Installation Instructions

Allen-Bradley

Ethernet-to-DeviceNet Linking Device

Catalog Number 1788-EN2DN

This publication tells you how to install the 1788-EN2DN Ethernet-to-DeviceNet linking device and use RSNetWorx™ for DeviceNet software to configure it.

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.

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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.
⚠	**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 and recognize the consequences.
⚡	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, drive or motor, to alert people that dangerous voltage may be present.
🔥	**BURN HAZARD:** Labels may be on or inside the equipment, for example, drive or motor, to alert people that surfaces may reach dangerous temperatures.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

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.

European Hazardous Location Approval

The following applies when the product bears the Ex Marking.

This equipment is intended for use in potentially explosive atmospheres as defined by European Union Directive 94/9/EC and has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of Category 3 equipment intended for use in Zone 2 potentially explosive atmospheres, given in Annex II to this Directive.

Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-15 and EN 60079-0.

> ⚠ **WARNING:** This equipment must be installed in an enclosure providing at least IP54 protection when applied in Zone 2 environments.
>
> This equipment shall be used within its specified ratings defined by Rockwell Automation.
>
> Provision shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 40% when applied in Zone 2 environments.
>
> Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.
>
> Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.

> ⚠ **ATTENTION:** This equipment is not resistant to sunlight or other sources of UV radiation.

Environment and Enclosure

ATTENTION: This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC 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, V2, V1, V0 (or equivalent) if non-metallic. 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

ATTENTION: Prevent 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 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.

About the Linking Device

The 1788-EN2DN Ethernet-to-DeviceNet linking device lets you seamlessly connect your information- or control-level networks with your device-level network.

The linking device provides full DeviceNet master functionality, so you can connect up to 63 DeviceNet slave devices to an Ethernet TCP/IP interface that supports the EtherNet/IP network and an HTTP web server. As examples, you could use the linking device:

- as a gateway to connect information- or control-level networks to device-level networks for programming, configuration, control, or data collection.

- as a router/bridge to connect the EtherNet/IP network to the DeviceNet network.

The linking device provides centralized data storage, or I/O tables, for data shared between the DeviceNet and EtherNet/IP networks. Data is placed into the I/O tables by one network interface, allowing the data to be read through the other network interface.

The linking device appears as a single device on either network by using standard protocol mechanisms. No special, or extended, protocol features are required for the devices on either network to read or write the data flowing through the I/O tables; all cross-network activity is transparent to the devices on either network.

All connections, whether power or fieldbus, to the linking device are made on one end of the module. Phoenix connectors are provided for power and DeviceNet connections. A RJ45 style connector is provided for EtherNet/IP connection.

The linking device can be mounted to a DIN rail.

System Requirements

The following hardware and software components are required to use the linking device.

Required Hardware

- 1788-EN2DN linking device
- DeviceNet cabling, power, and devices forming a DeviceNet network
- Ethernet cabling and power
- Computer with access to the Ethernet network
- Computer running DeviceNet configuration software

  The DeviceNet slave devices with which the linking device communicates are specified using a DeviceNet Configuration Software tool such as RSNetWorx for DeviceNet software.

- 24V DC power to the linking device

  DeviceNet power may be used; however, using DeviceNet power bypasses the DeviceNet network isolation.

Required Software

- DeviceNet configuration software, such as RSNetWorx for DeviceNet software, version 4.01 or later, to configure DeviceNet devices and the linking device's DeviceNet functionality

- RSLinx® software, version 2.31 or later

- DHCP server 2.3.2 or later, which ships with RSLinx software version 2.42 and later. If you are using an earlier version of RSLinx software, you will need to download the standalone server from http://www.rockwellautomation.com/support

Optional Software

RSLogix™ 5000 software, version 13 or later.

Installing and Configuring the Linking Device

> ⚠️ **WARNING:** If you connect or disconnect the communication cable with power applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations.
>
> 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.
>
> When you change switch settings while field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations.
>
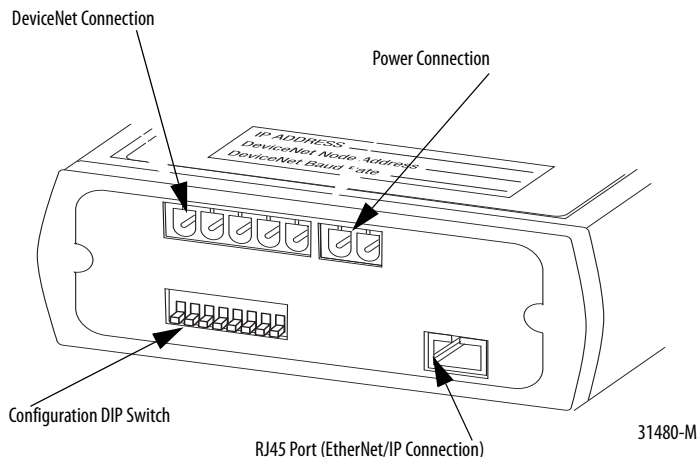> Be sure that power is removed or the area is nonhazardous before proceeding.

Follow these steps to install the linking device (described in the sections that follow).

Connect the Linking Device to the EtherNet/IP Network

Connect the EtherNet/IP network cable to the RJ45 port on the end of the linking device.

DeviceNet Connection

Power Connection

IP ADDRESS ___
DeviceNet Node Address ___
DeviceNet Baud rate ___

Configuration DIP Switch

RJ45 Port (EtherNet/IP Connection)

31480-M

> ⚠️ **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.

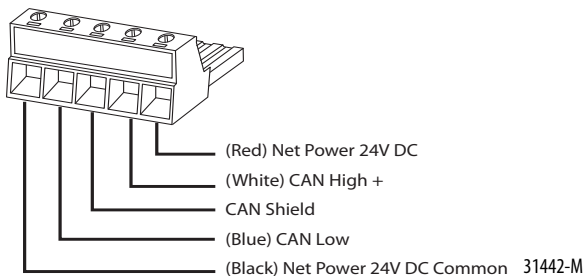## Connect the Linking Device to the DeviceNet Network

⚠️ **ATTENTION:**

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

To comply with the CE Low Voltage Directive (LVD), this equipment must be powered from a source compliant with Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV).

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

1. Make sure a computer running RSNetWorx for DeviceNet software is connected to the EtherNet/IP network.

2. With power to the linking device off, connect the DeviceNet network cable to the DeviceNet connector on the linking device.

   The female terminal block connector is provided with the linking device.

(Red) Net Power 24V DC
(White) CAN High +
CAN Shield
(Blue) CAN Low
(Black) Net Power 24V DC Common   31442-M

3. Connect the power cable to the linking device.

   The female terminal block connector is provided with the linking device.

24V DC common

24V DC +
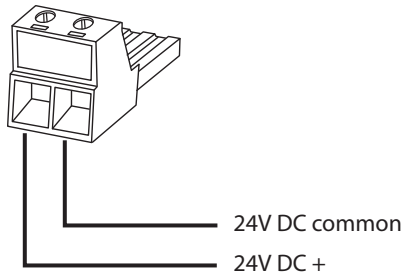
TIP Two 120 ohm termination resistors (supplied with the linking device) may be required for proper network termination at each end of the trunk line. See the DeviceNet Specification (available from the Open DeviceNet Vendors Association at http://www.odva.org) for specific rules on DeviceNet connections and termination.

4. Apply power to the linking device and DeviceNet network.

IMPORTANT The linking device defaults to Autobaud. This means that the linking device automatically finds the network communication rate at when power is applied. You must specify a master device, such as a DeviceNet Bridge Module (catalog number 1756-DNB) so that the linking device can pick up the correct communication rate. If you do not have another device installed, you must use RSNetWorx for DeviceNet software to set the communication rate, as described in Set the DeviceNet MAC ID and Communication Rate on page 21. Do not attempt to commission the linking device on a network configured at a different communication rate.

Configure the Linking Device IP Address

Several methods may be used to set the IP Address. These methods include the following:

- IP address configuration DIP switch
- DHCP protocol
- Web page
- RSLogix 5000 software, version 13 or later), and 1788-EN2DN Linking Device, revision 2.x or later

Setting the IP Address with the Configuration DIP Switch

A configuration DIP switch on the end of the linking device lets you set the IP address. If the configuration DIP switch is set to 1 (in the up position, as shown in the following figure), when power is applied to the switch, the value of the switch creates the IP address of 192.168.1.1.
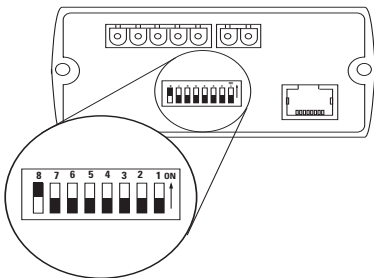
IMPORTANT	The numbers that appear above the switches on the DIP switch do not correspond to bit locations in the address value. The numbers on the switch are opposite the address value bit locations; for example, bit 0 is set by switch 8.

IP Address Configuration DIP Switch

31421-M

The switch represents the binary value of the last byte in the 4-byte IP address. In this case it is *n*. If $n = 0$, the linking device obtains its IP address from the software configuration (DHCP or web page).

IP address	192.168.1.*n*
Subnet mask	255.255.255.0
Gateway address	0.0.0.0 (No gateway set)

Setting the IP Address By Using DHCP/BootP

> **TIP** The use of DHCP is the default configuration for the linking device as shipped. The IP address configuration DIP switch ships with n =0.

When DHCP/BootP is enabled and a DHCP or BootP server is found, the IP address, Subnet mask, and Gateway address are automatically configured by the DHCP server, as shown in the following figure.
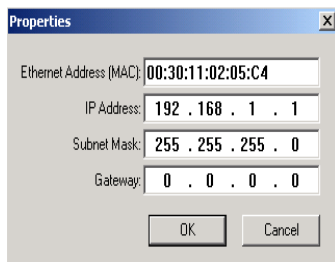
Automatic Configuration
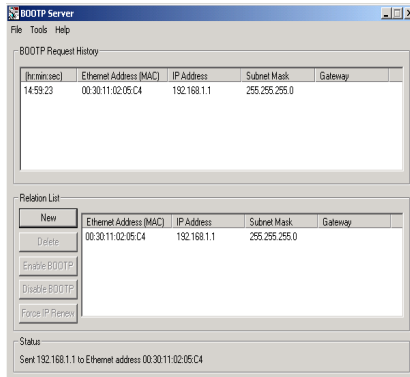
Follow these steps to change the IP address, Subnet mask, and Gateway address from this dialog box.
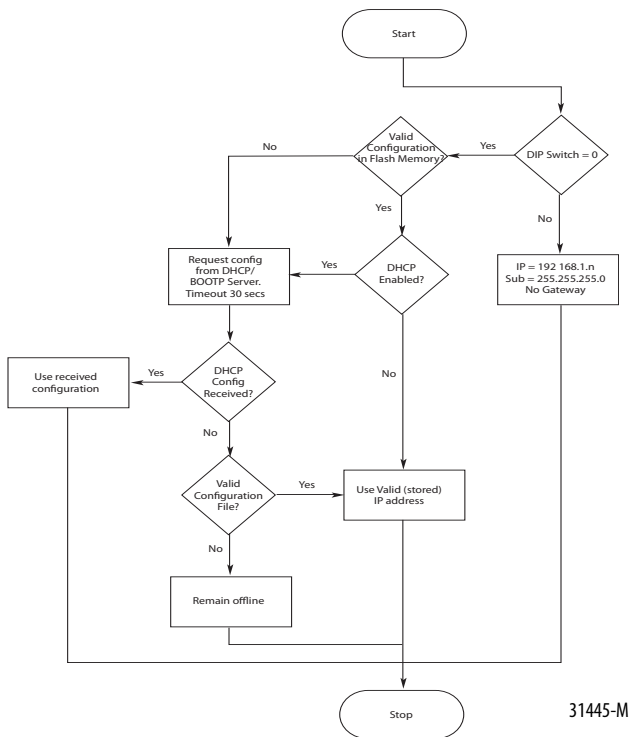
1. Click New.

   You see the Properties dialog box.

2. On the Properties dialog box, enter the appropriate values into the following fields.

   - Ethernet address (MAC ID) [from the linking device product ID label]
   - IP address
   - Subnet Mask
   - Gateway (IP address)

3. Click OK.

The following figure shows a flowchart describing how the IP configuration is determined when the linking device is powered up.

```
                        ┌─────────┐
                        │  Start  │
                        └────┬────┘
                             │
              ┌──────────────┴──────────┐
              │                         │
         Valid                          │
     Configuration    Yes           DIP Switch = 0
     in Flash Memory ◄─────         
              No                        No
              │                          │
     ┌────────▼────────┐        ┌────────▼────────┐
     │ Request config  │   Yes    DHCP            │ IP = 192 168.1.n │
     │ from DHCP/      │◄──────  Enabled?         │ Sub = 255.255.255.0 │
     │ BOOTP Server.   │                          │ No Gateway       │
     │ Timeout 30 secs │              No          └─────────────────┘
     └────────┬────────┘               │
              │                         │
          DHCP                          │
       Config        Yes               │
       Received? ──────►               │
              No       ┌─────────────┐  │
              │        │ Use received │  │
              │        │ configuration│  │
              ▼        └─────────────┘  │
          Valid        Yes   ┌──────────▼──────┐
      Configuration ──────►  │ Use Valid (stored)│
      File?                  │ IP address        │
              No             └─────────────────┘
              │
     ┌────────▼────────┐
     │ Remain offline  │
     └─────────────────┘

                        ┌─────────┐
                        │  Stop   │         31445-M
                        └─────────┘
```

> **TIP**   You can enable these values using the linking device's IP Configuration web page. Refer to .

Setting the IP Address Using By Using the Web Page

The EtherNet/IP address can also be configured using the IP Configuration web page on the linking device, as shown in the following figure.

The IP address can be set with the web page only if the linking device already has a valid IP address. Typically, you can do this by using the DIP switch to force the linking device to use a temporary IP address after you cycle power. Follow these steps to configure the IP address with the web page.

IMPORTANT	Because the DIP switch setting overrides other IP address configurations, be sure to set the DIP switch to the 0 position before continuing.
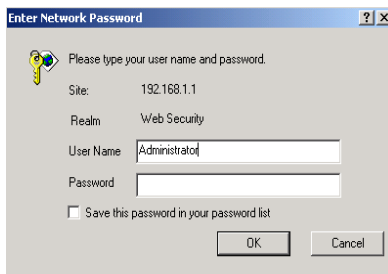
1. Browse to the linking device by entering the temporary IP address in your web browser's address bar and click Enter.

2. In the left pane, click IP Configuration.

   You see the Enter Network Password dialog box.

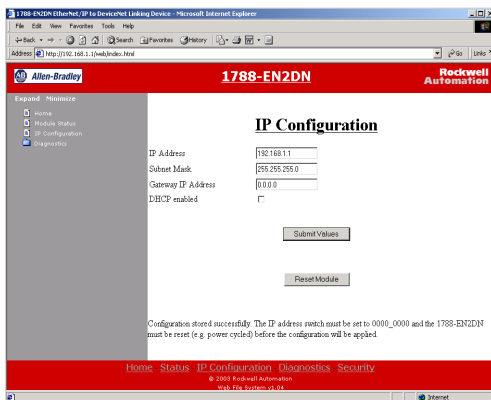3. In the Username field, enter Administrator.

4. Leave the password field blank.

Enter Network Password

Please type your user name and password.

Site: 192.168.1.1

Realm   Web Security

User Name   Administrator

Password

☐ Save this password in your password list

[OK]   [Cancel]

5. Click OK.

You see the IP Configuration dialog box.

1788-EN2DN   Rockwell Automation

IP Configuration

IP Address   192.168.1.1

Subnet Mask   255.255.255.0

Gateway IP Address   0.0.0.0

DHCP enabled   ☐

[Submit Values]

[Reset Module]

Configuration stored successfully. The IP address switch must be set to 0000_0000 and the 1788-EN2DN must be reset (e.g. power cycled) before the configuration will be applied.

Home Status IP Configuration Diagnostics Security
© 2003 Rockwell Automation
Web File System v1.04

6. Enter the following values into the IP Configuration dialog box.

In this field	Enter
IP Address	Any valid value. See your system administrator for a valid IP address.
Subnet Mask	Any valid value.
Gateway IP Address	
DHCP enabled	

7. Click Submit Values.

8. Follow the on-dialog box prompts.

9. Click the Reset Module button to reset the linking device.

Register the Driver in RSLinx Software

1. In RSLinx software, choose Communications>Configure Driver.

2. In the Configure Drivers menu, choose Ethernet Devices from the Available Driver Types pull-down menu.

3. Click Add New.

4. In the Add New RSLinx Drivers pop-up menu, click OK.

5. In the Configure Driver window that appears, enter the IP address of the linking device.

6. Click Close.

7. Click OK.

(Optional) Register the EDS file in RSNetWorx Software

RSNetWorx for DeviceNet software requires an electronic data sheet (EDS) to recognize a device and its capabilities. If you do not already have a registered EDS file for the device, you can download an EDS file from http://www.rockwellautomation.com/support/downloads.html.

IMPORTANT	If RSLinx or RSNetWorx for DeviceNet software cannot find the EDS file for the linking device, the linking device's icon may be labeled an unrecognizable device in the software.

1. In RSNetWorx for DeviceNet software, choose Tools>EDS Wizard.

2. Click Next.

3. Select Register an EDS File and click Next.

4. Select Register a Single File and enter or browse to the location of the EDS file for the linking device.

5. Click Next or Finish for the remaining option dialog boxes.

Use RSNetWorx for DeviceNet Software to Locate the Module on the Network

1. In RSNetWorx for DeviceNet software, choose Network>Online.

2. In the left pane, click the RSLinx Ethernet driver you added previously.

   Refer to .

3. In the left pane, click the + next to the 1788-EN2DN linking device icon.
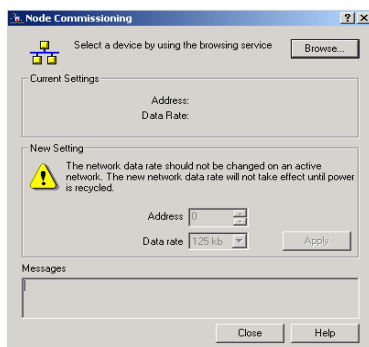
4. In the left pane, click DeviceNet, DeviceNet.
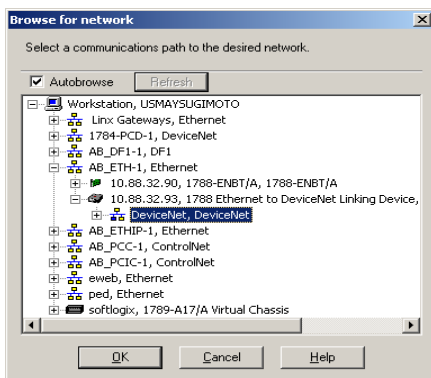
5. When asked to upload from the network, click OK to perform a single pass browse.
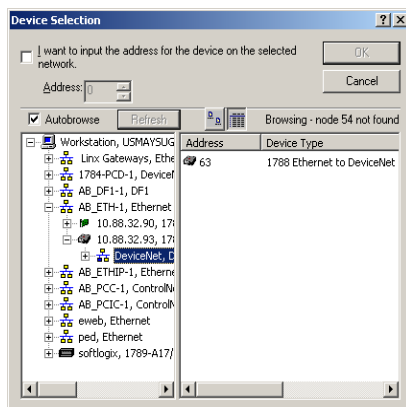
Set the DeviceNet MAC ID and Communication Rate

1. In RSNetWorx for DeviceNet software, choose Tools>Node Commissioning.
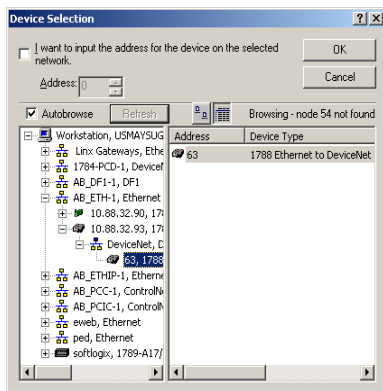
You see the Node Commissioning dialog box.

2. On the Node Commissioning dialog box, click Browse.

You see the Device Selection dialog box.

3. In the left pane, click the + next to the RSLinx driver for the 1788-EN2DN linking device.

4. In the left pane of the dialog box, click the + next to the IP address for the 1788-EN2DN linking device.

5. In the left pane, click the + next to the DeviceNet network.
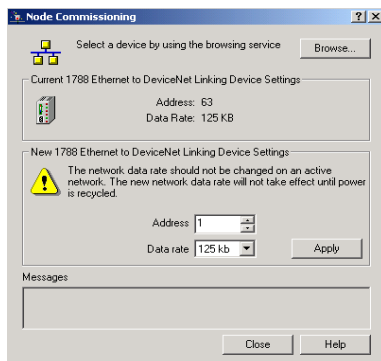
   You see the 1788-EN2DN linking device in the left pane.

6. Click on the 1788-EN2DN linking device in the left pane.

   It appears in the right pane.

7. Click OK.

8. If a warning text box asking you if you wish to continue appears, click Yes.

9. Enter the desired MAC address or data rate, then click Apply.

10. Click Close.

| IMPORTANT | The linking device will automatically reset if a new MAC ID is entered. If only the communication rate is changed you must cycle power to the linking device before the new communication rate will take effect. |
| | When the MAC ID is changed, the linking device's I/O configuration is cleared. |

11. Restart RSNetworx for DeviceNet software and go online.

| TIP | If you are using the linking device as a network gateway, you may need to restart RSNetWorx for DeviceNet software before continuing. |

(Optional) Disable Autobaud

If you do not want the linking device to automatically determine the network communication rate, disable Autobaud. By default, the linking device has Autobaud enabled.

1. In RSNetWorx for DeviceNet software, highlight the linking device by clicking on its icon.

2. From the pull-down menu, choose Device>Class Instance Editor.

3. If a warning text box appears, click Yes.

   You see the Class Instance Editor dialog box.

4. From the pull-down menu, choose Description>Set Single Attribute.
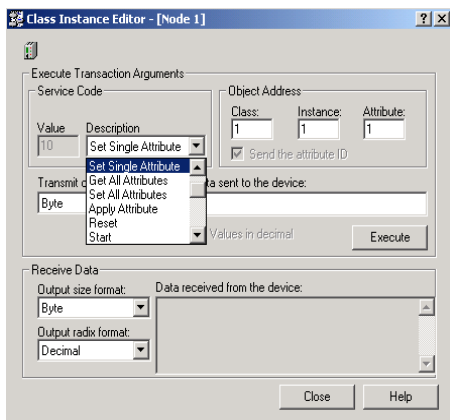
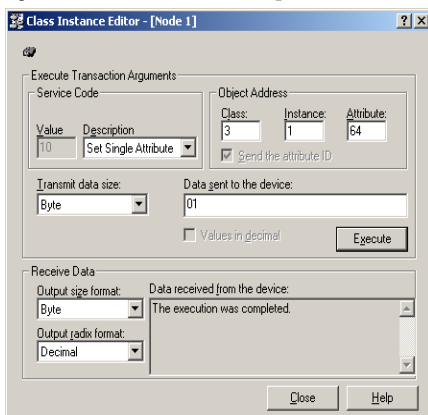| In this field	Select

Object Address
    Class
    Instance
    Attribute
	
	3
	1
	64h

Data Sent to Device	00 to enable Autobaud 01 to disable Autobaud
Transmit Data Size	Byte

IMPORTANT   Make sure the Values in Decimal checkbox is not checked.

5. Click Execute.

You should see a message in the Data received from device field indicating that the execution was completed.

| IMPORTANT | Changes to the autobaud option configuration do not take effect until you cycle power to the linking device. You may also have to cycle power to the slave devices. |
| | If the linking device is the only master on the DeviceNet network, do not enable autobaud. Automatic communication detection requires traffic on the network. There is typically no traffic until the master establishes connections. |

6. Click Close.

(Optional) Configure DeviceNet I/O

IMPORTANT	Steps 8 and 9 are required only if the linking device is used as an I/O scanner. The linking device can function as a gateway/bridge, even if no I/O is configured.

I/O Mapping

The DeviceNet I/O configuration defines the format of the Input and Output tables, or the mapping of DeviceNet slaves' I/O data to the I/O tables. As slaves are added to the linking device's DeviceNet scanner configuration, the location in the I/O tables of each part of the slave's I/O data is determined and stored.

IMPORTANT	The organization of the I/O tables is very important. I/O tables define the format of the data that will be provided to the EtherNet/IP scanner. The Input and Output table formats should be planned and documented to be sure the EtherNet/IP scanner is working with the correct data from the DeviceNet network.
	The size of the I/O data that can be exchanged with the EtherNet/IP scanner (and, hence, the size of the I/O tables) is restricted as explained below.
	• The Input table size cannot be larger than 496 bytes.
	• The Output table size cannot be larger than 492 bytes.
	• Either table may be empty (0 bytes).

To configure DeviceNet I/O, use RSNetWorx for DeviceNet software to set the linking device's scan list and I/O table mapping.

IMPORTANT	Automap is used in this example for simplicity. In some cases, you may want to organize the I/O data in other ways; you can do this using the Advanced data table editor in the Input and Output tabs. Refer to RSNetWorx online help for complete details.

1. In RSNetWorx for DeviceNet, go online by choosing Network>Online.

2. Select Network>Single Pass Browse. Wait for browsing to complete.

3. Select Network>Upload from Network. Wait for the device information to be uploaded from the network.

4. Double-click the linking device icon to bring up the Module Description dialog box.
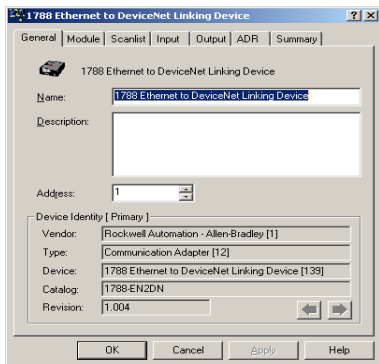

Several tabs appear on the top of the dialog box.

5. Click the Scanlist tab.

6. In the informational text box that appears, click Upload.

The dialog box shows two columns. On the left is a list of available devices that may be added to the scan list. On the right is a list of devices that are configured in the scan list.

7. Check AutoMap on Add.

8. Select the I/O devices on the left side of the dialog box and click > to move it to the right side of the dialog box.
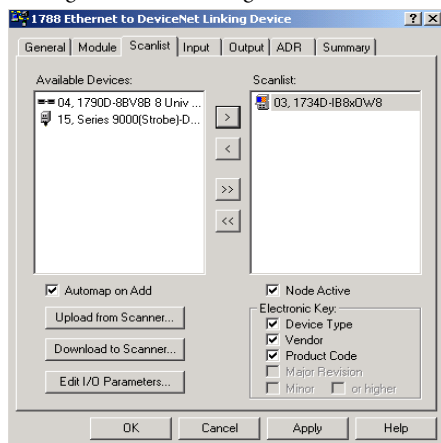
9. Select the Input tab.

The Input mapping dialog box is displayed.
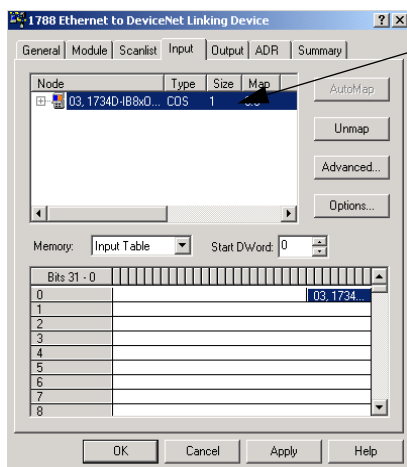
The top portion of this dialog box gives a list of the devices in the scan list from which the linking device receives input data. The bottom shows the location in the Input table where the data will be placed for each device. This shows the format of the Input table of the linking device. This is the format of the input data that will be sent to the EtherNet/IP scanner.

10. Select the Output tab.

The Output mapping dialog box is displayed.

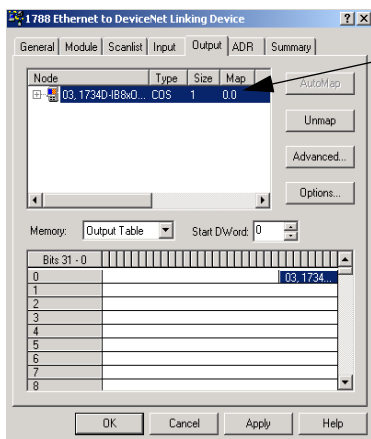The top portion of this dialog box gives a list of the devices in the scan list to which the linking device will send output data. The bottom shows the location in the Output table where the data will be placed for each device. This shows the format of the Output table of the linking device. This is the format of the output data that will be sent to the linking device from the EtherNet/IP scanner.

11. Click Apply, and click Yes to download the scanlist to the linking device.

> **TIP**   The linking device starts scanning as soon as it finds entries in its scanlist. However, in Idle mode, output data will not be sent to the devices.

12. Click OK.

(*Optional*) Add the Linking Device to an RSLogix 5000 Software Project

1. Create a new project in RSLogix 5000 software by selecting File>New.

You see the New Controller dialog box.

2. From the Type pull-down menu, choose the controller type.

3. From the Revision pull-down menu, choose the controller version.

4. Enter a name for the controller project.

5. Click OK.

   A project is created.

6. In the left pane, right-click I/O Configuration.

7. Click New Module.

8. In the Select Module Type menu, choose any EtherNet/IP Bridge Module (such as the 1788-ENBT module).

9. Click OK.

   You see the Module Properties dialog box.
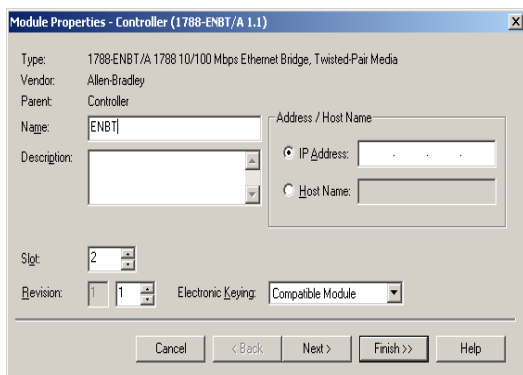
10. In the Slot Number field, enter the slot number in which the device resides.

11. Click Finish.

12. In the right pane, right-click the EtherNet/IP module you just added to your project.

13. Click New Module.

14. In the Select Module Type menu, choose 1788-EN2DN/A 1788 Ethernet to DeviceNet Linking Device.

15. Click OK.
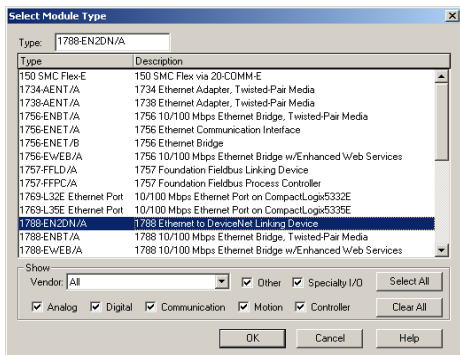
16. On the Select Major Revision dialog box that appears, choose the major revision from the drop-down box.
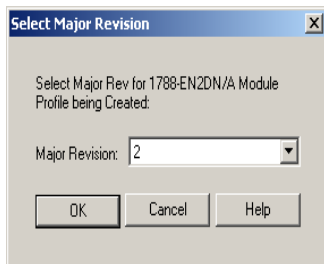
17. Click OK.

You see the Module Properties dialog box.

18. In the Name field, enter a module name.

19. Click the IP Address radio button and enter the IP address for which the linking device is configured.

20. Click Next.

21. Enter the Requested Packet Interval (RPI or update rate) in a range from 2...750 ms.

If you see errors in this field when you are online, see the table following this illustration.

RSLogix 5000 Software Error Codes

This Error code	Means	So you should
16#0203	Connection timed out	Check IP configuration and Ethernet cabling
16#0204	Connection Request Error: Connect request timed out	Check IP configuration and Ethernet cabling
16#0103	Service Request Error: CIP transport class not supported	Check for valid RPI range (for example, 2…3200ms)
16#0005	Connection Request Error: Bad class.	Check for correct assembly instance numbers in connection parameters

22. Click Next.

If an RSNetWorx for DeviceNet configuration file (filename *.dnt) already exists for the linking device, enter or browse to the appropriate filename. Doing so allows RSNetWorx for DeviceNet to launch directly from RSLogix 5000 software.
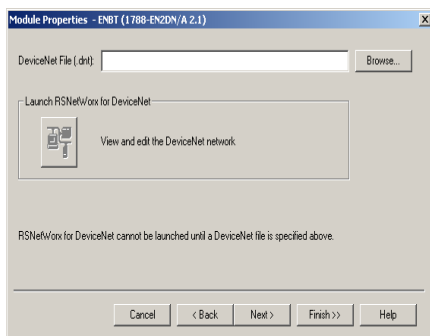
23. Click Finish.

You can now use the linking device as both a bridge and a scanner.

24. Write a user program to use the linking device on the network.

TIP   Consult Rockwell Automation Technical Support or your Rockwell Automation representative for assistance in writing the program.

25. To view information specific to the RSLogix 5000 tags that pertain to the linking device, do the following:

a. In the left pane of the RSLogix 5000 software window, click Controller Tags.
   In the right pane, you see the 1788-EN2DN linking device controller tags.

P	Tag Name	△	Alias For	Base Tag	Type	Style
	─EN2DN:I				AB:1788_EN2DN_500Bytes:...	
	⊞ EN2DN:I.StatusRegister				AB:1788_EN2DN_StatusRe...	
	⊞ EN2DN:I.Data				DINT[124]	Decimal
▶	─EN2DN:O				AB:1788_EN2DN_496Bytes:...	
	⊞ EN2DN:O.CommandRegister				AB:1788_EN2DN_Command...	
	⊞ EN2DN:O.Data				DINT[123]	Decimal
	─EN2DN:S				AB:1788_EN2DN_128Bytes:...	
	⊞ EN2DN:S.ScanCounter				DINT	Binary
	⊞ EN2DN:S.DeviceFailureRegister				SINT[8]	Binary
	⊞ EN2DN:S.AutoverifyFailureRegister				SINT[8]	Binary
	⊞ EN2DN:S.DeviceIdleRegister				SINT[8]	Binary
	⊞ EN2DN:S.ActiveNodeRegister				SINT[8]	Binary
	⊞ EN2DN:S.StatusDisplay				SINT[4]	Binary
	⊞ EN2DN:S.ScannerAddress				SINT	Hex
	⊞ EN2DN:S.ScannerStatus				SINT	Hex
	⊞ EN2DN:S.ScrollingDeviceAddress				SINT	Hex
	⊞ EN2DN:S.ScrollingDeviceStatus				SINT	Hex
	⊞ EN2DN:S.DeviceStatus				SINT[64]	Hex
✱						

Scope: demo(controller) Show: Show All Sort: Tag Name

b. Click on the + to the left of the tag name to expand it.

c. Review data in the fields that appear for each tag, as described in the section entitled <u>Assembly Objects and Connections</u> on page <u>36</u>.

Assembly Objects and Connections

Three Assembly Object instances are accessible from EtherNet/IP: input, output and status. The input and output assemblies are linked to the input and output tags created in RSLogix 5000 software. The status assembly provides current status information about the linking device.

IMPORTANT	With a specific 1788-EN2DN profile, I/O tags are mapped without an offset. For example, RSLogix 5000 version13 input tag EN2DN:I:Data[0] corresponds to word 0 of the RSNetWorx for DeviceNet software input mapping table.

The assembly instances associated with these three assemblies are listed in the following tables.

Input Assembly

The input assembly contains a 32-bit status register followed by the data in the linking device's input data table.

Input Assembly Format

DINT Offset	Size in DINTs	Description	RSLogix 5000 software version 12 example tags	RSLogix 5000 software version 13 or later example tags
0	1	Status register	EN2DN:I.Data[0]	EN2DN:I.Status Register
1	Up to 123	Input data	EN2DN:I.Data[1 - 124]	EN2DN:I.Data[0 …123]

The input data format and content is determined by the DeviceNet scanner configuration. The data appears in the table as it is mapped from the DeviceNet input connections. The input data in the assembly is 124 DINTs long; however, only the size of the input data table will be used. The remaining space will be filled with the value 0 (zero).

Output Assembly

The output assembly contains a 32-bit command register followed by the data in the linking device's output data table.

Output Assembly Format

DINT Offset	Size in DINTs	Description	RSLogix 5000 software version 12 example tags	RSLogix 5000 software version 13 or later example tags
0	1	Command register	EN2DN:O.Data[0]	EN2DN:O.Command Register
1	Up to 123	Output data	EN2DN:O.Data[1 - 123]	EN2DN:O.Data[0 …23]

The output data format and content is determined by the DeviceNet scanner configuration. The data appears in the table as it is mapped to the DeviceNet output connections. The output data in the assembly is 123 DINT long; however, only the size of the output data table will be used. The remaining space will be ignored.

Status Assembly

The status assembly is a collection of status and diagnostic information for the linking device's DeviceNet network interface. The information in the assembly is updated once a second.

IMPORTANT	All information in the status assembly is stored in little endian format. The least significant byte of multi-byte values is stored first.

Status Assembly Format

Byte Offset	Size in Bytes	Data Type	Name (RSLogix 5000 software version 13 or later)	Description
0	4	UDINT	Scan Counter	The number of DeviceNet I/O scans that have taken place since power was applied to the linking device.
4	8	64-bit Bitstring	Device Failure Register	Indicates which DeviceNet slaves are faulted. Each bit represents the status of the slave at the corresponding MAC ID.
12	8	64-bit Bitstring	Auto Verify Failure Register	Indicates which DeviceNet slaves are the incorrect device type. Each bit represents the status of the slave at the corresponding MAC ID.
20	8	64-bit Bitstring	Device Idle Register	Indicates which DeviceNet slaves are in Idle mode. Each bit represents the status of the slave at the corresponding MAC ID.
28	8	64-bit Bitstring	Active Node Register	Indicates which DeviceNet nodes are configured in the 1788-EN2DN's scan list. Each bit represents the status of the slave at the corresponding MAC ID.
36	4	ASCII[4]	Status Display	Mimics a 4-character alpha-numeric display. If there are no faults, the display shows the linking device's MAC ID and its Run/Idle status. If there are faults, the display will scroll through the MAC IDs of the faulted nodes and display the error code associated with each.
40	1	USINT	Scanner Address	The DeviceNet MAC ID of the linking device.
41	1	USINT	Scanner Status	The current status of the DeviceNet scanner.

Status Assembly Format (cont.)

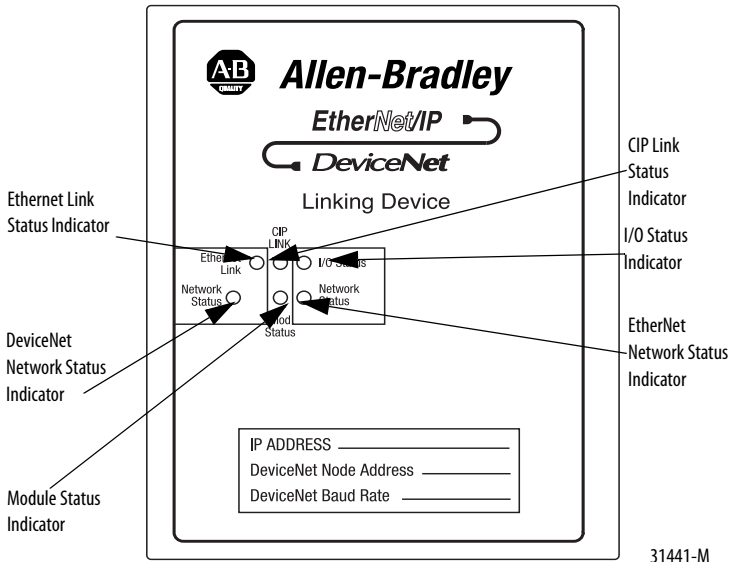| Byte Offset	Size in Bytes	Data Type	Name (RSLogix 5000 software version 13 or later)	Description
42	1	USINT	Scrolling Device Address and Status	The scrolling address and status fields scroll through the address and status of all DeviceNet slaves that are faulted. This scrolling includes the linking device scanner itself.
43	1	USINT		If there are no faulted nodes, both the scrolling address and status are set to 0. The scrolling fields change once a second.
44	20	USINT[20]	N/A	
64	64	USINT[64]	Device Status	The current status of each DeviceNet slave node. Each array element is the status of the node at the corresponding MAC ID. If a node is not configured in the linking device scan list, the status value will be set to 0. The linking device scanner status appears at the entry associated with the linking device MAC ID.

Understanding Status Indicators

A group of status indicators on the front panel of the linking device shows the current status of the linking device and the network interfaces, as shown in the following figures.

The following tables provide information on status indicator states.

For Information about the	See Page
I/O status indicator	42
DeviceNet Network status indicators	42
Module status indicators	43
Ethernet Link status indicators	43
EtherNet Network status indicators	43
CIP Link status indicators	44

Status Indicators

Ethernet Link
Status Indicator

CIP Link
Status
Indicator

I/O Status
Indicator

DeviceNet
Network Status
Indicator

EtherNet
Network Status
Indicator

Module Status
Indicator

CIP
LINK

Ether
Link

I/O Status

Network
Status

Network
Status

Mod
Status

IP ADDRESS

DeviceNet Node Address

DeviceNet Baud Rate

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I/O Status Indicator

TIP   If the I/O status indicator is flashing red and green for an extended period of time, count the number of red and green flashes and call Rockwell Automation technical support. Refer to the back cover of this publication for details on contacting technical support.

I/O Status Indicator States

Indicator	Status	Description
Flashing green	Idle	Module is in Idle mode.
Solid green	Running	Module is in Run mode.
Solid orange	Hardware Initialization	The status indicator will be in this state immediately after power is applied.
Flashing red/green	Error	A fault has been detected.
Off	No I/O	No DeviceNet I/O configured.

DeviceNet Network Status Indicator

DeviceNet Network Status Indicator States

Indicator	Status	Description
Solid green	Online and communicating	The linking device is on the DeviceNet network and communicating with at least one device.
Flashing green	Online, no communication	The linking device is on the DeviceNet network and is not currently communicating with any devices.
Solid red	DeviceNet interface fault	A major fault in the DeviceNet interface has been detected. Possible causes include Bus-off or duplicate MAC ID.
Flashing red	Connection time-out	A connection with at least one slave device has timed out.

Module Status Indicator

DeviceNet Module Status Indicator States

Indicator	Status	Description
Flashing green	Standby or not configured	The module has not been configured and is currently using default values. This status indicator state is also used to indicate that the module is in a standby state. This could occur during initialization or DeviceNet autobaud.
Solid green	Normal	Normal operation.
Solid red	Unrecoverable major fault	A fault the requires user intervention has been detected. Correct the problem and reset the linking device.
Flashing red	Recoverable minor fault	A fault that can be corrected and does not require a linking device reset has been detected.

Ethernet Link Status Indicator

The Ethernet Link status indicator indicates that the module is connected to an Ethernet network. The status indicator displays green if the link is active. The status indicator will flash when Ethernet packets are received and transmitted.

Ethernet Network Status Indicators

Ethernet Network Status Indicator States

Indicator	Status	Description
Off	No IP address	The module has no IP address assigned.
Solid green	Network OK and communicating	There is at least one EtherNet/IP connection.
Flashing green	Network OK	There are no active connections.

Ethernet Network Status Indicator States

Indicator	Status	Description
Solid red	Address conflict	The module's IP address is already in use by another module.
Flashing Red	Connection time-out	One or more of the connections in which this module is the target has timed out. This state is only left if all timed out connections are re-established or if the module is reset.
Red,Green alternate flashing	Self test	A self-test of the module is in progress.

CIP Link Status Indicator

The CIP Link status indicator indicates bridged and gateway activity between EtherNet/IP and DeviceNet networks. The status indicator will flash green when a CIP message is bridged from EtherNet/IP to DeviceNet networks. The status indicator will be solid green if an EtherNet/IP I/O connection is active.

Using Diagnostic Web Pages

Status

The Status page displays the linking device identification information, current status, and IP configuration. The module status is updated approximately every 2.5 seconds.

Active Nodes

The Active Nodes page indicates which DeviceNet nodes are currently configured as slaves to the linking device's DeviceNet scanner. Each node that is configured as a slave will be displayed with 'Active' next to the node's MAC ID.

Idle Nodes

The Idle Nodes page indicates which DeviceNet nodes are currently in the Idle state. If a node is Idle, the page will display 'Idle' next to the node's MAC ID. Note that only nodes configured as slaves to the linking device and the linking device itself are updated on this page.

Faulted Nodes

The Faulted Nodes page indicates which DeviceNet nodes are currently in a faulted state. If a node is faulted, the page will display "Faulted" next to the node's MAC ID. Note that only nodes configured as slaves to the linking device and the linking device itself are updated on this page.

A node is considered faulted if the linking device has lost communication or is unable to establish communications with the node. The actual problem can be determined by viewing the Node Status web page.

Invalid Nodes

The Invalid Nodes page indicates which DeviceNet nodes are not the correct device type. If a node's device type is different than that configured in the scan list, the page will display 'Invalid' next to the node's MAC ID. Note that only nodes configured as slaves to the linking device are updated on this page.

Node Status

The Node Status page displays the current status of all DeviceNet nodes that are configured as slaves to the linking device and the linking device itself. The status of each node is displayed next to the node's MAC ID. Note that only nodes configured as slaves to the linking device and the linking device itself are updated on this page.

The page will display the status textually for many of the common status values. However, to save web page size, many of the status values are only displayed numerically. The table below describes the meaning of each status value.

Node Status Codes

This status code	Means	So you should
0	OK	Do nothing.
60	Duplicate MAC ID test in progress	Do nothing.
70	Module failed Duplicate Node Address check	Change the module address to another available one. The node address you selected is already in use on that network.
71	Illegal data in scan list table	Reconfigure the scan list table and remove any illegal data.
72	Slave device stopped communicating	Inspect the field devices and verify connections.
73	Device's identity information does not match electronic key in scan list table entry	Verify that the correct device is at this node number. Make sure that the device at the scrolling node address matches the desired electronic key (such as vendor, product code, and product type).
74	Data overrun on port detected	Modify your configuration and check for invalid data. Check network communication traffic.
75	No traffic detected on the network	Check the network configuration.
76	No direct network traffic for module detected	None. The module hears other network communication.

Node Status Codes (cont.)

This status code	Means	So you should
77	Data size expected by the device does not match scan list entry	Reconfigure your module for the correct transmit and receive data sizes.
78	Slave device in scan list table does not exist	Add the device to the network, or delete the scan list entry for that device.
79	Module has failed to transmit a message	Make sure that your module is connected to a valid network. Check for disconnected cables.
80	Module is in IDLE mode	Put controller in RUN mode. Enable RUN bit in module command register.
81	Module is in FAULT mode	Check Module Command Register for fault bit set.
82	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 device is returning error responses when module attempts to communicate with it	Check accuracy of scan list table entry. Check slave device configuration. Slave device may be in another master's scan list. Reboot slave device.
84	Module is initializing the DeviceNet network	None. This code clears itself once module attempts to initialize all slave devices on the network.
85	Data size was incorrect for this device at runtime	Slave device is transmitting incorrect length data. Try replacing the device.
86	Device is producing zero length data (idle state) while module is in Run mode	Check device configuration and slave node status.
87	The primary owner has not allocated the slave	Put the primary owner on line.

Node Status Codes (cont.)

| This status code	Means	So you should
88	The connection choices (such as polled or strobed) between the primary connection and the shared input only connection do not match	Reconfigure the shared input only connection's choices to be the same as, or a subset of, the primary connection's choice(s).
89	Slave device initialization using Auto Device Replacement parameters failed	Put the slave device into configurable mode. Check the slave's EDS file, if the slave is configured offline. Check to see if the slave device has been replaced with an incompatible device.
90	User has disabled communication port	Check Module Command Register for DISABLE bit set.
91	Bus-off condition detected on comm port. Module is detecting communication errors	Check DeviceNet connections and physical media integrity. Check system for failed slave devices or other possible sources of network interference.
92	No network power detected on communication port	Provide network power. Make sure that module drop cable is providing network power to module comm port.
95	Application nonvolatile memory update in progress	Do nothing. Do not disconnect the module while application nonvolatile memory update is in progress. You will lose any existing data in the module's memory.
96	COMM port in Test mode	Do nothing.
97	Module operation halted by user command	Check Module Command Register for HALT bit set.
98	General firmware error	Replace module.
99	System failure	Replace module.

IP Configuration

The IP Configuration web page is used to change the IP configuration of the linking device.
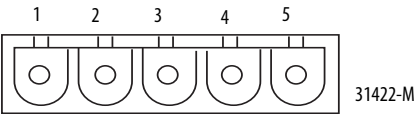
Security

Use the Security web page to change the security password.
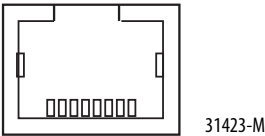
Dimensions

31444-M
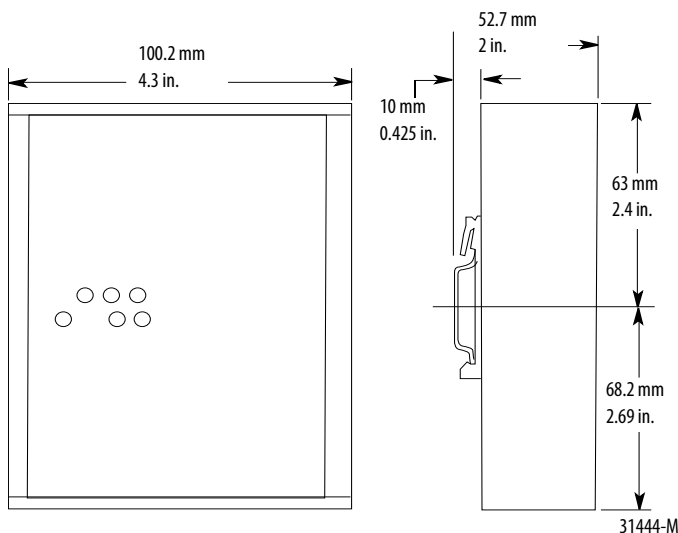
DeviceNet Connector Pinouts

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DeviceNet Pinouts

Pin	Signal
1	V-
2	CAN_L
3	Shield
4	CAN_H
5	V+

EtherNet/IP RJ45 Connector Pinouts

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EtherNet/IP Pinouts

Pin	Signal
1	TD+
2	TD-
3	RD+
4	Termination
5	Termination

EtherNet/IP Pinouts

Pin	Signal
6	RD-
7	Termination
8	Termination

Specifications

Technical Specifications - 1788-EN2DN

Attribute	1788-EN2DN
Enclosure type rating	None (open style)
Supply power and current rating	DeviceNet network: Operating voltage: 12…30V DC (24 V DC nom) 100 mA at 24V DC, Class 2 Input power Operating Voltage: 12…30V DC (24V DC nom) 300 mA at 24V DC, Class 2
Isolation voltage	50V (continuous), basic insulation type
Torque	0.5… 0.8 N•m (5…7 lb•in)

Technical Specifications - 1788-EN2DN

Attribute	1788-EN2DN
Wire size	DeviceNet connections: See appropriate system-level installation manual Ethernet network connections: RJ45 connector according to IEC 60603-7, 2 or 4 pair Category 5e minimum cable according to TIA 568-B.1 or Category 5 cable according to ISO/IEC 24702 DC Power connections: 0.2… 3.3 mm^2 (24…12 AWG) solid or stranded copper wire rated at 75 °C (167 °F), or greater, 1.2 mm (3/64 in.) insulation max
Wiring category[1]	2 - on power ports 2 - on communication ports
North American temp code	T4
IEC 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.

Environmental Specifications - 1788-EN2DN

Attribute	1788-EN2DN
Temperature, operating • IEC 60068-2-1 (Test Ad, Operating Cold), • IEC 60068-2-2 (Test Bd, Operating Dry Heat), • IEC 60068-2-14 (Test Nb, Operating Thermal Shock)	0…60 °C (32…140 °F)
Temperature, surrounding air, max	60 °C (140 °F)
Temperature, nonoperating • IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), • IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), • IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock)	-40…85 °C (-40…185 °F)

Environmental Specifications - 1788-EN2DN

Attribute	1788-EN2DN
Relative humidity • IEC 60068-2-30 (Test Db, Unpackaged Damp Heat)	5…95% noncondensing
Vibration • IEC 60068-2-6 (Test Fc, Operating)	5 g @ 10…500 Hz
Shock, operating • IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g
Shock, nonoperating • IEC 60068-2-27 (Test Ea, Unpackaged Shock)	50 g
ESD immunity • IEC 61000-4-2	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 80…2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz 1V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz
EFT/B immunity • IEC 61000-4-4	±2 kV at 5 kHz on power ports ±2 kV at 5 kHz on communication 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 communication ports
Conducted RF immunity • IEC 61000-4-6	10V rms with 1 kHz sine-wave 80% AM from 150 kHz…80 MHz

Certifications - 1788-EN2DN

Certification (when product is marked)[1]	1788-EN2DN
c-UL-us	UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810.
CE	European Union 2004/108/EC EMC Directive, compliant with: • EN 61326-1; Meas./Control/Lab., Industrial Requirements • EN 61000-6-2; Industrial Immunity • EN 61000-6-4; Industrial Emissions • EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
C-Tick	Australian Radiocommunications Act, compliant with: • AS/NZS CISPR 11; Industrial Emissions
Ex	European Union 94/9/EC ATEX Directive, compliant with: • EN 60079-15; Potentially Explosive Atmospheres, Protection "n" • EN 60079-0; General Requirements • II 3 G Ex nA nL IIC T4 X
ODVA	ODVA conformance tested to DeviceNet specifications
EtherNet/IP	ODVA conformance tested to EtherNet/IP specifications
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: • Article 58-2 of Radio Waves Act, Clause 3

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

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
EtherNet/IP Modules in Logix5000 Control Systems User Manual, publication ENET-UM001	Provides information about how to use EtherNet/IP modules with various Logix5000 controllers.
DeviceNet Network Configuration User Manual, publication DNET-UM004	Describes how to use DeviceNet modules with your Logix5000 controller and communicate with various devices on the DeviceNet network.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support/, 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://www.rockwellautomation.com/support/.

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 or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html, or contact your local Rockwell Automation representative.

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 (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

Documentation Feedback

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