



Compact I/O DeviceNet Scanner Module

(Cat. No. 1769-SDN)

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For More Information

For	Refer to this Document	Pub. No.
A more detailed description of how to use your DeviceNet Scanner Module	Compact I/O DeviceNet Scanner Module User Manual	1769-UM009A-EN-P
Detailed information on planning, mounting, wiring, and troubleshooting your CompactLogix System.	CompactLogix System User Manual	1769-UM007C-EN-P
Detailed information on planning, mounting, wiring, and troubleshooting your MicroLogix 1500 System.	MicroLogix 1500 Programmable Controllers User Manual	1764-UM001A-US-P
DeviceNet network planning information.	DeviceNet Cable System Planning and Installation Manual	DN-6.7.2
More information on proper wiring and grounding techniques.	Industrial Automation Wiring and Grounding Guidelines	1770-4.1

If you would like a manual, you can:

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- purchase a printed manual by:
 - contacting your local distributor or Rockwell Automation representative
 - visiting **www.theautomationbookstore.com** and placing your order
 - calling **1.800.963.9548** (USA/Canada)
or **001.330.725.1574** (Outside USA/Canada)

TIP



Translated versions of these Installation Instructions are available electronically. Obtain a translated version of this publication at **www.theautomationbookstore.com**.

European Communities (EC) Directive Compliance

This product carries the CE mark and is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet the Council Directive 89/336/EC Electromagnetic Compatibility (EMC) by applying the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2 EMC — Generic Emission Standard, Part 2 — Industrial Environment
- EN 50082-2 EMC — Generic Immunity Standard, Part 2 — Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests. For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the Allen-Bradley publication *Industrial Automation Wiring and Grounding Guidelines For Noise Immunity*, publication 1770-4.1. and the Automation Systems Catalog, B111.

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only. The following WARNING statement applies to use in hazardous locations.

WARNING



EXPLOSION HAZARD

- Substitution of components may impair suitability for Class I, Division 2.
 - Do not replace components or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
 - Do not connect or disconnect components unless power has been switched off or the area is known to be non-hazardous.
 - This product must be installed in an enclosure. All cables connected to the product must remain in the enclosure or be protected by conduit or other means.
 - All wiring must comply with N.E.C. article 501-4(b).
-

Environnements dangereux

Cet équipement est conçu pour être utilisé dans des environnements de Classe 1, Division 2, Groupes A, B, C, D ou non dangereux. La mise en garde suivante s'applique à une utilisation dans des environnements dangereux.

AVERTISSEMENT



DANGER D'EXPLOSION

- La substitution de composants peut rendre cet équipement impropre à une utilisation en environnement de Classe 1, Division 2.
 - Ne pas remplacer de composants ou déconnecter l'équipement sans s'être assuré que l'alimentation est coupée et que l'environnement est classé non dangereux.
 - Ne pas connecter ou déconnecter des composants sans s'être assuré que l'alimentation est coupée ou que l'environnement est classé non dangereux.
 - Ce produit doit être installé dans une armoire.
-

Module Description

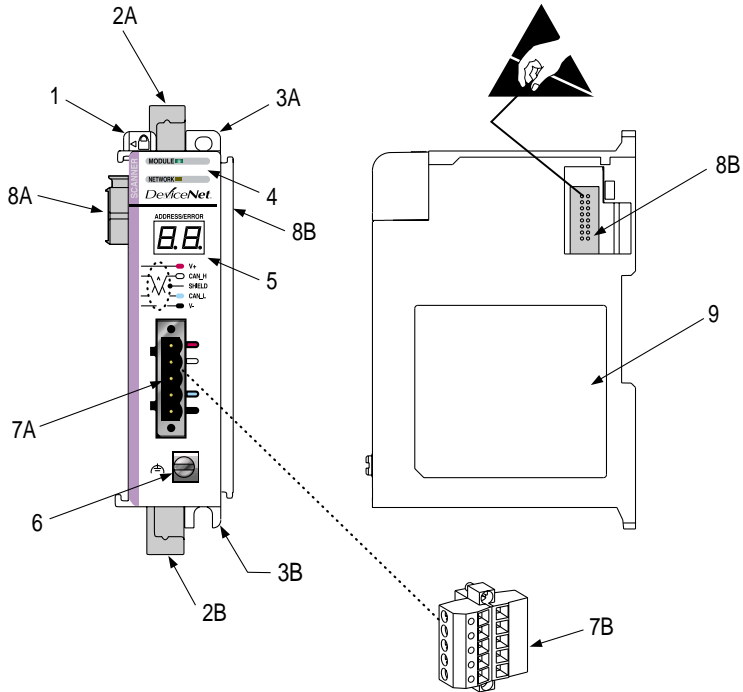


Table A

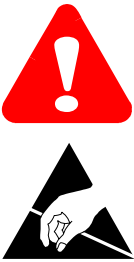
1	bus lever (with locking function)	6	grounding screw
2A	upper DIN rail latch	7A	DeviceNet mating male receptacle
2B	lower DIN rail latch	7B	removable DeviceNet female connector
3A	upper panel mounting tab	8A	movable bus connector with female pins
3B	lower panel mounting tab	8B	bus connector with male pins
4	Module and Network status LEDs	9	nameplate label
5	Address and Error numeric displays		

Module Installation

The 1769-SDN module is suitable for use in an industrial environment when installed in accordance with these instructions. Specifically, this equipment is intended for use in clean, dry environments (Pollution Degree 2⁽¹⁾) and with circuits not exceeding Over Voltage Category II⁽²⁾ (IEC 60664-1).⁽³⁾

Prevent Electrostatic Discharge

ATTENTION



Electrostatic discharge can damage integrated circuits or semiconductors if you touch bus connector pins. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential.
 - Wear an approved wrist-strap grounding device.
 - Do not touch the bus connector or connector pins.
 - Do not touch circuit components inside the module.
 - If available, use a static-safe work station.
 - When not in use, keep the module in its static-shield box.
-

⁽¹⁾ Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation shall be expected.

⁽²⁾ Over Voltage Category II is the load level section of the electrical distribution system. At this level transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.

⁽³⁾ Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

Remove Power

ATTENTION

Remove power before removing or inserting this module. When you remove or insert a module with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices, causing unintended machine motion
- causing an explosion in a hazardous environment

Electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance.

System Planning

Consider the following when planning your system:

- The scanner can communicate with up to 63 DeviceNet devices.
- The scanner, as a master, can own up to 63 slave I/O nodes.
- The scanner can simultaneously be a master and be a slave owned by another DeviceNet master.
- A 1769-ECR (right end cap) or 1769-ECL (left end cap) is required to terminate the end of the Compact I/O bus.
- Each bank of Compact I/O must have its own power supply (a MicroLogix 1500 acts as the power supply for modules directly connected to it).
- A Compact I/O power supply, or MicroLogix 1500 Base Unit, has limits in the amount of +5V dc and +24V dc current it can supply to modules in its I/O bank. These limits depend on the catalog number (e.g. 1769-PA2) of the supply. A bank of modules must not exceed the current limits of the I/O bank power supply or MicroLogix 1500 Base Unit.

Refer to the *Compact 1769 Expansion I/O Power Supplies Installation Instructions*, publication 1769-5.14 or the *MicroLogix 1500 User Manual*, publication 1764-UM001A-EN-P.

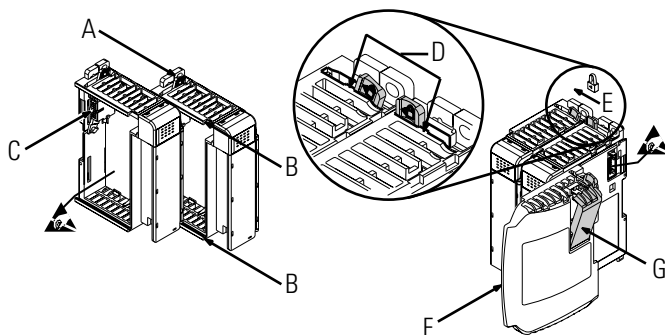
- The scanner has a distance rating of four, therefore the scanner must be within four modules of the I/O bank's power supply.
- Determine the DeviceNet baud rate based on standard DeviceNet considerations.
- Consider the number of words of I/O data the host controller supports.

For more information on planning your DeviceNet network, refer to the *DeviceNet Cable System Planning and Installation Manual*, publication DN-6.7.2.

System Assembly

The module can be attached to an adjacent controller, power supply, or I/O module. For mounting instructions, see “Panel Mounting” on page 10, or “DIN Rail Mounting” on page 12. To work with a system that is already mounted, see “Replacing a Single Module within a System” on page 13.

The following procedure shows you how to assemble the Compact I/O system.



1. Disconnect power.
2. Check that the bus lever of the module (A) is in the unlocked (fully right) position.
3. Use the upper and lower tongue-and-groove slots (B) to secure the modules together.
4. Move the module back along the tongue-and-groove slots until the bus connectors (C) line up with each other.
5. Use your fingers or a small screw driver to push the bus lever back slightly to clear the positioning tab (D).
6. Move the module's bus lever fully to the left (E) until it clicks. Ensure it is locked firmly in place.

ATTENTION



When attaching I/O modules, it is very important that the bus connectors are securely locked together to ensure proper electrical connection.

7. Attach an end cap terminator (F) to the last module in the system by using the tongue-and-groove slots as before.
8. Lock the end cap bus terminator (G).

IMPORTANT

A 1769-ECR or 1769-ECL right or left end cap must be used to terminate the end of the serial communication bus.

System Mounting

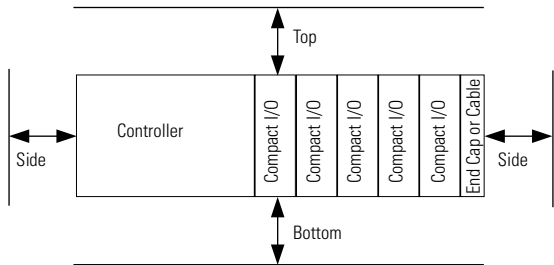
ATTENTION



During panel or DIN rail mounting of all devices, be sure that all debris (metal chips, wire strands, etc.) is kept from falling into the module. Debris that falls into the module could cause damage on power up.

Minimum Spacing

Maintain spacing from enclosure walls, wireways, adjacent equipment, etc. Allow 50 mm (2 in.) of space on all sides for adequate ventilation, as shown:



Allow at least 110 mm (4.33 in.) of enclosure depth to accommodate the module and the DeviceNet connector.

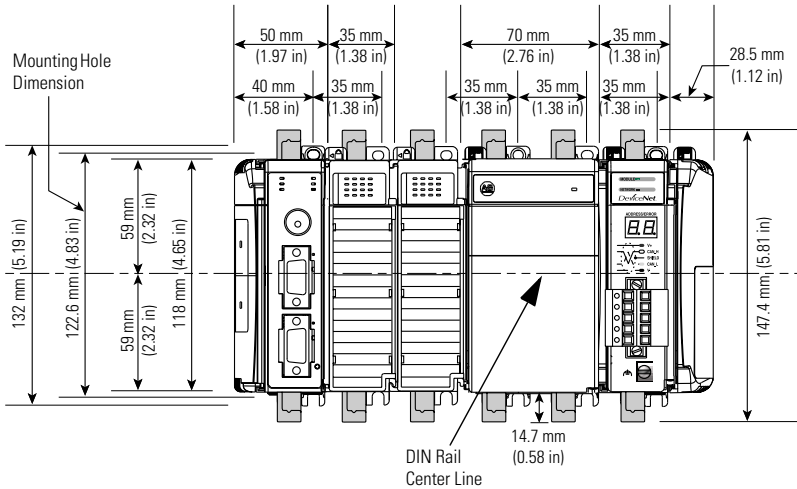
Panel Mounting

Mount the module to a panel using two screws per module. Use M4 or #8 panhead screws. Mounting screws are required on every module.

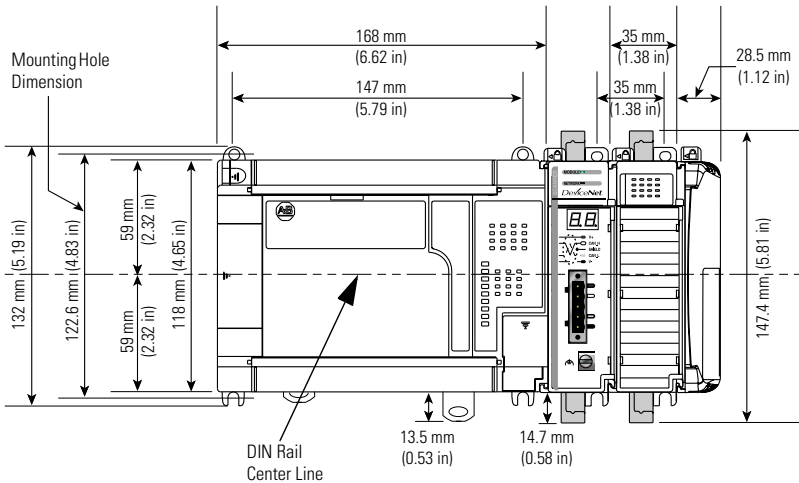
Panel Mounting Using the Dimensional Drawing

NOTE: All dimensions are in mm (inches). Hole spacing tolerance: ± 0.04 mm (0.016 in.).

Compact I/O with CompactLogix Controller and Power Supply



Compact I/O with MicroLogix 1500 Base Unit and Processor



Panel Mounting Procedure Using Modules as a Template

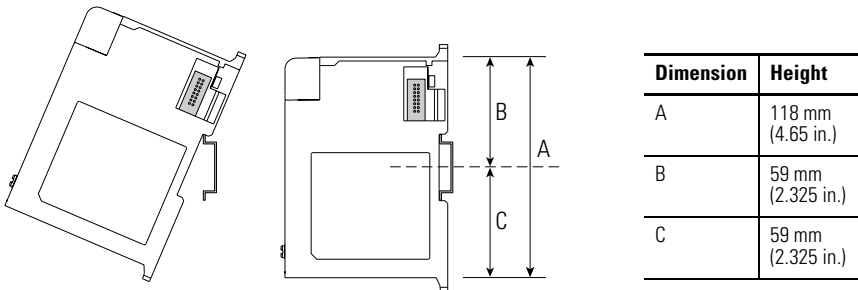
The following procedure allows you to use the assembled modules as a template for drilling holes in the panel. Due to module mounting hole tolerance, it is important to follow these procedures:

1. On a clean work surface, assemble no more than three modules.
2. Using the assembled modules as a template, carefully mark the center of all module-mounting holes on the panel.
3. Return the assembled modules to the clean work surface, including any previously mounted modules.
4. Drill and tap the mounting holes for the recommended M4 or #8 screw.
5. Place the modules back on the panel, and check for proper hole alignment.
6. Attach the modules to the panel using the mounting screws.
7. Repeat steps 1 to 6 for any remaining modules.

DIN Rail Mounting

The module can be mounted using the following DIN rails: 35 x 7.5 mm (EN 50 022 - 35 x 7.5) or 35 x 15 mm (EN 50 022 - 35 x 15).

Before mounting the module on a DIN rail, close the DIN rail latches. Press the DIN rail mounting area of the module against the DIN rail. The latches will momentarily open and lock into place. DIN rail mounting dimensions are shown below.



Replacing the Scanner Module within a System

The scanner can be replaced while the system is mounted to a panel (or DIN rail).

1. Remove power. See important note on page 7.
2. Remove the DeviceNet cable from the scanner by removing the DeviceNet connector.
3. Remove the upper and lower mounting screws from the scanner (or open the DIN latches using a flat-blade screwdriver).
4. On the scanner to be replaced and the right-side adjacent module (or end cap if the scanner is the last module in the bank), move the bus levers to the right (unlock) to disconnect the scanner from the adjacent modules.
5. Gently slide the disconnected scanner module forward.

If you feel excessive resistance, make sure that you disconnected the scanner from the bus and that you removed both mounting screws (or opened the DIN latches).

TIP

It may be necessary to rock the scanner slightly from front to back to remove it, or, in a panel-mounted system, to loosen the screws of adjacent modules.

6. Before installing the replacement scanner, be sure that the bus lever on the right-side adjacent module is in the unlocked (fully right) position.
7. Slide the replacement scanner into the open slot.
8. Connect the scanner and modules together by locking (fully left) the bus levers on the replacement scanner and the right-side adjacent module or end cap.
9. Replace the mounting screws (or snap the scanner onto the DIN rail).
10. Replace the DeviceNet cable on the scanner by attaching the connector to the scanner.

11. Restore scanner configuration using RSNetWorx for DeviceNet.

IMPORTANT

Be sure that the new module has the same node address and baud rate as the module that was replaced.

Field Wiring Connections

Grounding the Scanner Module

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel. Additional grounding connections from the scanner's mounting tabs or DIN rail (if used), are not required unless the mounting surface cannot be grounded.

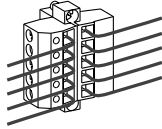
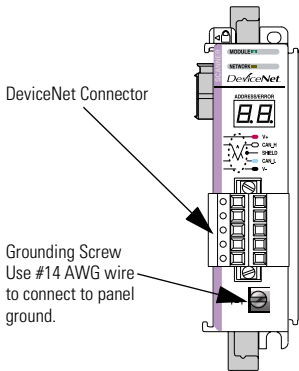
ATTENTION



The grounding screw on the front of the scanner must be connected to a suitable ground source when operating in electrically noisy environments. Use a #14 AWG wire to make this connection.

Refer to *Industrial Automation Wiring and Grounding Guidelines*, Allen-Bradley publication 1770-4.1, for additional information.

DeviceNet Wiring



Connect ⁽¹⁾	To
Red Wire	V+
White Wire	CAN High
Bare Wire	Shield
Blue Wire	CAN Low
Black Wire	V-

1. Connect the DeviceNet cable to the removable connector as shown.
2. Insert the removable female connector into the mating male connector on the DeviceNet scanner module.
3. Screw the removable connector to the scanner case with the upper and lower mounting screws. Screw torque is 0.6 to 0.7 Nm (5 to 6 in-lbs).

IMPORTANT

If the 1769-SDN is the first or last device connected to the DeviceNet network trunkline, be sure to add a termination resistor (120Ω 1% $\geq \frac{1}{4}W$ resistor, Allen-Bradley part number 1485A-C2) across the Blue (CAN Low) and White (CAN High) wires.

Scanner Module Power-Up

When power is applied via the Compact I/O bus, the scanner module goes through a self test sequence. Upon successful completion of the self test, the scanner is ready to communicate.

The default scanner settings are:

- baud rate = 125K
- node address = 63

Use your configuration software to change the baud rate and node address.

Configuring the 1769-SDN on DeviceNet

The 1769-SDN must be configured using a DeviceNet configuration tool. The recommended configuration software is RSNetWorx for DeviceNet (version 3.00 or higher).

TIP



If your RSNetWorx configuration software does not include the required EDS (Electronic Data Sheet) file, it is available via <http://www.ab.com/networks/eds>.

This configuration tool allows you to identify all of the devices (I/O modules, power supplies, expansion cables, end caps) and their locations in your system.

TIP



The controller must be in the Run mode, or the scanner in the Idle mode (bit 0 of the Module Command Array = 0), for the scanner to accept the configuration information.

For more information, refer to the *Compact I/O DeviceNet Scanner Module User Manual*, publication 1769-UM009A-EN-P.

Data Organization

The scanner uses the input and output data images to transfer data, status and command information between the scanner and the controller. The basic structure is shown below. Refer to the *Compact I/O DeviceNet Scanner Module User Manual*, publication 1769-UM009A-EN-P, for more detailed information.

Input Data Image

The input data image is transferred from the scanner module to the controller.

Word	Description	Data Type
0 to 63	Status Structure	64-word array
64 and 65	Module Status Register	2 words
66 to 245	Input Data Image	180-word array

Output Data Image

The output data image is transferred from the controller to the scanner module.

Word	Description	Data Type
0 and 1	Module Command Array	2-word array
2 to 181	Output Data Image	180-word array

The following table shows the bit descriptions for the Module Command Array.

Word	Bit	Operating Mode
0	0	1 = Run, 0 = Idle
	1	1 = Fault
	2	1 = Disable Network
	3	Reserved ⁽¹⁾
	4	1 = Reset
	5 to 15	Reserved ⁽¹⁾
1	0 to 15	Reserved ⁽¹⁾

⁽¹⁾ DO NOT manipulate Reserved Bits. Doing so may interfere with future compatibility.

Diagnostic Indicators

Indicator	Color/Status	Indicates	Recommended Action
Module	Off	No power applied to module.	Apply power.
	Flashing Green	No Bus Master (MicroLogix or CompactLogix controller) present.	Verify module connectors are properly seated. If they are, cycle power to the controller. If this does not correct the problem, replace the controller. If replacing the controller does not correct the problem, replace the 1769-SDN.
	Solid Green	Normal operation.	No action required.
	Flashing Red	Recoverable Fault - Memory has been erased or is being programmed.	Complete flash update or start a new update.
	Solid Red	Unrecoverable fault	Verify module connectors are properly seated. If they are, verify that bus terminator/end cap is installed. Cycle power. If still faulted, replace the module.
Network	Off	No module power, no network power, or communications are not occurring between the module and the DeviceNet network. (This may be an acceptable condition.)	Verify module has power. Check that the DeviceNet cable is securely connected and the DeviceNet network is powered. Verify that network power is adequate (11 to 25V dc).
	Flashing Green	Device is operational. There are no connections established with any of the network devices.	If the module is supposed to be controlling DeviceNet slaves, configure the module's scan list.
	Solid Green	Normal operation. Scan list is configured. Module is not in Idle mode.	No action required.
	Flashing Red	One or more of the devices that the scanner is communicating with is in a timed out state.	Monitor the status display, or the module's status field to determine which slave device is offline.
	Solid Red	Critical network failure. Duplicate DeviceNet node address detected.	Reset module. Change module's node address or change conflicting device's node address. If failure continues, replace module.
7-Segment Numeric Display	Node Address and Status Display	<p>Indicates diagnostic information about the status of the module.</p> <p>When the numeric display is showing 0 to 63, it is indicating the 1769-SDN module's DeviceNet node address.</p> <p>When it shows 70 to 99, it indicates an Error Code for the displayed node address.</p> <p>When it flashes alternating numbers, one is the Error Code (70 to 99), and the other is the Node Number (0 to 63) that has generated the error.</p> <p>See the list of Error Codes on page 19 for more information.</p>	

Error Codes

The following table describes the Error Codes indicated by the 7-segment numeric display.

Code (decimal)	Name	Description	Recommended Action
70	Duplicate Node	Controller has Failed Duplicate Node Address Check. The node address selected is already in use.	Change the module's or conflicting device's network address (node number) to an available one.
71	Illegal Scan List Data	Illegal data in Scan List.	Reconfigure the scan list table and remove any illegal data.
72	Slave Timeout	One of the module's slave devices has stopped communicating.	Inspect the module's slave devices and verify the DeviceNet connections.
73	Electronic Key Mismatch	The slave device Vendor ID key parameter does not match the slave's configuration in the module's scan list.	Make sure that the device at the flashing node address matches the desired electronic key (vendor, product code, product type)
75	No Messages Received	No network traffic received by the scanner. 10 seconds have elapsed and no network traffic for the module or for any other device have been received by the module.	Verify the scan list is correctly configured to scan slave devices. Verify DeviceNet network connections.
76	No Message For Scanner	No direct network traffic for the scanner detected. 10 seconds elapsed and no DeviceNet input being screened by the module has been received.	None. There are other active devices on the network, initiating messages, but none of the messages are for the module.
77	Slave Data Size Mismatch	The data being received from the slave device does not match the configuration in the scan list.	Either reconfigure the slave device, or change the module's scan list to match the slave device.
78	No Such Device	Slave device in scan list does not exist.	Either add the device to the DeviceNet network, or delete the device's entry in the scan list.
79	Transmit Failure	The module has failed to transmit a message.	Make sure that the module is connected to a valid network. Check for disconnected cables.
80	In Idle Mode	Module is in Idle mode.	Put the controller into Run mode and enable the scanner Run bit (bit 0 of the Module Command Array = 1). See page 17.
81	Scanner Faulted	The Scanner has stopped producing and consuming I/O data. This condition does not affect the scanner's system or messaging modes.	Check the FAULT value in the module command array.

Code (decimal)	Name	Description	Recommended Action
82	Fragmentation Error	Error detected in sequence of fragmented I/O messages from device.	Check scan list table entry for slave device to make sure that input and output data lengths are correct. Check slave device configuration.
83	Slave Init Error	Slave device is returning error responses when the module attempts to communicate with it.	Check slave device's configuration. Reboot slave device.
84	Not Yet Initialized	Module has not completed its initial attempt to establish communications with its slaves.	None. This code clears itself once the module properly initializes all slave devices on the network.
85	Receive Buffer Overflow	Data size returned is larger than expected.	Configure the slave device for a smaller data size.
86	Device Went Idle	Device is producing Idle state.	Check the device configuration and slave node status.
89	Auto Device Replacement (ADR) Error	Slave device responded with an error to the initialization data sent to it by the scanner; or the configuration table in the scanner's flash memory is not valid for a slave node.	Try the ADR download again. If it still fails, try clearing the ADR flash by downloading an empty ADR configuration to the scanner and then try the ADR configuration again.
90	Disabled Network	DeviceNet Port is Disabled	Check for the disable being set in the module command array.
91	Bus Off	Bus off condition detected on integral DeviceNet port.	Check the DeviceNet connections and physical media integrity. Check system for failed slave devices or other possible sources of network interference. Check the Baud Rate.
92	No DeviceNet Power	No network power detected on DeviceNet port.	Provide network power. Make sure the module drop cable is providing the proper power to the DeviceNet port.
95	FLASH Update	Flash Update In Progress	None. DO NOT disconnect the module from the network while a flash update is in progress.
98	Firmware Corrupted	Firmware is corrupted.	Reflash module firmware. DO NOT power cycle the module. Doing so may cause the module to become inoperable. If the problem persists contact Rockwell Automation Technical Support.
99	Hard Fault		Cycle Power. Reflash module firmware. Contact Rockwell Automation Technical Support.

Specifications

General Specifications

Specification	Value
Module Dimensions	118 mm (height) x 87 mm (depth) x 35 mm (width) height including mounting tabs is 138 mm 4.65 in. (height) x 3.43 in (depth) x 1.38 in (width) height including mounting tabs is 5.43 in.
Approximate Shipping Weight (with carton)	280g (0.61 lbs.)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Operating Temperature	0°C to +60°C (32°F to +140°F)
Operating Humidity	5% to 95% non-condensing
Operating Altitude	2000 meters (6561 feet) ⁽¹⁾
Vibration	Operating: 10 to 500 Hz, 5G, 0.030 inches maximum peak-to-peak
Shock	Operating: 30G panel mounted (20G DIN rail mounted) Non-Operating: 40G panel mounted (30G DIN rail mounted)
Agency Certification	<ul style="list-style-type: none"> • C-UL certified (under CSA C22.2 No. 142) • UL 508 listed • CE and C-Tick compliant for all applicable directives • ODVA DeviceNet conformance tested
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)
Radiated and Conducted Emissions	EN50081-2 Class A
<i>Electrical /EMC:</i>	<i>The module has passed testing at the following levels:</i>
ESD Immunity (IEC61000-4-2)	<ul style="list-style-type: none"> • 4kV contact, 8kV air, 4kV indirect
Radiated Immunity (IEC61000-4-3)	<ul style="list-style-type: none"> • 10 V/m, 80 to 1000 MHz, 80% amplitude modulation, +900 MHz keyed carrier
Fast Transient Burst (IEC61000-4-4)	<ul style="list-style-type: none"> • 2 kV, 5 kHz
Surge Immunity (IEC61000-4-5)	<ul style="list-style-type: none"> • 2 kV galvanic gun
Conducted Immunity (IEC61000-4-6)	<ul style="list-style-type: none"> • 10V, 0.15 to 80 MHz⁽²⁾

⁽¹⁾ For operation above 2000 meters, consult the factory.

⁽²⁾ Conducted Immunity frequency range may be 150 kHz to 30 MHz if the Radiated Immunity frequency range is 30 MHz to 1000 MHz.

Electrical and DeviceNet Specifications

Specification	Value
Bus Current Draw (maximum)	440 mA at 5V dc (2.2 Watts)
DeviceNet Power Requirements	N.E.C. Class 2 90 mA at 11V dc (maximum) 110 mA at 25V dc (maximum) 200 mA for 1.5 ms (inrush)
Heat Dissipation (maximum)	3.8 Watts (assumes typical network traffic)
Baud Rates	125K bits/second (default) 250K bits/second 500K bits/second
Maximum Cable Length	500 meters at 125K baud 100 meters at 500K baud
DeviceNet Cable	Allen-Bradley catalog number 1485C-P1-Cxxx. Refer to publication DN-2.5 for more information.
Power Supply Distance Rating	4 (The module may not be more than 4 modules away from the power supply).
DeviceNet to Compact Bus Isolation	Verified by one of the following dielectric tests: 500V ac for 1 minute or 707V dc for 1 minute. 30V dc working voltage (IEC Class 2 reinforced insulation)
Vendor I.D. code	1
Product Type Code	12
Product Code	105

Compact, CompactLogix, MicroLogix and RSNetWorx are trademarks of Rockwell Automation. DeviceNet is a trademark of Open DeviceNet Vendors Association (ODVA).

Notes:

www.rockwellautomation.com

Corporate Headquarters

Rockwell Automation, 777 East Wisconsin Avenue, Suite 1400, Milwaukee, WI, 53202-5302 USA, Tel: (1) 414.212.5200, Fax: (1) 414.212.5201

Headquarters for Allen-Bradley Products, Rockwell Software Products and Global Manufacturing Solutions

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe: Rockwell Automation SA/NV, Vorstlaan/Boulevard du Souverain 36-BP 3A/B, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Headquarters for Dodge and Reliance Electric Products

Americas: Rockwell Automation, 6040 Ponders Court, Greenville, SC 29615-4617 USA, Tel: (1) 864.297.4800, Fax: (1) 864.281.2433

Europe: Rockwell Automation, Brühlstraße 22, D-74834 Elztal-Dallau, Germany, Tel: (49) 6261 9410, Fax: (49) 6261 17741

Asia Pacific: Rockwell Automation, 55 Newton Road, #11-01/02 Revenue House, Singapore 307967, Tel: (65) 351 6723, Fax: (65) 355 1733

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