

# DeviceNet System

## Quick Reference



### Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for Application, Installation, and Maintenance of Solid State Controls (publication [SGI-1.1](#) available from your local Rockwell Automation sales office or online at <http://literature.rockwellautomation.com>) 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, and recognize the consequence.

#### **SHOCK HAZARD**



Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.

#### **BURN HAZARD**



Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.



## Select

Use this table to select the appropriate media for your system. For other media choices, refer to Chapter 6 in the On-Machine Connectivity Catalog, publication [M116-CA001](#).

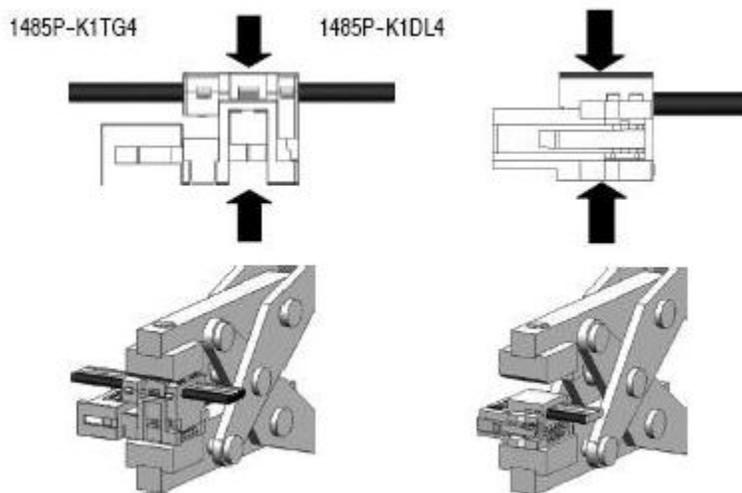
Description	Cat. No.
DeviceNet handheld configuration terminal	193-DNCT
IP20 flat media	1485-P1W100
Trunk-line connector, IDC	1485P-K1TG4
Drop-line connector, IDC	1485P-K1DL4
Terminating resistor, IDC	1485P-K1TR4
Terminal block, IDC	1485P-K1TLR4
Flat-to-thin round cable converter, IDC	1485P-K1GK4
5-pin open style connector, IDC	1485P-K1G4-Y5
Manual crimp tool	1485A-KCRIMP
ControlLogix DeviceNet scanner module	1756-DNB
CompactLogix DeviceNet scanner module	1769-SDN
4-in/2-out block I/O 120V AC relay DSA	100-DNY41R
4-in/2-out block I/O 24V DC relay DSA	100-DNY42R
AC/DC DIN-rail mount power supply, DeviceNet 4 A	1606-XLDNET4
E1 DeviceNet module for 193 E1 plus overload relay	193-EDN
PowerFlex DeviceNet communication interface	22-COMM-D
Thin round cable, 50 m (164 ft) roll	1485-P1C50
Terminating resistor	1485A-C2

## Install

Locate and mount the modules. Follow these steps to crimp the connectors. For thin round media, refer to the DeviceNet Media Design Installation Guide, publication [DNET-UM072](#).

- Important:**
- Do not crimp the edge of the connector cover.
  - Do not crimp at the back of the crimp block.
  - Be sure to set the connector in the correct orientation.

1. Set the center of the connector cover (see arrows) in the center of the crimp block of the crimp tool.



2. Crimp the connector until you hear the connector lock into place.

## Configure

### 193-DNCT Handheld Configuration Device, Revision 2.1 or Later

The 193-DNCT DeviceNet configuration terminal is a handheld device that can configure, program, retrieve historical data, and monitor DeviceNet components, while directly connected to the network. Commissioning is made simple with the capability to upload, store, and download complete device configurations, while online with the network. This tool also aids in troubleshooting by providing physical layer diagnostics and network bandwidth statistics.



### Node Commissioning on Your DeviceNet Network

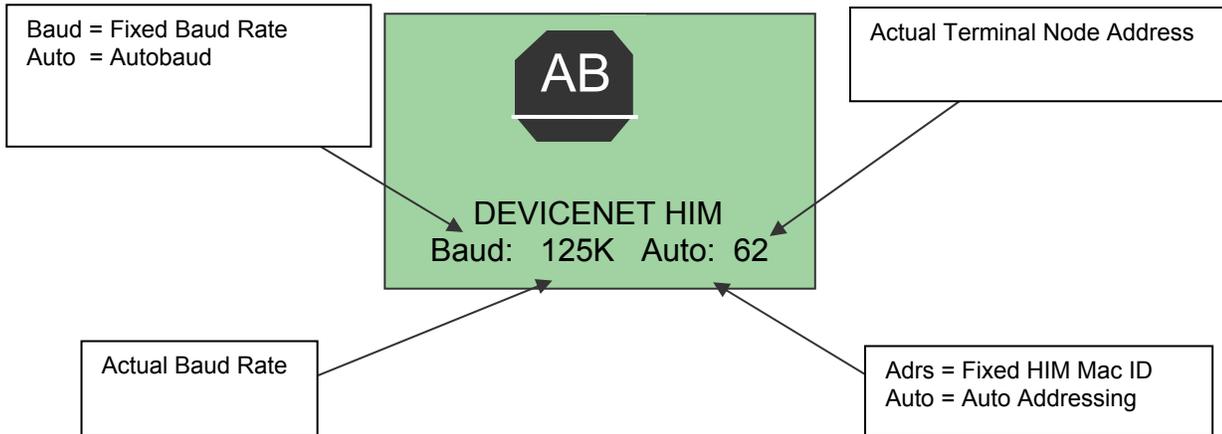
Once the DeviceNet media and/or cabling system is installed, you need to assign a unique node number, between 0 and 63, to every device on the DeviceNet network. You can do this by setting the rotary or dip switches or by using the Node Commission function via software or a handheld device.

Set each device on the network to the same communication rate: 125, 250, 250, or 500 Kbps.

**Important:** The factory default for each device is 125 Kbps, set to node number 63 with autobaud enabled.

## Starting the 193-DNCT Terminal

Attach and connect the 193-DNCT terminal to the DeviceNet network. This display appears for 10 seconds.



**Important:** The DeviceNet configuration terminal is shipped so that when it is placed on a DeviceNet network for the first time, it automatically sets its baud rate to that of the traffic on the network. Auto Addressing automation assigns an unused network node address to the terminal.

After 10 seconds, a **Network Who** dialog box similar to the one shown below appears with all nodes and associated devices on the network.

```

NETWORK WHO Node: 43
0 -- DeviceNet Scanner
2 -- 100-DNY42
5 -- E1 Plus
6 -- Parker Valve
7 -- E1 Plus
8 -- 100-DNY42
    
```

Notice that the node number in the upper right corner constantly changes. This shows the node number that the 193-DNCT terminal is currently scanning during the active network browse it is performing.

If the Network Who dialog box does not appear after 10 seconds, the 193-DNCT terminal is set to Autobaud Enabled and cannot determine a communication rate as no communication is currently occurring on the network.

Follow these steps to disable Autobaud.

1. On the 193-DNCT keypad, press ESC .
2. Select AutoBaud and press the <Up Arrow>  to choose Disable.

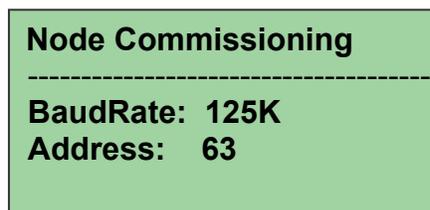
Follow these steps to set the communication rate to 125 Kbps.

1. Press SEL  to advance to BaudRate.
2. Select BaudRate and press the Up Arrow  to choose 125 Kbps.
3. Press ESC  to exit Setup.

### Change Node Number 63 to Node Number 1

No entry exists for node 1 in the Network Who dialog box because the device is currently at node 63. Follow these steps to change to node number from 63 to 1.

1. On the 193-DNCT keypad, press the Down Arrow  to scroll through the list and select '63 – No Product Name'.
2. Press Enter  to advance to the configuration dialog box.
3. Press the Down Arrow  to select Tools.
4. Press Enter .  
A dialog box appears with NodeComm selected.
5. Press Enter  again.  
The Node Commissioning dialog box appears with BaudRate selected.



6. Press SEL  to advance to Address and select it.
7. To change the Address, press 1 and then Enter .  
An Apply Changes dialog box appears.

**Tip:** You can use the Up Arrow  and Down Arrow  to scroll through the node numbers.

8. Press SEL  and then Enter  to complete the node commissioning.

After approximately 2 seconds the 193-DNCT terminal re-initializes. In another 10 seconds, the terminal again displays the Network Who dialog box with node 1 now visible.

### Create the 1756-DNB and 1769-SDN Scanlist by Using AutoScan

The DeviceNet network AutoScan feature allows a scanner to automatically map a network of slave devices into its scanlist without the use of RSNetWorx for DeviceNet software. This greatly improves the ease of setting up a DeviceNet network, especially networks comprised of simple devices.

When you enable AutoScan, the 1756-DNB or 1769-SDN scanner module searches for devices on the network that are not yet mapped. Once a qualifying device is found, the scanner adds the device to its scanlist and maps its I/O data into a predefined location in the scanner's I/O memory table. This location is based on the device's node address and the mapping size.

AutoScan is not enabled initially. You must enable AutoScan so that devices are automatically added to the scanlist whenever the scanner module is in Idle mode. The mapping size provides the scanner module with the number of bytes per node to allocate in the I/O tables. Set the mapping size so that it is higher than the maximum input or output size of every device on the network. If a device found on the network has an input or output size larger than the mapping size you set, it will **not** be added to the scanlist.

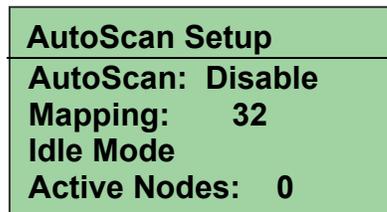
In this example, the mapping size is set to 32 bytes per node. The 193-DNCT terminal configures and originates AutoScan from a special menu, created specifically for that purpose.

1. Turn the key on the front of the 1756-L63 controller (in slot 2) completely clockwise.

This puts the ControlLogix controller into Program mode, which also puts the scanner module into Idle mode.

2. In the Network Who dialog box, press the Up Arrow  to navigate to and select the first line (0 – 1756-DNB DeviceNet Scanner).
3. Press Enter  to go to its configuration dialog box.
4. Press the Down Arrow  to navigate to and select Scanner and press Enter .
5. Press the Down Arrow  to navigate to and select AutoScan and press Enter .

This AutoScan Setup dialog box appears.



6. If AutoScan is selected and set to Disable, press the Up Arrow  to change to Enable.

7. Press SEL  to select Mapping and press 3, 2, and then Enter .

8. Press SEL  and then Enter  to save your changes.

AutoScan begins and the Active Nodes value increments. When the value reaches a node count of 6, AutoScan is finished and found all 6 nodes on the network.

9. Select AutoScan and press the Up Arrow  to change to Disable.

10. Press SEL  twice and then press Enter  to save your changes.

AutoScan is disabled in the scanner.

11. Press ESC  three times to return to the Network Who dialog box on the 193-DNCT terminal.

12. Turn the key on the front of the 1756-L63 controller (in slot 2) completely counter-clockwise.

This puts the ControlLogix controller back into Run mode, which will also put the scanner module into Run mode, provided that the scanner run bit is set by the logic or data table.

### View the I/O Mapping Information

Once all of the devices have been added to the scanlist via AutoScan, you can check the I/O data mapping that was generated by AutoScan. The 193-DNCT terminal can view the input and output data sizes along with the input and output data mapping assignments for each device.

1. In the Network Who dialog box, press the Up Arrow  to navigate to and select the first line (0 – 1756-DNB DeviceNet Scanner).

2. Press Enter  to go to its configuration dialog box.

3. Press the Down Arrow  to navigate to and select Scanner and press Enter .

4. Press the Down Arrow  to navigate to and select ScanList and press Enter .

This ScanList dialog box appears.

```
ScanList
0 -- DeviceNet Scanner
2 -- 100-DNY42
5 -- E1 Plus
6 -- Parker Valve
7 -- E1 Plus
8 -- 100-DNY42
62 -- This DeviceNet HIM
```

5. Press the Down Arrow  to navigate to and select 5 – E1 Plus and press Enter .

A dialog box appears with the mapping details of the E1 Plus devices scanlist entry. You can temporarily disable the 1756-DNB scanner scanlist entry.

6. Press SEL  to select Mapping.

This entry lets you modify the size of the native data location for the controller you are using. For example, the Logix-based controllers use a 32 bit Dword for each location in their data table while some other controllers may use only a 16 bit word. Depending on the native data size of the controller you are using, you may need to modify this entry, to accurately view the data mapping assignments for a device in the scanlist.

- The input mapping line displays an 8 to signify an input size of 8 bytes of data going back to the scanner.
- The next line displays D40:0 --- D41:31 to signify that the data starts at Dword 40, bit 0 of the input table and continues contiguously to Dword 41, bit 31. Therefore the mapping takes two complete, 32 bit, Dword locations in the data table. The output mapping line displays a 1 to signify an output size of 1 byte of data coming from the scanner.
- The last line displays D40:0 --- D40:7 to signify that the data starts at Dword 40, bit 0 of the output table and continues contiguously to Dword 40, bit 7.

7. Press the Down Arrow  to change the mapping value.

Notice the effect this change has on the mapping details.

8. Press ESC  four times to return to the Network Who dialog box on the 193-DNCT terminal.

### Example: Configure the E1 Overload

With your fully wired and operational network, there is usually some configuration required for one or more of the devices, including how the device will behave on the DeviceNet network or how the device will act as its main function. The 193-DNCT terminal can configure and monitor parameters in the devices connected to the network. In this example, the 193-DNCT terminal changes the OverLoad Warning Level parameter in the E1 Plus overload unit.

1. In the Network Who dialog box, press the Down Arrow  to navigate to and select 5 – E1 Plus.
2. Press Enter  to go to the E1 Plus configuration dialog box.
3. Press the Down Arrow  to navigate to and select Params and press Enter .

Device parameters can be viewed by Groups of similar functions or as a Numerical Listing.

4. Press the Down Arrow  to navigate to and select Num List and press Enter .

The 193-DNCT terminal now displays parameter 1, the Average %FLA parameter.

**Important:** Additional information is provided at the bottom of the display for each parameter display, including the parameter description (that scrolls continuously), minimum and maximum values, and if the parameter is read only.

5. Press 1, then 7, and press Enter  to display parameter 17 (the OL Warning Level configuration).  
The OL Warning Level parameter 17 displays with a value of 80%.
6. Press the SEL , then press 9, 0, and Enter  to change the value to 90%.

Notice how the configuration value changes to 90% on the display. This value was actually written to the E1 Plus and has been stored into nonvolatile memory within the device.

## Maintain

### Diagnostics and Troubleshooting

The 193-DNCT terminal has some diagnostics built in that can be used to troubleshoot a DeviceNet network. These diagnostics include bus voltages, bandwidth utilization percentage, and CAN error counts.

1. Press the Down Arrow  to navigate to Node 62 This DeviceNet HIM.
2. Press Enter  to select the HIM.
3. Press the Down Arrow  to navigate to and select the Network group and press Enter .

This dialog box, with similar values, appears on the 193-DNCT terminal.

<b>Baud Rate:</b>	<b>125K</b>
<b>Bus Voltage:</b>	<b>23.90</b>
<b>Bus Voltage Hi:</b>	<b>24.02</b>
<b>Bus Voltage Low:</b>	<b>23.81</b>
<b>Bus % Load:</b>	<b>9.4</b>
<b>Max Bus % Load</b>	<b>16.9</b>
<b>CAN Errors/Sec:</b>	<b>0</b>

The Max Bus % Load and CAN Errors/Sec parameters are not easily measured by other means and are valuable for troubleshooting the network. The Max Bus % Load parameter shows the maximum network bandwidth that has ever been used. If this value goes too high, communication anomalies could occur on the network due to devices being 'starved' for bandwidth. The CAN Errors/Sec parameter is generated if packets are being corrupted on the network, such as due to electrical noise or a bad device. This value, which should be zero on a healthy network, is a good barometer of the general health of the DeviceNet packet-delivery mechanism.

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