



Installation Instructions

dc (10...60V) Output Module

Catalog Number 1771-OBD Series C

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About This Publication

Use this document as a guide when installing the 1771-OBD series C output module.

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.

<p>WARNING</p> 	<p>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.</p>
<p>IMPORTANT</p>	<p>Identifies information that is critical for successful application and understanding of the product.</p>
<p>ATTENTION</p> 	<p>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.</p>
<p>SHOCK HAZARD</p> 	<p>Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.</p>
<p>BURN HAZARD</p> 	<p>Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.</p>

Environment and Enclosure

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 (6562 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 nonmetallic. 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.

Preventing 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.
-

Before You Begin

Before you begin, make sure that the following decisions are made.

Determining Module Placement in the I/O Chassis

You can place your module in any I/O module slot of the I/O chassis, except for the extreme left slot. This slot is reserved for programmable controllers or adapters.

Group your module to minimize adverse effects from radiated electrical noise and heat. We recommend the following:

- Group analog input and low voltage dc modules away from ac modules or high voltage dc modules to minimize electrical noise.
- Do not place this module in the same module I/O group with a digital high-density I/O module when using two-slot addressing. This module uses a byte in both the input and output image tables for block transfer.

Important Preinstallation Considerations

The 1771-OBD series C module is compatible with all 1771 universal I/O chassis except 1771-A1, 1771-A2, and 1771-A4. Make sure no other output module or single-slot block transfer module is placed in the same module group when using two-slot addressing.

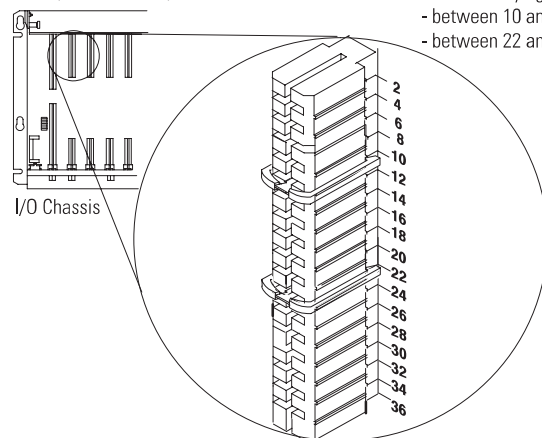
Calculate Power Requirements

Your module receives its power through the 1771 I/O chassis backplane from the chassis power supply. The module requires 400 mA from the output of this supply. To calculate the requirements for the backplane power supply, add 400 mA to the power requirements of all other modules in the I/O chassis. Calculating the requirements will prevent an overload to the chassis backplane and/or backplane power supply.

Key the Backplane

Place your module in any slot in the chassis except the leftmost slot, which is reserved for processors or adapters.

Position keying bands in the backplane connectors to correspond to the key slots on the module.



Place the keying bands:
- between 10 and 12
- between 22 and 24

You can change the position of these bands if subsequent system design and rewiring makes insertion of a different type of module necessary.

1. Position the keying bands in the backplane connectors to correspond to the key slots on the module.
2. Place the keying bands:
 - between 10 and 12.
 - between 22 and 24.

You can change the position of these bands if subsequent system design and rewiring makes insertion of a different type of module necessary.

ATTENTION



Observe the following precautions when inserting or removing keys:

- Insert or remove keys with your fingers.
- Make sure that key placement is correct.

Incorrect keying or the use of a tool can result in damage to the backplane connector and possible system faults.

Install the Module

ATTENTION

Make certain that you do not install this module into a chassis slot keyed for a 1771-IAD series D input module.



Install the module and secure it in the chassis.

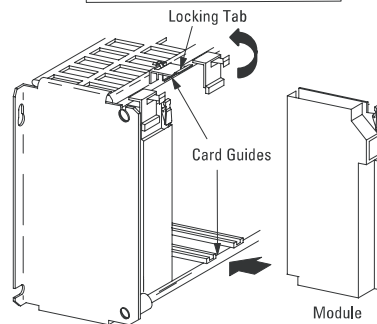
1. Position the module in the card guides for the chosen slot.
2. Slide the module into the chassis and apply firm, even pressure to seat the module into its backplane connector.
3. **Series A chassis:** Snap the chassis latch lever over the top of the module to secure the module in the chassis.

Series B chassis: Swing the locking bar down into place, making sure the locking bar pins are engaged to secure the module in the chassis.

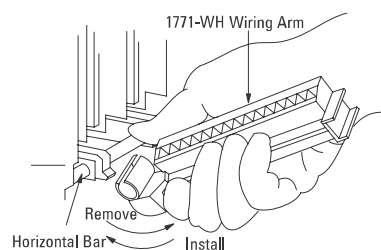
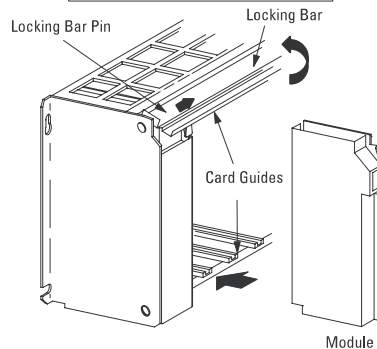
4. Attach the field wiring arm to the horizontal bar at the bottom of the chassis. The wiring arm pivots upward so you can install or remove the module without disconnecting the wires.

The 1771-OBD module is a modular component of the 1771 I/O system requiring a properly installed system chassis. Refer to the Universal I/O Chassis Installation Instructions, publication 1771-IN075, for detailed information on acceptable chassis, along with proper installation and grounding requirements. Limit the adjacent slot power dissipation to 10 W maximum.

1771-A1B, 1771-A2B, 1771-A3B,
1771-A3B1, 1771-A4B I/O Chassis



1771-A1B, 1771-A2B, 1771-A3B1,
1771-A4B Series B I/O Chassis



Connect Wiring

Connect your I/O devices to the field wiring arm, 1771-WH, shipped with the module.

WARNING

When you connect or disconnect the wiring arm with field-side power applied, 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.

WARNING

Permanent damage to the module may occur in applications where frequent overload or short circuit conditions are possible. To prevent module damage where these conditions exist, use the optional 1771-WHF or 1771-WHFB fused field-wiring arm instead of the 1771-WH field-wiring arm shipped with the module. Note that the optional 1771-WHF or 1771-WHFB fused field-wiring arms are not certified for use in Class I, Division 2, Groups A, B, C, and D environments.

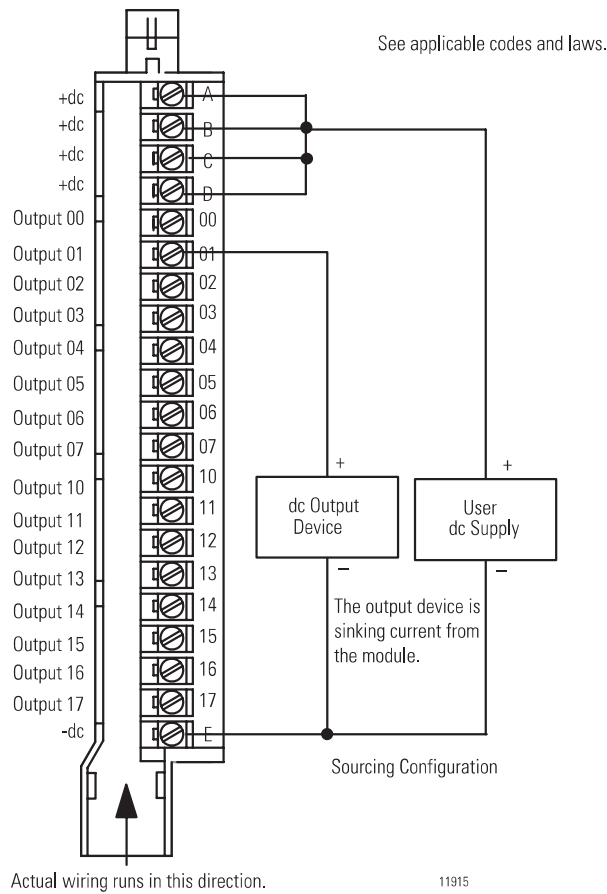
ATTENTION

Remove power from the 1771 I/O chassis backplane before you install this module. Failure to remove power from the backplane could cause:

- module damage or degradation of performance.
- injury or equipment damage due to possible unexpected operation.

You can use an ac (24V) output module, 1771-OND series C, to directly drive terminals on an ac/dc (24V) input module, 1771-IND series C, as shown in the connection diagram on page 8.

Connection Diagram



You must supply dc at terminals A through D on the wiring arm. You need four dc connections to accommodate the total required surge rating on the module without overstressing any single connection on the field wiring arm. Jumper all dc connections together to prevent module damage. Connect terminal E to dc common.

ATTENTION



Observe proper polarity, as indicated in the connection diagram on page 10 with dc power connections. Reverse polarity, or application of ac voltage, could damage the module.

IMPORTANT

You can use a dc (10...60V) output module (771-OB series C) to directly drive terminals on the following modules:

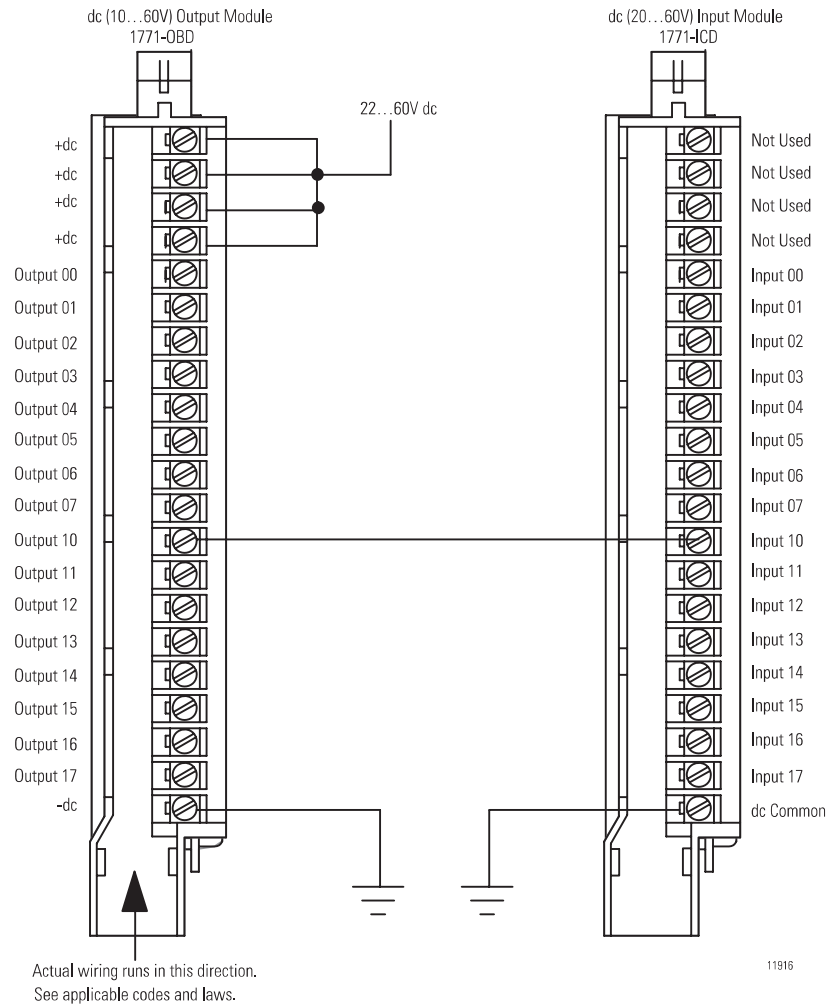
- dc (5...30V) input module (1771-IQ)
 - dc (10...30V) input module (1771-IBD, 1771-IBN)
 - dc (20...60V) input module (1771-ICD)
 - dc (12...24V) input module (1771-IB)
 - dc (24V) input module (1771-IQ16)
 - dc (48V) input module (1771-IC)
-

Refer to Driving an Input with an Output Module on page for direct connection to a 1771-ICD input module.

IMPORTANT

Use the same dc supply to power both modules to make sure that ground is at the same potential.

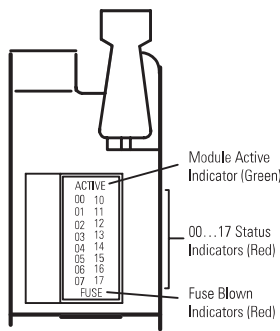
Driving an Input with an Output Module



Interpreting the LED Indicators

The front panel of your module contains one green module active indicator, 16 red status indicators, and one red fuse blown indicator.

The green module active indicator lights when the module is powered and the processor keyswitch is in RUN mode. The indicator light turns off when the processor resets the outputs.



The module active indicator must be on to properly interpret the red status indicators. The red status indicators are provided for indication of individual outputs. They indicate the state to which the transistor is commanded by the processor and are powered by circuitry within the module. The indicators will turn on and off as commanded by the processor. They do not indicate the presence or absence of dc power at an output terminal.

The module active indicator must be on to properly interpret the red status indicators. The red status indicators are provided for indication of individual outputs. They indicate the state to which the transistor is commanded by the processor and are powered by circuitry within the module. The indicators will turn on and off as commanded by the processor. They do not indicate the presence or absence of dc power at an output terminal.

The fuse blown indicator turns on when the fuse is blown. When the fuse blown indicator is lit, check the fuse. After checking the fuse, make sure the field wiring arm is firmly in place. Do this before checking the status of the other indicators.

Use this table to help you interpret the 1771-OBD status indicators and to troubleshoot module and system faults.

Troubleshooting

Indicator Status	Description	Action
Module Active On (Green)	Normal indication.	None.
Module Active On (Green) and Output Status On (Red)	Check voltage at output point on swing arm.	If voltage is present, take no action. If no voltage is present, replace module.
Module Active On (Green) and Output Status Off	Output point not on in data table.	None.
	Module failure.	Replace module.
Module Active Off and Output Status On or Off (Red)	Processor in Program mode.	None.
	Module not functioning properly.	Check chassis power supply and processor. If they are okay, replace module.

Replace the Fuse

An overload or short will cause the single onboard fuse to blow when the module output exceeds 10 A. The onboard fuse does not protect the individual output transistors.

To replace the onboard fuse, do the following:

1. Turn off all power to the I/O chassis and all output device power to the field wiring arm.

ATTENTION



Remove power from the 1771 I/O chassis backplane and field wiring arm before removing or installing an I/O module.

- Failure to remove power from the backplane or wiring arm could cause module damage, degradation of performance, or injury.
- Failure to remove power from the backplane could cause injury or equipment damage due to possible unexpected operation.

-
2. Remove the module from the chassis and replace the blown fuse with a 10 A, 250V rectifier fuse (1/4 x 1-1/4 inch), Littelfuse part number 322010.

The fuse is accessible through the side of the module.

WARNING





Failure to use the specified replacement fuse may cause module damage, degradation of performance, or injury.

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3. Replace the module in the chassis and attach the field wiring arm.
 4. Turn system power on.

Hazardous Location Approvals

North American Hazardous Location Approval

<p>The following information applies when operating this equipment in hazardous locations.</p> <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>Informations sur l'utilisation de cet équipement en environnements dangereux .</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>	
<p>WARNING</p> 	<p>EXPLOSION HAZARD</p> <ul style="list-style-type: none"> • Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. • 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. • If this product contains batteries, they must only be changed in an area known to be nonhazardous. 	<p>AVERTISSEMENT</p> 	<p>RISQUE D'EXPLOSION</p> <ul style="list-style-type: none"> • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement. • 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. • La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Division 2. • S'assurer que l'environnement est classé non dangereux avant de changer les piles.

European Hazardous Location Approval

European Zone 2 Certification

(The following applies when the product bears the EEx Marking.)

This equipment is intended for use in potentially explosive atmospheres as defined by European Union Directive 94/9/EC.

The LCIE (Laboratoire Central des Industries Electriques) certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of Category 3 equipment intended for use in potentially explosive atmospheres, given in Annex II to this Directive.

Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-15.

IMPORTANT

Observe the following additional Zone 2 certification requirements:

- This equipment is not resistant to sunlight or other sources of UV radiation.
 - This equipment must be installed in an enclosure providing at least IP54 protection when applied in Class I, Zone 2 environments.
 - This equipment shall be used within its specified ratings defined by Allen-Bradley.
 - Provision shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 40% when applied in Class I, Zone 2 environments.
-

Specifications

dc (10...60V) Output Module, 1771-OBD Series C

Attribute	Value
Outputs per module	16 nonisolated
Module location	1771-A1B through 1771-A4B I/O chassis (Do not use this module with 1771-A4 I/O chassis)
User supply voltage	10...60V dc
Voltage, on-state output, nom	48V dc
Current rating (see Derating Curve)	2 A per output resistive, not to exceed 8 A per module 0.2 A per output pilot duty
Surge current, max	4 A per output for 10 ms, repeatable every 2 s 25 A per output for 10 ms, repeatable every 2 s
Load current, min	2.5 mA
On-state voltage drop (at rated current), max	1.5V dc
Off-state leakage current, max	0.5 mA
Output signal delay, max Off to on On to off	0.1 ms 0.2 ms
Power dissipation, max	15.6 W
Thermal dissipation, max	53.3 BTU/hr
Isolation voltage (continuous-voltage withstand rating)	60V (continuous), Basic Insulation Type Tested at 1000V ac for 60 s, I/O to system
Backplane current, max	400 mA @ 5V dc
Conductors wire size	0.34...2.5 mm ² (22...14 AWG) solid or stranded copper wire rated at 120 °C (248 °F) or higher 1.2 mm (3/64 in.) insulation max
Category ⁽¹⁾	2 - on signal ports
Temperature code, IEC	T3
Temperature code, North America	T3C
Field wiring arm	1771-WH 1771-WHF (3 A fused) ⁽²⁾ 1771-WHFB (1.5 A fused) ⁽²⁾
Field wiring arm screw torque	1.0 Nm (9 lb-in)
Keying	Between 10 and 12 Between 22 and 24

⁽¹⁾ Use this conductor category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

⁽²⁾ Not suitable for Class I Division 2 Groups A, B, C, and D Hazardous Locations.

Environmental Specifications

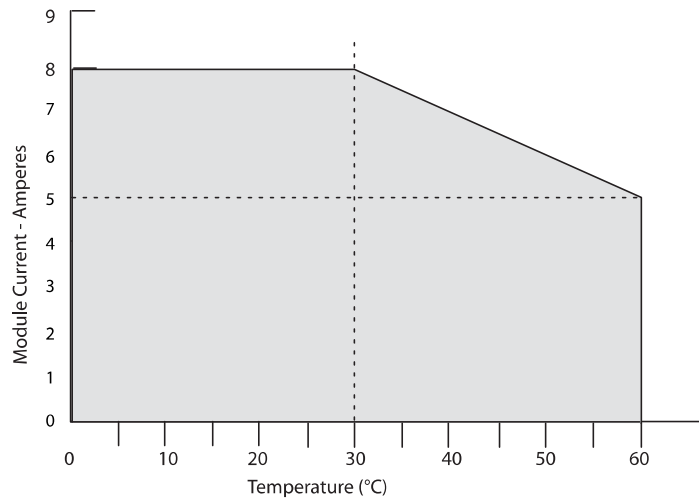
Attribute	Value
Temperature, operating	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): 0...60 °C (32...140 °F)
Temperature, storage	IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): -40...85 °C (-40...185 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5...95% noncondensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 2 g @ 10...500 Hz
Shock, operating	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 30 g
Shock, nonoperating	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 50 g
ESD immunity	IEC 61000-4-2: 4 kV indirect contact discharges
Radiated RF immunity	IEC 61000-4-3: 10 V/m with 1 kHz sine-wave 80% AM from 30...1000 MHz
EFT/B immunity	IEC 61000-4-4: ±1 kV at 5 kHz on signal ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80% AM from 150 kHz...30 MHz
Emissions	CISPR 11: Group 1, Class A (with appropriate enclosure)
Enclosure type rating	None (open style)

Certifications

Certification (when product is marked) ⁽¹⁾	Value
UL	UL Listed Industrial Control Equipment. See UL File E65584
CSA	CSA certified Process Control Equipment. See CSA file LR54689C.
CSA	CSA certified Process Control Equipment for Class I, Division 2, Groups A, B, C and D Hazardous Locations. See CSA file LR69960C.
EEx	European Union 94/9/EC Directive, compliant with: EN 60079-15; Potentially Explosive Atmospheres, Protection n (zone 2)
CE	European Union 89/336/EEC EMC Directive, compliant with: EN 61000-6-4; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity
C-Tick	Australian Radiocommunications Act compliant with AS/NZS CISPR 11, Industrial Emissions

⁽¹⁾ See the Product Certification link at www.ab.com for Declarations of Conformity, certificates, and other certification details.

Derating Curve



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 with a hardware module 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 module up and running.

United States	1,440,646,3223 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell 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, it may need to be returned.

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 return procedure.

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