

# Micro800 4-channel and 8-channel Analog Voltage/current Input and Output Modules

Catalog Number 2085-IF4, 2085-IF8, 2085-OF4

<http://www.rockwellautomation.com/literature/>

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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://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.

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

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|  |   |
|--|---|
|   | <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>ATTENTION:</b> 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 consequences. |
|   | <b>SHOCK HAZARD:</b> Labels may be on or inside the equipment (for example, 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, drive or motor) to alert people that surfaces may reach dangerous temperatures.  |
| <b>IMPORTANT</b>   | Identifies information that is critical for successful application and understanding of the product.  |

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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 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 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 or be approved for the application 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 the following:

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

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**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.
-

## North American Hazardous Location Approval

The following modules are North American Hazardous Location approved:  
2085-IF4, 2085-IF8, 2085-OF4

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



**WARNING:** When you connect or disconnect the Removable Terminal Block (RTB) 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:** When used in a Class I, Division 2, hazardous location, this equipment must be mounted in a suitable enclosure with proper wiring method that complies with the governing electrical codes.

**WARNING:** If you connect or disconnect wiring while the field-side power is on, 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:** Do not connect directly to line voltage. Line voltage must be supplied by a suitable, approved isolating transformer or power supply having short circuit capacity not exceeding 100 VA maximum or equivalent.

**WARNING:** If you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed before proceeding.

**WARNING:** Do not unscrew the RTB hold down screws and remove the RTB while power is on. This could cause an explosion in hazardous location installations. Be sure that power is removed before proceeding.

## Additional Resources

| Resource  | Description  |
|---|--|
| Micro830 and Micro850 Programmable Controller User Manual, publication <a href="#">2080-UM002</a> | A detailed description of how to install and use a Micro850 Programmable Controller. |
| Micro 800 Bus Terminator Installation Instructions, publication <a href="#">2085-IN002</a>        | Information on installing the bus terminator module.                                 |
| Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>       | More information on proper wiring and grounding techniques.                          |

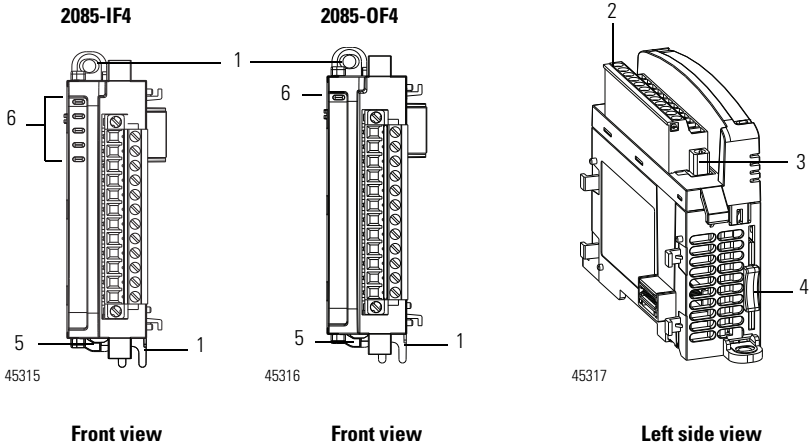
If you would like a manual, you can:

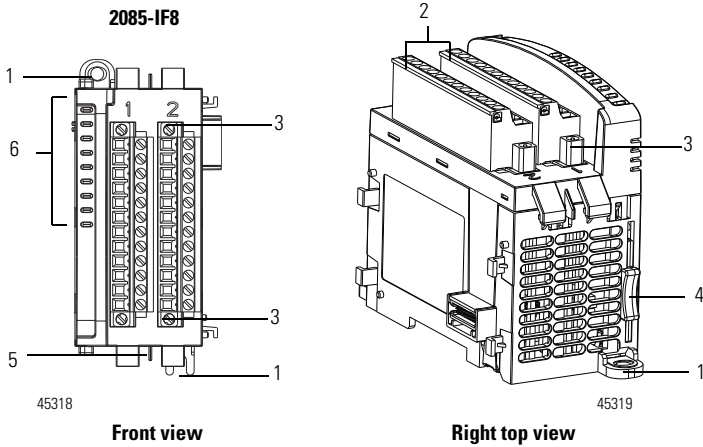
- download a free electronic version from the Internet:  
<http://www.rockwellautomation.com/literature/>.
- purchase a printed manual by contacting your local Allen-Bradley distributor or Rockwell Automation representative

## Overview

The Micro800™ expansion I/O is a modular I/O that complements and extends the capabilities of Micro850™ controllers. These expansion I/O modules interface with Micro850 controllers using an I/O expansion port.

### I/O Module Overview





**Module Description**

| Description |                                     | Description |                           |
|-------------|-------------------------------------|-------------|---------------------------|
| 1           | Mounting screw hole / mounting foot | 4           | Module interconnect latch |
| 2           | Removable Terminal Block (RTB)      | 5           | DIN rail mounting latch   |
| 3           | RTB hold down screws                | 6           | I/O status LED            |



This equipment is sensitive to electrostatic discharge (ESD). Follow ESD prevention guidelines when handling this equipment.



**ATTENTION:** To comply with UL restrictions, this equipment must be powered from a source compliant with the following:

Class 2 or Limited Voltage/Current.

**ATTENTION:** To comply with the CE Low Voltage Directive (LVD), 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).

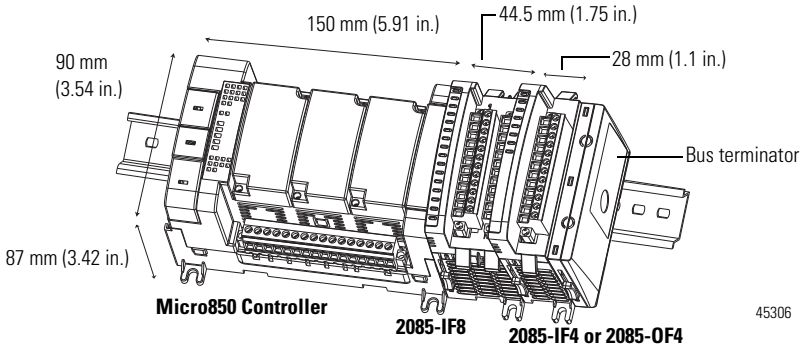
**Mount the Module**

For more information on proper grounding guidelines, see the Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#).

## Module Spacing

Maintain spacing from objects such as enclosure walls, wireways and adjacent equipment. Allow 50.8 mm (2 in.) of space on all sides for adequate ventilation, as shown.

### Mounting Dimensions and DIN Rail Mounting



Mounting dimensions do not include mounting feet or DIN rail latches.

## DIN Rail Mounting

The module can be mounted using the following DIN rails: 35 x 7.5 mm x 1 mm (EN 50 022 - 35 x 7.5).

**TIP** For environments with greater vibration and shock concerns, use the panel mounting method, instead of DIN rail mounting.



**ATTENTION:** This product is grounded through the DIN rail to chassis ground. Use zinc plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (for example, aluminum or plastic) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding. Secure DIN rail to mounting surface approximately every 200 mm (7.8 in.) and use end-anchors appropriately.

Before mounting the module on a DIN rail, use a flat-blade screwdriver in the DIN rail latch and pry it downwards until it is in the unlatched position.

1. Hook the top of the DIN rail mounting area of the module onto the DIN rail, and then press the bottom until the module snaps onto the DIN rail.
2. Push the DIN rail latch back into the latched position.  
Use DIN rail end anchors (Allen-Bradley part number 1492-EAJ35 or 1492-EAHJ35) for vibration or shock environments.

To remove your module from the DIN rail, pry the DIN rail latch downwards until it is in the unlatched position.

## Panel Mounting

The preferred mounting method is to use two M4 (#8) per module. Hole spacing tolerance:  $\pm 0.4$  mm (0.016 in.). For mounting dimensions, refer to Micro830 and Micro850 Programmable Controller User Manual, publication [2080-UM002](#).

Follow these steps to install your module using mounting screws.

1. Place the module next to the controller against the panel where you are mounting it. Make sure the controller and module are spaced properly.
2. Mark drilling holes through the mounting screw holes and mounting feet then remove the module.
3. Drill the holes at the markings, then replace the module and mount it. Leave the protective debris strip in place until you are finished wiring the module and any other devices.

## System Assembly

The Micro800 expansion I/O module is attached to the controller or another I/O module by means of interconnecting latches and hooks, as well as the bus connector. The Micro850 controller and expansion I/O modules must terminate with a 2085-ECR Bus Terminator module.

Be sure to lock the module interconnect latches and tighten the RTB hold down screws before applying power to the module.

For installation of the 2085-ECR module, refer to Micro800 Bus Terminator Module Installation Instructions, publication [2085-IN002](#).



**ATTENTION:** Failure to connect a bus terminator module to the last expansion I/O module will result in a controller hard fault.

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## Field Wiring Connections

In solid-state control systems, grounding and wire routing helps limit the effects of noise due to electromagnetic interference (EMI).



**ATTENTION:** Do not wire more than 2 conductors on any single terminal.

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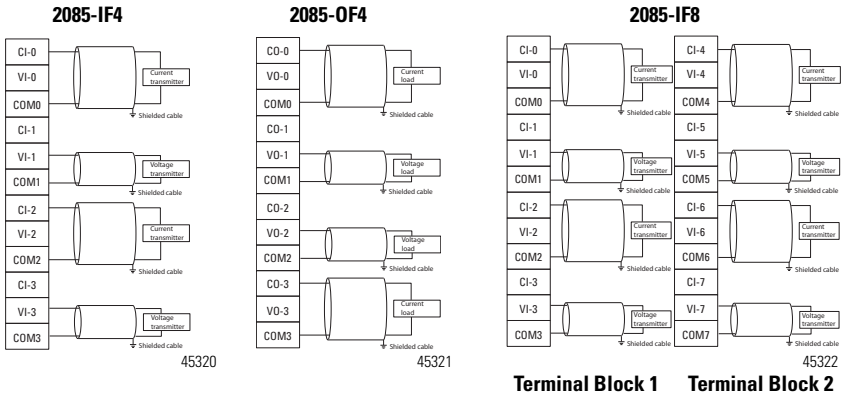


**ATTENTION:** To comply with UL restrictions, this equipment must be powered from a source compliant with the following:  
Class 2 or Limited Voltage/Current.

## Wire the Outputs

Included with your 2085-IF4 or 2085-OF4 module is a single 12-pin Removable Terminal Blocks (RTB). Included with your 2085-IF8 module are two 12-pin RTB. Basic wiring of your module is shown below.

### Basic Wiring to the 2085-IF4, 2085-IF8, 2085-OF4 Modules



## Specifications

### General Specifications

| Attribute                      | 2085-IF4  | 2085-OF4                        | 2085-IF8                                      |
|--------------------------------|---|---------------------------------|---|
| Number of I/O                  | 4   |                                 | 8   |
| Dimensions HxWxD               | 28 x 90 x 87 mm<br>(1.1 x 3.54 x 3.42 in.)  |                                 | 44.5 x 90 x 87 mm<br>(1.75 x 3.54 x 3.42 in.) |
| Shipping weight, approx.       | 140 g (4.93 oz)   |                                 | 220 g (7.76 oz)                               |
| Bus current draw, max          | 5V DC, 100 mA<br>24V DC, 50 mA  | 5V DC, 160 mA<br>24V DC, 120 mA | 5V DC, 110 mA<br>24V DC, 50 mA                |
| Wire size                      | 0.25... 2.5 mm <sup>2</sup> (22...14 AWG) solid or stranded copper wire rated at 75 °C (167 °F), or greater, 1.2 mm (3/64 in.) insulation max |                                 |   |
| Wiring category <sup>(1)</sup> | 2 – on signal ports   |                                 |   |
| Wire type                      | Shielded  |                                 |   |
| Terminal screw torque          | 0.5...0.6 Nm<br>(4.4...5.3 lb.-in.) <sup>(2)</sup>  |                                 |   |

**General Specifications**

| Attribute                | 2085-IF4   | 2085-OF4              | 2085-IF8               |
|--------------------------|--|-----------------------|------------------------|
| Power dissipation, total | 1.7 W  | 3.7 W                 | 1.75 W                 |
| Enclosure type rating    | None (open-style)  |                       |                        |
| Status indicators        | 4 red error indicator  | 1 red error indicator | 8 red error indicators |
| Isolation voltage        | 50V (continuous), Reinforced Insulation Type, channel to system and channel to channel. Type tested at 720V DC for 60s |                       |                        |
| North American temp code | T4   |                       |                        |

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

(2) RTB hold down screws should be tightened by hand. They should not be tightened using a power tool.

**Input Specifications – 2085-IF4 and 2085-IF8**

| Attribute                                    | 2085-IF4  | 2085-IF8 |
|--|---|----------|
| Number of Inputs                             | 4   | 8        |
| Resolution<br>Voltage<br>Current             | 14 bits (13 bits plus sign bit)<br>1.28 mV/cnt unipolar; 1.28 mV/cnt bipolar<br>1.28 µA/cnt   |          |
| Data format                                  | Left justified, 16 bit 2s complement  |          |
| Conversion type                              | SAR   |          |
| Update rate                                  | <2 ms per enabled channel without 50 Hz/60 Hz rejection, <8 ms for all channel<br>8 ms with 50 Hz/60 Hz rejection                     |          |
| Step response time<br>up to 63%              | 4...60 ms without 50Hz/60 Hz rejection – depends on number of enabled channel and filter setting<br>600 ms with 50 Hz/60 Hz rejection |          |
| Input current terminal,<br>user configurable | 4...20 mA (default)<br>0...20 mA  |          |
| Input voltage terminal,<br>user configurable | ±10V<br>0...10V   |          |
| Input impedance                              | Voltage terminal >1 MΩ<br>Current terminal <100 Ω   |          |
| Absolute accuracy                            | ±0.10% Full Scale @ 25 °C   |          |
| Accuracy drift with temp                     | Voltage terminal – 0.00428 % Full Scale/°C<br>Current terminal – 0.00407 % Full Scale/°C  |          |
| Calibration required                         | Factory calibrated. No customer calibration supported.  |          |
| Overload, max.                               | 30V continuous or 32 mA continuous, one channel at a time.  |          |
| Channel diagnostics                          | Over and under range or open circuit condition by bit reporting   |          |

## Output Specifications – 2085-OF4

| Attribute   | 2085-OF4   |
|---|--|
| Number of Inputs  | 4  |
| Resolution<br>Voltage<br>Current                          | 12 bits unipolar; 11 bits plus sign bipolar<br>2.56 mV/cnt unipolar; 5.13 mV/cnt bipolar<br>5.13 $\mu$ A/cnt |
| Data format   | Left justified, 16 bit 2s complement   |
| Step response time up to 63%                              | 2 ms   |
| Conversion rate, max                                      | 2 ms per channel   |
| Output current terminal,<br>user configurable             | 0 mA output until module is configured<br>4...20 mA (default)<br>0...20 mA                                   |
| Input voltage terminal,<br>user configurable              | $\pm$ 10V<br>0...10V   |
| Current load on voltage output,<br>max                    | 3 mA   |
| Absolute accuracy<br>Voltage terminal<br>Current terminal | 0.133 % Full Scale @ 25 °C or better<br>0.425 % Full Scale @ 25 °C or better                                 |
| Accuracy drift with temp                                  | Voltage terminal – 0.0045 % Full Scale/°C<br>Current terminal – 0.0069 % Full Scale/°C                       |
| Resistive load on mA output                               | 15...500 ohm @ 24V DC  |

## Environmental Specifications

| Attribute                         | Value  |
|-----------------------------------|--|
| Temperature, operating            | IEC 60068-2-1 (Test Ad, Operating Cold),<br>IEC 60068-2-2 (Test Bd, Operating Dry Heat),<br>IEC 60068-2-14 (Test Nb, Operating Thermal Shock):<br>-20...65 °C (-4...149 °F)  |
| Temperature, surrounding air, max | 65 °C (149 °F)   |
| Temperature, non-operating        | IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold),<br>IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat),<br>IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock):<br>-40...85 °C (-40...185 °F) |
| Relative humidity                 | IEC 60068-2-30 (Test Db, Unpackaged Damp Heat):<br>5...95% non-condensing  |
| Vibration                         | IEC 60068-2-6 (Test Fc, Operating):<br>2 g @ 10...500 Hz   |
| Shock, operating                  | IEC 60068-2-27 (Test Ea, Unpackaged Shock):<br>25 g  |
| Shock, non-operating              | IEC 60068-2-27 (Test Ea, Unpackaged Shock):<br>25 g – for DIN rail mount<br>35 g – for panel mount   |
| Emissions                         | CISPR 11<br>Group 1, Class A   |

## Environmental Specifications

| Attribute                | Value   |
|--------------------------|---|
| ESD immunity             | IEC 61000-4-2:<br>6 kV contact discharges<br>8 kV air discharges  |
| Radiated RF immunity     | IEC 61000-4-3:<br>10V/m with 1 kHz sine-wave 80% AM from 80...2000 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz<br>10V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz |
| EFT/B immunity           | IEC 61000-4-4:<br>±2 kV at 5 kHz on signal ports  |
| Surge transient immunity | IEC 61000-4-5:<br>±1 kV line-line(DM) and ±2 kV line-earth(CM) on signal ports  |
| Conducted RF immunity    | IEC 61000-4-6:<br>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.<br>UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E334470   |
| 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) |
| C-Tick  | Australian Radiocommunications Act, compliant with:<br>AS/NZS CISPR 11; Industrial Emissions   |
| KC  | Korean Registration of Broadcasting and Communications Equipment, compliant with:<br>Article 58-2 of Radio Waves Act, Clause 3   |

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

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