DeviceNet Network Interface Unit

May 1999 GFK-1660B

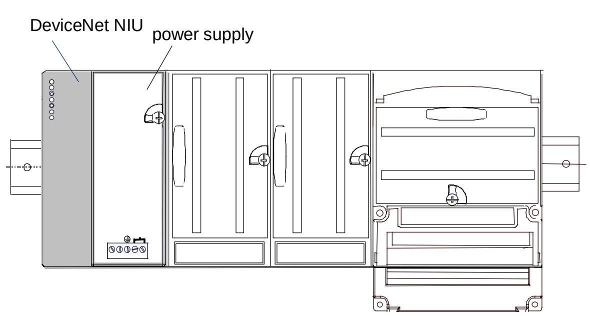
Product Description

Revision Letter:	AA
Firmware version:	1.10
Firmware upgrades:	None
DeviceNet Certification:	Certificate available on request

Specifications

Number of I/O modules	8 per station.
I/O data	Up to 128 bytes of inputs + 2-byte status word Up to 128 bytes of outputs + 2-byte control word
DeviceNet Features	Group 2 Only Server I/O Types: Polling or Change-of-State
DeviceNet network address	0 to 63. Default is 63. Set by switches on the module.
DeviceNet network data rate	125K, 250K, 500K baud. Set by switches on the module.
Indicators (5)	Power LED to indicate presence or absence of power. OK LED to indicate the status of the NIU powerup. Fault LED to indicate presence of faults. Mod Status LED to indicate the status of the NIU module. Net Status LED to indicate health of the DeviceNet network. Force LED (not used) .
Power Consumption	160mA at 5V, 10mA at 3.3V

The DeviceNet Network Interface Unit is a DeviceNet slave module that acts as controller for a set of I/O modules. Power for module operation is provided by a power supply that installs directly on the NIU.

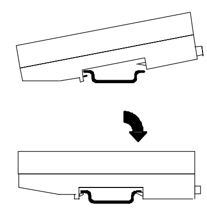


Preinstallation Check

Carefully inspect all shipping containers for damage. If any equipment is damaged, notify the delivery service immediately. Save the damaged shipping container for inspection by the delivery service. After unpacking the equipment, record all serial numbers. Save the shipping containers and packing material in case it is necessary to transport or ship any part of the system.

Quick Start Guide

1. **Install the NIU on the DIN Rail** by simply clicking it into place.

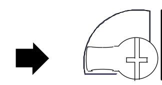


Note: The NIU and connecting carriers must be installed on the same section of 35mm x 7.5mm DIN rail.

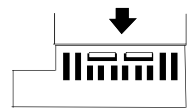
The DIN rail must have a conductive (unpainted) finish for proper grounding.

(*Refer to the heading* **Module Installation** *for information about space requirements or module orientation, or if you are installing the NIU in an area of excessive vibration).*

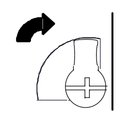
2. **Install the Power Supply on the NIU***.*



The latch on the power supply must be in the unlocked position.



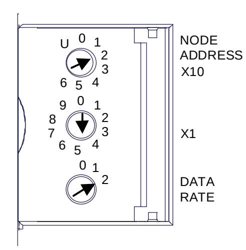
Align the connectors and the latch post and press the power supply module down until the two tabs on the bottom of the power supply click into place.



Turn the latch to the locked position to secure the power supply to the top of the NIU.

Complete the power supply wiring as described in the installation instructions provided with the Power Supply**.**

3. **Adjust the rotary switches** on the front of the NIU using a 2.44mm (3/32in) flat screwdriver. These switches, marked Node Address X10 and X1, and Data Rate select the tens, and units digits of the network address and the network data rate. Select any valid address in the range 0-63. Select the data rate using 0 - 125K, 1 - 250K, and 2 - 500K.

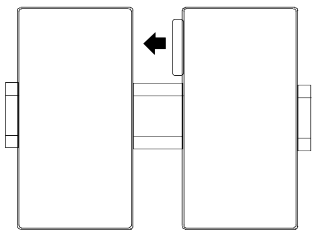


Cycle power to the NIU after changing the switch settings.

4. Connect the communications bus to the to the connector on the front of the Network Interface Unit. (*Refer to the heading* **Bus Installation Guidelines** *for detailed bus installation instructions.)*

5. **Remove the connector cover on the right-hand side of the NIU**. Do not discard this cover; you will need to install it on the last carrier. It protects the connector pins from damage and ESD during handling and use. Do not remove the connector cover on the left-hand side.

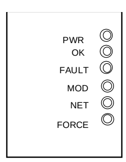
6. **Install additional modules** by mounting modules on their carriers and sliding them along the DIN rail to fully engage the connectors in the sides of the carriers.



7. **Power up the NIU**. The modules in the I/O station will automatically be configured, starting at slot 1. Autoconfiguration stops at the first empty slot or faulted module.

   Note: If the I/O station includes any additional power supplies, those power supplies must be turned on either before the NIU Power Supply or at the same time to assure accurate autoconfiguration.

8. **Observe the Module LEDs**. The LEDs indicate the presence of power and show the operating mode and status of the NIU.



PWR green when power is applied.

OK green when the NIU is operational.

FAULT amber if the NIU has detected faults.

MOD OFF when the NIU is not powered.

Blinks green if the NIU configuration is missing, incomplete, or incorrect. The NIU may be in Standby state.

Green during normal operation.

Blinks red if there is a recoverable fault.

Red if there is an unrecoverable fault. The NIU may need replacing.

NET OFF when the NIU is not online or not powered.

Blinks red and green if the NIU detects a Network Access error and is in the Communications Faulted state.

Blinks green if the NIU is online but has no connections in the established state. It is online but has no established connections to other nodes. It is not allocated to a master.

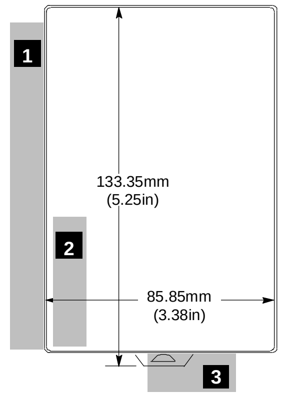
Green when the NIU is online and has connections in the established state. The NIU is allocated to a master.

Blinks red if one or more I/O Connections are in the Timed-Out state.

Red if an error renders the NIU incapable of communicating on the network.

FORCE (future) indicates the presence of any forced I/O value. Always OFF.

Module Installation



Modules must be mounted on a horizontal DIN rail.

1. Allow sufficient finger clearance for opening NIU door.
2. Allow adequate clearance for serial port cables.
3. Allow adequate space for power wiring.

The NIU with power supply attached fits into a 70mm deep enclosure.

Rated thermal specifications are based on a clearance of 5.1cm (2in) above and below the equipment and 2.54cm (1in) to the left of the NIU module.

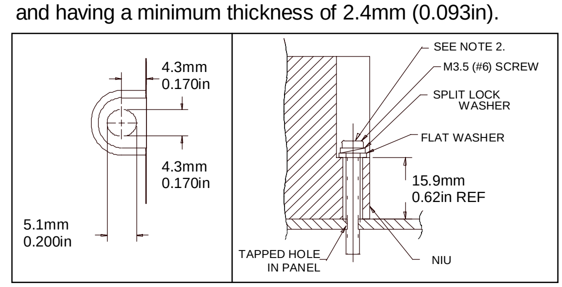
Panel-Mounting

For best stability, the DIN rail should be installed on a panel using screws spaced approximately 5.24cm (6in) apart.

If excessive vibration is a factor the NIU should also be screwed down to the mounting panel.

Note 1. Tolerances are +/- 0.13mm (0.005in) non-cumulative.

Note 2. 1.1-1.4Nm (10-12 in/lbs) of torque should be applied to M3.5 (#6-32) steel screw threaded into material containing internal threads and having a minimum thickness of 2.4mm (0.093in).



Removing the NIU from the DIN Rail

1. Turn off power to the power supply.
2. (If the NIU is attached to the panel with a screw) remove the power supply module. Remove the panel-mount screw.
3. Slide the NIU away from the other modules until the connector on the right side disengages from the next carrier.
4. With a small flathead screwdriver, pull the DIN rail latch out while tilting the other end of the NIU down to disengage it from the rail.

Bus Installation Guidelines

The network cable required for DeviceNet operation is specified in the following table. A 5-conductor cable is necessary. One wire is a drain, two wires are for carrying power on the network, and the remaining two wires are to carry the data transmission. On a DeviceNet fieldbus, every device must, at least, power its network transceivers from the network power source. Some devices draw all of their power from the network supply.

DeviceNet specifies two types of network cable, Thick and Thin cable. Thick cable provides for longer distances and more power. Generally, Thick cable is used for the Trunk cable. Thin cable is used for shorted distances and is generally used for drop cables or where cable flexibility is necessary.

DeviceNet Cable Specifications	
Thick Cable General Specifications	Two shielded pairs - Common axis with drain wire in center Overall braid shield - 65% coverage; 36 AWG or 0.12mm tinned Cu braid minimum (individually tinned) Drain wire- #18 Copper min.; 19 strands minimum (individually tinned) Outside diameter - 0.410 inches (min) to 0.490 inches (max.) roundness -radius delta to be within 15% of 0.5 O.D.
Thin Cable General Specifications	Two shielded pairs - Common axis with drain wire in center Overall braid shield - 65% coverage; 36 AWG or 0.12mm tinned Cu braid minimum (individually tinned) Drain wire - #22 Copper; 19 strands minimum (individually tinned) Outside diameter - 0.240 inches (min.) to 0.280 inches (max.) roundness -radius delta to be within 20% of 0.5 O.D.
Network Topology	Bus with limited branching (trunkline/dropline)
Redundancy	Not Supported
Network Power for Node devices	Nominal 24 volt DC ±4%
Allowed Nodes (Bridging excluded)	64 nodes
Data Packet Size	0-8 bytes with allowance for message fragmentation
Duplicate Address Detection	Addresses verified at power-up
Error Detection / Correction	CRC - retransmission of message if validity not acknowledged by recipient

Bus Length

The maximum length of the bus is limited by the cable type, transfer rate, and number and accumulated length of drop lines. Individual branch lengths may not exceed 6 meters and are limited to one network node per drop. However, the node may be a node offering multiple ports.

With Thin cable, the maximum bus length, regardless of data rate, is 100m. With Thick cable used as the trunk line, the maximum bus length is as shown in the following table.

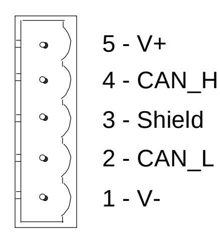
Data Rate	Bus length and drop length restrictions
500Kbps	100m bus length and branches totaling < 39m
250Kbps	250m bus length and branches totaling < 78m
125Kbps	500m bus length and branches totaling < 156m

Bus Connectors and Termination

DeviceNet makes use of several forms of connectors. The NIU provides the 5-pin standard Phoenix open-style pluggable connector. This pin to signal to wire color assignments are as shown in the following table:

Pin	Signal	Wire Color
5	V+	Red
4	CAN_H	White
3	Shield	Bare
2	CAN_L	Blue
1	V-	Black

The illustration below shows the connector orientation on the NIU:



Termination of a DeviceNet network is passive and includes one resistor at each end of the network. A terminating resistor is placed across the data communication signals at pin 2 (CAN_L) and pin 4 (CAN_H). Correct terminating resistor is a 121 ohm 1% ¼ watt resistor.

Bus Power Supply and Grounding

DeviceNet requires a power supply of 24VDC (±4%) at a 16A maximum. However, with the use of Thick cable, a maximum of 8A is permitted on a single network segment. This is possible if the power supply is placed at the center point of two network segments, thus supplying 8A to each segment. With the use of Thin cable, a maximum of 3A is permitted.

As with most Fieldbus networks, grounding of the network and its devices is very important. In DeviceNet, it is required that all cable shields be tied to ground at each device connection. This is done by tying the bare wire of the cable to pin 3 (Shield) of the connector.

In addition, the DeviceNet network power supply must also be grounded but only at one point. The V- signal must be connected to Protective Earth Ground at the power supply only. If multiple power supplies are used, only one power supply must have V- connected to Earth Ground.