

## Introduction

This manual describes how to configure and troubleshoot your Logix Remote I/O (RIO) Communication Module.

The 1756-RIO module:

- runs in a ControlLogix environment.
- allows upgrade from PLC-5, PLC-3, or SLC systems to a ControlLogix system with a minimum of downtime and startup time.
- uses integer data.
- does not require MSG instructions. All data is scheduled.
- offloads block transfer execution to reduce processing burden on the processor.

This publication explains how and why you would use a 1756-RIO module. The module is used in two modes, scanner and adapter mode.

In scanner mode, the 1756-RIO module enables communication and data transfer between a ControlLogix controller and devices on a Remote I/O network. The module continuously scans adapters on the remote network. The module transfers discrete and block transfer data.

In adapter mode, the module performs two functions simultaneously. First, it emulates one or more racks of I/O to a scanner, exchanging data with that scanner. Second, it monitors other remote I/O racks on the same Remote I/O network.

It can be used to upgrade an existing PLC-5, PLC-3, or SLC system to a ControlLogix system.

The advantages of using the 1756-RIO module to upgrade your system include:

- allowing the user to leave the existing Remote I/O network in place, alleviating the time and/or expense of replacing the I/O and field wiring, or the process of testing out field wiring.
- allowing the new application to be tested before you switch over, so that it works just like the old one.
- allowing you to switch back to the old application in minutes, should you run into problems.

For installation information, see the Remote I/O (RIO) Module Installation Instructions, publication [1756-IN610](#).

## The 1756-RIO Module-Getting Started

### Introduction

This document is a user's guide for the 1756-RIO module. The module lets Rockwell Automation ControlLogix controllers communicate with remote I/O over the backplane or over a remote network. This chapter describes the ControlLogix 1756-RIO module and how it links a ControlLogix controller to the Universal Remote I/O network.

This chapter also describes the module's physical features, software requirements, software and add-on profile installation instructions, and RSLogix 5000 project setup.

| Topic                                                    | Page |
|----------------------------------------------------------|------|
| 1756-RIO Module Components                               | 13   |
| 1756-RIO Module Requirements                             | 15   |
| Prepare the Module                                       | 16   |
| Install the Software                                     | 19   |
| Install the Add-on Profile                               | 19   |
| Create the RSLogix 5000 Project                          | 22   |
| Launch the Configuration Tool and Select the Module Mode | 30   |

The 1756-RIO module:

- supports native RIO 16-bit words for data, control, and status bits.
- acts as a scanner on a Remote I/O network.
- acts as an adapter that exchanges data on a Remote I/O network.
- supports discrete data and block transfer data in either mode.
- supports up to 10 produced/consumed data connections (along the backplane between the ControlLogix controller and the 1756-RIO module) with 248 words of integer input and 248 words of integer output for each connection.
- uses produced/consumed connections using a 1756-RIO add-on profile in RSLogix 5000 programming software.
- supports requested packet intervals (RPIs) from 2...750 ms. All connections use one set RPI.
- maps all discrete and block transfer data into produced/consumed connections.
- monitors existing I/O in adapter mode (Monitor mode). It can report all existing inputs and outputs, discrete and block transfer module data to the ControlLogix controller.

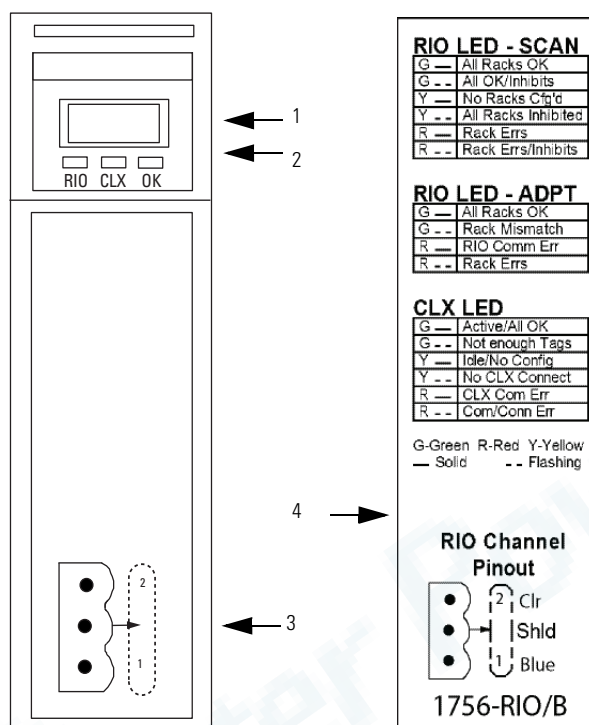
## 1756-RIO Module Components

The 1756-RIO module components include a 4-character display, status indicators, an RTB connection, and an inside-door label.

### 1756-RIO/B Module

Note that the 3-pin connector has been changed.

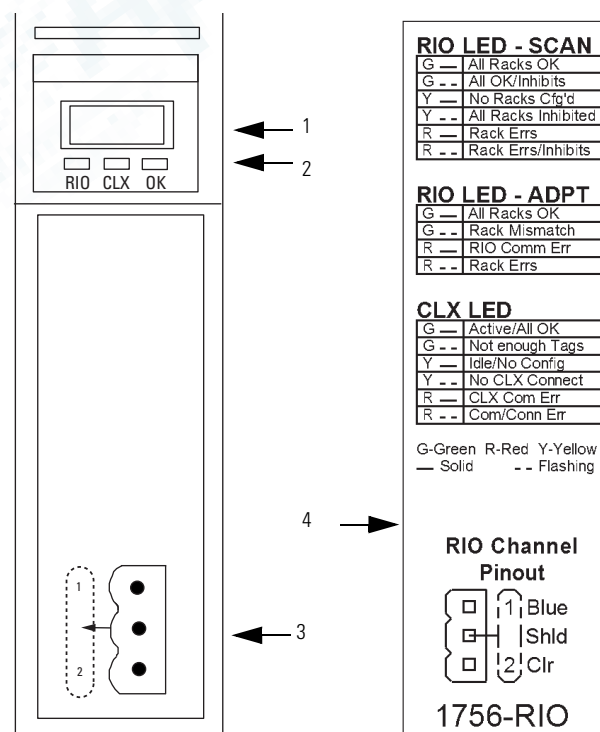
44777



43161

### 1756-RIO/A Module

44777A



43161A

**Chapter 1** The 1756-RIO Module-Getting Started

---

| Item | Description                                                                                                                                                                                                                                     |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | 4-character scrolling display                                                                                                                                                                                                                   |
| 2    | Three status indicators <ul style="list-style-type: none"><li>• RIO indicates the status of the network</li><li>• CLX indicates the status of the connection to the controller</li><li>• OK indicates the module's own internal state</li></ul> |
| 3    | 3-pin connector (blue hose) that connects to the remote devices<br><br>This is also known as the removable terminal block (RTB).                                                                                                                |
| 4    | Inside-door label with error codes                                                                                                                                                                                                              |

## 1756-RIO Module Requirements

The requirements for the module to operate include the installation of:

- RSLogix 5000 programming software, version 17 or later, and the associated controller firmware.
- RSLinx software, version 2.54 or later, with an activation. Use RSLinx Gateway or RSLinx Professional software. Do not use RSLinx Lite software.
- the 1756-RIO module add-on profile from the CD provided with the module.
- the 1756-RIO module installed in a 1756-ControlLogix chassis.

## The 1756-RIO Modes

The 1756-RIO module can be used in various capacities depending on the user's needs. First, decide which mode you want the 1756-RIO module to use.

In most cases, the module is used in scanner mode to scan and control remote I/O data on a network.

In adapter mode, the 1756-RIO module can perform two functions simultaneously. First, the module can emulate one or more racks of I/O to a scanner, exchanging data with that scanner (for example, a PLC-5, PLC-3, or SLC). It can exchange data with the scanner as discrete data, or via block transfers.

Second, the 1756-RIO module can act as a 'shadow,' referred to as Monitor mode, to monitor racks on a remote network. The module listens to the remote I/O and provides all inputs and outputs from the existing scanner to the ControlLogix controller. Users can then run their converted logic against those inputs, generate temporary outputs, and compare the existing outputs with outputs generated by the new logic.

## Troubleshooting Display and Status Indicators

This section covers problems that may occur with your 1756-RIO module. The following areas are covered:

- 1756-RIO module's alphanumeric display
- RIO status indicator
- CLX status indicator
- OK status indicator
- Debug log
- Fatal errors
- Updating the firmware

### Alphanumeric Display

The 4-character, alphanumeric display shows 'RIO Scanner', or 'RIO Adapter', followed by the firmware version number, and any banner text defined in the module configuration.

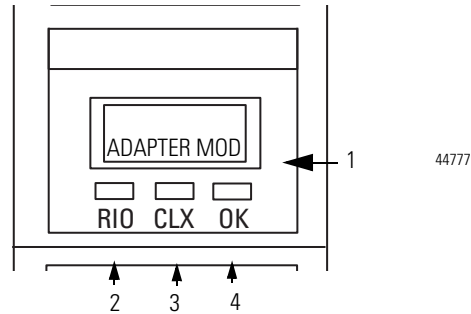
The display shows the following messages at power-up.

| Message                | Description                                                  |
|------------------------|--------------------------------------------------------------|
| B#nn                   | Stages in the start-up processes; nn is a hexadecimal number |
| Boot                   | Next stage in power-up sequence                              |
| RIO Scanner v. x.xx.xx | Module firmware revision                                     |

If the indicator on the 1756-RIO module does not cycle through these messages on powerup, contact Technical Support.

## Status Indicators

The 1756-RIO module has three status indicators to indicate the state of internal operations. The status indicators are labeled RIO, CLX, and OK.



### Module Display and Indicators

| Indicator | Description           |
|-----------|-----------------------|
| 1         | Module status display |
| 2         | RIO status indicator  |
| 3         | CLX status indicator  |
| 4         | OK status indicator   |

### RIO Status Indicator – Remote Devices Status

The RIO indicator displays the status of the Remote I/O network connection. Status varies depending on the mode of the module.

#### Scanner Mode

In order of priority, highest first.

| Indicator | Status              | Description                                                                                                                                                                                 |
|-----------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RIO       | Red                 | A frame-receive error has been received in the last second (CRC error, abort, or time-out). Indicator stays red for 1 second after the error occurs.<br><br>One or more racks are in error. |
|           | Flashing red/off    | At least one rack being scanned (not inhibited) is in error. One or more racks are inhibited.                                                                                               |
|           | Yellow              | Idle, no racks are configured.                                                                                                                                                              |
|           | Flashing yellow/off | All configured racks are inhibited.                                                                                                                                                         |
|           | Flashing green/off  | No racks being scanned (not inhibited) are in error, but one or more racks are inhibited.                                                                                                   |
|           | Green               | Successful communication with all configured racks, no inhibited racks.                                                                                                                     |

### *Adapter Mode*

In order of priority, highest first.

| Indicator | Status             | Description                                                                                                                                          |
|-----------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| RIO       | Red                | A frame-receive error has been received in the last second (CRC error, abort, or time-out). Indicator stays red for 1 second after the error occurs. |
|           | Flashing red/off   | One or more racks are not being scanned.                                                                                                             |
|           | Flashing green/off | Configuration mismatch on one or more racks.                                                                                                         |
|           | Green              | All racks are being scanned and there are no configuration mismatches.                                                                               |

### **CLX Status Indicator – ControlBus Status**

The CLX indicator displays the status of communication with the ControlLogix processor.

| Indicator | Status              | Description                                                                                                                                    |
|-----------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| CLX       | Green               | The module has successfully processed a request from the ControlBus backplane within the last five seconds. All required connections are open. |
|           | Flashing green/off  | Controlling Connection is open, but not all required connections are open.                                                                     |
|           | Yellow              | Idle, no requests received from the backplane in the last five seconds. No connections; empty configuration.                                   |
|           | Flashing yellow/off | Controlling Connection is not open.                                                                                                            |
|           | Red                 | The module has returned a CIP error to a request from the backplane within the last second. All required connections are open.                 |
|           | Flashing red/off    | The module has returned a CIP error within the last second. All required connections are not open.                                             |

## OK Status Indicator – Module Health

| Indicator | Status | Description                                                                                                                      |
|-----------|--------|----------------------------------------------------------------------------------------------------------------------------------|
| OK        | Green  | Indicates that module has passed all power-up diagnostics and is functioning normally.                                           |
|           | Red    | Indicates that module startup diagnostics failed, or a major module fault such as watchdog time-out, or jabber inhibit occurred. |

### IMPORTANT

If all three status indicators are solid red and the 4-character display shows M#xx, (where xx is the error number), a fatal error has occurred. See [Fatal Errors](#). Make a note of the error code numbers to give Tech Support, if you must call for help.

## The Debug Log

The firmware on the 1756-RIO module maintains a log of informational and diagnostic messages that can be useful in determining the cause of configuration and network problems.

To view the log, select Monitor>Debug Log, in the scanner or adapter configuration program within the configuration tool.

## Fatal Errors

Fatal errors occur when the firmware on the module encounters an unexpected condition. The module stops running, turns all three status indicators red, and displays the fatal error number on the 4-character display. The module also records its state at the time the fatal error occurred in a log.

To clear the fatal error and capture the fatal error log, follow these steps.

1. Cycle power on the module. The 4-character display should show “FatalErrorCapture required.”
2. From the Tools menu, choose 1756-RIO Fatal Error Capture in the scanner or adapter configuration program.
3. Store the fatal error log to a file.

This also clears the fatal error on the module.

Contact Technical Support and provide them with the fatal error log file to help diagnose the cause of the problem.