

## *Installation Instructions*

# Process Remote I/O (RIO) Communication Interface Module

Catalog Number 1757-ABRIO

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### **About This Publication**

Use this publication as a guide to install the Process Remote I/O (RIO) Communication Interface Module. Refer to publication [1757-UM007C](#), the 1757-ABRIO User Manual, for additional information. You can download a .pdf file of the manual at: <http://literature.rockwellautomation.com>.

### Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at <http://literature.rockwellautomation.com>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.





In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

<b>WARNING</b> 	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
<b>IMPORTANT</b>	Identifies information that is critical for successful application and understanding of the product.
<b>ATTENTION</b> 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you to identify a hazard, avoid a hazard and recognize the consequences.
<b>SHOCK HAZ-</b> 	Labels may be on or inside the equipment, such as a drive or motor, to alert people that dangerous voltage may be present.
<b>BURN HAZARD</b> 	Labels may be on or inside the equipment, such as a drive or motor, to alert people that surfaces may reach dangerous temperatures.

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## Environment and Enclosure

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**ATTENTION**

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 m (6561 ft) without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.



This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA, V2, V1, V0 (or equivalent) if non-metallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see:

- Industrial Automation Wiring and Grounding Guidelines, for additional installation requirements, Allen-Bradley publication [1770-4.1](#).
  - NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.
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## North American Hazardous Location Approval

<b>The following information applies when operating this equipment in hazardous locations.</b>	<b>Informations sur l'utilisation de cet équipement en environnements dangereux.</b>
<p>Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.</p>	<p>Les produits marqués "CL I, DIV 2, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.</p>

<b>WARNING</b>	<b>EXPLOSION HAZARD</b>	<b>AVERTISSEMENT</b>	<b>RISQUE D'EXPLOSION</b>
	<p>Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.</p> <p>Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product. Substitution of components may impair suitability for Class I, Division 2.</p> <p>If this product contains batteries, they must only be changed in an area known to be nonhazardous.</p>		<p>Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.</p> <p>Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit.</p> <p>La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Division 2.</p> <p>S'assurer que l'environnement est classé non dangereux avant de changer les piles.</p>

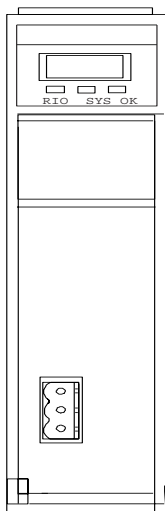
## Prevent Electrostatic Discharge

**ATTENTION**

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

## Identify Module Features



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The module has:

- a 4-character scrolling display.
- 3 status indicators.
  - RIO** indicates the status of the network.
  - SYS** indicates the connection to the processor.
  - OK** indicates the module's own internal state.
- a 3-pin Phoenix connector that connects to the remote devices.

## Prepare the Chassis for Module Installation

Before you install the 1757-ABRIO module, you must install and connect a ProcessLogix or ControlLogix chassis and power supply.

### Determine Module Slot Location

Chassis slots are numbered starting from the left, starting at 0. Slot 0 is the first slot to the right of the power supply.

You can:

- use any size chassis.
- install the module in any available slot.
- install multiple 1757-ABRIO modules in the same chassis, depending on how your power supply is rated.

### Remove and Insertion Under Power

You can install or remove the module while the chassis is powered if you observe these precautions.

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**WARNING**



When you insert or remove the module while backplane power is on, an electrical arc can occur. If you connect or disconnect the communications cable with power applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance that can affect module operation.

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### Wire the Connector for the Remote I/O Network

Follow these steps to wire the connector.

1. Connect Line 1 of the remote I/O cable to the upper pin.
2. Connect the shield to the middle pin.
3. Connect Line 2 to the lower pin on the 1757-ABRIO.
4. Terminate both ends of a remote I/O network by using external resistors attached to the physical ends of the network.

There should be two and terminators on the network.

#### *Select Proper Resistor*

Use 82 ohm resistors if the network operates at 230.4 kbps or if the network operates at 57.6 kbps or 115.2 kbps and none of the devices in the table below are present. The maximum number of devices on the network is 32.

Use 150 ohm resistors if the network contains any of the devices in the table below, or if the network operates at 57.6 kbps or 115.2 kbps and you do not require the network to support more than 16 devices.

<b>Device Type</b>	<b>Catalog Number</b>	<b>Series</b>
Adapters	1771-AS	All
	1771-ASB	
	1771-DCM	
Miscellaneous	1771-AF	



## Removing or Replacing the Module

If you are replacing an existing module with an identical one, and you want to resume identical system operation, you must:

- install the new module in the same slot.
- run the configuration program and download the appropriate configuration to the module.

## Apply Chassis Power

Turn the rack power supply on.

## Check Power Supply and Module Status

The rack power supply indicator should be green. The module OK status indicator should be solid red immediately after you turn on the rack power supply and then it turns solid green. Refer to the installation instructions for your particular 1756 rack power supply for recommended actions for checking your power supply.

## Status Display Power-up Messages

The alphanumeric display shows the following messages at power-up.

B#nn	Stages in the start-up processes, nn is a hexadecimal number
Boot	Next stage in power-up sequence
57ABRIO Ver x.xx.xx	Module firmware version

If the indicator on the 1757-ABRIO module does not cycle through these messages on powerup, refer to the Troubleshooting section of publication [1757-UM007C](#), the 1757-ABRIO User Manual.

## Power Supply Indicator

POWER Indicator	Power Supply Status	Recommended Action
Off	Not operating	<ul style="list-style-type: none"> <li>• Turn power switch ON.</li> <li>• Check power wiring connections.</li> <li>• Check fuse.</li> </ul>
On	Operating	None, normal operation.

## Interpret the Alphanumeric Display

The Process Remote I/O (RIO) Communication Interface Module displays alphanumeric messages that provide diagnostic information about your module. The warning messages display twice, then the normal display resumes. The following table summarizes the messages.

### Alphanumeric Display Message Descriptions

Message	Description
57ABRIO Version x.xx.xx	The module's firmware version, displayed at powerup. The three parts of the version number are the major revision, the minor revision and the build number.
Config	The module is being configured from the configuration program.
Inactive	The module is not receiving any messages that read or write tags. It is scanning discrete I/O in program mode. Block transfers are not updating.
Active	The module is receiving messages that read or write tags. It is scanning discrete I/O in run mode. Block transfers are updating.
Forced Active	The module has been put into active mode by the configuration program.
RIO Flash Config Invalid	<p>The configuration stored in Flash memory on the module is invalid due to the following possible reasons.</p> <ul style="list-style-type: none"> <li>• The module has never been configured.</li> <li>• The module firmware has been updated and the configuration format has changed.</li> <li>• A fatal error has been captured.</li> </ul> <p>To clear the invalid state, download the I/O configuration.</p>

Message	Description
Error: Heard Another RIO Master	Another master has been detected on the network because of the following possible reasons. <ul style="list-style-type: none"> <li>• The module is connected to a network with another RIO master.</li> <li>• The module is connected to a Data Highway Plus network.</li> </ul>
RIO Master Config Scan	At startup, the module scans the RIO network to see what racks are connected.
Rack xx I/O Group yy Size Mismatch	The rack size in the stored configuration on the module for the rack at rack number xx octal, starting I/O group yy, does not match the rack size on the network.
Rack xx I/O Group yy Offline	The rack at rack number xx octal, starting I/O group yy, is not responding.
Firmware Update	The firmware on the module is being updated.

## Interpret the Status Indicators

The three status indicators on the module provide information about your module and the status of communication with a host processor and with the remote I/O network. The following tables outline the indicator condition and the corresponding status for each indicator.

### RIO Status Indicator – Remote Devices Status

The RIO indicator displays the status of the remote I/O network connection.

Indicator	Status
Green	Successful communication with all configured racks.
Yellow	Idle, no racks are configured.
Red	One or more configured racks is not responding or a protocol error has occurred within the last second.

### SYS Status Indicator – ControlBus Status

The SYS indicator displays the status of communication with the processor.

Indicator	Status
Green	The module has successfully processed a request from the ControlBus backplane within the last five seconds.
Yellow	Idle, no requests received from the backplane in the last five seconds.
Red	The module has returned an error to a request from the backplane within the last second.

### OK Status Indicator – Module Health

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

#### IMPORTANT

If all three status indicators are solid red and the 4-character display shows the #xx, (where xx is the error number) this is where the fatal area occurs. Refer to publication [1757-UM007C](#), the 1757-ABRIO User Manual for information on clearing fatal errors. Be sure to make a note of the error code numbers to give Tech Support, if you need to call for help.

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### Configuring the Module

Now that you have installed your 1757-ABRIO module, you must configure it. Refer to publication [1757-UM007C](#), the 1757-ABRIO User Manual, for information on module configuration.

## Specifications

### Process Remote I/O (RIO) Communication Interface Module - 1757-ABRIO

Attribute	Value
Module Location	ProcessLogix or ControlLogix chassis
Backplane Current	675 mA @ +5.1V dc 5 mA @ 24 V dc
Power dissipation, max	4 W
Isolation Voltage	30V, continuous, basic insulation type
Screw Terminal Torque	0.5...0.6 Nm (5...7 lb-in)
Wiring Category <sup>(1)</sup>	2 - on communications ports
Wire Size	20 AWG, 0.519mm <sup>2</sup>
Wire Type	Belden 9463 Twinaxial

<sup>(1)</sup> Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

### Environmental Specifications

Attribute	Value
Temperature, operating	0...60 °C (32...140 °F) IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock)
Temperature, nonoperating	-40...85 °C (-40...185 °F) IEC 60068-2-1 (Test Ab, Un-packaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Nonoperating Thermal)
Relative Humidity	5...95% noncondensing IEC 60068-2-30 (Test Db, Un-packaged Nonoperating Damp Heat)
Shock, operating	IEC60068-2-27 (Test Ea, Unpackaged shock), 30g
Shock, nonoperating	IEC60068-2-27 (Test Ea, Unpackaged shock), 50g
Vibration	IEC60068-2-6 (Test Fc, Operating): 2 g @ 10...500 Hz

### Environmental Specifications

Attribute	Value
Emissions	CISPR 11: Group 1, Class A
ESD immunity	IEC 61000-4-2: 6 kV contact discharges 8 kV air discharges
Radiated RF immunity	IEC 61000-4-3 10V/m with 1 kHz sine-wave 80%AM from 80 MHz to 2000 MHz 10V/m with 200 Hz 50% Pulse 100%AM at 900 Mhz
EFT/B immunity	IEC 61000-4-4: ±2 kV at 5 kHz on communication ports
Surge Transient Immunity	IEC 61000-4-5: ±2 kV line-earth (CM) on communication ports
Conducted RF Immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80%AM from 150 kHz to 80 MHz
Enclosure Type Rating	None (open-style)
North American temperature code	T4A

### Certifications

Certification	Value
Certifications (when product is marked) <sup>(1)</sup>	<p>c-UL-us UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E219376. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E314476.</p> <p>CE European Union 2004/108/EC EMC Directive, compliant with: EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A &amp; B)</p>

<sup>(1)</sup> See the Product Certification link at <http://ab.com> for Declarations of Conformity, Certificates, and other certification details.

## Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
Refer to publication <a href="#">1757-UM007C</a> , the 1757-ABRIO User Manual for information on module configuration.	Provides details about how to configure, access data, monitor and troubleshoot the module.
Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, <a href="http://ab.com">http://ab.com</a>	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://literature.rockwellautomation.com>. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

## Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At <http://support.rockwellautomation.com>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://support.rockwellautomation.com>.

## Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

United States	1.440.646.3434 Monday – Friday, 8 a.m. – 5 p.m. EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

## New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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### Power, Control and Information Solutions Headquarters

America: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444  
Europe/Middle East/Africa: Rockwell Automation, Vortlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2.663.0600, Fax: (32) 2.663.0640  
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887.4788, Fax: (852) 2508.1846

Publication 1757-IN916C-EN-P - March 2008

PN 21307

Supersedes Publication 1757-IN916B-EN-P - February 2004

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