*Installation Instructions*

# High Frequency 13.56 MHz RFID EtherNet/IP Interface Block

Catalog Numbers 56RF-IN-IPS12, 56RF-IN-IPD22, and 56RF-IN-IPD22A

## 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://www.rockwellautomation.com/literature/) 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.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

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

| | |
|---|---|
| **WARNING** ⚠ | **WARNING:** 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. |
| **ATTENTION** ⚠ | **ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence. |
| **SHOCK HAZARD** ⚡ | **SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present. |
| **BURN HAZARD** ♨ | **BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures. |
| **IMPORTANT** | Identifies information that is critical for successful application and understanding of the product. |

## Environment and Enclosure

Follow these guidelines for environment and enclosure information for this equipment.

| ATTENTION | This equipment is intended for use in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating. This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR 11. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted and radiated disturbances.<br>This equipment is supplied as enclosed equipment. It should not require additional system enclosure when used in locations consistent with the enclosure type ratings stated in the Specifications section of this publication. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings, beyond what this product provides, that are required to comply with certain product safety certifications. In addition to this publication, see:<br>• Industrial Automation Wiring and Grounding Guidelines, Rockwell Automation publication 1770-4.1, for additional installation requirements.<br>• NEMA Standards 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure. |
|---|---|

## Prevent Electrostatic Discharge

Follow these guidelines when you handle this equipment.

| ATTENTION | This equipment is sensitive to electrostatic discharge that can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment.<br>• Touch a grounded object to discharge potential static.<br>• Wear an approved grounding wrist strap.<br>• Do not touch connectors or pins on component boards.<br>• Do not touch circuit components inside the equipment.<br>• Use a static-safe workstation if available.<br>• Store the equipment in appropriate static-safe packaging when not in use. |
|---|---|

## About the 13.56 MHz RFID EtherNet/IP Interface Block

The EtherNet/IP Interface Block is a 24V DC I/O module that communicates via EtherNet/IP. It features up to two RFID interface ports and two configurable points. The sealed IP65, IP67, and IP69K housing of these modules requires no enclosure. Note that environmental requirements other than IP65, IP67, and IP69K may require an additional appropriate enclosure. I/O connectors are sealed M12 style.

EtherNet/IP networks use advanced network technology, for example, producer/consumer communication, to increase network functionality and throughput.

### High Frequency 13.56 MHz RFID EtherNet/IP Interface Block
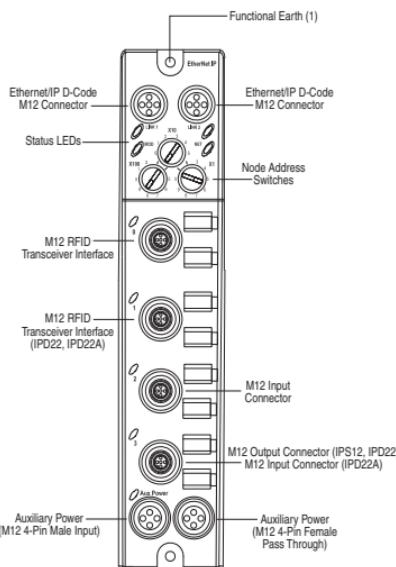


[1] Functional Earth grounds the I/O block's EtherNet/IP communication circuitry which is designed to mitigate the effect of noise on the network. Refer to EtherNet/IP Connectors on page 10 for connections.

## Catalog Number Explanation

Refer to the table for a description of the modules' catalog numbers.

| Cat. No. | Interface Ports | Inputs | Outputs | Network Connector | Auxiliary Power |
|---|---|---|---|---|---|
| 56RF-IN-IPS12 | 1 transceiver | 1 | 1 | | |
| 56RF-IN-IPD22 | 2 transceivers | 1 | 1 | Dual D-code M12 | Dual 4-pin mini |
| 56RF-IN-IPD22A | 2 transceivers | 2 | — | | |

## Install the Module

Refer to the following sections to install your module.

- Set the Network Address (page 6).
- Mount the Module (page 7).
- Connect the I/O, Network, and Auxiliary cables to the EtherNet/IP Interface Block (page 8).

## Set the Network Address

The I/O block ships with the rotary switches set to 999 and DHCP enabled. To change the network address, you can do one of the following:

- adjust the switches on the front of the module.
- use a Dynamic Host Configuration Protocol (DHCP) server, such as Rockwell Automation BootP/DHCP.
- retrieve the IP address from nonvolatile memory.

The I/O block reads the switches first to determine if the switches are set to a valid number. Set the network address by adjusting the three switches on the front of the module (refer to the illustration below). Use a small blade screwdriver to rotate the switches. Line up the small notch on the switch with the number setting you wish to use. Valid settings range from 001...254.

## Network Address Example

**This example shows the network address set at 63.**
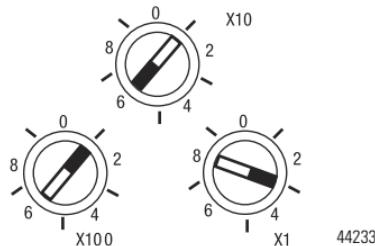


When the switches are set to a valid number, the IP address of the I/O block is 192.168.1.xxx (where xxx represents the number set on the switches). The subnet mask of the I/O block is 255.255.255.0 and the gateway address is set to 0.0.0.0. When the I/O block uses the network address set on the switches, the I/O block does not have a host name assigned to it or use any Domain Name Server.

If the switches are set to an invalid number (for example, 000 or a value greater than 254 excluding 888), the I/O block checks to see if DHCP is enabled. If DHCP is enabled, the I/O block asks for an address from a DHCP server. The DHCP server also assigns other Transport Control Protocol (TCP) parameters.

If DHCP is not enabled, the I/O block uses the IP address (along with other TCP configurable parameters) stored in nonvolatile memory.

## Mount the Module

Two sets of mounting holes are used to mount the module directly to a panel or machine. Mounting holes accommodate #8 (M4) pan head screws. The torque specification is 1.13 N•m (10 lb•in).

## Product Dimensions

Refer to the approximate dimension illustrations to help you mount the modules.
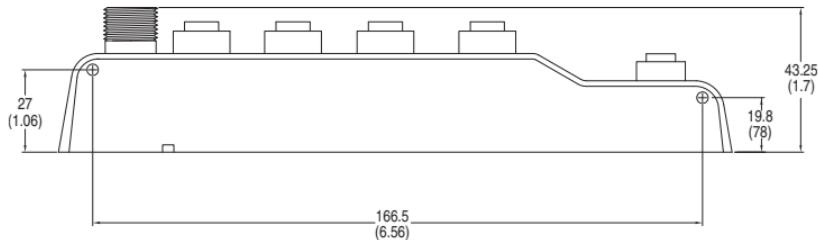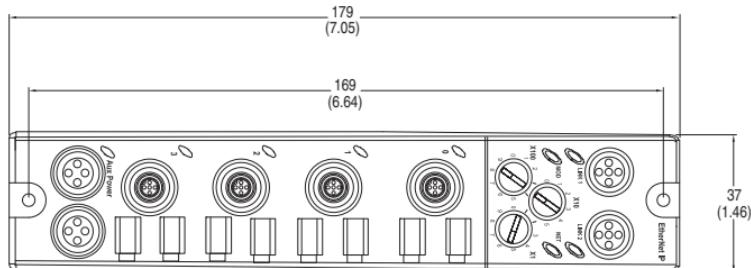
*Mount the Module in High Vibration Areas*

If you mount the module in an area that is subject to shock or vibration, we recommend you use a flat and a lock washer to mount the module. Mount the flat and the lock washer as shown in the mounting illustration below. Tighten the mounting screws to 1.13 N•m (10 lb•in).

**High Vibration Area Mounting**



**Connect the I/O, Network and Auxiliary Cables to the EtherNet/IP Interface Block**

The EtherNet/IP Interface Block has 5-pin micro-style connectors for I/O and RFID interface. We provide caps to cover the unused connectors on your module. Connect the quick-disconnect cord sets you selected for your module to the appropriate ports.

*I/O Connectors*

**Micro-style 5-Pin Input Female Connector**
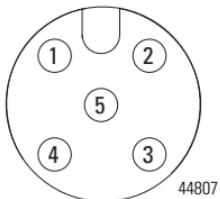
**(View into connector)**
**The input pinout is:**
**Pin 1    Sensor voltage**
**Pin 2    Not used**
**Pin 3    Return**
**Pin 4    Digital input**
**Pin 5    Not used (shield)**

44807

**Micro-style 5-Pin Output Female Connector**
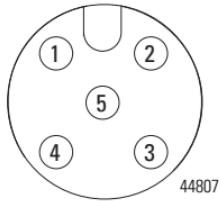
**(View into connector)**
**The output port pinout is:**
**Pin 1    Not used**
**Pin 2    Not used**
**Pin 3    Return**
**Pin 4    Digital output**
**Pin 5    Not used (shield)**

44807

**RFID Transceiver Interface**
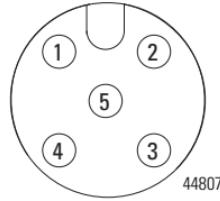
**(View into connector)**
**The RFID pinout is:**
**Pin 1    Sensor voltage**
**Pin 2    Data +**
**Pin 3    Return**
**Pin 4    Data -**
**Pin 5    Not used (shield)**

44807

*EtherNet/IP Connectors*

**D-Code M12 Network Female Connector**
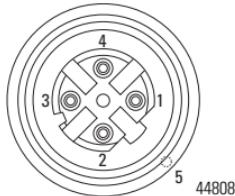


**(View into connector)**
**Pin 1   M12_Tx+**
**Pin 2   M12_Rx+**
**Pin 3   M12_Tx-**
**Pin 4   M12_Rx-**
**Pin 5   Connector shell shield FE**

| IMPORTANT | Use the 1585D-M4DC-H: Polyamide small body unshielded or the 1585D-M4DC-SH: Zinc die-cast large body shielded mating connectors for the D-Code M12 female network connector. |
|---|---|

| IMPORTANT | Use two twisted pair CAT5E UTP or STP cables. |
|---|---|

| D-Code M12 Pin | Wire Color | Signal | 8-way Modular RJ45 Pin |
|---|---|---|---|
| 1 | White-Orange | TX+ | 1 |
| 2 | White-Green | RX+ | 3 |
| 3 | Orange | TX- | 2 |
| 4 | Green | RX- | 6 |

| ATTENTION ⚠ | Make sure all connectors and caps are securely tightened to properly seal the connections against leaks and maintain IP enclosure type requirements. |
|---|---|

## Configure Operations
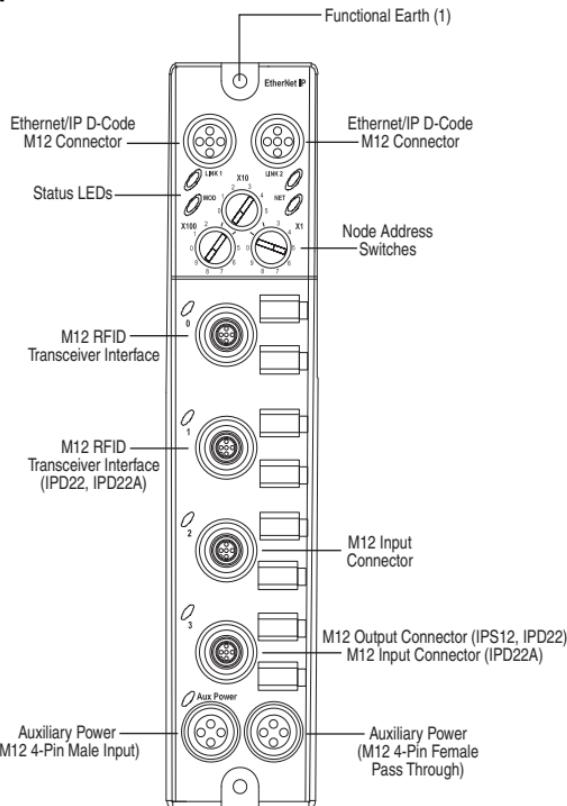


Refer to On-Machine Connectivity Catalog for Rockwell Automation cable and cord set offerings or use the configuration tools available at www.ab.com/e-tools/.

## Auxiliary Power Cable

Attach a micro-style 4-pin female to the micro-style 4-pin male receptacle as shown below. The female side is used to daisy chain the power to another device. The power connection is limited to 4 A. When the daisy chain approach is used,

the maximum number of interface blocks that can be connected is determined by the total power consumed by each block.

| IMPORTANT | Power must be connected to the male connector first. Do not connect power to the female connector and leave the male connector exposed. The pins in the male connector will have 24V DC potential for short circuit |
|---|---|

The pin connections for the aux power connectors are shown below:



**Male**



**Female**
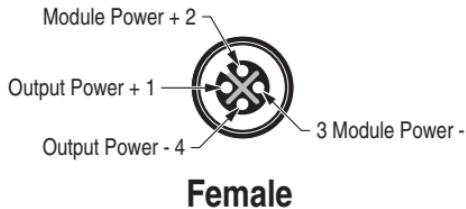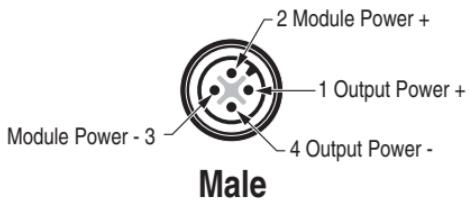
The power for the output port is separate from the power to the remaining portions of the interface block. This allows the output device to be turned off, while maintaining power to the transceivers, the input port as well as the EtherNet/IP connection. When the output is connected to the safety related portion of the machine control system, an actuator can be turned off, while diagnostic information is still available to the machine control system.

## Interpret LED Indicators

This module has the following indicators:

- Network, Module, and Link status indicators for EtherNet/IP
- Auxiliary Power indicator
- Individual I/O status indicators for inputs and outputs
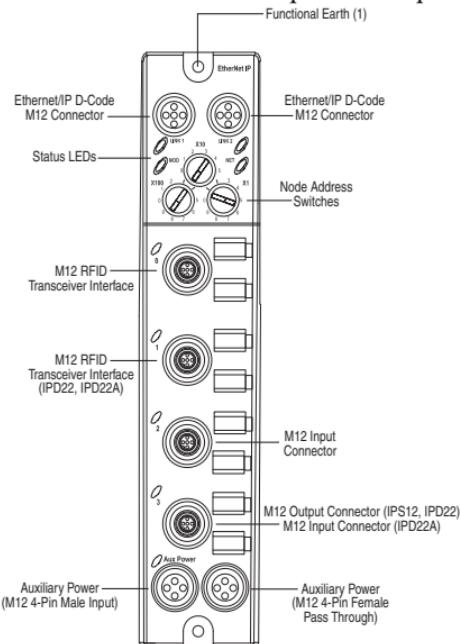


**Indicator Status for Modules**

|  | Status | Description |
|---|---|---|
| Module status LED | Off | No power applied to device. |
|  | Flashing green | Standby |
|  | Green | Device operating normally. |
|  | Flashing red | Recoverable fault. |
|  | Red | Unrecoverable fault – may require device replacement. |

**Indicator Status for Modules**

|  | **Status** | **Description** |
|---|---|---|
| Network status LED | Off | The device is not initialized or the module does not have an IP address. |
| | Flashing green | The device has no CIP connections. The device has an IP address, but no CIP connections are established. |
| | Green | The device is online, has an IP address, and CIP connections are established. |
| | Flashing red | One or more connections have timed out. |
| | Red | The module has detected that its IP address is already in use. |
| Link1 and Link2 LEDs | Off | No link established. |
| | Green | Link established on indicated port at 100 Mbps. |
| | Flashing green | Link activity present on indicated port at 100 Mbps. |
| | Yellow | Link established on indicated port at 10 Mbps. |
| | Flashing yellow | Link activity present on indicated port at 10 Mbps. |
| Auxiliary status | Off | No power |
| | Green | Communicating |
| Transceiver Module Status LED | Green | Power ON |
| | No illumination | No power |
| Transceiver Read/Write LED | Green | Normal operation |
| | Flashing green (short interval) | Communicating |
| | Flashing amber (short interval) | Sensing tag |
| | Flashing red (long interval) | Communication error |
| | Flashing green (long interval) | No tag |
| I/O LED | Off | I/O off |
| | Yellow | I/O on |

| **IMPORTANT** | The Module Status LED indicator will flash red and green for a maximum 30 s while the module completes its POST (Power-On Self Test). |
|---|---|

## Specifications

### EtherNet/IP Interface Block Input – 56RF-IN-IPS12, 56RF-IN-IPD22, and 56RF-IN-IPD22A

| Attributes | Value |
|---|---|
| Number of inputs | 2 – 56RF-IN-IPD22A<br>1 – all other modules |
| Input type | Sink, 24V DC |
| Voltage, off-state input, max. | 5V DC |
| Voltage, on-state input, max. | 30V DC |
| Voltage, on-state input, nom | 24V DC |
| Voltage, on-state input, min. | 11V DC |
| Current, off-state input, max. | 1.5 mA @ 5V DC |
| Current, on-state input, max. | 5 mA @ 30V DC |
| Voltage, sensor source, max. | 30V DC |
| Voltage, sensor source, min. | 10V DC |
| Input delay time<br>ON to OFF<br>OFF to ON | $0…16000\ \mu s$ |
| Isolation voltage | 50V (continuous), Basic Insulation Type, Inputs and Sensor Power to Network<br>No isolation between individual Inputs or between Network channels Type tested at 707V DC for 60s |

### EtherNet/IP Interface Block Output – 56RF-IN-IPS12 and 56RF-IN-IPD22

| Attributes | Value |
|---|---|
| Number of outputs | 1 |
| Output type | Source, 24V DC |
| Voltage drop, on-state output, max. | 0.5V DC |
| Voltage off-peak blocking, min. | 30V DC |
| Voltage, on-state output, max. | 30V DC |
| Voltage, on-state output, min. | 11V DC |
| Voltage, on-state output, nom | 24V DC |
| Current on-state output, max. | 0.5 A |

**EtherNet/IP Interface Block Output – 56RF-IN-IPS12 and 56RF-IN-IPD22**

| Attributes | Value |
|---|---|
| Leakage current, off-state output, max. | 50 µA |
| Surge current per output, max. | 1.2 A for 10 ms, repeatable every 2 s |
| Isolation voltage | 50V (continuous), basic insulation type, outputs and output power to network<br>No isolation between individual outputs or between outputs and output power or between network channels<br>Type tested at 707V DC for 60 s |

**EtherNet/IP Interface Block RFID – 56RF-IN-IPS12 and 56RF-IN-IPD22**

| Attributes | Value |
|---|---|
| Voltage | 24V DC (-20…+10%) |
| Output current per RFID port, max. | 100 mA @ 24V DC |

**General Specifications**

| Attributes | Value |
|---|---|
| Voltage, auxiliary power [1] | 24V DC (-20…+10%) |
| Auxiliary current per module, max. [2] | 4 A |
| Output current per RFID transceiver port, max. | 100 mA @ 24V DC |
| Current for output device power per I/O port, max. | 0.5 A @ 30V |
| Current for input device power per I/O port, max. | 5 mA @ 30V |
| Communication rate | EtherNet/IP<br>10/100 Mbps<br>Full or half-duplex<br>100 meter per segment |
| LED indicators | Module Status - red/green<br>Network Status - red/green<br>Link Status - green/yellow<br>Auxiliary Power - green<br>I/O LED - yellow |
| Dimensions (HxWxD), approx. | 179x37x43.25 mm (7.05x1.46x1.7 in.) |
| Weight, approx. | 0.2 kg (0.45 lb) |
| Enclosure type rating | IP67 and IP69K |
| Wiring category [3] | 1 - on signal ports<br>1 - on power ports<br>1 - on communications ports |

[1] Intended to be powered by a limited voltage, limited current supply.

[2] A Listed or Recognized 4 A fuse shall be installed on the line side of the device.

[3] Use this Conductor Category information for planning conductor routing. Refer to publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.

**Environmental Specifications**

| Attribute | Value |
|---|---|
| Temperature, operating | IEC60068-2-1/2, Test Ad/Bd<br>Cold: -20 °C (-4 °F)<br>Dry Heat: 60 °C (140 °F)<br>Gradient: 1 °C (33.8 °F)/min<br>Duration: 33.6 hr with insulation tests |
| Temperature, storage | IEC60068-2-1/2, Test Ad/Bd<br>Cold: -40 °C (-40 °F)<br>Dry Heat: 85 °C (185 °F)<br>Gradient: 1 °C (33.8°F)/min<br>Duration: 33.6 hr with insulation tests |
| Relative humidity | IEC60068-2-30, Test Db<br>Temperature Cycle Range: 20-60-20 °C (68-140-68 °F)<br>Humidity Cycle Range: 80…95% non-condensing |
| Vibration | IEC60068-2-6<br>Frequency Range: 10…500 Hz<br>Acceleration: 5 g<br>Displacement: 0.030 in. (p-p)<br>Duration: One octave per minute sweep rate<br>No. of sweeps: 10<br>Vertical mounting |
| Shock, operating | IEC60068-2-27<br>Acceleration:30 g, 11 ms<br>Vertical mounting |
| Shock, non-operating | IEC60068-2-32, Test Ea<br>Acceleration: 50g, 11 ms<br>Vertical mounting |
| Emissions | IEC61000-6-4, (CISPR11)<br>Class A |
| ESD susceptibility<br>(Performance Criteria B) | IEC61000-4-2<br>Indirect (Coupling Plate): +/-6 kV contact discharge<br>Direct (to "Points of Initial Contact"): +/-6 kV contact discharge; +/-8 kV air discharge |
| Radiated RF immunity<br>(Performance Criteria A) | IEC61000-4-3, ENV50204<br>80…1000 MHz: 10V/m, with 1kHz sine wave 80% AM<br>1…2 GHz: 10V/m, with 1 kHz sine wave 80% AM<br>900 MHz Pulse: 10V/m, with 200 Hz 50% pulse 100% AM<br>1.89 GHz Pulse: 10V/m with 200 Hz 50% pulse 100% AM<br>2…2.7 GHz: 1V/m, with 1 KHz sine wave 80% AM |

## Environmental Specifications

| Attribute | Value |
|---|---|
| EFT/B immunity (Performance Criteria B) | IEC61000-4-4<br>DLR Ports: +/-3 kV clamp inject at 5 kHz for 5 min<br>Module and Output Power: +/-3 kV clamp inject at 5 kHz for 5 min<br>Digital I/O: +/-3 kV clamp inject at 5 kHz for 5 min<br>Analog I/O: +/-3 kV clamp inject at 5 kHz for 5 min<br>Earth Ground: +/-3 kV clamp inject at 5 kHz for 5 min |
| Surge immunity (Performance Criteria B) | IEC61000-4-5<br>DLR Ports: +/-2 kV common mode @ 2 ohms<br>Module and Output Power: +/-2 kV common mode @ 12 ohms; +/-2 kV differential mode @ 2 ohms<br>Shielded Digital I/O: +/-2 kV common mode @ 2 ohms<br>Shielded Analog I/O: +/-2 kV common mode @ 2 ohms |
| Conducted radiated immunity (Performance Criteria A) | DLR Ports, Module Power, Output Power, Digital I/O, and Analog I/O<br>150 kHz…80 MHz, CDN inject<br>10V, with 1 kHz sine wave 80% AM |

## Compliance

| *Compliance (when product is marked)*[1] | *Value* |
|---|---|
| *CE* | *European Union 2004/108/EC EMC Directive, compliant with:*<br>*EN 61326-1; Meas./Control/Lab., Industrial Requirements*<br>*EN 61000-6-2; Industrial Immunity*<br>*EN 61000-6-4; Industrial Emissions*<br>*EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)* |
| *EtherNet/IP* | *ODVA conformance tested to Ethernet/IP specifications.* |

[1] *See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.*

## Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support/, 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$^{SM}$ support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

## Installation Assistance

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

| United States or Canada | 1.440.646.3434 |
|---|---|
| Outside United States or Canada | Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html, or contact your local Rockwell Automation representative. |

## 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 to complete the return process. |
|---|---|
| Outside United States | Please contact your local Rockwell Automation representative for the return procedure. |

## Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication RA-DU002, available at http://www.rockwellautomation.com/literature/.

Drawing Number 10000181820 Ver. 01 - November 2012