



Barrel Temperature Control Module

Cat. No. 1746-BTM

Contents

Use this document as a guide to install and wire the 1746-BTM barrel temperature control module.

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Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of these products must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

In no event will Rockwell Automation be responsible or liable for indirect or consequential damage resulting from the use or application of these products.

Any illustrations, charts, sample programs, and layout examples shown in this publication are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley™ publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Rockwell Automation office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this publication, notes may be used to make you aware of safety considerations. The following annotations and their accompanying statements help you to identify a potential hazard, avoid a potential hazard, and recognize the consequences of a potential hazard:

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



Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

ATTENTION**Environment and Enclosure**

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 meters 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 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.

See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure. Also, see the appropriate sections in this publication, as well as the Allen-Bradley publication 1770-4.1 ("Industrial Automation Wiring and Grounding Guidelines"), for additional installation requirements pertaining to this equipment.

Prevent Electrostatic Discharge**ATTENTION**

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

- touch a grounded object to discharge potential static
- wear an approved grounding wrist strap
- do not touch connectors or pins on component boards
- do not touch circuit components inside the equipment
- if available, use a static-safe workstation
- when not in use, store the equipment in appropriate static-safe packaging

How to Get the Related User Manual

The following table describes the related user manual that is available for this module. To order a copy or to view or download an online version, visit The Automation Bookstore at: **www.theautomationbookstore.com**

For information about:	See this document:	Publication number:
Programming, calibrating and troubleshooting the barrel temperature module	Barrel Temperature Control Module User Manual	1746-UM010

Determine the Module's Chassis Power Requirement

When computing power supply requirements, add the values shown below to the requirements of all other modules in the SLC® chassis to prevent overloading the chassis power supply:

5V dc amps	24V dc amps
0.110	0.085

Choose a Module Slot in a Local I/O Chassis

Place your module in any slot of an SLC 500™ module, or modular expansion chassis, except for the left-most slot (slot 0), reserved for the SLC processor or adapter modules.

IMPORTANT

For proper operation, use this module with a local processor. The module is not designed to operate in a remote chassis.

Installation Considerations

Most thermocouple-type applications require an industrial enclosure to reduce the effects of electrical interference. Thermocouple inputs are highly susceptible to electrical noises due to the small signal amplitudes (microvolt/°C). Isolate them from other input wiring and modules that radiate electrical interference.

Group your modules within the I/O chassis to minimize adverse effects from radiated electrical noise and heat. Consider the following conditions when selecting a slot location. Position the module *away from* modules that:

- connect to sources of electrical noise such as relays and ac motor drives
- generate significant heat, such as 32-point I/O modules

Install the Module

To install your module into the chassis:

1. Turn off the chassis power supply.

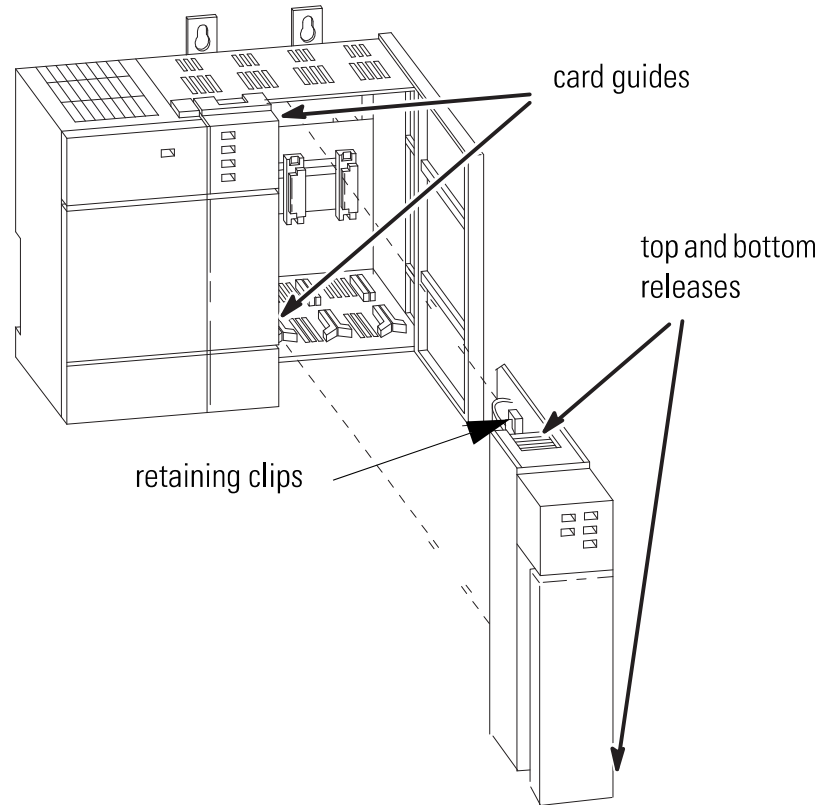
WARNING



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 or the area is nonhazardous before proceeding.

2. Align the circuit board of the thermocouple module with the card guides located at the top and bottom of the chassis.
3. Slide the module into the chassis until both top and bottom retaining clips are secured. Apply firm even pressure on the module to attach it to its backplane connector. Never force the module into the slot.
4. Cover unused slots with the card slot filler, catalog number 1746–N2.

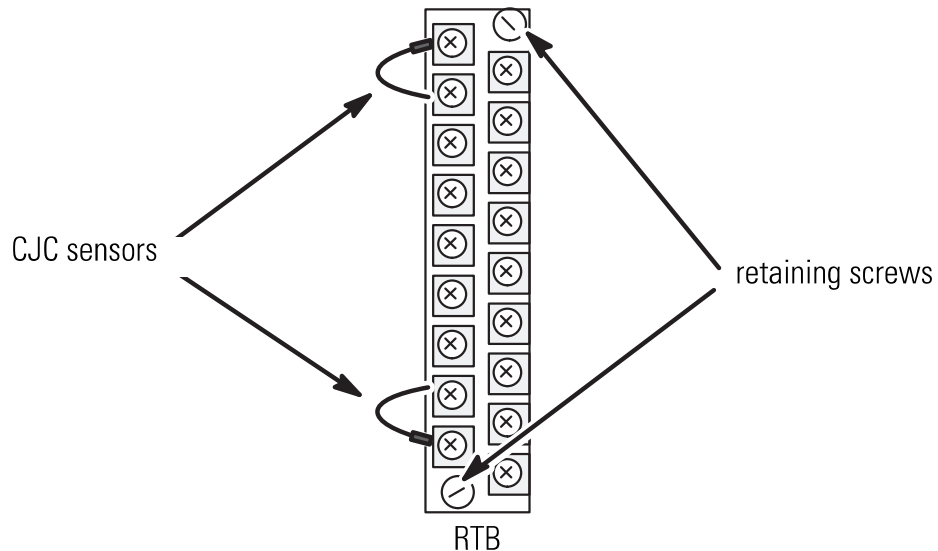
5. To remove, press the releases at the top and bottom of the module, and slide the module out of the chassis slot.



Remove/Install the Removable Terminal Block

The module ships with an attached an 18-position removable terminal block (RTB). When you install the module, it is not necessary to remove the RTB. If you ever need to remove it, follow this procedure:

1. Alternately loosen the two retaining screws to avoid cracking the RTB.



2. Grasp the RTB at the top and bottom and pull outward and down. When removing the RTB, be careful not to damage the CJC sensors.
3. Use the write-on label to identify the slot, chassis and module type.

SLOT _____	RACK _____
MODULE _____	

To install the RTB:

1. Remove power from the SLC 500 chassis.

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.

2. Make certain the color of the RTB matches the color band on the module.

ATTENTION

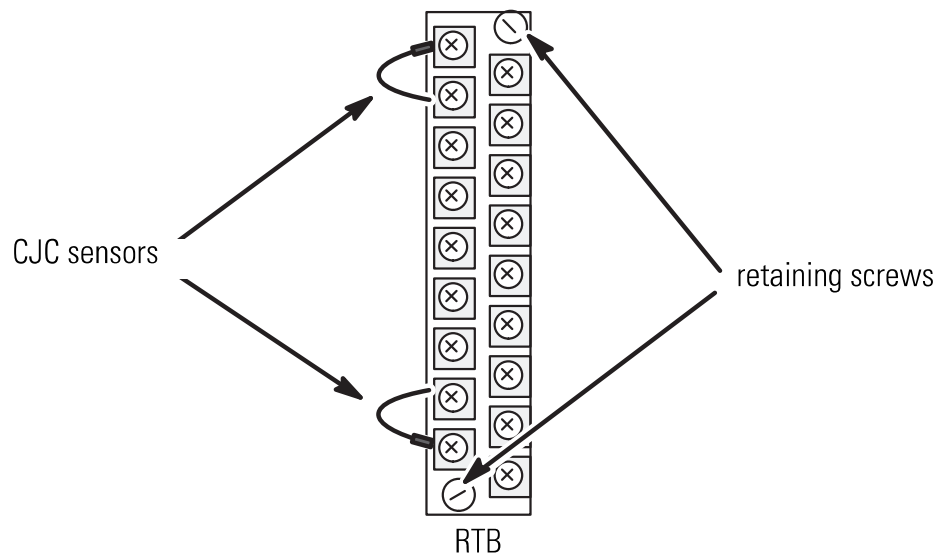
Inserting a wired RTB on an incorrect module can damage the module's circuitry when power is restored.



-
3. View the write-on label to identify the slot, chassis and module type.

SLOT _____	RACK _____
MODULE _____	

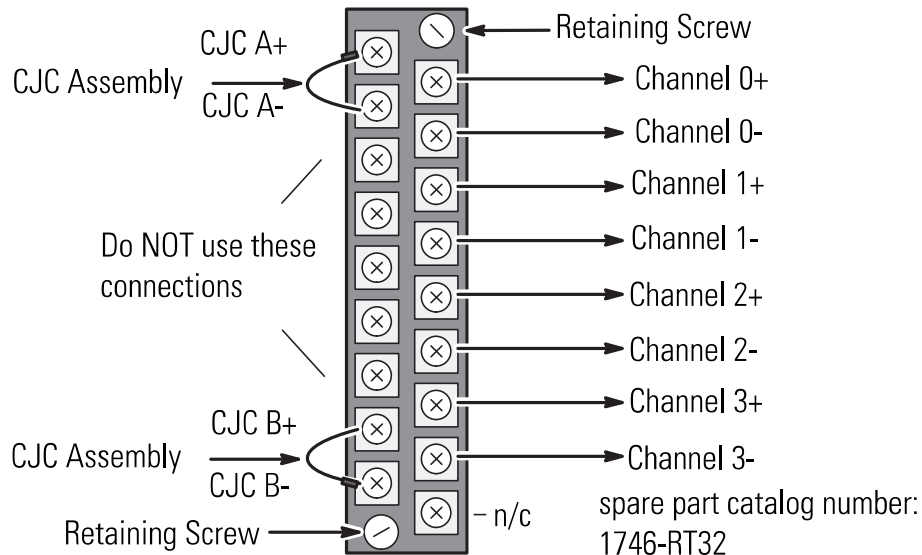
4. Align the RTB retaining screws with the mating connector on the module. Be careful not to damage the CJC sensors.



5. Press the RTB firmly onto the connector contacts.
6. Alternately tighten the two retaining screws to avoid cracking the RTB. Tighten to a maximum 6-8 inch-pounds.

Wire the RTB

Use the following illustration to wire the RTB:



Cold Junction Compensation (CJC)

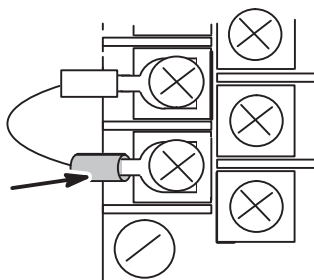
ATTENTION



Do not remove or loosen the cold junction compensating thermistors located on the terminal block. **Both thermistors are critical to ensure accurate thermocouple input readings at each channel.** The module will not operate in the thermocouple mode if a thermistor is removed

In case of accidental removal of one or both thermistors (part number A40845-221-01), replace them by connecting them across the CJC terminals located at the top and/or bottom left side of the terminal block. Always connect the red lug to the (+) terminal (to CJC A+ or CJC B+) as shown below.

Always attach red lug to the CJC+ terminal



CJC Sensor part number
A40845-221-01

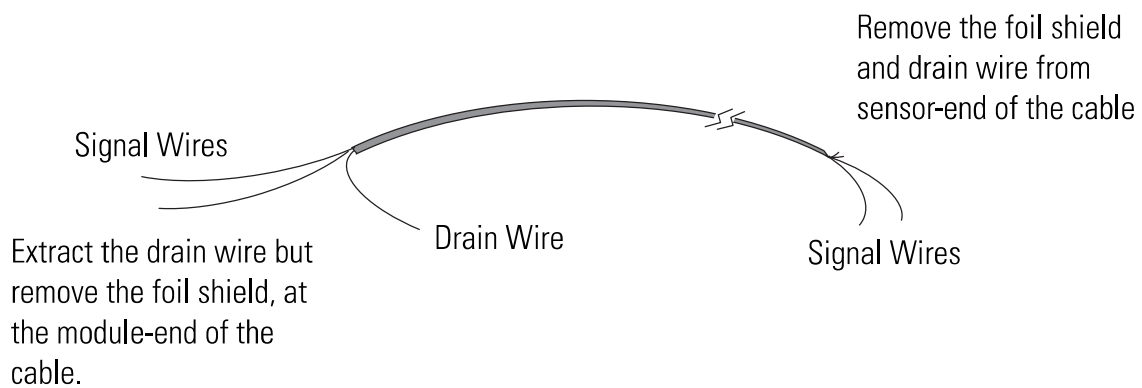
Wiring Guidelines

Follow these guidelines when planning your system wiring.

- To limit the pickup of electrical noise, keep thermocouple and millivolt signal wires away from power and load lines.
- For high immunity to electrical noise, use Alpha 5121 (shielded, twisted pair) or equivalent wire for millivolt sensors; or use shielded, twisted pair thermocouple extension lead wire specified by the thermocouple manufacturer. Using the incorrect type of thermocouple extension wire or not following the correct polarity may cause invalid readings. See IEEE Std. 518, Section 6.4.2.7 or contact your sensor manufacturer for additional details.
- When trimming cable leads, minimize the length of unshielded wires.
- Ground the shield drain wire at only one end of the cable. The preferred location is at the I/O chassis ground.
- For maximum noise reduction, use 3/8 inch braid wire to connect cable shields to the nearest I/O chassis mounting bolt. Then connect the I/O chassis to earth ground. These connections are a requirement regardless of cable type.
- Tighten terminal screws to 6-8 inch-pounds. Excessive tightening can strip the screw.
- The open-circuit detector generates approximately 20 nano-amperes into the thermocouple cable. A total lead resistance of 25 ohms (12.5 one-way) will produce 0.5 mV of error.
- Follow system grounding and wiring guidelines found in your SLC 500 Modular Hardware Style User Manual, publication 1747-UM011.

Preparing and Wiring the Cables

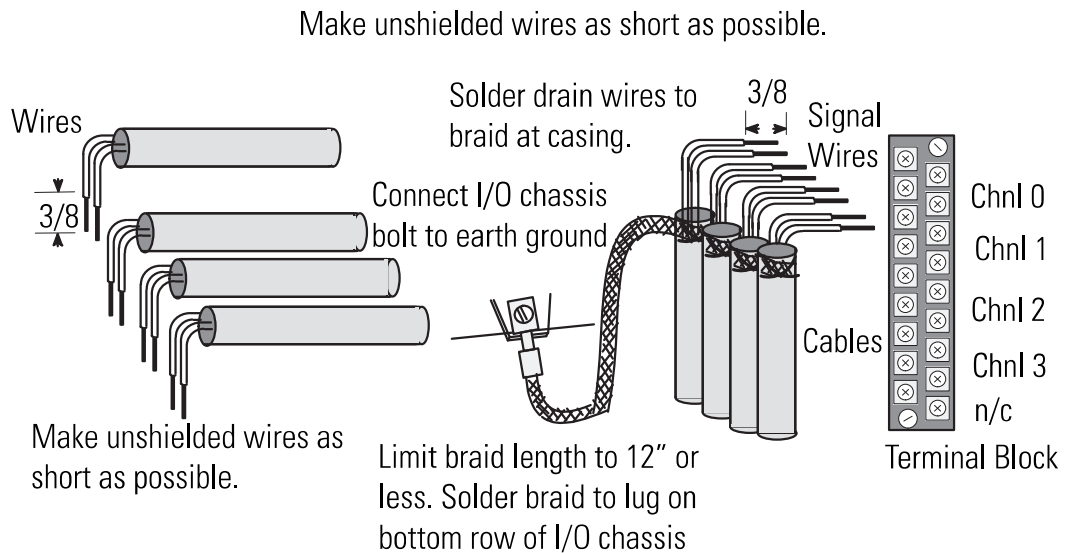
To prepare and connect cable leads and drain wires, follow these steps:



1. At each end of the cable, strip some casing to expose individual wires.
2. Trim signal wires to 5-inch lengths beyond the cable casing. Strip about 3/16 inch (4.76 mm) of insulation to expose the ends of the wires.
3. At the module-end of the cables:
 - extract the drain wire and signal wires
 - remove the foil shield
 - bundle the input cables with a cable strap
4. Connect drain wires together and solder them to a 3/8" wire braid, 12" long. Keep drain wires as short as possible.
5. Connect the 3/8" wire braid to the nearest chassis mounting bolt.
6. Connect the signal wires of each channel to the terminal block.

7. At the source-end of cables from mV devices (see following figure):

- remove the drain wire and foil shield
- apply shrink wrap as an option
- connect to mV devices keeping the leads short



IMPORTANT

If noise persists, try grounding the opposite end of the cable. Ground one end only.

The following information applies when operating this equipment in hazardous locations:	Informations sur l'utilisation de cet équipement en environnements dangereux :
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.	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.
WARNING 	EXPLOSION HAZARD - 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.
AVERTISSEMENT 	RISQUE D'EXPLOSION - 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.

Specifications

Module Location	SLC chassis - any I/O module slot except 0
Input from System Backplane	5Vdc @ 0.110 A, 24Vdc @ 0.085A
Thermocouple Types	b, c, d, e, j, k, n, r, s, t
Input Voltage	-50 to +50mV and -100 to +100mV
Number of Channels	4 (backplane and channel-to-channel isolated)
A/D Conversion Method	Sigma-Delta modulation
Input Filtering	Analog filter with low-pass digital filter
Normal mode rejection between [+] input and [-] input	Greater than 50dB @ 50Hz Greater than 60dB @ 60Hz
Common mode rejection between inputs and chassis ground	Greater than 120dB @ 50/60 Hz with 1K ohm imbalance
Channel bandwidth (-3db)	8Hz
Calibration	Once every six months
Isolation	Tested to 1000Vac for 60 sec. between channels and between user connections and backplane connections
Operating Temperature	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)
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bc, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85°C (-40 to 185°F)
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5-95% non condensing
Required Terminal Block	Cat. No. 1746-RT32
Wiring Wire Category ¹ Torque	24-14 AWG 2 6-8 in-lbs.
Enclosure Type Rating	None (open style)
Certifications ² (when product is marked)	UL UL Listed Industrial Control Equipment CSA CSA Certified Process Control Equipment CSA CSA Certified Process Control Equipment for Class I, Division 2 Group A,B,C,D Hazardous Locations CE European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions C-Tick Australian Radiocommunications Act, compliant with: AS/NZS 2064; Industrial Emissions
User Manual	Publication 1746-UM010, Barrel Temperature Module User Manual

¹Use this conductor category information for planning conductor routing as described in publication 1770-4.1, *Industrial Automation Wiring and Grounding Guidelines*.

²See the Product Certification link at 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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Publication 1746-IN020B-EN-P - July 2002

Supersedes Publication 1746-5.20 - February 1999

PN 957689-86

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