DeviceNet Safety Scanner for GuardPLC™

Catalog Number 1753-DNSI

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.ab.com/manuals/gi) 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.

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.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you: • identify a hazard • avoid a hazard • recognize the consequence

Environment and Enclosure Information

| 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.

Description

The DeviceNet Safety Scanner for GuardPLC, catalog number 1753-DNSI, provides DeviceNet access for GuardPLC controllers, Series B or later, that support High-speed Safety Protocol (HSP).
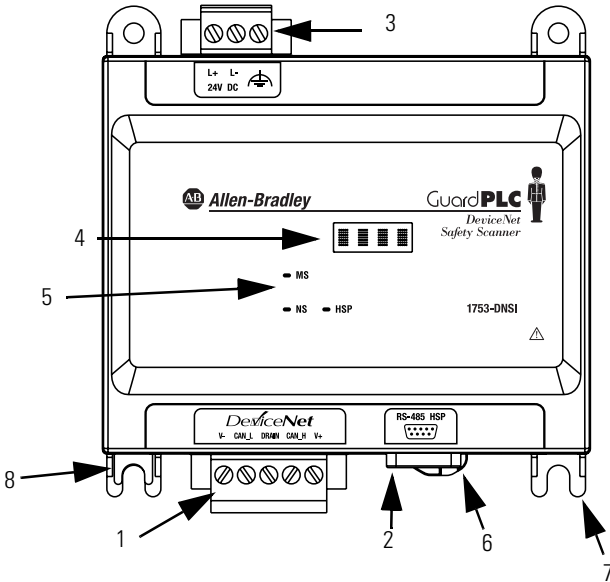
Item	Description	Item	Description
1	DeviceNet Safety Port[1]	5	LED Indicators
2	HSP Port	6	DIN Rail Latches (2)
3	External Power Source Connection	7	Mounting Feet
4	Alphanumeric Display	8	Ground Stamping

(1) See page 11 for COMM1 port pin designation and information on wiring the DeviceNet connector.

General Safety Information

ATTENTION	Personnel responsible for the application of safety-related Programmable Electronic Systems (PES) shall be aware of the safety requirements in the application of the system and shall be trained in using the system.

ATTENTION	Do not remove the protective debris strip until after the module and all other equipment in the panel near the module is mounted and wiring is complete. Once wiring is complete, remove the protective debris strip. Failure to remove the strip before operating can cause overheating.

ATTENTION	**Preventing Electrostatic Discharge** 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.

Mount the Scanner

IMPORTANT	For effective cooling:

- Because of thermal considerations, mount the module horizontally only.
- Provide a gap of at least 100 mm (3.94 in.) above, below, and on each side of the module.
- Provide a gap of at least 51 mm (2.0 in.) from the front face of the module to the door of the enclosure.
- Select a location where air flows freely or use an additional fan.
- Do not mount the module over a heating device.

The module can be DIN rail or panel-mounted as described in the following sections.

| ATTENTION	Be careful of metal chips when drilling mounting holes for your module or other equipment within the enclosure or panel. Drilled fragments that fall into your module could cause damage. Do not drill holes above a mounted module if the protective debris strip has been removed.

Module dimensions are shown below.

Dimensions	
A	90 mm (3.5 in.)
B	110 mm (4.33 in.)
C	87 mm (3.43 in.)
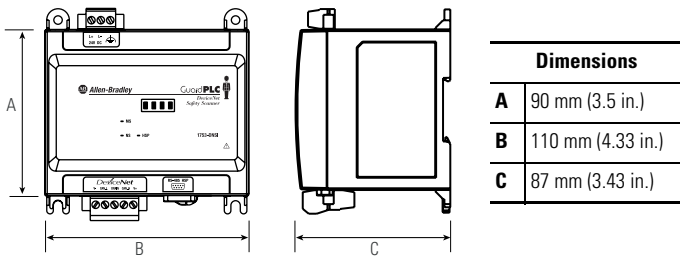
DIN Rail Mounting

Mount the module to an EN50022-35x7.5 or EN50022-35x15 DIN rail by following the steps below:

1. Close the DIN latch, if it is open.

2. Hook the top slot over the DIN rail.
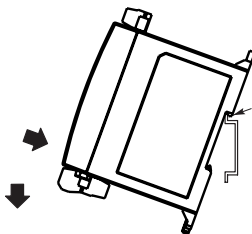
3. While pressing the module down against the top of the rail, snap the bottom of the controller into position.

To remove the module from the DIN rail:

1. Insert a flathead screwdriver into the gap between the housing and each latch and pull the latch downward.

2. When both latches are open, lift the module off of the rail.
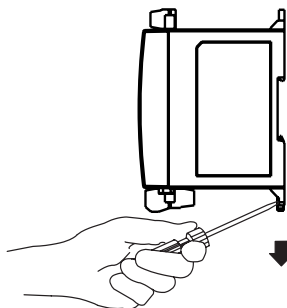
The maximum extension of each DIN rail latch is 14 mm (0.55 in.) in the open position.

Panel Mounting

Mount the module directly to a panel using 4 screws. The preferred screws are #8 (M4); however, #6 (M3.5) may be used.

To install your module, follow the steps below:

1. Remove the mounting template from inside the back cover of this document.

2. Space the module properly to allow for adequate cooling. See page 6.)

3. Secure the template to the mounting surface.

4. Drill holes through the template.

5. Remove the mounting template.

6. Secure the module to the panel using 4 screws. Leave the protective debris strip in place until you are finished wiring any other modules located near the module.

Ground the Module

This product is intended to be mounted to a well grounded mounting surface such as a metal panel. Refer to the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1, for additional information.

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 (e.g. aluminum, plastic, etc.) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding.

Functionally ground the module through its DIN rail connection or through the mounting foot, if panel-mounted.


Grounding Stamping
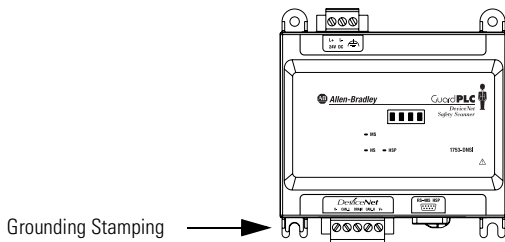
For proper grounding, you must always connect the power supply functional ground screw when connecting the power supply.

You must provide an acceptable grounding path for each device in your application. For more information on proper grounding guidelines, refer to the Industrial Automation Wiring and Grounding Guidelines, publication number 1770-4.1.

Connect Power Source

Power for the module is provided via an external 24V dc power source as well as from the DeviceNet cable. In North America, you must use a power supply that is marked CLASS 2 per the requirements of NFPA (National Electric Code) or CSA 22.1 (Canadian Electric Code, Part 1). Outside of North America, you must use a Safety Extra Low Voltage (SELV), or a Protected Extra Low Voltage (PELV) power supply to power this module. A SELV supply cannot exceed 30V rms, 42.4V peak, or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.

Tighten power supply terminal screws to 0.5 to 0.6 Nm (4.4 to 5.3 in-lb.).
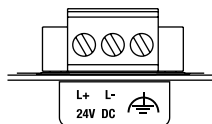
Make Communication Connections

The DeviceNet Safety port supports a maximum of 32 DeviceNet Safety input connections, 32 DeviceNet Safety output connections, and standard connections for up to 63 nodes. The HSP port lets the module communicate with a single GuardPLC 1600 or 1800 controller via a 1753-CBLDN cable.

WARNING	Do not connect or disconnect the communications cable with power applied to this module or any device on the network, because an electrical arc can occur. This could cause an explosion in hazardous location installations.

Wire the DeviceNet Connector

Use an open-style 5- or 10-position linear plug to connect to the DeviceNet network.

IMPORTANT	For detailed DeviceNet connection information, refer to the DeviceNet Cable System Planning and Installation Manual, publication DN-6.7.2. Also refer to the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Wire the connector according to the following illustrations:

Connect	To
Red Wire	V+
White Wire	CAN High
Bare Wire	Shield
Blue Wire	CAN Low
Black Wire	V-

5-position linear plug

10-position linear plug

DeviceNet cable
Red
White
Bare
Blue
Black
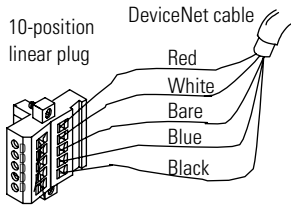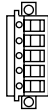
Connect to the DeviceNet Network

Attach the connector to the module's DeviceNet port. Tighten the screws on the connector to 0.6 to 0.7 Nm (5 to 6 in-lb).

Make High-speed Safety Protocol (HSP) Connections

The module ships with the cable used to connect its HSP port to the GuardPLC controller's COMM3 (ASCII/HSP) port. The minimum bend radius of the 1753-CBLDN is:

- 30 mm (1.18 in.) when the cable is permanently restrained by the use of a wire tie, cable trough, or other means.
- 60 mm (2.36 in.) when unrestrained.
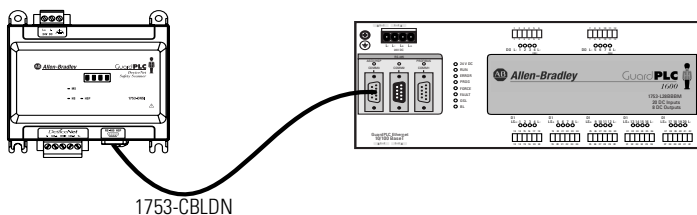
1753-CBLDN

IMPORTANT	The maximum length of the cable connection between the module and the GuardPLC controller is 0.75 m (2.46 ft). To achieve a SIL 3 rating, you must use the 1753-CBLDN cable, which is shipped with the module.

Monitor Status

Alphanumeric Display

When the module is powered up, the alphanumeric display cycles once through the following information:

- Firmware revision
- MAC ID
- DeviceNet Communication Rate

Thereafter, the module displays status codes that provide diagnostic information, as needed. In the absence of errors, the steady-state display will toggle between displaying the scanner's MAC ID (A#nn, where nn is the MAC ID) and application state (RUN/IDLE). For a complete list of error codes, refer to the DeviceNet Safety Scanner for GuardPLC User Manual, publication number 1753-UM002.

Status LEDs

The module has 3 LEDs which allow you to monitor module, DeviceNet network, and High-speed Safety Protocol (HSP) status

LED	Color/State	Description
Module Status (MS)	Off	No power.
	Green, On	The module is operating under normal conditions.
	Green, Flashing	The module is Idle.
	Red, Flashing	A recoverable fault exists.
	Red, On	An unrecoverable fault exists. You may need to replace the module.
	Red/Green, Flashing	Self-tests are in progress, or the module's configuration is incomplete or incorrect.

LED	Color/State	Description
Network Status (NS)	Off	The module is not online or may not have power from the DeviceNet network.
	Green, On	The module is online; connections are established.
	Green, Flashing	The module is online; no connections are established.
	Red, Flashing	Communication timeout.
	Red/Green, Flashing	The SNN is being set.
	Red, On	Communication failure. The module has detected an error which has prevented network communication.
HSP Status (HSP)	Off	No messages have been received on the HSP interface.
	Green, On	The module is transmitting data over the HSP communication interface.
	Green, Flashing	The HSP interface is receiving messages from a controller, but there is a configuration mismatch.
	Red, Flashing	The HSP connection to the controller has timed out or faulted.

Certifications

When marked, the components have the following certifications. See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates, and other certification details.

Certification[1] (when product is marked)	Description
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada
	UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for US and Canada
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 • EN61131-2; Programmable Controllers (Clause 8, Zone A, B, & C)
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
TÜV	Functional Safety: SIL 1 to 3, according to IEC 61508; Category 1 to 4, according to EN954-1; NFPA79; when used as described in the *GuardPLC Controller Systems Safety Reference Manual*, publication 1753-RM002.
ODVA	ODVA conformance tested to DeviceNet Safety specifications.

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

Specifications

General Specifications

Dimensions (H x W x D)	90 mm[2] x 110 mm x 87 mm[3] (3.5 in.[2] x 4.33 in. x 3.43 in.[3])
Weight	400 kg (0.882 lb)
DeviceNet Current Load, Max.	90 mA @ 24V dc
Power Consumption	10 W maximum
Response to Output Overload	shut down of the concerned output with cyclic reconnecting
Isolation Voltage	30V continuous Tested to withstand 710V dc for 60 seconds
HSP Cable	1753-CBLDN (ships with safety scanner)
Wire Type	Copper
Wire Size Range	12 to 24 AWG
Wiring Category[1]	2 - on power and communication ports

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

(2) Height does not include DIN rail latches or mounting feet.

(3) Depth does not include communication cable.

Environmental

Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Operating Temperature	0°C to +60°C (+32°F to +140°F)
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5% to 95% noncondensing
Vibration	IEC60068-2-6 (Test Fc, Operating): 2g at 10 to 500 Hz
Operating Shock	IEC60068-2-27 (Test Ea, Unpackaged Shock): 30g
Non-operating Shock	IEC60068-2-27 (Test Ea, Unpackaged Shock): 50g
Enclosure Type Rating	none (open-style)

Electrical/EMC

Emissions	CISPR 11: Group 1, Class A
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 30 MHz to 2000 MHz • 10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz • 10V/m with 200 MHz 50% Pulse 100% AM at 1890 MHz • 3V/m with 1 kHZ sine-wave 80% AM from 2000 MHz to 2700 MHz
EFT/B Immunity	IEC 61000-4-4: • ±2 kV at 5 kHz on power ports • ±2 kV at 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 • ±2 kV line-earth (CM) on communications ports
Conducted RF Immunity	IEC 61000-4-6: • 10Vrms with 1 kHz sine-wave 80% AM from 150 kHz to 80 MHz

North American Hazardous Location Approval

| 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.

For More Information

For	Refer to this Document	Pub. No.
Information on configuring, operating, and troubleshooting the DeviceNet Safety Scanner for GuardPLC	DeviceNet Safety Scanner for GuardPLC User Manual	1753-UM002
Information on configuring, programming, operating, and troubleshooting a GuardPLC Controller System	GuardPLC Controller System User Manual	1753-UM001
Information on installing and operating 1791DS DeviceNet Safety I/O Modules	DeviceNet Safety I/O User Manual	1791DS-UM001
Information on the safety concept of the GuardPLC system, including safety requirements, safety times, PFD and PFH values.	GuardPLC Controller System Safety Reference Manual	1753-RM002

If you would like a manual, you can:

- download a free electronic version from the internet at **www.rockwellautomation.com/literature**.
- purchase a printed manual by contacting your local Allen-Bradley distributor or Rockwell Automation sales office.

Mounting Template

95.86 mm
(3.774 in.)

DIN rail center line.

⌀ 0.164

99.97 mm
(3.936 in.)
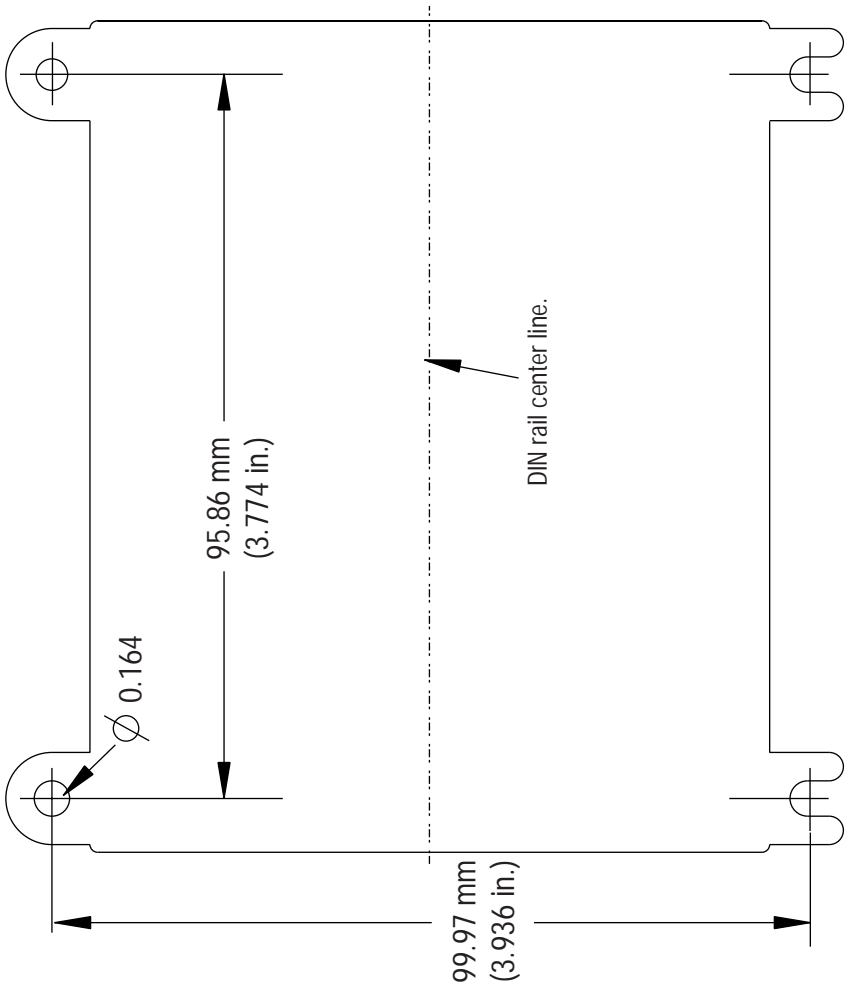
Rockwell Automation Support

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 and needs 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.