

## ***Installation Instructions***

# **1732E ArmorBlock 2 Port Ethernet Module**

Catalog Numbers 1732E-IB16M12R, 1732E-OB16M12R,  
1732E-IB16M12DR, 1732E-OB16M12DR, 1732E-16CFGM12R,  
1732E-IB16M12SOEDR, 1732E-8X8M12DR

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### 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 HAZARD</b> 	Labels may be on or inside the equipment, for example, 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, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

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## Environment and Enclosure

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

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**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.

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:

- Industrial Automation Wiring and Grounding Guidelines, Rockwell Automation publication [1770-4.1](#), for additional installation requirements.
  - NEMA Standards 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.
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## Prevent Electrostatic Discharge

Follow these guidelines when you handle this equipment.

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**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.

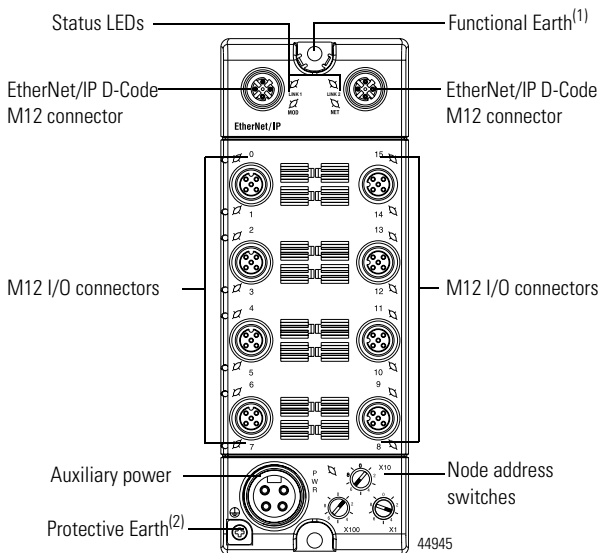
- Touch a grounded object to discharge potential static.
  - Wear an approved grounding wrist strap.
  - Do not touch connectors or pins on component boards.
  - Do not touch circuit components inside the equipment.
  - Use a static-safe workstation if available.
  - Store the equipment in appropriate static-safe packaging when not in use.
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## About the ArmorBlock 2 Port Ethernet Module

The EtherNet/IP ArmorBlock is a 24V DC I/O module that communicates via EtherNet/IP. 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.

### EtherNet/IP ArmorBlock 16-Point I/O Module



<sup>(1)</sup> 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 9 for connections.

<sup>(2)</sup> Protective Earth is provided for the grounding of field devices and is internally connected to each Pin 5 of the M12 I/O connectors. Refer to I/O Connectors on page 8 for connections.

## Catalog Number Explanation

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

<b>Cat. No.</b>	<b>Description</b>	<b>Network Connector</b>	<b>Auxiliary Power</b>
1732E-IB16M12R	16 Channel 24V DC Digital Input Dual-Port Ethernet Module	Dual D-Code M12	Single 4-pin mini
1732E-OB16M12R	16 Channel 24V DC Digital Output Dual-Port Ethernet Module		
1732E-16CFGM12R	16 Channel 24V DC Configurable Digital I/O Dual-Port Ethernet Module		
1732E-IB16M12DR	Diagnostic 16 Channel 24V DC Digital Input Dual-Port Ethernet Module	Dual D-Code M12	Single 4-pin mini
1732E-OB16M12DR	Diagnostic 16 Channel 24V DC Digital Output Dual-Port Ethernet Module		
1732E-8X8M12DR	Diagnostic 8-Input/8-Output 24V DC Digital I/O Dual-Port Ethernet Module	Dual D-Code M12	Single 4-pin mini
1732E-IB16M12SOEDR	Diagnostic Sequence of Events 16 Channel 24V DC Digital Input Dual-Port Ethernet Module	Dual D-Code M12	Single 4-pin mini

## Install the Module

Refer to the following sections to install your module.

- Set the Network Address
- Mount the Module
- Connect the I/O, Network and Auxiliary cables to the ArmorBlock Module

## Set the Network Address

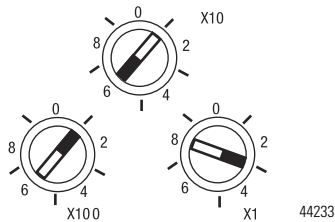
The I/O block ships with the rotary switches set to 999 and DHCP enabled. To change the network address, you can do one of the following:

- 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 3 switches on the front of the module (refer to the illustration on page 6). 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 I/O block's IP address is 192.168.1.xxx (where xxx represents the number set on the switches). The I/O block's subnet mask 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.

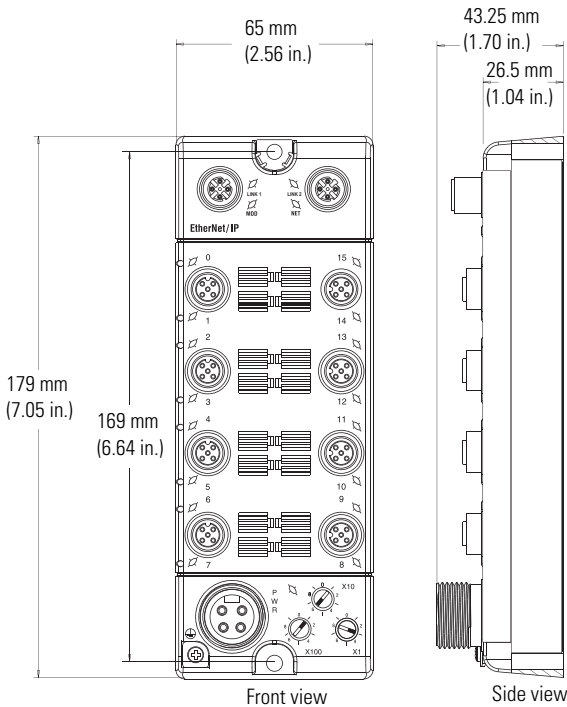
If DHCP is not enabled, the I/O block uses the IP address (along with other TCP configurable parameters) stored in nonvolatile memory.

## 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 Nm (10 in-lb).

## Product Dimensions

Refer to the mounting dimensions illustration to help you mount the modules.

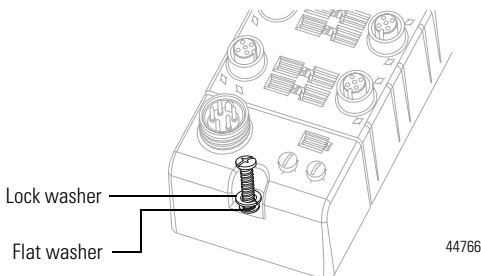


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### *Mount the Module in High Vibration Areas*

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. Torque the mounting screws to 1.13 Nm (10 in-lb).

### **High Vibration Area Mounting**



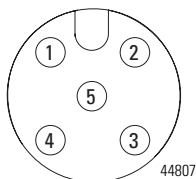
### **Connect the I/O, Network and Auxiliary Cables to the ArmorBlock Module**

The ArmorBlock EtherNet/IP family has 5-pin micro-style connectors. 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*

Refer to the pinout diagrams for the I/O connectors.

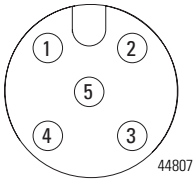
#### **Micro-style 5-Pin Input Female Connector**



(View into connector)

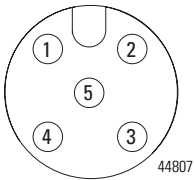
- Pin 1 Sensor source voltage
- Pin 2 Input B
- Pin 3 Return
- Pin 4 Input A
- Pin 5 PE



**Micro-style 5-Pin Output Female Connector**

(View into connector)

- Pin 1 Not used
- Pin 2 Output B
- Pin 3 Return
- Pin 4 Output A
- Pin 5 PE

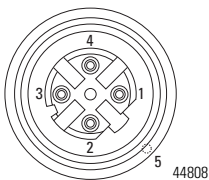
**Self-configuring Connector**

(View into connector)

- Pin 1 Sensor source voltage
- Pin 2 Input or output B
- Pin 3 Return
- Pin 4 Input or output A
- Pin 5 PE

*EtherNet/IP Connectors*

Refer to the pinout diagrams for the network 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

The 1732E-16CFGM12R self-configuring module contains both input and output functionality.

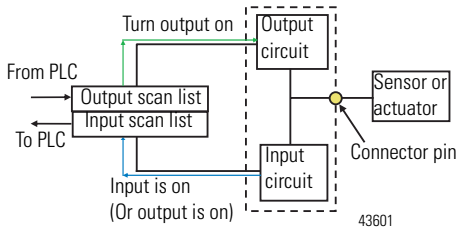
- If an I/O point is to be an output, dedicate that point as an output with a wired load and energize it through a control program.
- Energized outputs show an associated active input that can be used as a feedback mechanism to make certain that the output is on.
- If an I/O point is to be an input, wire the input device as normal and leave the associated output de-energized at all times.

**ATTENTION**



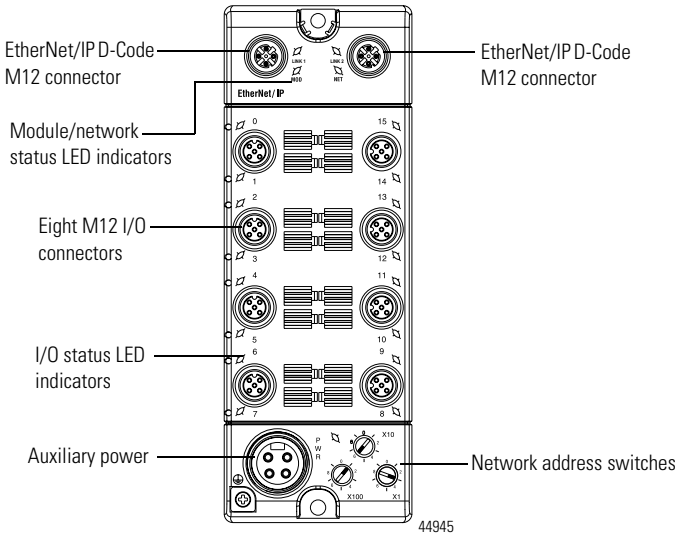
Make sure all connectors and caps are securely tightened to properly seal the connections against leaks and maintain IP enclosure type requirements.

**I/O Self-configure Circuitry**



Refer to the illustration for configuration operations.

## Configure Operations

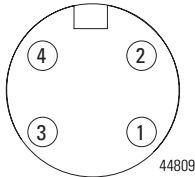


Refer to On-Machine Connectivity Catalog, publication [M116-CA001](#), for Rockwell Automation cable and cord set offerings or use the configuration tools available at [www.ab.com/e-tools/](http://www.ab.com/e-tools/).

## Auxiliary Power Cable

Attach the mini-style 4-pin connector to the mini-style 4-pin receptacle as shown below.

### Mini-style 4-Pin Input Male Receptacle



(View into receptacle)

Pin 1 Output power+

Pin 2 Sensor/MDL power+

Pin 3 Sensor/MDL power-

Pin 4 Output power-

Auxiliary Power is based on a 4-pin connector system and is used to provide 24V DC power to I/O modules and other devices. Running separate power to these devices is most typically used for I/O devices with output connections to prevent power supply interruption due to switching of outputs. However, some devices require separate auxiliary power to power them regardless of the presence of outputs.

Depending on the devices used, it may be possible to provide power through only one pair of the four available pins, and in this case the other available pair may be used for single channel E-stop through the use of special E-stop drop or power T-ports and shorting plugs. Allen-Bradley E-stop T-ports and shorting plugs are red in color for easy identification.

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**ATTENTION**

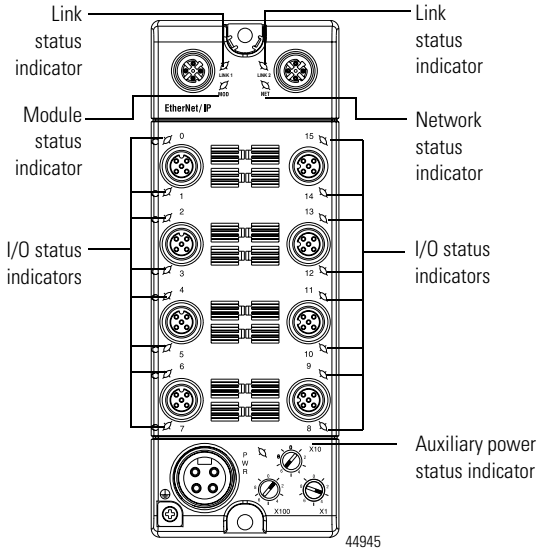
To comply with the CE Low Voltage Directive (LVD), this equipment and all connected I/O must be powered from a source compliant with the following: Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV).

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## 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	Off	No power applied to device.
	Flashing red/green	Device is in self-test.
	Green	Device operating normally.
	Flashing red	Recoverable fault.
	Red	Unrecoverable fault – may require device replacement.

## Indicator Status for Modules

	Status	Description
Network status	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.
	Flashing red/green	The module is performing a powerup self-test.
Network link status	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 auxiliary power to device or input not valid.
	Green	Auxiliary power applied to device.
Digital output status <sup>(1)</sup>	Off	Output not energized.
	Yellow	Output energized.
	Red	Output shorted.
	Flashing red	Output open load.
Digital input status <sup>(1)</sup>	Off	No valid input.
	Yellow	Valid input.
	Red	Sensor source voltage shorted.
	Flashing red	Sensor source open wire.

<sup>(1)</sup> Only diagnostic modules 1732E-\*DR have red I/O status LEDs.

### 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

### ArmorBlock 2 Port Ethernet Module Input – 1732E-8X8M12DR, 1732E-IB16M12R, 1732E-IB16M12DR, 1732E-IB16M12SOEDR, 1732E-16CFGM12R

Attributes	Value
Number of inputs	8 – 1732E-8X8M12DR 16 – 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 ON to OFF OFF to ON	0...16000 $\mu$ s
Isolation voltage	50V (continuous), Basic Insulation Type, Inputs and Sensor Power to Network No isolation between individual Inputs or between Network channels Type tested at 707V DC for 60s

### ArmorBlock 2 Port Ethernet Module Output – 1732E-8X8M12DR, 1732E-OB16M12R, 1732E-OB16M12DR, 1732E-16CFGM12R

Attributes	Value
Number of outputs	8 – 1732E-8X8M12DR 16 – all other modules
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

**ArmorBlock 2 Port Ethernet Module Output – 1732E-8X8M12DR,  
1732E-OB16M12R, 1732E-OB16M12DR, 1732E-16CFGM12R**

<b>Attributes</b>	<b>Value</b>
Voltage, on-state output, min	11V DC
Voltage, on-state output, nom	24V DC
Current on-state output, max	2 A – 1732E-OB16M12R 0.5 A – all other modules
Current per module, max	4.0 A – 1732E-8X8M12DR 8.0 A – all other modules
Leakage current, off-state output, max	50 $\mu$ A
Surge current per output, max	4.8 A for 10 ms, repeatable every 2 s – 1732E-OB16M12R 1.2 A for 10 ms, repeatable every 2 s – all other modules
Isolation voltage	50V (continuous), Basic Insulation Type, Outputs and Output Power to Network No isolation between individual Outputs or between Outputs and Output power or between Network channels Type tested at 707V DC for 60s
Pilot duty rating	DC-14

**General Specifications**

<b>Attributes</b>	<b>Value</b>
Voltage, auxiliary power, max	30V DC
Voltage, auxiliary power, min	12V DC
Current, Ethernet system power, max (pins 2, 3 sensor source/module power)	0.4 A – 1732E-OB16M12R, 1732E-OB16M12DR 0.8 A – 1732E-8X8M12DR 1.2 A – 1732E-IB16M12R, 1732E-IB16M12DR, 1732E-IB16M12SOEDR, 1732E-16CFGM12R
Current, auxiliary power, max per output module (pins 2, 3 sensor source/module power plus pins 1, 4 for output loads)	4 A – 1732E-8X8M12DR 8 A – all other modules
Current, sensor source, per input, max	50 mA
Current, sensor source, per connector, max	100 mA
Communication rate	EtherNet/IP 10/100 Mbps Full or half-duplex 100 meter per segment



## General Specifications

Attributes	Value
LED indicators	Module Status - red/green Network Status - red/green Link Status - green/yellow Auxiliary Power - green I/O LED - yellow I/O LED - yellow/red – 1732E-*DR modules only
Dimensions (HxWxD), approx.	179 x 65 x 43.25 mm (7.05 x 2.56 x 1.70 in.)
Weight, approx.	0.34 kg (0.75 lb)
Enclosure type rating	Meets IP65/66/67/69K (when marked)
Wiring category <sup>(1)</sup>	1 - on signal ports 1 - on power ports 1 - on communications ports

<sup>(1)</sup> 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	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): -20...60 °C (-4...140 °F)
Temperature, storage	IEC 60068-2-1 (Test Ab, Unpackaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Non-operating Thermal Shock): -40...85 °C (-40...185 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5...95% non-condensing
Vibration	IEC60068-2-6 (Test Fc, Operating): 5 g @ 10...500 Hz
Shock, operating	IEC60068-2-27 (Test Ea, Unpackaged Shock): 30 g
Shock, non-operating	IEC60068-2-27 (Test Ea, Unpackaged Shock): 50 g
Emissions	CISPR 11: Group 1, Class A

## Environmental Specifications

Attribute	Value
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...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 900 Mhz 10V/m with 200 Hz 50% Pulse 100% AM @ 1890 Mhz 3V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz
EFT/B immunity	IEC 61000-4-4: ±4 kV @ 5 kHz on power ports ±3 kV @ 5 kHz on signal ports ±3 kV @ 5 kHz on communications ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line(DM) and ±2 kV line-earth(CM) on power ports ±1 kV line-line(DM) and ±2 kV line-earth(CM) on signal ports ±2 kV line-earth(CM) on communications ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80% AM from 150 kHz...80 MHz

## Certifications

Certification (when product is marked) <sup>(1)</sup>	Value
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E322657.
CE	European Union 2004/108/EC EMC Directive, compliant with: EN 61326-1; 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 & B)
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
EtherNet/IP	ODVA conformance tested to Ethernet/IP specifications.

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

**Notes:**

## 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 (see 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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