleshoot communication flow on the XIO Interface-XIO Server connections. Packet log is for advanced personnel and may be required by ABB tech support for analysis. See section 6.1.4 XIO Interface Communications: Packet Log.
- **Writes Stats**: Monitor statistics specific to write requests per application. Use information to perform application-specific troubleshooting if errors are suspected. Statistics that are classified per application help to isolate issues for that application. See section 6.1.5 XIO Interface Communication: Write Stats.

### 1.6.2 System (exported XIO app)

- **Station Setup**: View or update basic XIO station parameter configuration. See section 6.2.1 XIO Interface System: Station Setup.
- **Applications**: View the applications running on the XIO. See section 6.2.2 XIO Interface System: Applications.
- **Resources**: Monitor XIO resource utilization such as CPU, memory usage. See section 6.2.3 XIO Interface System: Resources.
- **Registry**: View the XIO's embedded software components and versions. See section 6.2.4 XIO Interface System: Registry.

### 1.6.3 Remote communication applications (exported XIO apps)

Remote communication application screens display the exported applications currently activated on the XIO. The applications are not added on the controller but run on the XIO:

- Coriolis Interface
- Data Transfer
- I/O Interface
- LevelMaster
- Liquid Coriolis Interface
- Therms Master
- Wireless Remote I/O
- XMV Interface

The XIO Interface detects these applications and makes them available on the controller for configuring, monitoring, and troubleshooting communication with the devices (serial or I/O peripherals) connected to the XIO.

**IMPORTANT NOTE:** I/O System or communication application screen descriptions are not included in this document. They are documented separately, and help files are available when you click **Help** on those applications' screens.

# 2 Startup using Auto Discovery (recommended)

These procedures describe how to add and configure the XIO Interface application on a remote controller (the RMC is used as an example) to establish communication with an XIO for the first time. This communication requires that the XIO servers on the XIO are enabled. The XIO [Read] Server and XIO Write Server applications are configured and enabled from the factory. It is recommended to leave their configuration with default values.

Assumptions:

- The startup procedures in this section assume that the interfaces for both the XIO and the controller are configured with valid IP parameters and that the XIO has a unique Station ID. The Station ID helps identify each specific XIO when multiple XIOs connect to the same network.
- Both devices are connected to the same network.
- Auto Discovery is enabled on both devices (default).
- The XIO is fully configured, and local communications or IO applications are configured and set for export. For XIO configuration details, see the XIO User Manual.

**IMPORTANT NOTE:** If XIOs have security enabled (security passcode configured), make sure to configure the same security passcode on the XIO Interface Setup. The XIO Interface cannot access a secured XIO without the code.

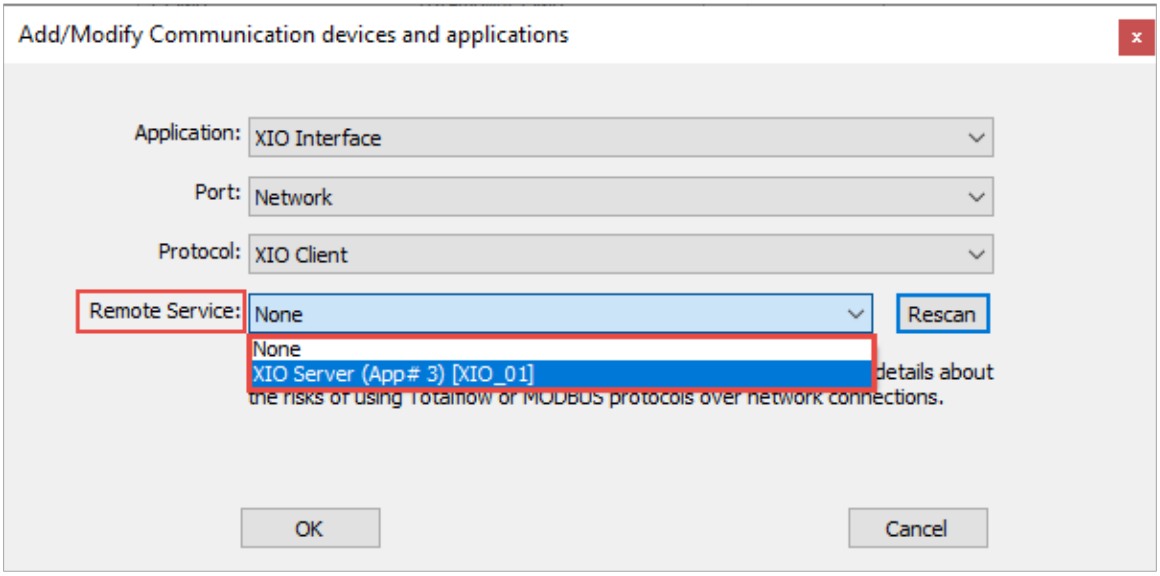
## 2.1 Add the XIO Interface on Communication Setup tab

The XIO Interface is not instantiated on the RMC by default. This procedure uses the Communication Setup tab to add the application. This method is the preferred method to automate and minimize configuration. It benefits from the Auto Discovery feature which allows the controller to automatically discover XIO devices (and servers) and their required connection parameters on the network.

**IMPORTANT NOTE:** XIO Interface instances are assigned to the network port that connects the controller to the same network as the XIOs. A network port can handle multiple logical (TCP) connections on the same physical interface.

Figure 2-1 shows an XIO detected from an RMC. The Remote Service list displays on the Add/Modify Communication devices and applications window. This window displays when adding an application from the RMC Communication Setup screen. When multiple XIOs are installed and connected to the same network as the RMC, the Remote Service field displays all detected XIOs.

**Figure 2-1: RMC detects XIO Server as a remote service**




When the remote controller detects an XIO, it automatically determines its unique Station ID, IP configuration and XIO server TCP port information. These parameters are required to establish connection successfully.

In multi-XIO installations, the remote controller detects multiple remote services. Each advertised XIO server is detected as a remote service and is uniquely identified by the XIO Station ID. When selecting which XIO device the XIO Interface will connect with, make sure to select the correct XIO ID.

Auto Discovery only works when each device on the network has correct configuration. At first-time installation, be sure to configure valid and unique IP parameters and unique XIO IDs.

To add the XIO Interface:

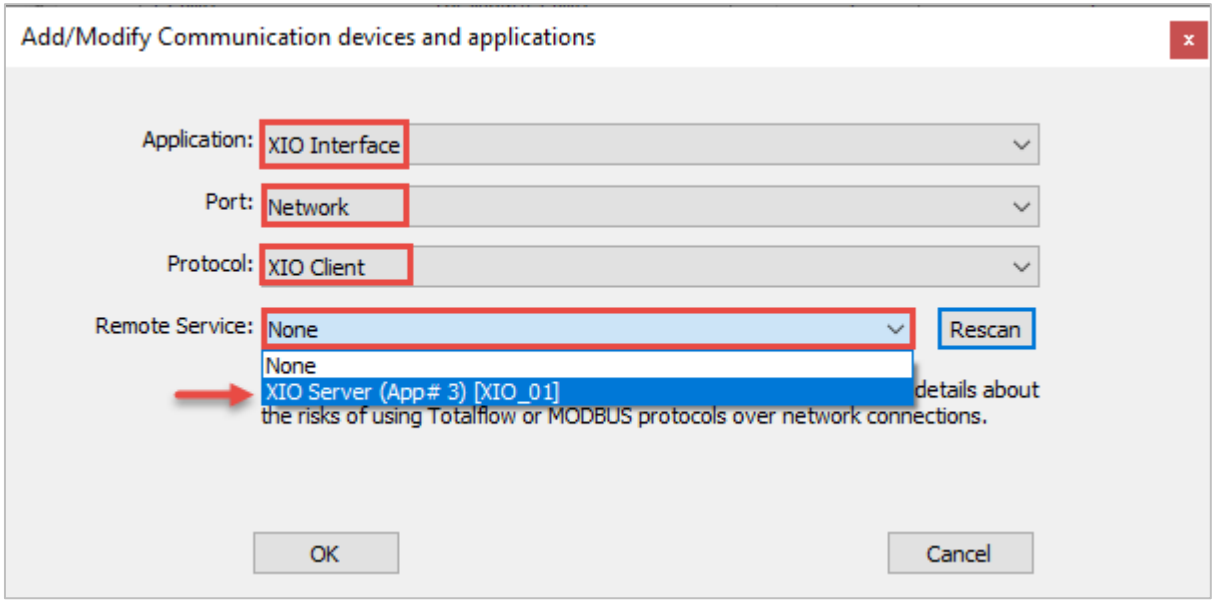
1. Launch another instance of PCCU to connect to the RMC.
2. Click **Entry**.
3. On the navigation tree, select **Communications**, then select the **Services** tab.
4. Verify that Auto Discovery Service is enabled.
5. Select the **Communications Setup** tab.
6. Click **Add New Device/Application**. The Add/Modify Communications devices and applications window displays.
7. Configure the following (see Figure 2-2):
   a. Select **XIO Interface** from the Application drop-down list.

b. Select **Network** from the Port drop-down list.
c. Leave the **XIO Client** (default) on the Protocol drop-down list.
d. Click the **Remote Service** drop-down list. The list of detected XIOs in the field network displays: The XIO Server application displays with each associated XIO ID. In the example, a single XIO is identified as XIO Server [XIO_01]. Identify the correct XIO when multiple XIOs display.

**IMPORTANT NOTE:** Identify the correct XIO when multiple XIOs display. The App# assigned to the XIO Server application on the XIO also displays. It helps identify the specific instance when the application names are the same. In the example shown, the App# is 3 which is the slot number where the XIO Server is instantiated.

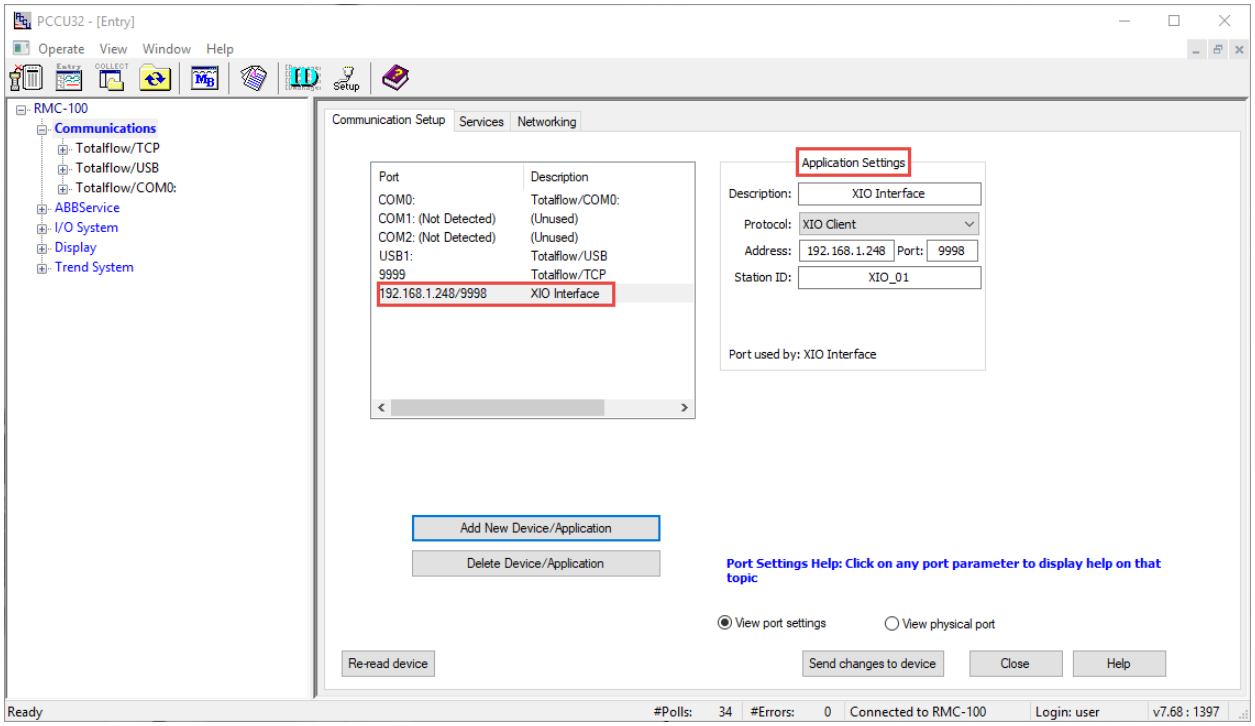
e. Locate and select the XIO from the list. The selected XIO displays in the Remote Service field.

**Figure 2-2: Add the XIO Interface application and assign to detected XIO**



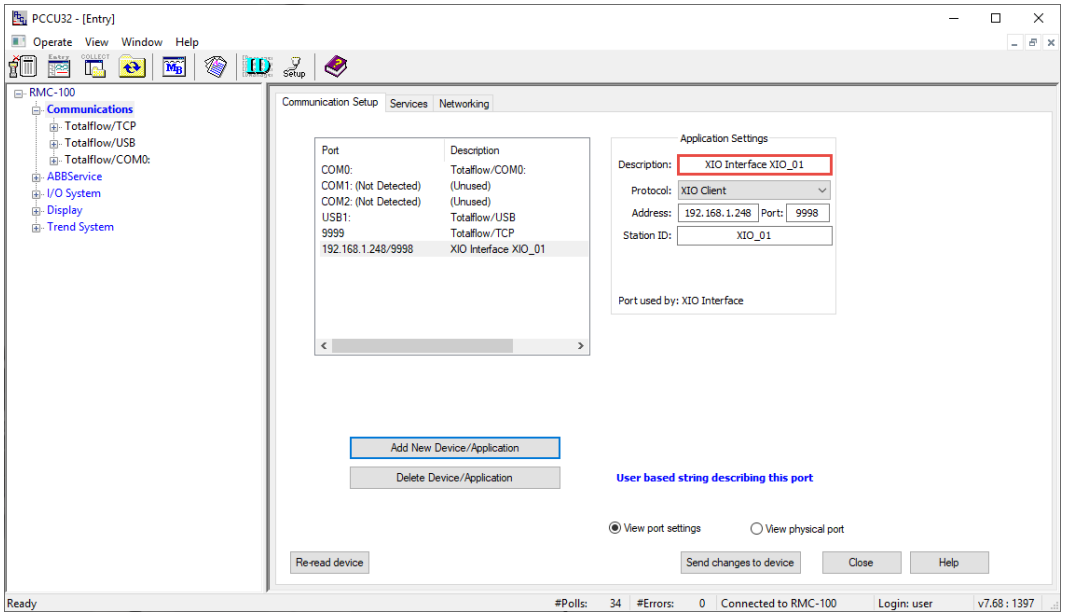

8. Click **OK**. The communication port and application (XIO Interface) for communication with the XIO displays in the port list (Figure 2-3). Note that while the network port was selected in the previous configuration, the list does not display the port with a generic name of Network, but as an IP/TCP port combination (in the example, 192.168.1.248/9998). The IP address is that of the detected XIO, and the TCP port is the logical port that the XIO reserves to grant connection requests from the RMC XIO Interface client. The default XIO TCP port is 9998.

**Figure 2-3: XIO Interface instance XIO IP/TCP port assignment**



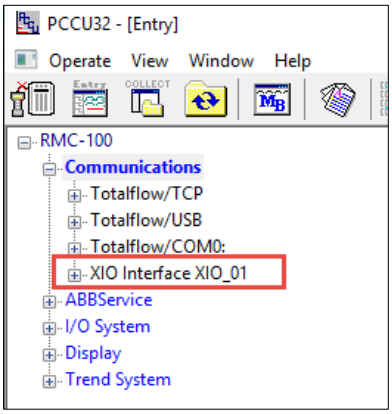

9. Verify the values of the additional configuration fields. The Application Settings section displays the generic description of the XIO Interface, default protocol, detected TCP parameters and XIO Station ID. These values are automatically populated when the XIO Interface was added.
10. For a multiple XIO installation, change the description field to a name that helps identify the XIO. A unique description that includes the XIO Station ID is easier to locate on the navigation tree than the generic default description (XIO Interface or XIO Interface-n).

**Figure 2-4: User-defined XIO Interface instance name (description)**



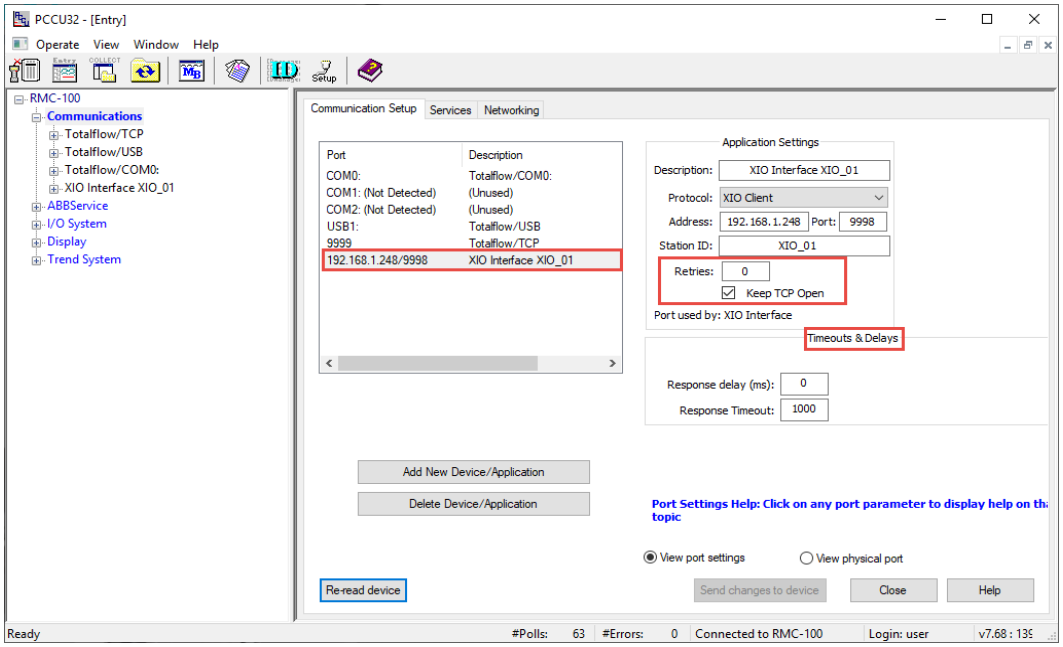

11. Click **Send changes to device**. The XIO Interface application displays in the navigation tree (Figure 2-5).

**Figure 2-5: XIO Interface instance on RMC navigation tree**



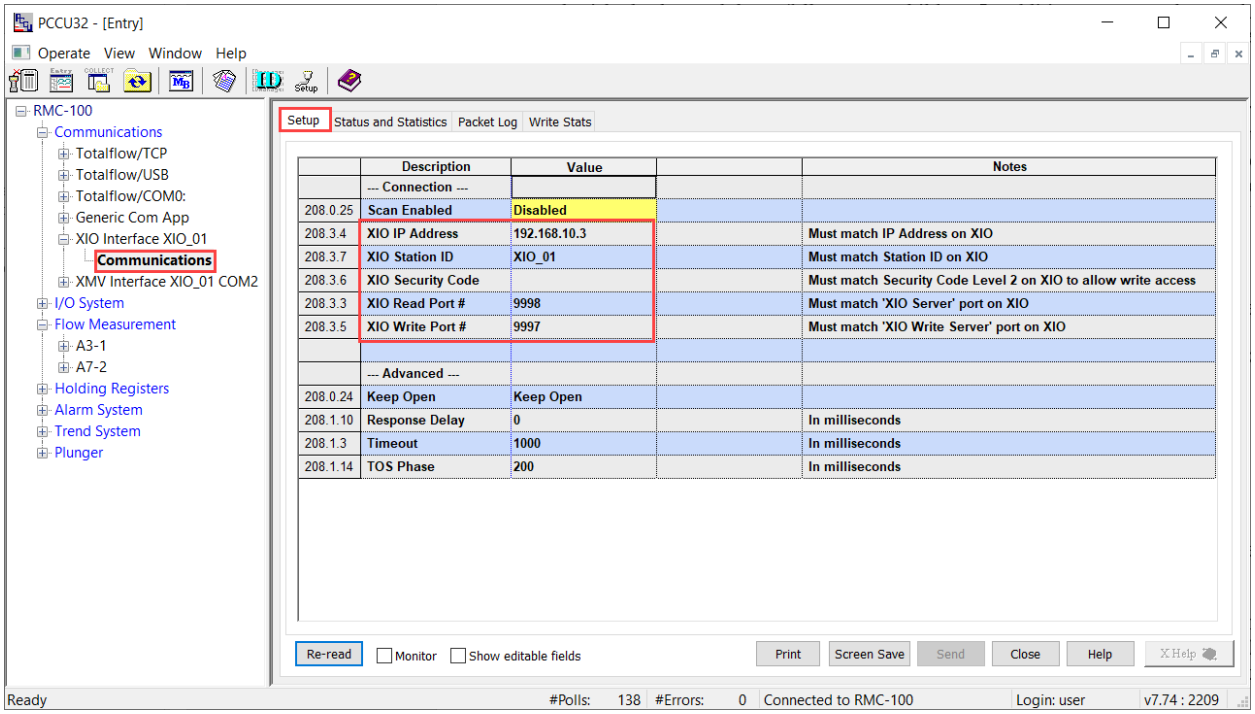

12. If unable to see the XIO interface on the navigation tree, refresh the navigation tree or click **Close**. View or reconnect to verify that the navigation tree displays the XIO Interface application.
13. On the communication setup tab, select the XIO Interface port from the list (Figure 2-6). Notice that the Application Settings section displays additional configuration parameters. The Timeouts & Delays section also displays.
14. The communication parameters are user-configurable, but default values can be used. Change the default configuration of these parameters if necessary.

**Figure 2-6: Additional Application Settings for XIO Interface instance**




15. Click **Send changes to device** if Applications or Time/delays are updated.
16. If you prefer to configure communication parameters on the XIO Interface instance screens:
    a. Select the XIO Interface instance on the navigation tree. (If you have configured a different instance name in the communication setup TCP/IP description field, select that name on the tree.) Then, select **Communications**. The Setup screen displays.
    b. On the Setup screen, under the Advanced section (Figure 2-7), ensure the Keep Open Parameter is set to: **Keep Open**, and update the other parameters as required.

**Figure 2-7: XIO Interface communication setup**




17. Enable the Scan function next.

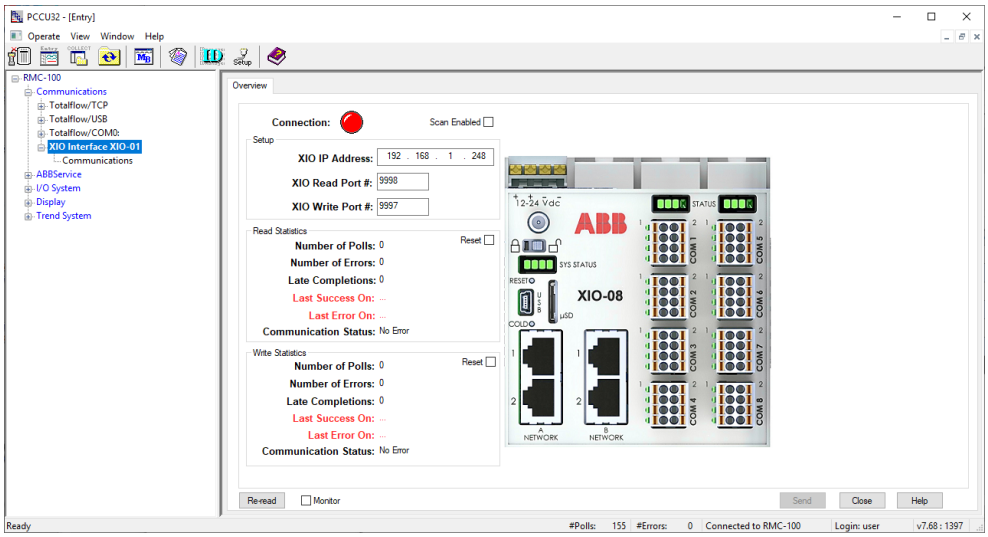
## 2.2 Enable Scan

The scan function enables the ability to read from or write to the XIO. It is required for successful RMC-XIO communication.

To enable scan:

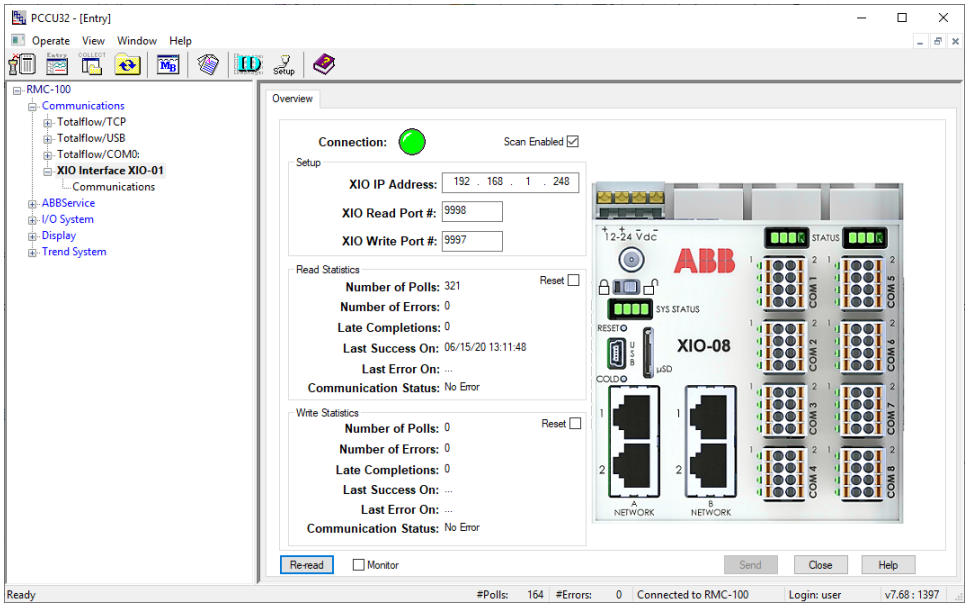
1. Select XIO Interface on the navigation tree (if you configured a different port name in the communication setup TCP/IP description field, select that name on the tree). The **Overview** tab displays and provides the status of the connection between the RMC and the XIO. At first installation, the connection status is red because the RMC is not yet enabled to communicate with the XIO (Figure 2-8).

**Figure 2-8: XIO Interface overview screen – default**




2. Select **Scan Enabled**.
3. Click **Send**.
4. Click **Re-read** to refresh the screen.

**Figure 2-9: XIO Interface overview screen – Scan Enabled**




5. Verify the status of the RMC-XIO connection:
   a. The connection is successful if the Connection indicator is green (Figure 2-9). The Communication Status under the Read Statistics section should display: No Error.
   b. The connection failed if the Connection indicator is red. The Communication Status under the Read Statistics section displays: Connection Timeout. If the connection indicator stays red (or yellow) for long, proceed to section 5 Troubleshooting.
6. Add additional XIO Interface instances and enable scanning for additional XIOs if necessary.
7. Verify that exported applications display (see section 2.3 Verify exported applications display in the navigation tree).

Once XIO Interface instances are added and scanning is enabled, no further configuration is necessary unless the XIO Station ID or IP configuration is updated later. The XIO Interface does not automatically update XIO connection parameters, so further communication with a reconfigured XIO would fail. When the XIO connection parameters are updated, make sure to update the same parameters on the XIO Interface.

## 2.3 Verify exported applications display in the navigation tree

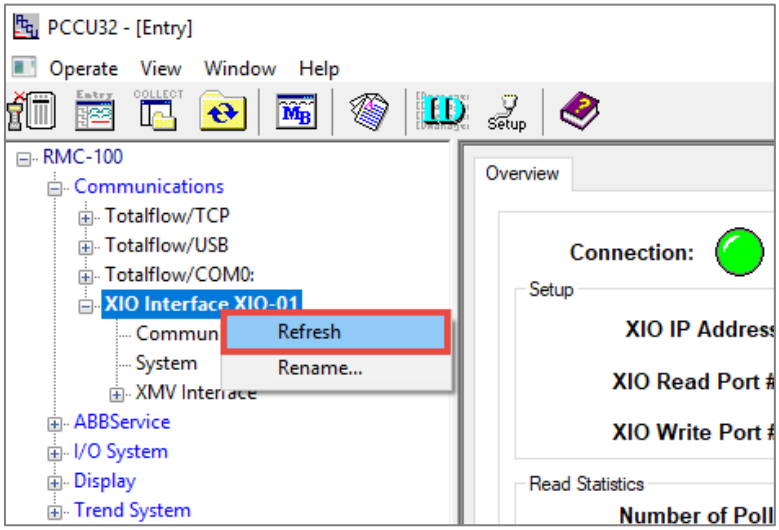
When scan is enabled and successful, the XIO Interface application can start polling the XIO. The XIO Interface automatically determines the applications the XIO exported and displays those applications on the navigation tree. This procedure verifies that the exported applications are visible from the RMC.

**IMPORTANT NOTE:** In multi-XIO installations, each XIO Interface instance displays the applications exported by the XIO it is assigned to. Perform this procedure for each instance as necessary.

Verify exported applications under the XIO Interface:

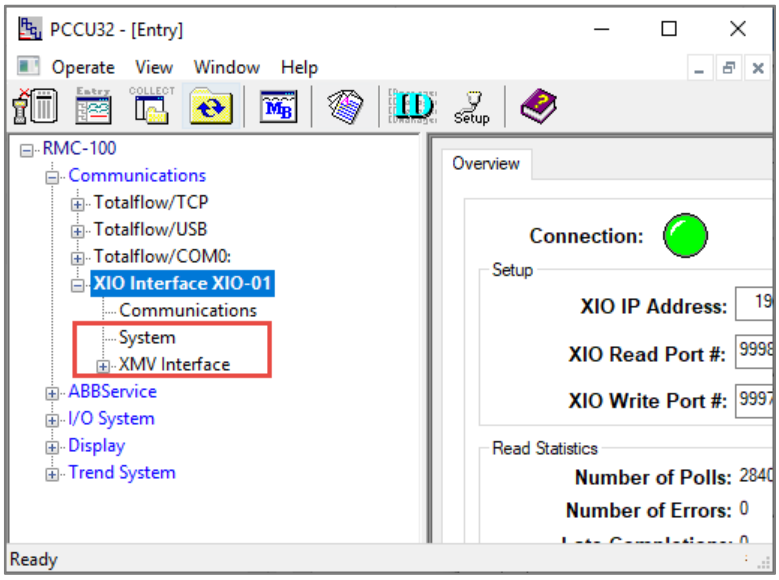
1. On the navigation tree, right click on the XIO Interface instance, then select **Refresh**.

**Figure 2-10: Refresh XIO Interface instance from navigation tree**




2. On the navigation tree, expand the XIO Interface instance to display all its detected applications.
3. Verify that the exported XIO applications display under the XIO Interface instance.

**Figure 2-11: Exported XIO applications displayed under an XIO Interface instance**




4. If expected applications do not display, make sure those applications are configured for export on the XIO. Note that the XIO System application is automatically exported, but applications added by the user must be manually set for export. See section 5 Troubleshooting if needed.

## 2.4 Configure the XIO security code

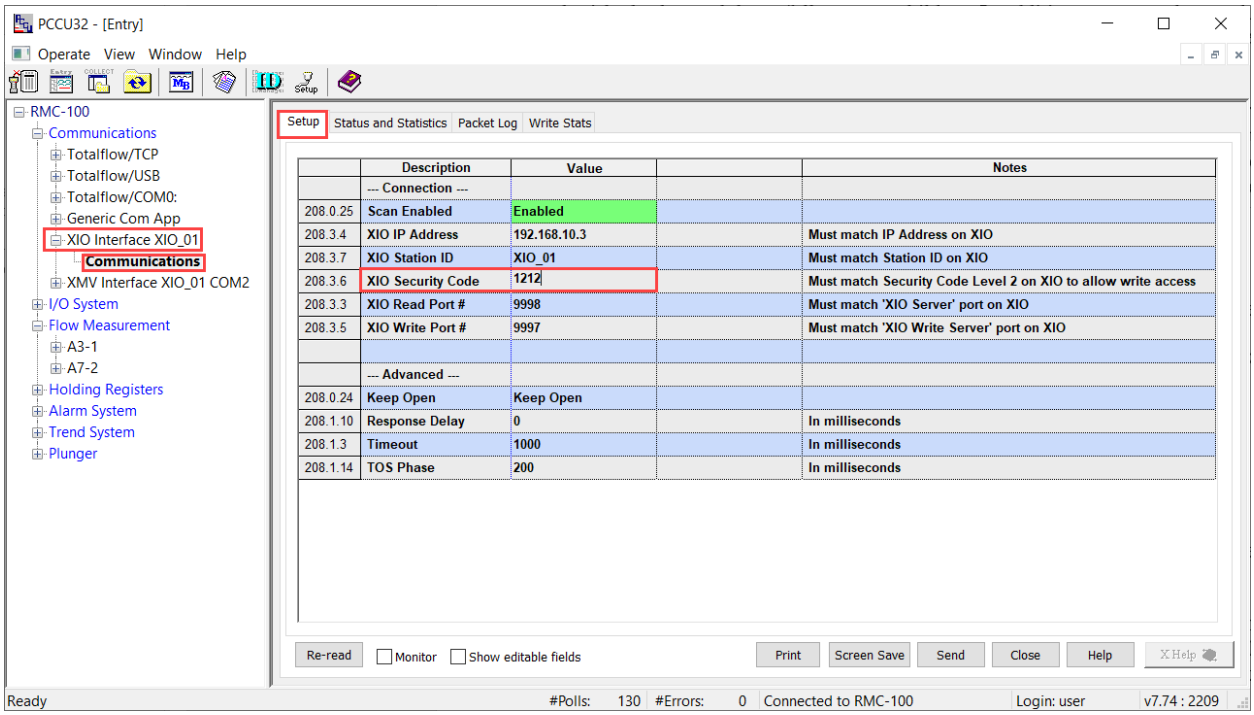
The XIO Interface application requires read and write privileges to work properly with the XIO. The correct XIO level 2 security code in the XIO Interface allows controller writes on the XIO, otherwise connection fails.

**IMPORTANT NOTE:** This procedure assumes that an XIO level 2 security code is configured on the XIO, and that the code was recorded for safe keeping. Once configured, the security code is not visible on the screen. Before proceeding, obtain the correct code. Note that the position of the security switch on the XIO does not remove the requirement for the XIO Interface App to be configured for level 2 access. An XIO may also have a level 1 security code configured. This level, however, allows only read privileges. An XIO interface configured with a level 1 security code will only be allowed to read XIO data.

To enter the XIO security code in the XIO Interface:

1. On the navigation tree, expand the **XIO Interface** and then select **Communications**. The **Setup** tab displays.
2. On the **Setup** tab, under the Connection section, locate the **XIO Security Code** value field.
3. Type the XIO level 2 security code. It should match the security code level 2 configured in the XIO.

**Figure 2-12: Configure XIO level 2 security for each XIO Interface instance**




4. Click **Send**.
5. Click **Yes** to confirm. Note that the security code is no longer visible.
6. Monitor the connection, as described in section 4 Operation.
7. Verify that there are no read/write errors. If errors occur or communication fails, see section 5 Troubleshooting or the Setup or Statistics screen descriptions.

# 3 Manual XIO Interface communication setup

Use this procedure if the XIO Interface application was added from the **Application/License Management** tab or if the assigned XIO has been reconfigured. If the XIO Interface instance has not been added yet, follow the procedure in section 2.1 Add the XIO Interface on Communication Setup tab.

Communication setup parameters are not automatically detected when the XIO interface is added from the **Application/license Management** tab (first time installation) or when the XIO parameters are changed (after initial successful communication).

Always ensure that configured values on the XIO Interface match those on the XIO. Verify and obtain the communication parameters from the XIO to complete this procedure.

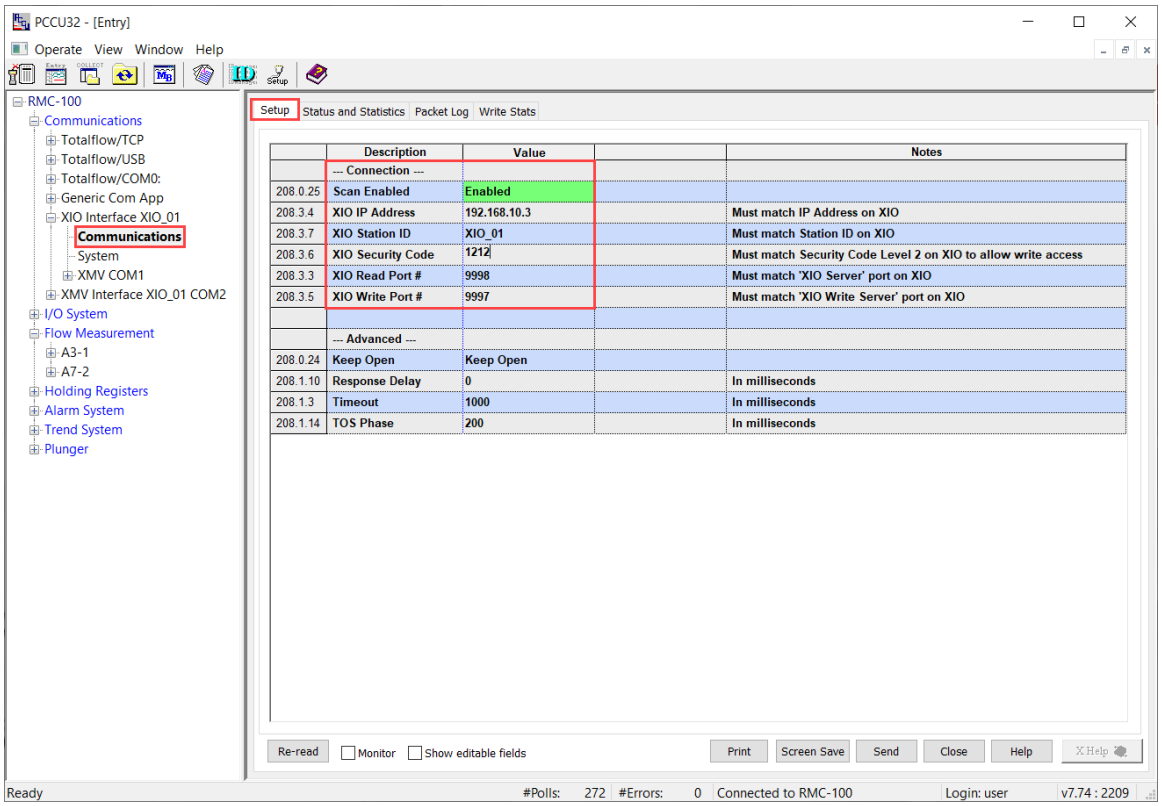
**IMPORTANT NOTE:** Changing the XIO IP address reinitializes the XIO Interface application. All data associated with the existing IP address is replaced by data associated with the new IP address. This data includes all the exported applications along with their data.

To set up communication:

1. On the Navigation tree, expand the XIO Interface, then select **Communications**. The Setup screen displays.
2. Under the Connection section:
   a. From the **Scan Enabled** drop-down list, select **Enabled**.
   b. Type the XIO IP address. Make sure the IP address is the address for the network connecting the RMC with the XIO. Depending on configuration, the XIO may have more than one IP address configured. Use the correct address.

c. Type the XIO Station ID.
d. Type the security code (level 2) if security is enabled on the XIO.
e. Type the XIO Read and Write ports only if using bi-default values. Make sure non-default ports are not in use by other processes or applications.

**Figure 3-1: XIO Interface Communication Setup**

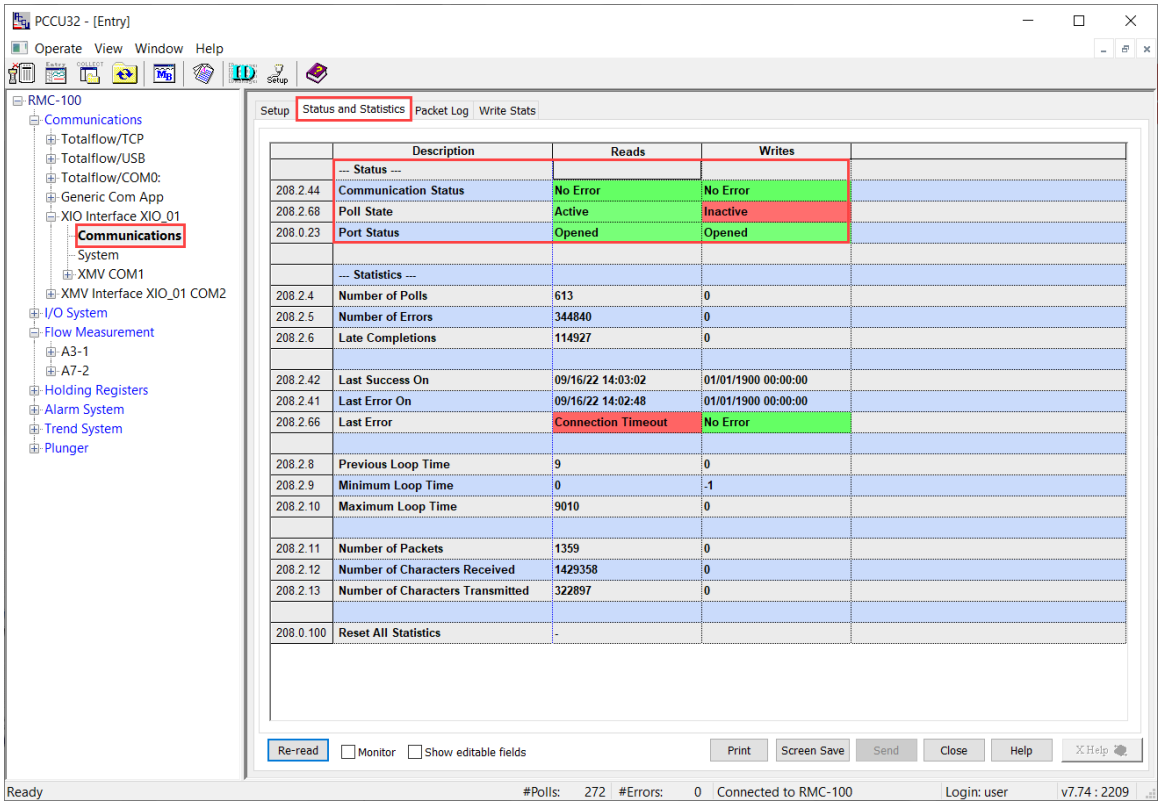



3. Click **Send** to save connection parameters. After the device saves the configuration, wait 4 to 5 seconds for the device to be ready for communication, then proceed to the next step.
4. Select the **Status and Statistics** tab (Figure 3-2).
5. Under the **Status** section verify that:
   a. The communication status for reads and writes displays: No Error.
   b. The Poll State for reads displays: Active.

**IMPORTANT NOTE:** The Poll State for writes shows Inactive until at least one write has occurred. At first-time installation, an inactive poll state for writes does not indicate an error in communication. Writes are issued only as needed.

   c. The Port Status displays: Opened. This indicates the RMC-XIO connection is successfully established.

**Figure 3-2: Verifying communication Status section from the Status and Statistics tab**




6. On the navigation tree, right-click the XIO Interface instance and select **Refresh**.
7. Verify that all exported applications from the XIO display under the XIO Interface instance.

# 4 Operation

## 4.1 Monitor overall communication with the XIO

The XIO Interface communication Overview screen provides quick visual connection status. Use this screen to verify the overall health of the RMC-XIO communication.

To monitor communication with the XIO:

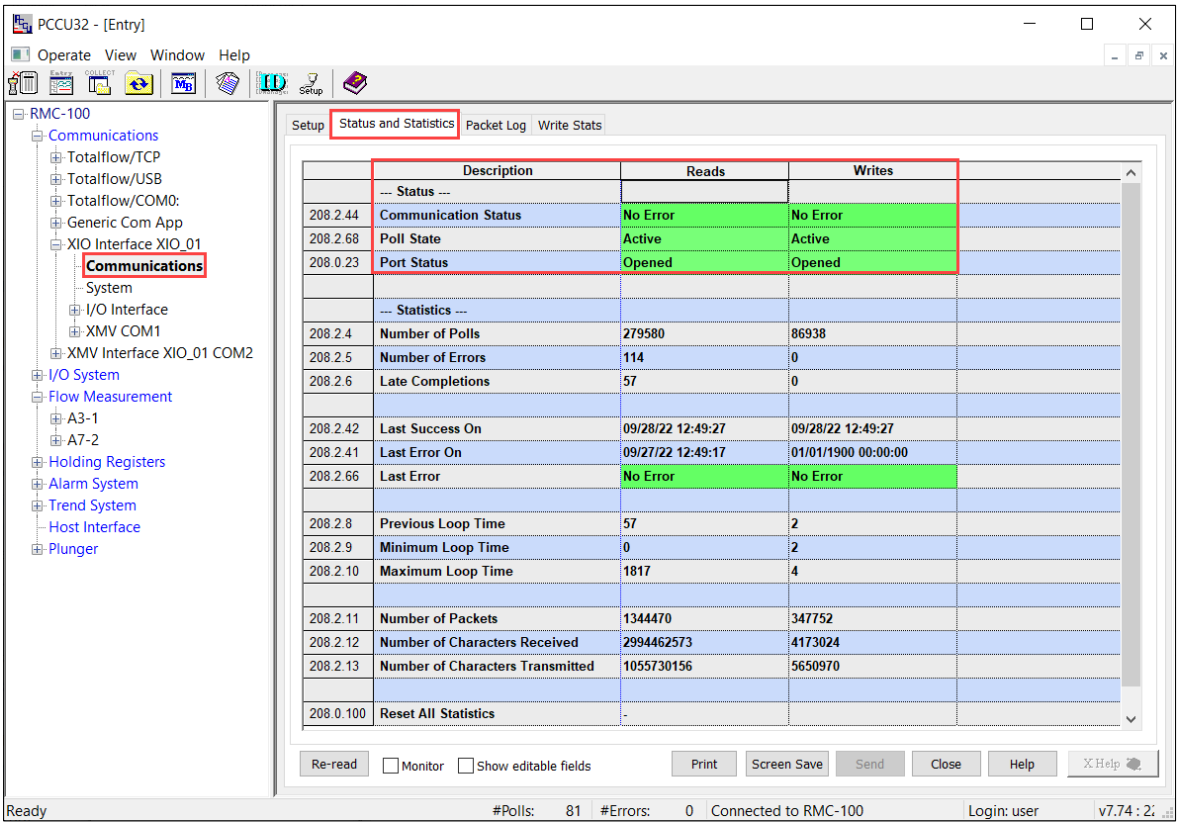
1. On the Navigation tree, select the XIO Interface. The Overview screen displays.
2. Verify the connection indicator color.
3. Ensure the indicator is green and the Scan Enabled is selected.
4. Monitor statistics for any errors that display. Reset statistics to monitor if errors continue to appear. If they continue to increase, proceed to troubleshoot.
5. If the connection indicator remains red or yellow, proceed to troubleshoot. Observe the communication status for both the read and write connections to determine if communication failure has occurred for both connections, or only for one.

# 5 Troubleshooting

The XIO Interface **Overview** and **Status and Statistics** tabs display parameter values used to monitor connection status and report statistics per reads and writes. The XIO Interface monitors the read and write connections separately, helping to isolate issues specific to each flow. For additional troubleshooting procedures, refer to the XIO User Manual. See the Additional information section for a link to the manual.

When XIO-controller communication is successfully established, the status or Reads and Writes will show no error. The connections established are ready for the controller to read from or write data to the XIO as shown in Figure 5-1.

**Figure 5-1: Successful XIO-controller connection**




**IMPORTANT NOTE:** Before troubleshooting communication issues verify that the values for the **XIO IP address**, **XIO Station ID** and **XIO Security Code** are correctly configured in the XIO Interface **Setup** tab.

## 5.1 Connection indicator stays red or yellow

The connection indicator displayed on the Overview screen allows quick visual verification of the state of the communication with the XIO. An indicator that remains red or yellow indicates connection failure. For specific Ethernet troubleshooting, see the Networking Communication Guide. See the Additional information section for a link to the guide.

1. On the Navigation tree, select the XIO Interface instance of interest. The **Overview** tab displays.
2. Verify that **Scan Enabled** is selected. If not, select it, and click **Send**.
3. Click **Re-read** and verify if the connection indicator turns green.
4. If the indicator remains red, verify the physical connections for each the RMC and the XIO. Network connections for both devices must be active for communication to take place. Check network equipment also. Failure of field network switches/routers can cause the devices to lose connection or IP configuration if DHCP is used.
5. If cabling and network connections are ok, select **XIO Interface**>**Communication** on the navigation tree.
6. On the **Setup** tab, verify that the connection parameters for the XIO displayed on the screen match the parameters set up on the XIO device. Reconfigure if necessary.

## 5.2 Missing XIO applications from the navigation tree

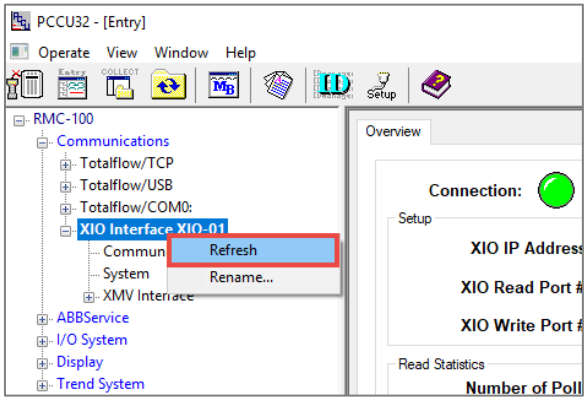
The XIO Interface must detect the XIO applications. If XIO applications do not display on the navigation tree under an XIO Interface instance, verify that the applications are set for export.

Only applications that support export can display under the XIO Interface instances.

To verify if an application is exported:

1. On the navigation tree, right click the XIO Interface instance and select **Refresh**.

**Figure 5-2: Refresh XIO Interface instance from the RMC navigation tree**




2. Expand or select the XIO Interface instance.
3. Verify if the missing application displays after the refresh. If the application does not display, continue to the next step.
4. On the navigation tree, select **System**. The Station Setup screen displays.
5. Select the **Applications** tab.
6. Locate the application of interest and verify that the application shows as exported. If it is not exported, connect to the XIO and set the configuration for export from the XIO Application/Licensing Management screen.
7. Verify that the application displays under the XIO Interface.

## 5.3 Communication Status for writes displays: Request Not Accepted

The remote controller-XIO connection is established but writes by the controller are not accepted by the XIO. This error displays if the XIO level 1 security code (instead of level 2) is configured in the XIO Interface Setup. Using level 1 security code allows only read access to the XIO. Figure 5-3 shows this error on the **Overview** tab. Figure 5-4 shows this error in the **Status and Statistics** tab.

**Figure 5-3: Write Communication Status error message - Request Not Accepted (Overview tab)**

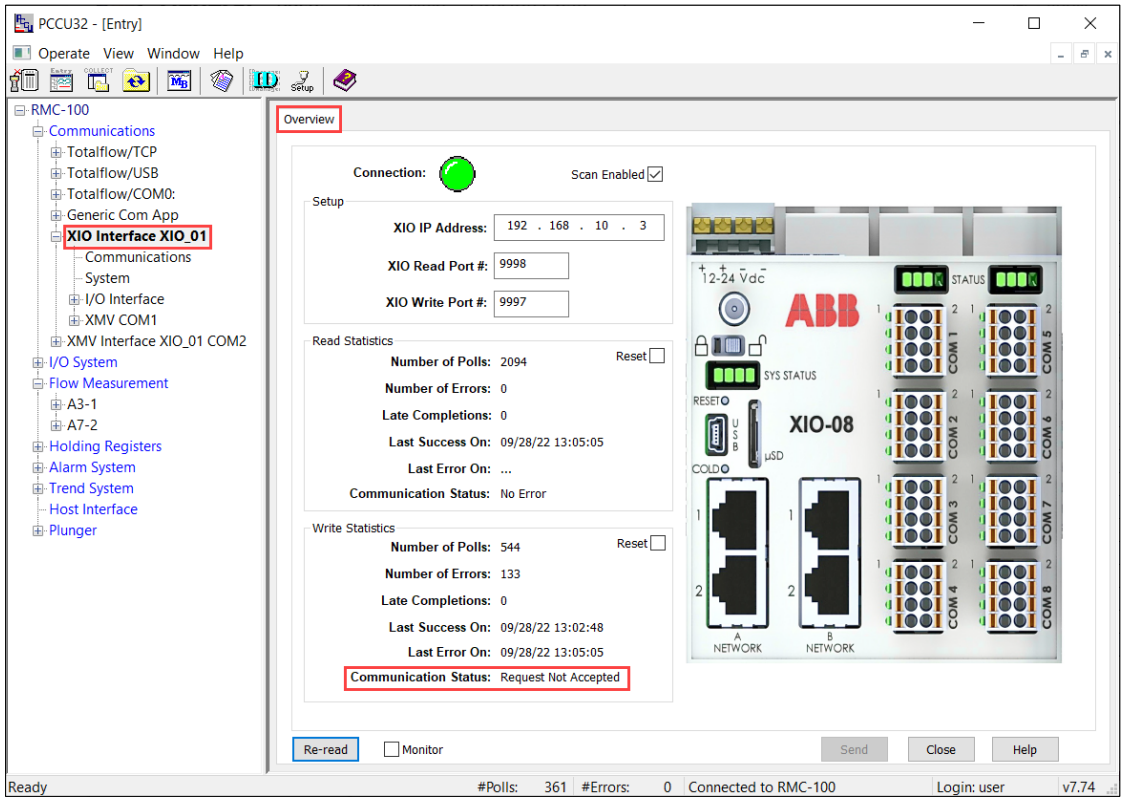
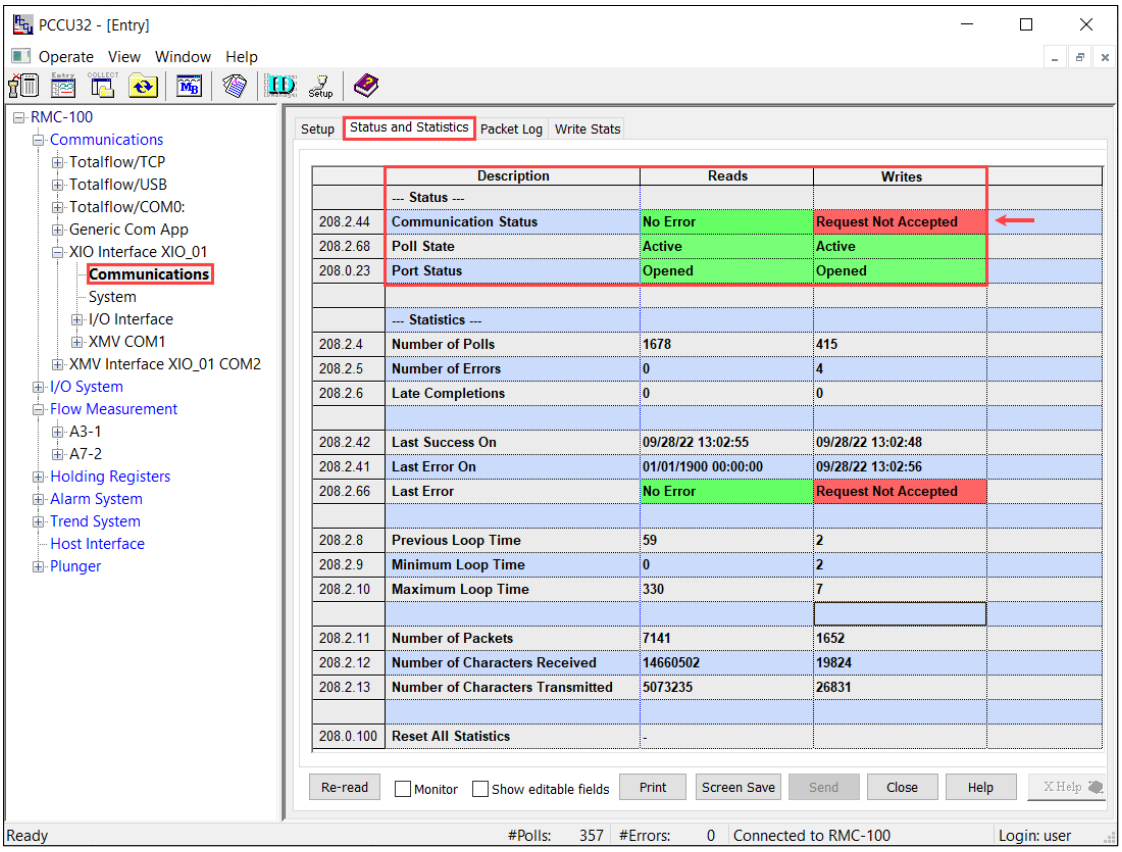


**Figure 5-4: Write Communication Status error message - Request Not Accepted (Status and Statistics tab)**




There is no way to verify an existing security code as it is not visible once it is saved. It is expected that any security code configured is recorded for safe keeping.

To reconfigure the security code:

1. Obtain the level 2 security code used on the XIO.
2. Type the same security code in the XIO Interface Setup screen.

To verify that the security code change works:

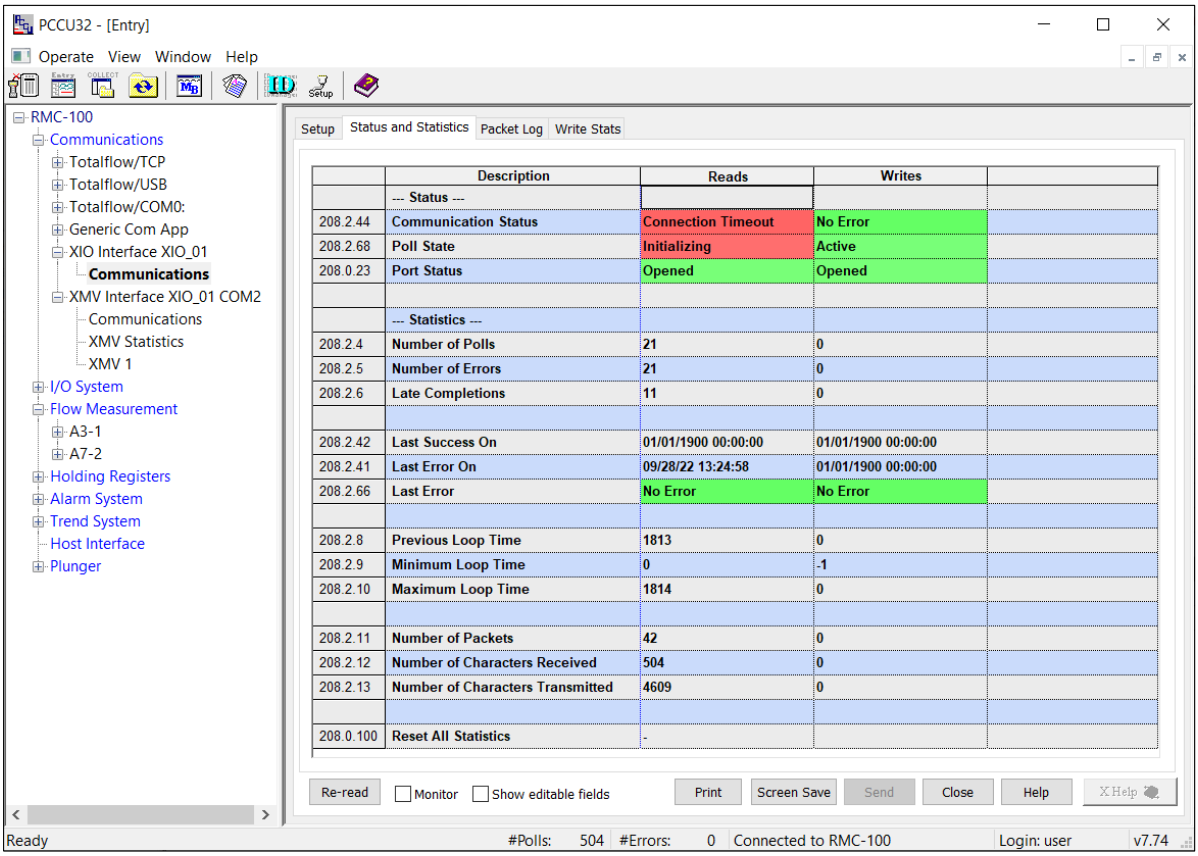
1. Expand the XIO Interface instance and then select **Communications**.
2. On the Setup screen, under the Connection section, type the security code for the XIO.
3. Click **Send**.
4. Select the **Status and Statistics** tab.
5. Click **Re-read** and verify the communication status for writes. It should display: No error.

**IMPORTANT NOTE:** The Poll State for writes may show Inactive until at least one write has occurred. At first-time installation, an inactive poll state for writes does not indicate an error in communication. Writes are issued only as needed.

## 5.4 Communication Status for reads displays: Connection Timeout

The remote controller-XIO connection fails due to incorrect security code. Figure 5-5 shows the error displayed. In this case the controller attempts to establish connection but no read access or write access is granted and the connection fails.

**Figure 5-5: Connection Timeout due to incorrect security code**




To correct the security code:

1. Obtain the correct level 2 security code configured in the XIO.
2. On the RMC, Expand the XIO Interface instance and then select **Communications**.
3. On the Setup screen, under the Connection section, type the level 2 security code for the XIO.
4. Click **Send**.
5. Select the **Status and Statistics** tab.
6. Click **Re-read** and verify the communication status for reads. It should display: No error.

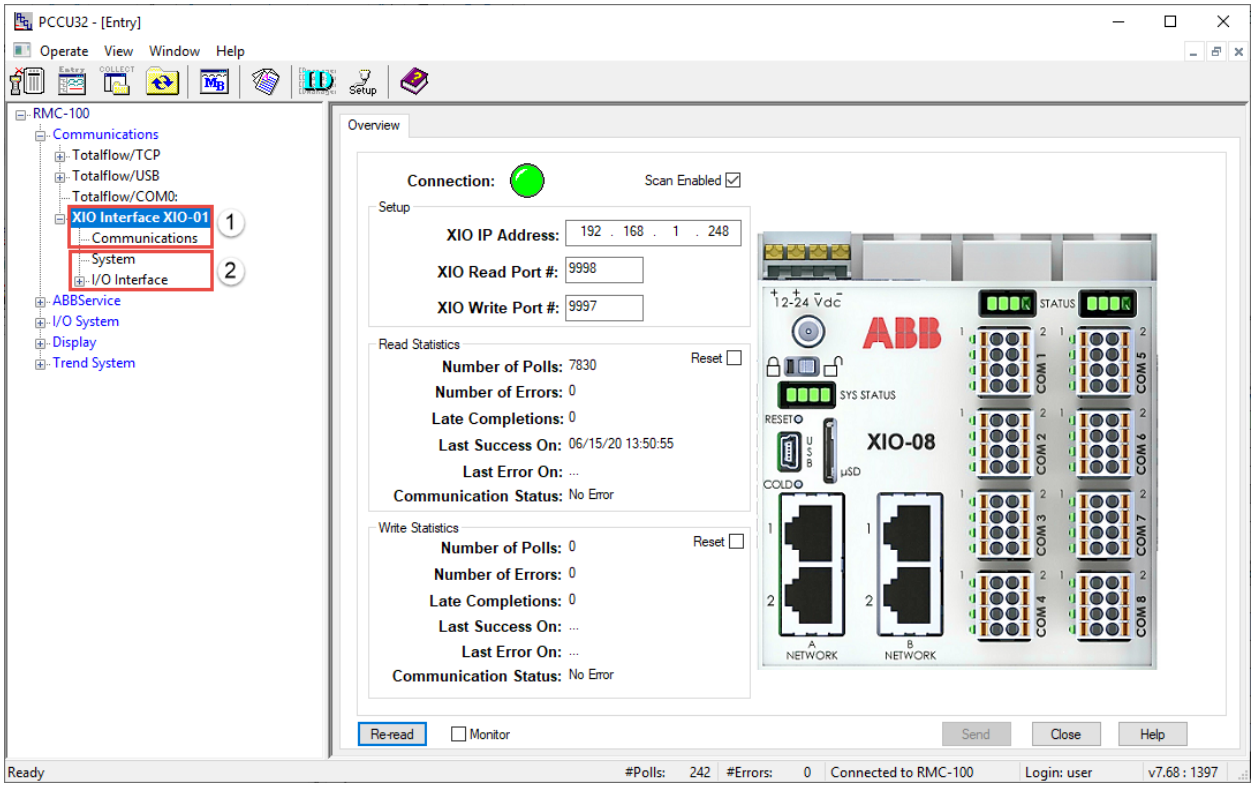
# 6 Reference Information

## 6.1 XIO Interface application screens

The information included in this section provides detailed parameter descriptions for each of the XIO Interface screens; (see item 1 in Figure 6-1). These screens include the default Overview screen (shown in the capture), and the Communication Screens: Setup, Packet Log, Statistics, Write Stats. For exported application screens; (see item 2 in Figure 6-1), refer to section 6.2 Exported application screens: System application.

**IMPORTANT NOTE:** On the remote controller's PCCU navigation tree, each XIO Interface instance displays all exported applications from the associated XIO; (see item 2 in Figure 6-1). The applications displayed may vary depending on which applications are exported by the XIO. In the example below, the System and I/O Interface applications display.

**Figure 6-1: XIO Interface screens and exported applications**




The I/O Interface application and communication application screen descriptions are beyond the scope of this guide. The applications are documented in other manuals and the help files.

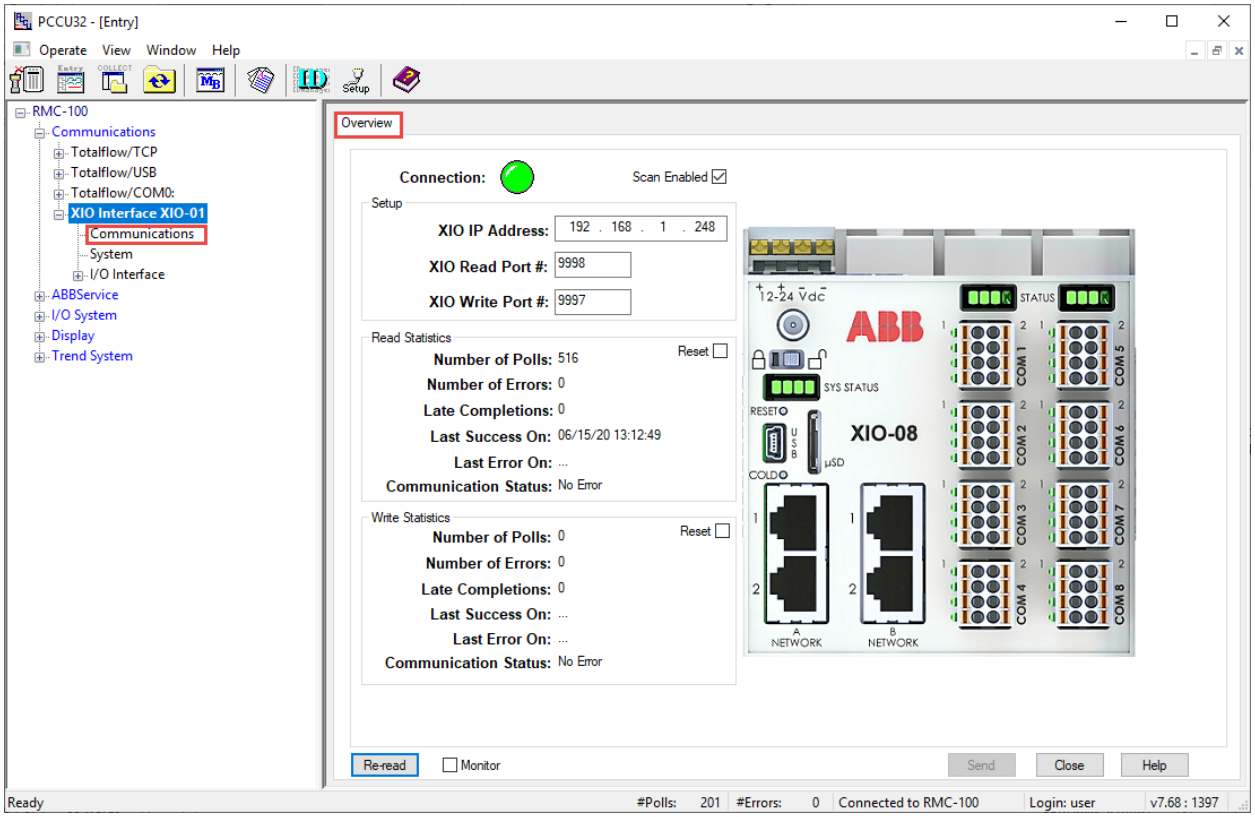
## 6.1.1 XIO Interface Communications: Overview

The Overview screen provides a brief overview of the communication status and statistics related to read and write requests.

The screen displays setup information for the XIO it connects with and statistics for the connections supported:

- The Read Statistics section provides an overview of the connection established with the XIO [Read] Server. This connection manages the flow of Reads.
- The Write Statistics section provides an overview of the connection established with the XIO Write Server. This connection manages the flow of writes.

**Figure 6-2: XIO Interface Overview Screen**




### 6.1.1.1 Enable Scan

Scanning is disabled by default. Check the Scan Enabled box to enable scanning. Enabling scanning is required for successful remote controller-XIO communication. Enable as soon as the configuration verification or update is complete. The Enable scan option is also available in the Setup screen.

### 6.1.1.2 Communication parameter verification or configuration

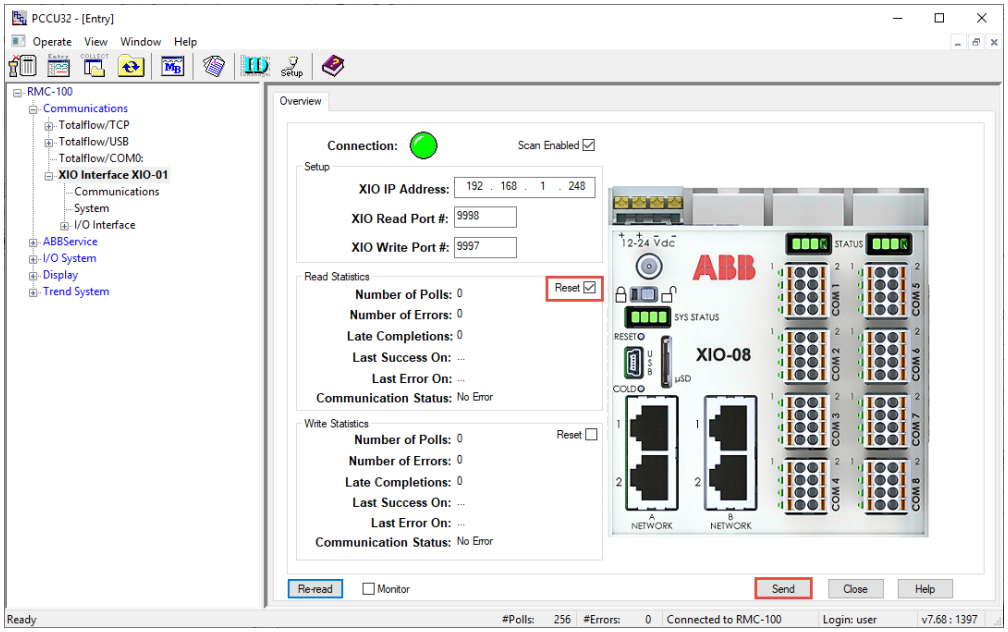
If the XIO communication parameters in this screen are not automatically populated, you can configure the parameters on this screen.
Always obtain the XIO parameters from the XIO device to ensure that the XIO Interface connection parameters match that on the XIO. Mismatched parameters prevent connection with or access to the XIO.

### 6.1.1.3 Statistics reset

Statistic reset is available on the Overview screen. Resetting statistics is useful for troubleshooting purposes or when changing communication parameters. It helps to monitor whether errors cease or continue to accumulate after corrective measures are taken.
The screen displays statistics for the read and the write connections. You can reset read or write statistics separately in two ways:

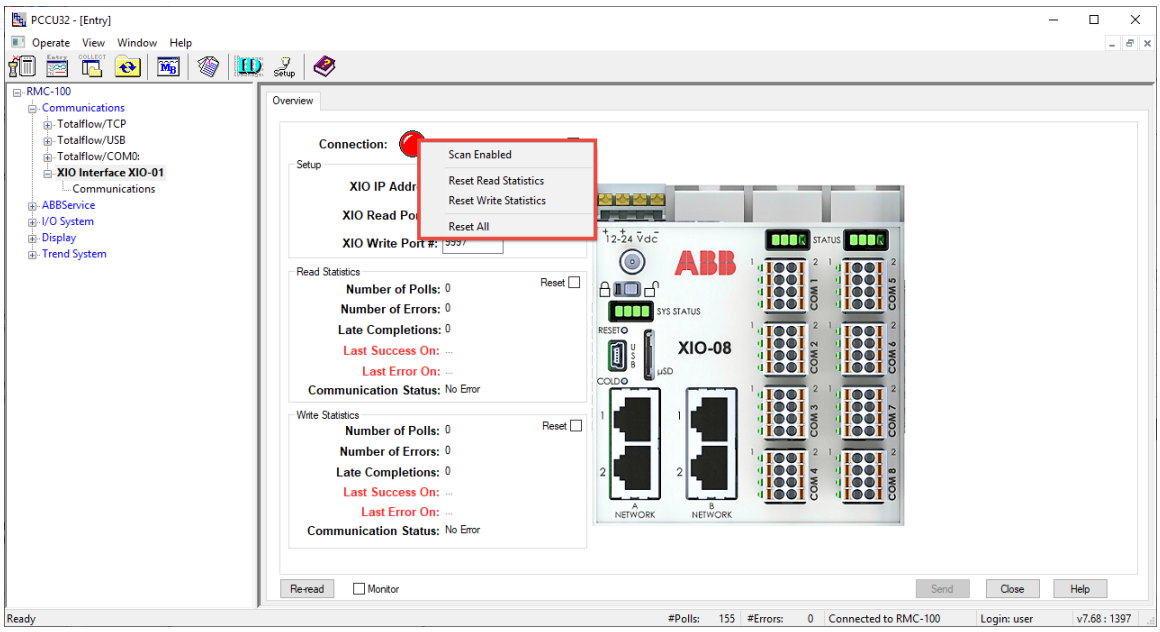
1. From each statistic section: Select **Reset** and then click **Send**.

**Figure 6-3: Reset from Read or Write Statistics sections**




2. From the top of the screen (quickest way): Right-click the connection indicator and select **Reset Read Statistics** or **Reset Write Statistics**. The statistic resets without the need to click **Send**. Reset all statistics onscreen by selecting **Reset All** if necessary.

**Figure 6-4: Reset from connection indicator**




### 6.1.1.4 Parameter Description

The table below provides parameter or function descriptions for the Overview screen.

**IMPORTANT NOTE:** The Scan Enabled and Statistics Reset options are also available by right-clicking the Connection indicator (Figure 6-5).

**Figure 6-5: Reset from connection indicator**

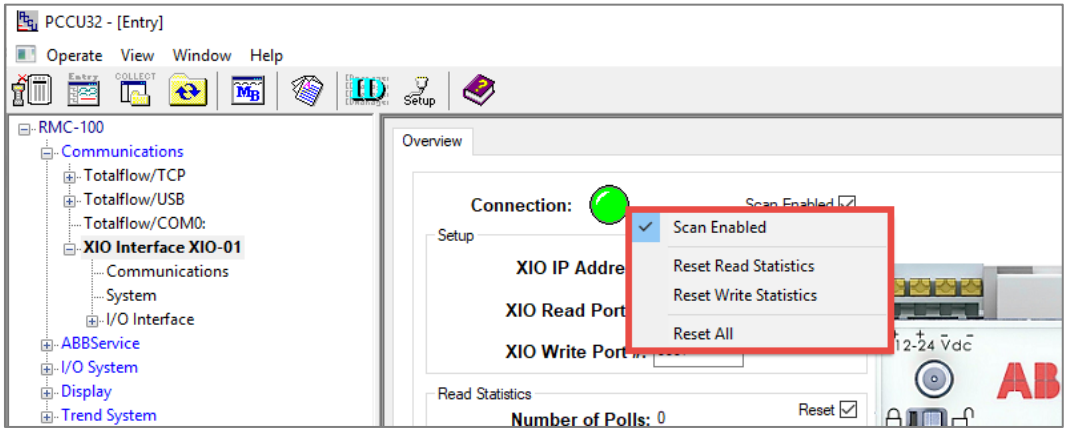



**Table 6-1: XIO Interface Overview screen parameter description**

| Parameter/ Function | Description | Values |
|---|---|---|
| Connection Indicator | Provides visual indication of the overall status of the RMC-XIO communication.<br>The expected sequence at the startup of the XIO Interface application is from red, to yellow, to green.<br>If the indicator is red or yellow for long, check connection parameters or physical connection with the XIO (cables, connectors, network equipment). | Indicator color changes to reflect the following conditions:<br>– Red: Poll State is initializing, configuring, or stopped. Communication Status is reporting an error. Port Status is Closed.<br>– Yellow: Poll State is synchronizing.<br>– Green: Communication with the XIO is successfully established. The poll state is active. The port status is opened. |
| Scan Enabled | Function to enable or disable read or write communication with the associated XIO. | Select checkbox: Enable continuous reads and required writes from and to the XIO.<br>Clear checkbox (default): Do not perform reads and writes from or to the XIO. Scan disabled closes the TCP connection. |
| **Setup** | | |
| XIO IP Address | The Internet Protocol (IP) address of the XIO that the device uses to establish connection.<br>**Note:** The XIO may have more than one IP address depending on the field network topology and connections. Configure the IP address that is valid for the network the controller connects to the XIO on. | Automatically populated if the XIO Interface is added from the Communication Setup tab and the controller detects the XIO with auto discovery. If not automatically configured, the default value is: 0.0.0.0<br>Manually configure if the XIO Interface is added from the Application/Licensing tab or if the XIO is reconfigured: Type new IP address.<br>**Note:** Changing an existing IP address will reinitialize the application and all the data from the XIO represented by the existing IP address is replaced by data from the XIO represented by new IP address. This data includes all the exported applications and their data. |
| XIO Read Port # | TCP port that the XIO [Read] Server listens to for XIO Interface connection requests and communication flow for reads. The connection established for reads is a separate logical connection from the connection for writes. | Automatically populated if the XIO Interface is added from the Communication Setup tab and the controller detects the XIO with auto discovery.<br>Manually configure if not using the default value: Type the TCP port number assigned to the XIO Server on the XIO.<br>Default value: 9998<br>Valid values: 1024 - 65535 |
| XIO Write Port # | TCP port that the XIO Write | Automatically populated if the XIO Interface is |

| Parameter/ Function | Description | Values |
|---|---|---|
| | Server listens to for XIO Interface connection requests and flow for writes.<br>The connection established for writes is a separate logical connection from the connection for reads. | added from the Communication Setup tab and the RMC detects the XIO with auto discovery.<br>Manually configure if not using the default value:<br>Type the TCP port number assigned to the XIO Write Server on the XIO.<br>Default: 9997<br>Valid values: 1024 - 65535 |
| **Read Statistics** | | |
| Number of Polls | Number of times the device successfully reads data from the XIO.<br>The count usually increments by 1 every second, but depending on the size of data to poll, it may increment by more than 1 every second. | Read-only<br>Valid values: 0 - 4294967295 |
| Number of Errors | Number of times the device could not read data from the XIO due to an error. The count increments only when there is an error. | Read-only<br>Valid values: 0 - 4294967295 |
| Late Completions | Number of times it took more than a second to read the data from the XIO. The count increments only when data is received late. | Read-only<br>Valid values: 0 - 4294967295 |
| Last Success On | Date/Time of the last successful poll from the XIO | Read-only<br>Valid value is date format: mm/dd/yy h:m:s<br>"…" means no successful poll has occurred yet. |
| Last Error On | Date and time of the last read request sent to the XIO that resulted an error | Read-only<br>Valid value is date format: mm/dd/yy h:m:s<br>"…" means no successful poll has occurred yet. |
| Communication Status | Status of the last poll request sent the XIO | Read-only.<br>The following values can display:<br>– No Error: successful poll<br>– Connection Timeout: no response received from XIO<br>– Unknown Request Type: invalid request type in packet<br>– Request Not Accepted: request rejected by XIO<br>– Bad Packet CRC: CRC check failed for the request<br>– Bad Packet Length: incorrect length of the request packet<br>– No Data Received: no data received in the response |
| Reset | Function to clear all poll statistics<br>Hint: This reset is the same function as selecting the option: **Reset Read Statistics,** available when right-clicking the Connection indicator at the top of the screen. | To trigger reset:<br>Select **Reset** and then click **Send**. |
| **Write Statistics** | | |
| Number of Polls | Number of times the device successfully writes data to the | Read-only<br>Valid values: 0 - 4294967295 |

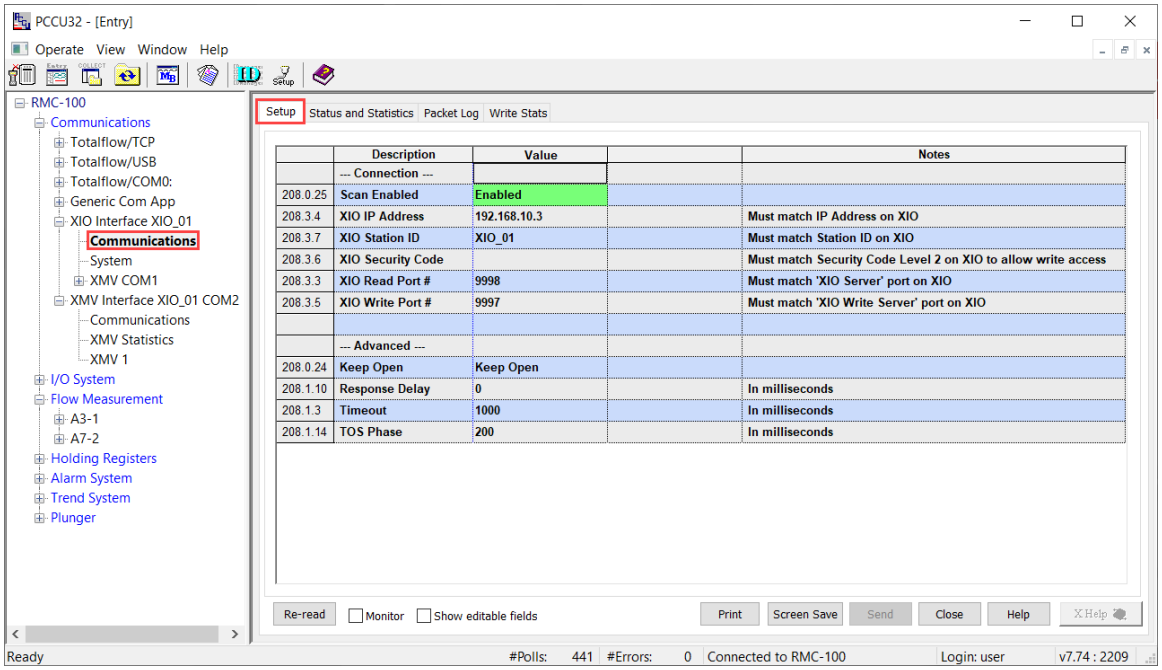
| Parameter/ Function | Description | Values |
|---|---|---|
| | XIO. The count usually increments by 1 for requests sent to the XIO. In some cases, the count may increment by more than 1 every second. | |
| Number of Errors | Number of times the device could not write data to the XIO due to an error. The count increments only when there is error. | Read-only<br>Valid values: 0 - 4294967295 |
| Late Completions | Number of times it took more than a second to write the data to the XIO and to receive a response. The count increments only when data is received late. | Read-only<br>Valid values: 0 - 4294967295 |
| Last Success On | Date/Time of the last successful write request to the XIO | Read-only<br>Valid value is date format: mm/dd/yy h:m:s<br>"…" means no successful poll has occurred yet. |
| Last Error On | Date/Time of the last write request sent to the XIO that resulted an error | Read-only<br>Valid value is date format: mm/dd/yy h:m:s<br>"…" means no failed poll has occurred yet. |
| Communication Status | Status of the last poll request sent the XIO | Read-only<br>The following states display:<br>– No Error: successful poll<br>– Connection Timeout: no response received from XIO<br>– Unknown Request Type: invalid request type in packet<br>– Request Not Accepted: request rejected by XIO<br>– Bad Packet CRC: CRC check failed for the request<br>– Bad Packet Length: incorrect length of the request packet<br>– No Data Received: no data received in the response |
| Reset | Function to clear all write statistics<br>Hint: This reset is the same function as selecting the option: **Reset Write Statistics**, available when right-clicking the Connection indicator at the top of the screen. | To trigger reset:<br>Select **Reset** and then click **Send**. |
| | | |
| Reset All Statistics | Function to reset all read and write statistics. | To trigger the reset:<br>Select **Reset All Read and Write Statistics** from the drop-down list, then click **Send**.<br>This is equivalent to selecting the Reset for the read statistics and the write statistics and clicking Send to reset both statistics sets together. |

## 6.1.2 XIO Interface Communications: Setup

The Setup screen allows the manual setup of the connection and authentication parameters for communication between the device and an XIO.

The screen has several parameters sections for configuration, fine tuning, and status verification. Review overview sections below or see parameter details in section 6.1.2.3 Parameter Description.

**Figure 6-6: XIO Interface Communications Setup screen**




### 6.1.2.1 Connection: parameter configuration or verification

The Setup section on the Setup screen lists the XIO parameters required to establish connection.

TCP/IP parameters values may be automatically configured when the XIO Interface is added from the Communication Setup tab and the device has detected the XIO through auto discovery.

Parameters are not automatically detected when the XIO Interface is added from the Application/License Management tab (first time installation) or when the XIO parameters are changed (after initial successful communication). In these cases, configure correct parameters in this screen.

**IMPORTANT NOTE:** Always obtain the XIO parameters from the XIO device to ensure that the XIO Interface connection parameter configuration matches that on the XIO. Mismatched configuration prevents connection with or access to the XIO.

Changing the XIO IP address reinitializes the XIO Interface application. All data associated with the existing IP address is replaced by data associated with the new IP address. This data includes all the exported XIO applications along with their data.

### 6.1.2.2 Advanced parameters: connection mode and fine-tuning

The Advanced section on the Setup screen provides additional advanced configuration parameters for connection mode and fine-tuning. The factory default configuration is recommended, but it can be updated to adjust to conditions in the field or user preferences. Modification of these parameters may be necessary to adapt to the processing load on the devices and the number of devices connected on the same network.

### 6.1.2.3 Parameter Description

The table below provides parameter or function description for the Setup screen.

**Table 6-2: XIO Interface Communications – Setup screen parameter description**

| Parameter/ Function | Description | Values |
|---|---|---|
| **Connection** | | |
| Scan Enabled | Function to enable or disable read and write communication with the associated XIO. | Select options from the drop-down list:<br>– Enabled: Perform continuous reads and required writes from and to the XIO. |

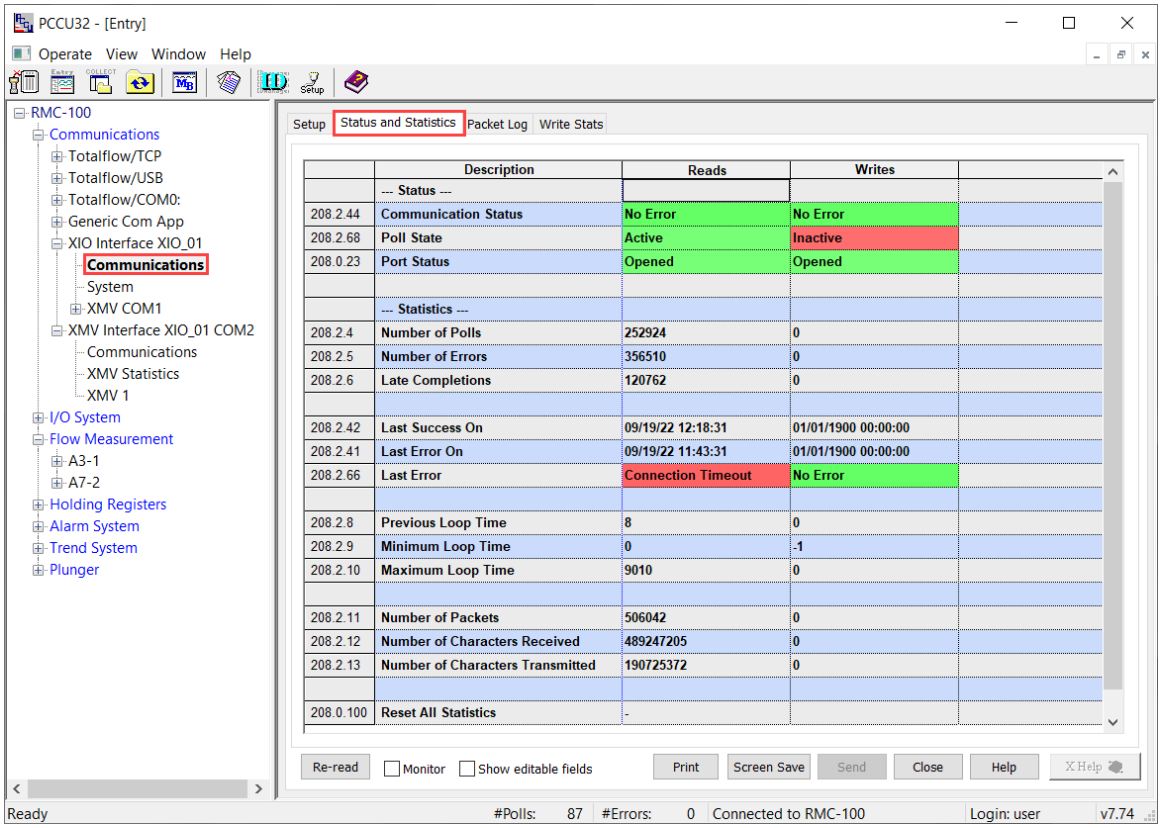
| Parameter/ Function | Description | Values |
|---|---|---|
| | | – Disabled (default): Do not perform reads and writes from or to the XIO. Scan disabled closes the TCP connection. |
| **Setup** | | |
| XIO IP Address | Internet Protocol (IP) address of the XIO that the device uses to establish connection.<br>**Note:** The XIO may have more than one IP address depending on the field network topology and connections. Configure the IP address that is valid for the network the controller uses to connect to the XIO. | Automatically populated if the XIO Interface is added from the Communication Setup tab and the RMC detects the XIO with auto discovery. If not automatically configured, the default value is: 0.0.0.0<br>Manually configure if the XIO Interface is added from the Application/Licensing Management tab or if the XIO is reconfigured. Type the new valid IP address.<br>**Note:** Changing an existing IP address will reinitialize the app and all the data from the XIO represented by the existing IP address will be replaced by data from the XIO represented by the new IP address. |
| XIO Station ID | The XIO station identification or name. It must match the configured value in the XIO device.<br>Hint: The remote controller requires the ID to detect and establish communication with the XIO. The device can differentiate advertised XIO servers by multiple XIOs based on this ID. | Automatically configured when the XIO Interface is added from the Communication Setup tab and the device auto discovers the XIO.<br>Manually configure if the XIO Interface is added from the Application/Licensing Management tab or if the XIO is reconfigured. Type the ID as configured in the XIO.<br>Default: TOTALFLOW (not recommended.) Change to non-default value on both the XIO and in this screen.<br>Valid Length: 1-10 Characters |
| XIO Security Code | Provide the 4-digit level 2 security code configured on the XIO device to allow write access. | User-configurable<br>Default: 0000<br>Obtain the level 2 security code configured in the XIO and type the same number in this field.<br>The security number is hidden for viewing but can be changed by typing in the value. |
| XIO Read Port # | TCP port the XIO [Read] Server listens to for XIO Interface connection requests and communication flow for reads.<br>The connection established for reads is a separate logical connection from the connection for writes. | Automatically populated if the XIO Interface is added from the Communication Setup tab and the RMC detects the XIO with auto discovery.<br>Manually configure if not using the default value: Type the TCP port number assigned to the XIO Server on the XIO.<br>Default: 9998 (recommended)<br>Valid values: 1024-65535 (Ensure the port number is not in use by another application.) |
| XIO Write Port # | TCP port the XIO Write Server listens to for XIO Interface connection requests and flow for writes.<br>The connection established for writes is a separate logical connection from the connection for reads. | Automatically populated if the XIO Interface is added from the Communication Setup tab and the RMC detects the XIO with auto discovery.<br>Manually configure if not using the default value. Type the TCP port number assigned to the XIO Write Server on the XIO.<br>Default: 9997 (recommended)<br>Valid values: 1024-65535 (Ensure the port number is not in use by another application.) |
| **Advanced** | | |
| Keep Open | TCP connection mode: The connection with the XIO can be kept open or be | Default (recommended): Keep Open.<br>Select from the drop-down list: |

| Parameter/ Function | Description | Values |
|---|---|---|
| | closed after each request. Keeping the connection open reduces the overhead in creating and closing TCP connections. This setting applies to both Read and Write connections. | – Keep Open: The device keeps connections open for subsequent requests after the connections are established for the first request.<br>– Close Always: The device closes connections after each request. |
| Response Delay | The delay (in milliseconds) that is on the front end of communications between devices. It delays the start of communication to another device. Set to zero for no delay or enter a delay value in milliseconds. In most cases no delay is required.<br>A small delay (~10 ms) may be required if the XIO or this device is heavily loaded. Heavy load on a device is reflected in frequent errors or late counts. | User-defined<br>Default (Recommended): 0<br>Suggested Value range: 0 – 20 ms |
| Timeout | Maximum time (in milliseconds) tolerated between a request and a response from the XIO, or the largest gap tolerated between characters within a packet. If the Timeout time expires, any partial packet is discarded and the application protocol looks for the beginning of a new packet.<br>Typically, 1000 milliseconds works well for communication with the XIO.<br>This applies to both Read and Write connections. | User-defined<br>Default (Recommended): 1000<br>Suggested Value range: 0 – 1000 ms |
| TOS Phase | TOS represents Top of Second. Everything in the device happens or is done in 1 second intervals including the scanning of XIO. The TOS phase field is for entering a delay in milliseconds from the top of second before starting the scan cycle of the XIO. TOS allows other applications to run prior to the XIO scan cycle.<br>It applies to read connections only. It does not apply to the write requests which happen when required. | User-defined<br>Default (Recommended): 200<br>Suggested Value range: 0 -500 ms |

### 6.1.3 XIO Interface Communication: Status and Statistics

The **Status and Statistics** screen provides information on key remote controller-XIO communication parameters to help in troubleshooting. The information reports statistics for both Read and Write Communication. For write-specific statistics, go to the **Write Stats** tab.

**Figure 6-7: XIO Interface Communications – Status and Statistics screen**




### 6.1.3.1 Communication status verification

The Status section in the Status and Statistics screen provides details on communication with the XIO, the state of the Poll function, and the status of the TCP ports. When communication or polling is not successful, the screen displays specific error messages that identify the cause of failure. The port status indicates if the TCP connections are established or not.

Verify the state of each of these parameters after parameter configuration or update is complete. It takes the device 4 to 5 seconds to be ready for communication (Poll Status displays: Active). Refresh the XIO Interface instance on the navigation tree to verify that the exported applications from the XIO display.

### 6.1.3.2 Statistics

If an unusually high number of errors display in the Statistics section on this screen or the overview screen, check the communication parameter configuration on the **Setup** tab. Ensure parameter values, such as the XIO Station ID, IP address or TCP ports, match those on the XIO. Ensure that the security code that allows read/write access to the XIO is configured in the XIO Interface setup. The remote controller cannot perform reads or writes unless it has this code.

When troubleshooting, reset statistics to observe if errors continue to accumulate after attempting to resolve connectivity or configuration issues.

### 6.1.3.3 Parameter description

The table below provides a detailed description of the parameters on the Statistics screen.

**Table 6-3: XIO Interface Communications – Statistics screen parameter description**

| Parameter/Function | Description | Values |
|---|---|---|
| **Status** | | |
| Communication Status | Status of the last read/write request sent to the XIO. | (Read-only)<br>The following states may display:<br>– No Error: successful poll |

| Parameter/Function | Description | Values |
|---|---|---|
| | | – Connection Timeout: no response received from the XIO<br>– Unknown Request Type: invalid request type in packet<br>– Request Not Accepted: request rejected by the XIO<br>– Bad Packet CRC: CRC check failed for the request<br>– Bad Packet Length: incorrect length of the request packet<br>– No Data Received: no data received in the response |
| Poll State | State of the polling function which is responsible for supporting the reads and writes from and to the XIO. The polling function goes through several states at the XIO Interface startup (when scanning is enabled). | (Read-only)<br>The states display for reads in the following sequence:<br>– Initializing: initializing register definitions<br>– Configuring: reading system configuration from XIO<br>– Synchronizing: reading data for each exported application<br>– Active: reading all the continuous data from XIO<br>– Stopped: shutting down<br>The states display for writes in the following sequence:<br>– Inactive: no write has happened yet<br>– Active: at least 1 write has occurred |
| Port Status | Status of the TCP port/connection to XIO. Connection should be Opened if the Scan is Enabled. | (Read-only)<br>The following states display:<br>– Opened: connection is established with the XIO<br>– Closed: connection with the XIO is closed |
| **Statistics** | | |
| Number of Polls | Number of times the device successfully read data from the XIO. Usually increments by 1 every second but depending on the size of data to poll, it may increment by more than 1 every second. | Valid Values: 0 - 4294967295<br>Set to 0 to reset the value. |
| Number of Errors | Number of times the device could not read data from the XIO due to an error. Increments only when there is an error. | Valid Values: 0 - 4294967295<br>Set to 0 to reset the value. |
| Late Completions | Number of times it took more than a second to read the data from the XIO. The value in this field increments only when data is received late. | Valid Values: 0 - 4294967295<br>Set to 0 to reset the value. |
| Last Success On | Last Date/Time when the XIO was successfully polled. For reads, it should be updating every second. For writes it updates only when a write occurs. | Read-only<br>Valid Value date format: mm/dd/yy h:m:s<br>"…" means no successful poll has occurred yet. |
| Last Error On | Date/Time of the last request | Read-only |

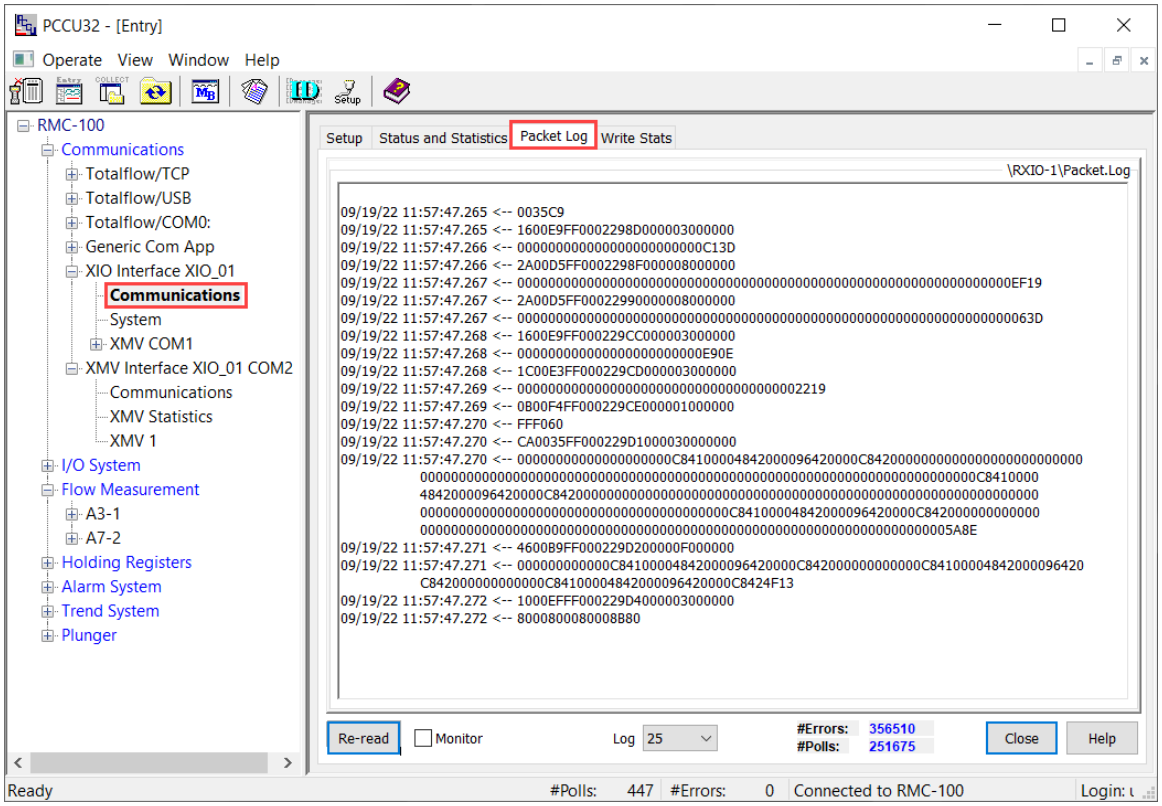
| Parameter/Function | Description | Values |
|---|---|---|
| | sent to the XIO that resulted in an error (displayed in the Last Error parameter below). | Valid Value date format: mm/dd/yy h:m:s<br>"…" means no failed poll has occurred yet. |
| Last Error | Cause for the last error that occurred in communication | Read-only<br>The following values may display:<br>– No Error: successful poll<br>– Connection Timeout: no response received from the XIO<br>– Unknown Request Type: invalid request type in packet<br>– Request Not Accepted: request rejected by the XIO<br>– Bad Packet CRC: CRC check failed for the request<br>– Bad Packet Length: incorrect length of the request packet<br>– No Data Received: no data received in the response |
| Previous Loop Time | Displays the last poll loop time in milliseconds. | Read-only<br>Valid Values: 0 - 4294967295 |
| Minimum Loop Time | Keeps the minimum poll loop time of all polls in milliseconds. Set to -1 to reset. | Read-only<br>Valid Values: 0 - 4294967295 |
| Maximum Loop Time | Keeps the maximum poll loop time of all polls in milliseconds. Set to 0 to reset. | Read-only<br>Valid Values: 0 - 4294967295 |
| Number of Packets | Displays the total number of transmit/receive packets. | Read-only<br>Valid Values: 0 - 4294967295 |
| Number of Characters Received | Displays a running total of received bytes from the devices. | Read-only<br>Valid Values: 0 - 4294967295 |
| Number of Characters Transmitted | Displays a running total of transmitted bytes to the devices. | Read-only<br>Valid Values: 0 - 4294967295 |
| Reset All Statistics | Function to reset all the statistics and date/times in the statistics screen. | To trigger statistic reset:<br>Select **Now** from the drop-down list, then click **Send**. |

### 6.1.4 XIO Interface Communications: Packet Log

The Packet Log tab is included for troubleshooting purposes only. The information provided only relates to Totalflow protocol. Customer service representatives may ask for information provided on this screen.

The information displayed on the screen is provided from a file maintained in the device. Specify the number of records that are kept in the file by selecting one of the values from the **Log Size** drop down list. Only the newest records are kept. To receive any updated information after initially viewing the screen, either click the **Re-read** button or check the **Monitor** button. The information displayed will only change if additional polls have occurred since the last time the information was read.

**Figure 6-8: XIO Interface Communications - Packet Log screen**

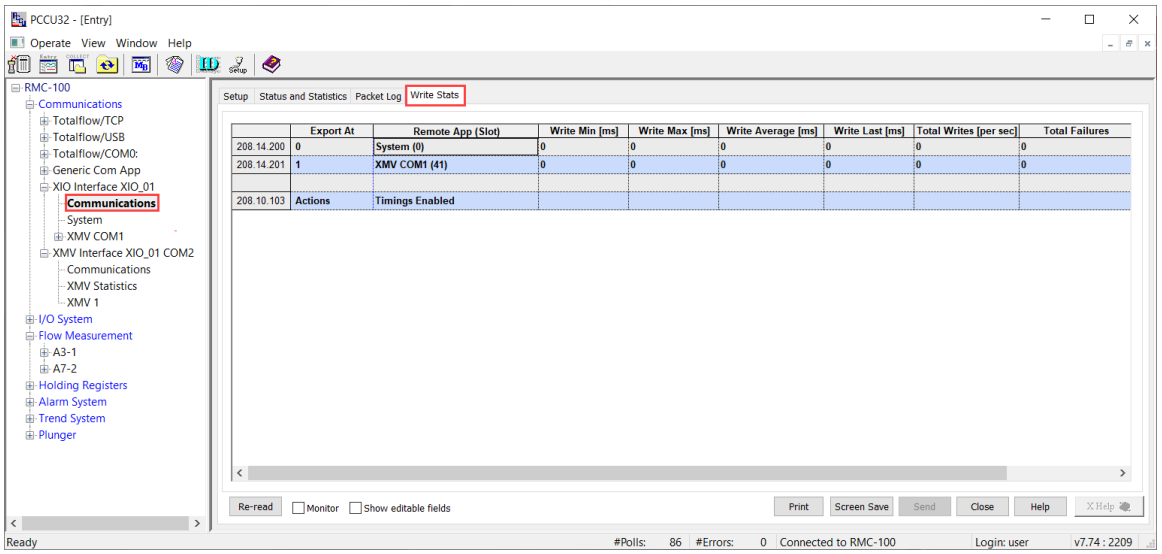



## 6.1.5 XIO Interface Communication: Write Stats

The Write Stats [Statistics] screen provides information to help in troubleshooting write request flow with the XIO remote applications.

The information reports write timing, write failures, and write totals per exported XIO application (app). Specific app statistic tracking helps narrow down the search for the source of errors. Unusually high timing values, or number of failures displayed for an application, helps focus troubleshooting specifically on that application. The remote application can then be checked on the XIO.

**Figure 6-9: XIO Interface Communications – Write Stats screen**



#### 6.1.5.1 Statistics enabling or reset

The screen supports statistics tracking enabling or statistics reset at any time. This ability is available for all applications. Reset statistics to monitor if errors continue to accumulate even after taking corrective action.

#### 6.1.5.2 Supported applications

The XIO supports the export of up to 16 applications including the System application. If the maximum number of applications is exported and statistics are tracked for all, the screen can display information for up to 16 applications.

#### 6.1.5.3 Parameter description

The table below provides the description of the parameters the device keeps statistics for. The Write Statistics screen displays only the exported applications. Statistic values display for each application.

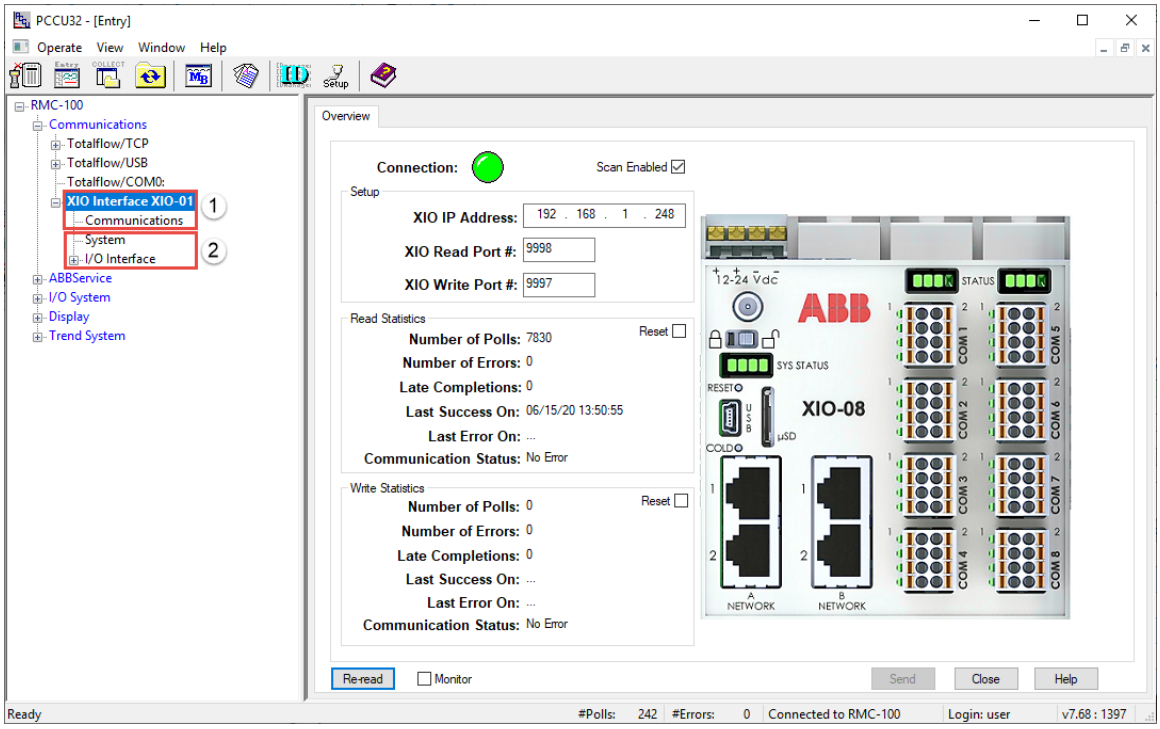
**Table 6-4: XIO Interface Communications – Write Stats screen parameter description**

| Parameter or function (Information per app) | Description | Values |
|---|---|---|
| Export At | The index the application is exported at in the XIO | Read-only<br>Valid Values: 0-15 |
| Remote App (Slot) | The application name and slot for the app on the XIO | Read-only<br>Valid Values: <App Name> (0-254) |
| Write Min [ms] | Minimum loop time of all write requests in milliseconds for that app on XIO. | Read-only<br>Valid Values: floating point (2 decimal points) |
| Write Max [ms] | Maximum loop time of all write requests in milliseconds for that app on XIO. | Read-only<br>Valid Values: floating point (2 decimal points) |
| Write Average [ms] | Average loop time of last 100 write requests in milliseconds for that app on XIO. | Read-only<br>Valid Values: floating point (2 decimal points) |
| Write Last [ms] | Last loop time in milliseconds for that app on XIO. | Read-only<br>Valid Values: floating point (2 decimal points) |
| Total Writes [per sec] | Total number of writes per sec for that app on XIO | Read-only<br>Valid Values: floating point (2 decimal points) |
| Total Failures | Total number of errors occurred for that app on XIO | Read-only<br>Valid Values: floating point (2 decimal points) |
| Actions | Enable/Disable or Reset all statistics displayed on the screen | Select from the drop-down list:<br>– Timings Enabled (Default): start tracking all statistics on the screen<br>– Timings Disabled: stop tracking all statistics on the screen<br>– Reset Timings: reset all statistics on the screen |

## 6.2 Exported application screens: System application

The following sections describe the screens of the XIO System application only. The System application is automatically exported from the XIO to the remote controller when the remote controller-XIO connection is established successfully. When connecting to a new (non-configured) XIO, this application is the only application that displays under the XIO Interface instance assigned to that XIO. As additional applications are configured on the XIO, those applications, if exported, should display on the remote controller navigation tree (under the XIO Interface instance). See application set (2) in Figure 6-10 below.

**Figure 6-10: XIO Interface exported applications - System app**

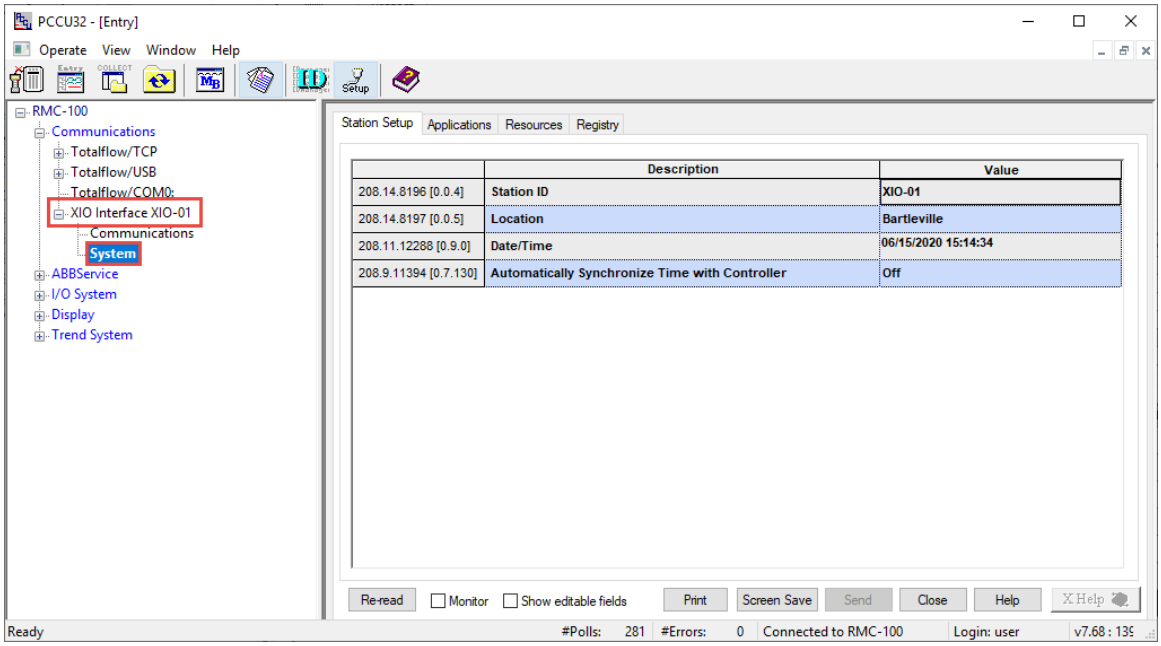



**IMPORTANT NOTE:** The exported System application shows a subset of the parameters shown in the System screens on the XIO. If you need to have more details or access the full parameter view, connect to the XIO instead, and view screens from there.
I/O System or communication application screen descriptions are not included in this section. They are documented separately as embedded help files. Click **Help** on those applications' screens to view.

## 6.2.1 XIO Interface System: Station Setup

Figure 6-11 shows the Station Setup of the XIO as seen from the controller.

**Figure 6-11: Exported XIO System Application - Station Setup screen**




### 6.2.1.1 Parameter description

The table below provides description of the parameters on the exported Station Setup view.

**Table 6-5: Exported XIO System Application - Station Setup screen parameter description**

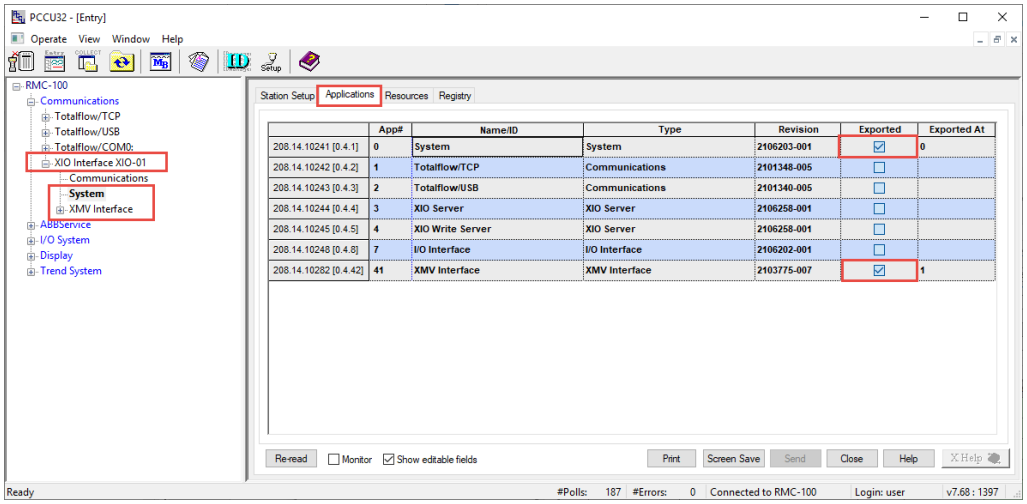
| Parameter or function | Description | Values |
|---|---|---|
| Station ID | Name that uniquely identifies each installed XIO. This name is detected by remote controllers (using Auto Discovery) and must be unique. It is recommended not to leave the factory default name even when installing only a single XIO. | Read-Only<br>Default: TOTALFLOW (change from the XIO at installation time) |
| Location | Describes the physical location of the device, such as the county name or road number. | Read-Only<br>Default: Measurement and Control (change from the XIO at installation time) |
| Date/Time | Date and Time kept at the XIO.<br>It can be automatically configured if the XIO date/time is synchronized with a laptop's date/time during installation, or manually configured later.<br>For initial installations, if you replied "yes" to the request to synchronize data and time with your laptop when you connected with the device for the first time, you do not need to change these values.<br>**Note:** Date and time must agree with the collection equipment. Changing date and time after the device is in operation must be considered carefully as it will affect time stamps for events, calibration, and logs required by auditing. Follow your company policies. | Read-Only<br>Configure from the XIO if necessary. The XIO offers the additional option to synchronize time with an RMC-100. See Automatically Synchronize time with controller, below in this table.<br>MM/DD/YYYY HH:MM:SS<br>(24-hour clock) |
| Automatically Synchronize time with controller | Function to enable keeping the same time (with a reasonable margin of error) on the XIO and the remote controller, for the purpose of correlating events and logs on both devices.<br>If new XIOs are connected to an RMC, set them to automatically synchronize their date/time with the RMC. There is no need to synchronize each with the laptop.<br>If new XIOs are not connected to ABB Totalflow remote controllers, sync the XIOs date/time with the laptop at installation time or manually set up when required.<br>**Note:** Changing date and time after the device is in operation affects time stamps for events, calibration, and logs required by auditing. Follow your company policies. | Select from the drop-down list:<br>– Off: does not synchronize the XIO time with the remote controller's time.<br>– On (recommended): automatically synchronizes the XIO time with the remote controller's time. |

## 6.2.2 XIO Interface System: Applications

The read-only Applications screen provides a list of all the applications currently instantiated in the XIO. The list helps identify:

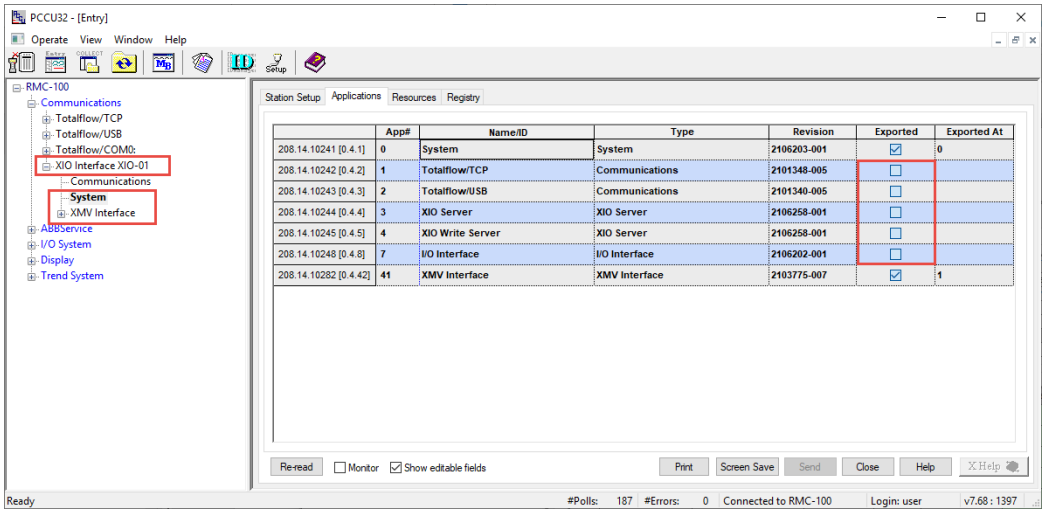
— Exported applications from the XIO. Exported applications can be managed or monitored from the remote controller without the need to connect to the XIO. They are visible under XIO Interface instances on the controller's navigation tree. In the image below (Figure 6-12), the Applications screen lists all applications on an XIO. The System and the XMV Interface applications are exported and display on the RMC navigation tree (under the XIO Interface instance, on the left).

**Figure 6-12: Exported XIO applications**




— Non-exported XIO applications. These applications are not visible on the remote controller navigation tree. These can be applications that do not support export, or applications not configured for export. In the image below (Figure 6-13), there are several applications that are not exported, including the I/O Interface. Of these non-exported apps, only the I/O Interface supports export and can be set to export on the XIO.

**Figure 6-13: Non-exported instantiated XIO applications**




### 6.2.2.1 Application display on navigation tree

When updating application exports on the XIO, remember to refresh the navigation tree on the remote controller, then verify that the XIO Interface instance updates its display and the exported applications display.

### 6.2.2.2 Parameter description

Note that on the left-most column of the displayed application list, the screen displays the register mapping from the XIO system registers to the remote controller registers. The first register is the remote controller register. The second register (in square brackets) is the register on the actual XIO. The table below describes the Application screen parameters.

**Table 6-6: Exported XIO System Application - Applications screen parameter description**

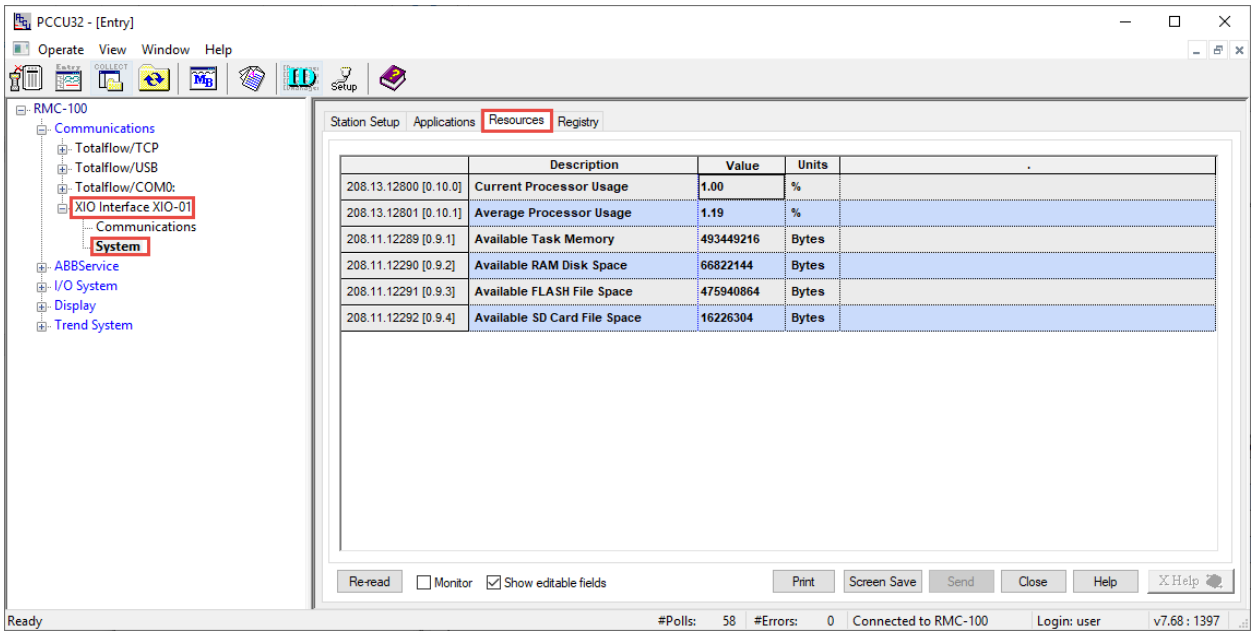
| Parameter or function | Description | Values |
|---|---|---|
| App# | The app slot number assigned to the application on the XIO | Read-only<br>Valid values: 0-253 |
| Name/ID | The name of the application instance on the | Read-only |

| Parameter or function | Description | Values |
|---|---|---|
| | XIO. | Default or user-defined application name |
| Type | Name of the general application category | Read-only |
| Revision | Application part number and revision | Read-only<br><Totalflow part number>-<revision number><br>For example: 2103775-007 is the part number for the XMV Interface application for revision 007. |
| Exported | Indicates that the XIO application is set for export to the remote controller | Read-only<br>Verify app export:<br>– Selected: the XIO exported the application to the remote controller<br>– Cleared: the XIO did not export the application to the remote controller<br>If the application is not exported and it is required, set to Export on the XIO Application/License Management tab. |
| Exported At | In the XIO, this is the index the application is exported at.<br>This number is used to calculate the corresponding register number for the remote application on the XIO Interface (RMC).<br>Reserved index numbers are 0 for the System app, and 255 for un-exported apps. | Read-only<br>Valid Values: 0-15, where 0 is reserved for the XIO System app |

## 6.2.3 XIO Interface System: Resources

The Resources screen displays information on the XIOs system component utilization. This helps to determine system loading and available capacity for processor, memory, and disk space.

**Figure 6-14: Exported XIO System Application - Resources screen**




### 6.2.3.1 Parameter description

The table below describes the Resources screen parameters.

**Table 6-7: Exported XIO System Application - Resources screen parameter description**

| Parameter or function | Description | Values | Units |
|---|---|---|---|
| Current Processor Usage | Current processor utilization or load | Read-only | Value in |

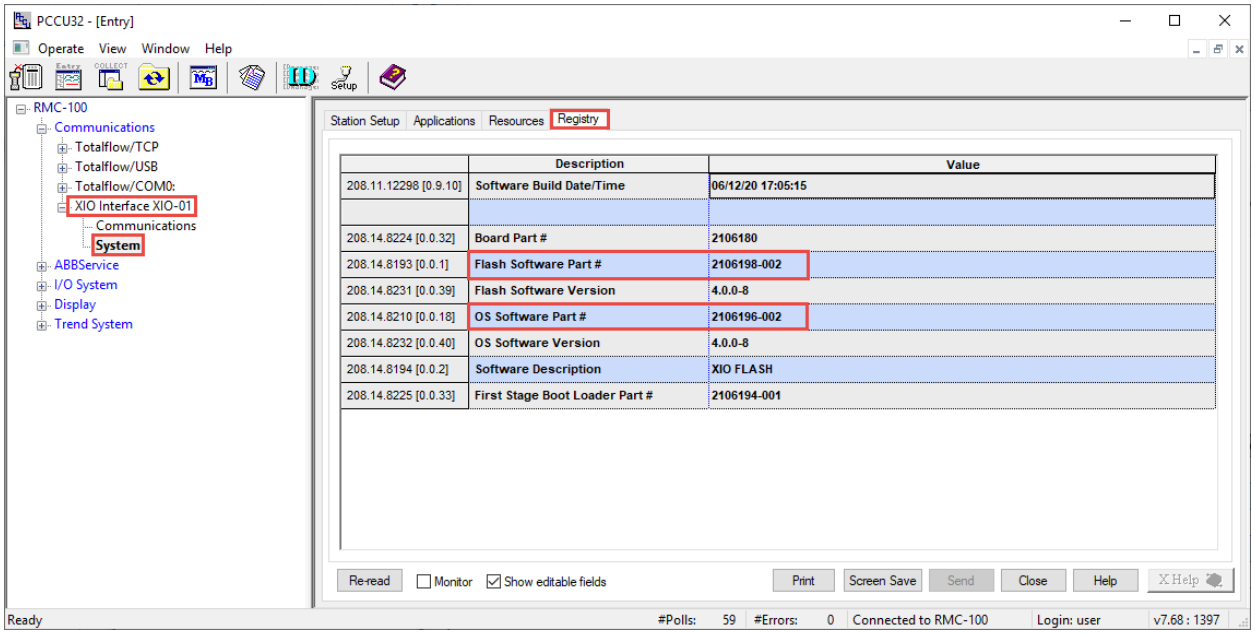
| Parameter or function | Description | Values | Units |
|---|---|---|---|
| | | | Percentage |
| Average Processor Usage | Running average processor load for the last 3 minutes. | Read-only | Value in percentage |
| Available Task Memory | Displays the amount of memory in bytes currently available. This is the part of RAM in which tasks run.<br>Monitor (check) this value after:<br>– Adding applications<br>– Adding any task that will consume memory<br>– Removing unused applications to free up memory for other purposes | Read-only | Bytes |
| Available RAM Disk Space | Displays the amount of RAM file space currently available.<br>RAM file space is consumed by information such as the OS, Totalflow application (Totalflow.exe), the run time configuration data (tfData), and historical flow records and trend files.<br>Check this value to verify that all file space has not been consumed after:<br>– Adding an application<br>– Increasing the frequency of log periods | Read-only | Bytes |
| Available FLASH file Space | Displays the amount of file space currently available. FLASH is the non-volatile memory which contains files such as the Boot Loader, Configuration Files (tfCold), the Operating System, and the Totalflow application (Totalflow.exe). Information from FLASH is loaded into RAM during Cold starts. | Read-only | Bytes |
| Available SD Card File Space | Displays available space on an SD card, if one is installed. An SD card is not required for normal operation but is recommended for additional memory space. It provides additional memory for data such as chromatograms, trend files, etc. | Read-only | Bytes |

### 6.2.4 XIO Interface System: Registry

The Registry screen displays the XIO embedded hardware and software part numbers, revisions, and versions (Figure 6-15). The screen displays a subset of the parameters shown in the Registry screen local to the XIO. Of special interest on this screen are the part numbers for the Flash Software and the OS Software. ABB makes the OS+Flash packages available for download. The Flash-only and OS-only packages are not available for download but may be needed in cases where the update requires that each package is uploaded separately. If this is required, call ABB technical support to obtain access to the specific revs.

**IMPORTANT NOTE:** The OS+Flash package number is not listed in the Registry screen. The XIO OS+Flash package part number is 2106200. The Flash part number embedded in this package is 2106198.

**Figure 6-15: Exported XIO System application - Registry screen**

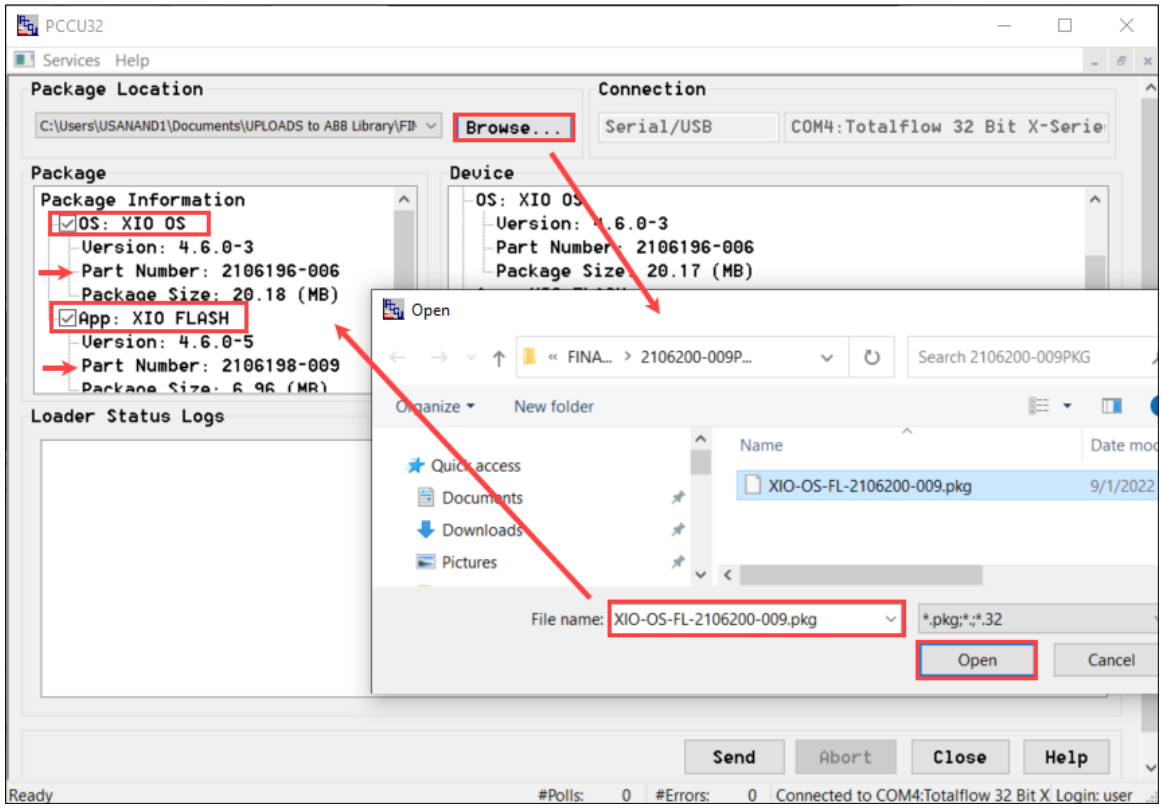



This information helps determine software versions running on the XIO.

Determining the software revision running on the XIO helps when troubleshooting or when deciding if updates are required. ABB technical support personnel may require this information to determine the course of action to correct a problem.

When using the Device Loader to display customer package contents, the OS and Flash part numbers also display individually (Figure 6-16).

**Figure 6-16: Determine customer package contents using the device loader**



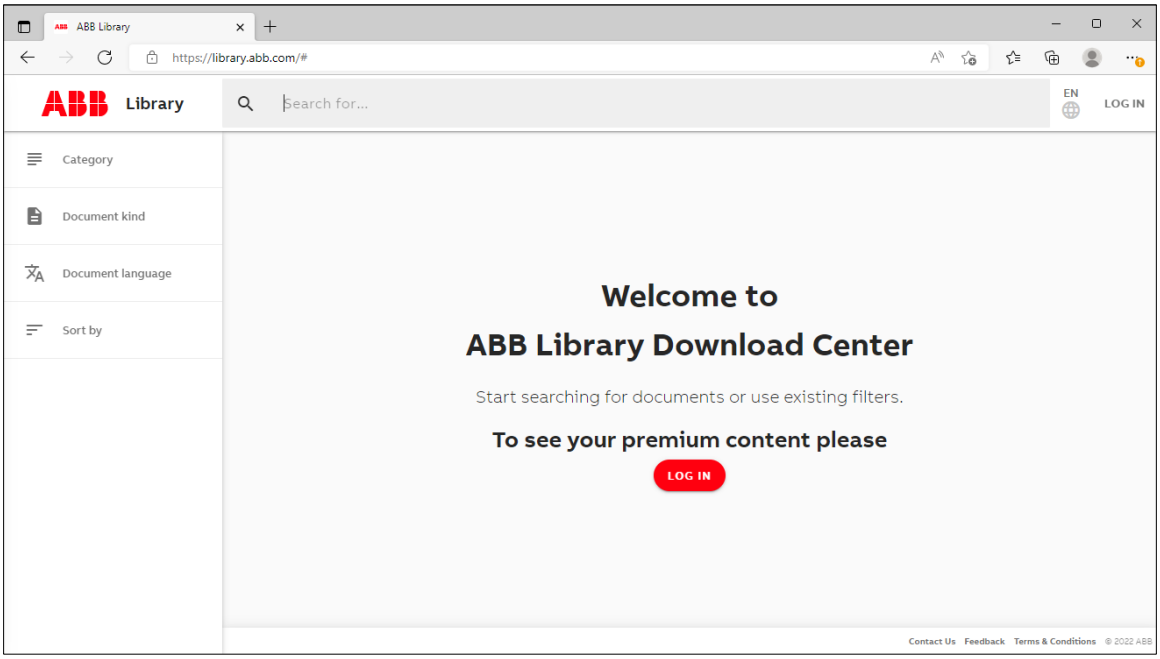

If you or ABB Technical support determine that the XIO requires a software update, perform the update on the XIO using the device loader. See the XIO User Manual for details (See Additional information for the link to the document).

Obtain the required software package revision from the ABB website (www.abb.com/upstream) or the ABB download center (easiest, and shown below).

To obtain software for the XIO:

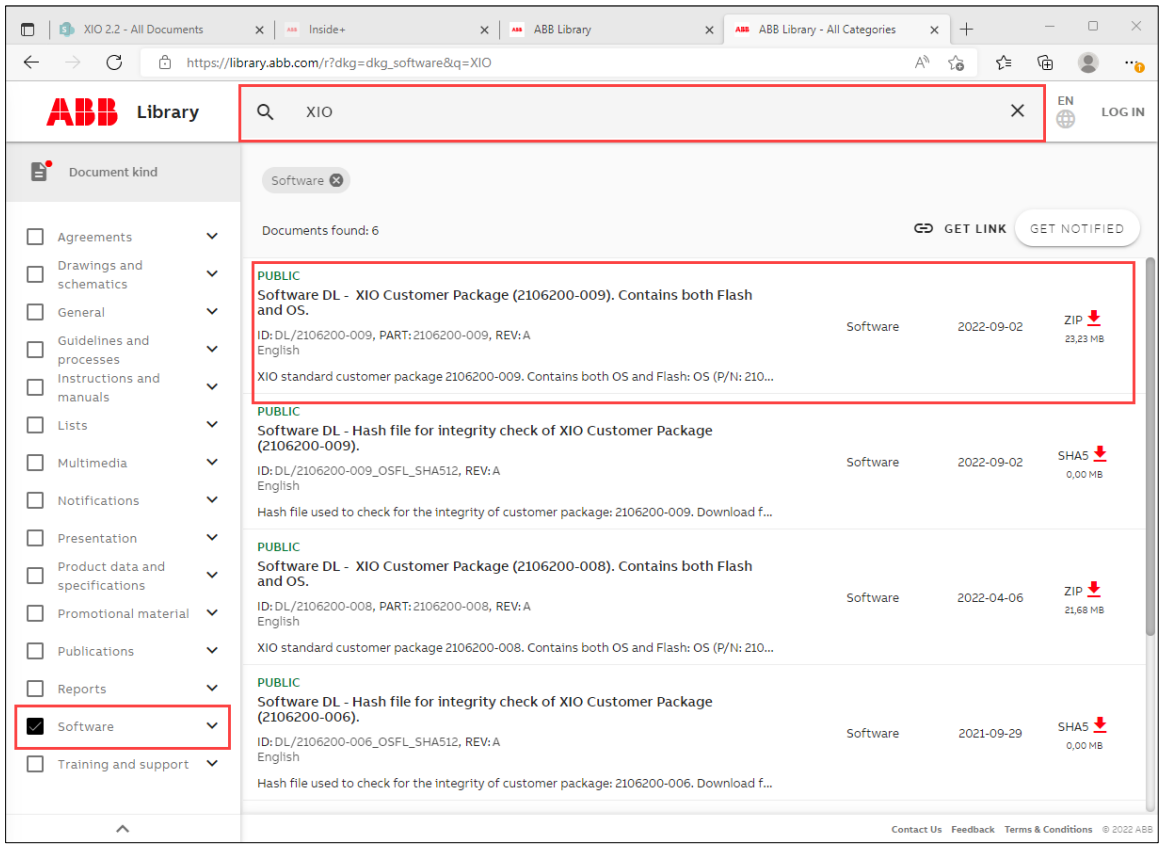
1. Go to the ABB library download center (library.abb.com).

**Figure 6-17: ABB Library Download Center**




2. Type the product type or name in the search field (Figure 6-18).
3. On the navigation tree on the left, select **Document Kind** as the filter for the search.
4. Scroll down to locate and select **Software**. The list of available software packages displays.

**Figure 6-18: ABB library search lists XIO software**




5. Search to locate the OS+Flash package (part number 2106200). Download the latest revision (for example, -002 or later). The latest package revision is always available.

**ABB Inc.**
Measurement & Analytics
Quotes: US-IAMA.inquiry@us.abb.com
Orders: US-IAMA.order@us.abb.com
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