Ethernet Network Interface Unit (EBI001)

June 14, 2001 GFK-1859A

Product Description

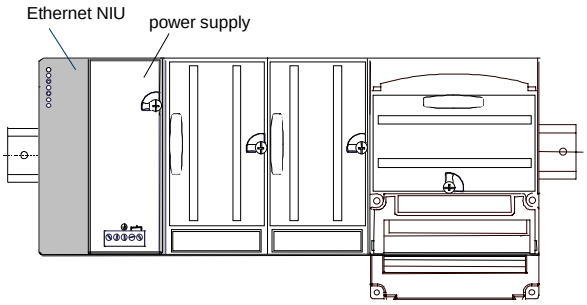
Revision Letter:	AB
Firmware version:	R1.1
Firmware upgrades:	The Ethernet Network Interface Unit (ENIU) firmware resides in FLASH memory. This firmware may be upgraded with future versions via a download from an appropriate personal computer connected to the Ethernet connector (RJ-45) on the ENIU. The download uses an FTP session to the ENIU.

Specifications

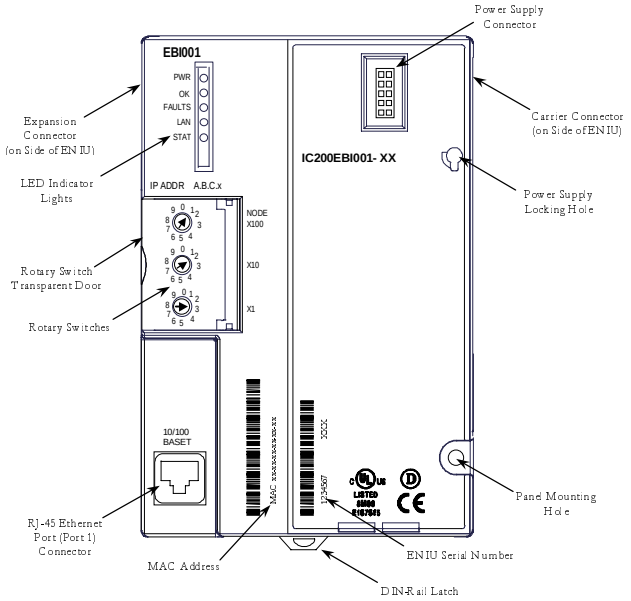
Ethernet IP address	Any Valid IP Address Default is 195.0.0.x, where x is selected on the rotary switches.
Ethernet network data rate	10Base-T or 100Base-TX, auto-negotiated
I/O data	1024 bytes maximum. Up to 512 bytes of inputs or 512 bytes of outputs.
Fault data	128 bytes maximum
Indicators (5)	Power LED indicates presence of input power OK LED indicates health of the ENIU Faults LED indicates presence of faults LAN LED indicates health of Ethernet network Stat LED solid green indicates Modbus connection present or receipt of EGD exchanges; flashing Amber indicates invalid IP address
Number of I/O modules	Release 1.0 supports 8 I/O modules and no expansion racks Release 1.1 supports 64 I/O modules and 7 expansion racks.
Power Consumption	+5V@175mA, +3.3V@425mA
Protocols	Modbus Ethernet, Class 0 & 1 (all releases) Ethernet Global Data (Release 1.1)
High density analog modules	Support was added in Release 1.1 (requires VersaPro 2.0 or later, Remote I/O Manager 2.0 or later, or Logic Developer PLC 2.10 or later to configure)
Hot Insertion for I/O modules	Support was added in Release 1.1
Firmware Update	Order kit Number 44A751424-G01 to update to Release 1.1

Overview

The Ethernet Network Interface Unit (ENIU) is an Ethernet 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 ENIU.



ENIU Physical Features

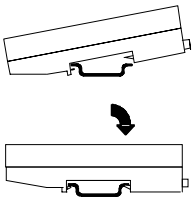


Preinstallation Check

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 ENIU on the DIN-rail** by simply clicking it into place.

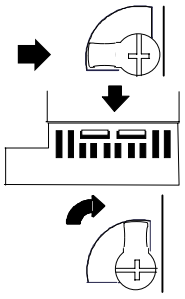


Note: The ENIU and connecting carriers must be installed on the same section of 35mm x 7.5mm DIN-rail.

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 ENIU in an area of excessive vibration).*

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



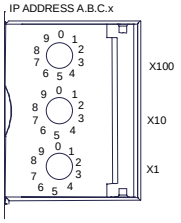
The latch on the power supply must be in the unlocked position.

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 ENIU.

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

3. **Set the IP Address - Adjust the rotary switches** on the front of the ENIU using a 2.44mm (3/32in) flat screwdriver. These switches, marked IP Address A.B.C.x / X100, X10 and X1, select the hundreds, tens, and ones digits of the last field in the Ethernet IP address. The first three fields in the IP address, A.B.C., are fixed to 195.0.0. when the unit is shipped from the factory. For the last field, select any valid address in the range 1-254. Always cycle power to the ENIU after changing the switch settings.



4. **Alternate Method to set Temporary IP Address using Telnet**

NOTE: This step is an alternate to Step 3 above. Be aware that the address set with this method is temporary. It will be lost if power is cycled.

a. The ENIU and the personal computer must be operational and interconnected via an Ethernet connection. At the computer's DOS command prompt, type in the following, then press the Enter key:

arp –s (IP address you want to assign to ENIU) (MAC address of the ENIU) (IP address of your computer)

FOR EXAMPLE:

arp –s 3.16.27.5 08-00-19-01-48-64 3.16.88.139

NOTE: You will not see any reply on the screen.

b. To verify that the ARP table entry was accepted, type the following at the command prompt, then press the Enter key:

arp –a

An entry matching the desired ENIU IP address ("Internet Address") and MAC address ("Physical Address") should be seen in the ARP table, with the "Type" listed as 'static.' ARP TABLE ENTRY EXAMPLE:

Internet Address	Physical Address	Type
3.16.27.5	08-00-19-01-48-64	static

c. Next, create a Telnet connection to the ENIU (Port 1) by typing in the following command at the computer's MS-DOS prompt, then pressing the Enter key:

telnet (IP Address) 1

FOR EXAMPLE: **telnet 3.16.27.5 1**

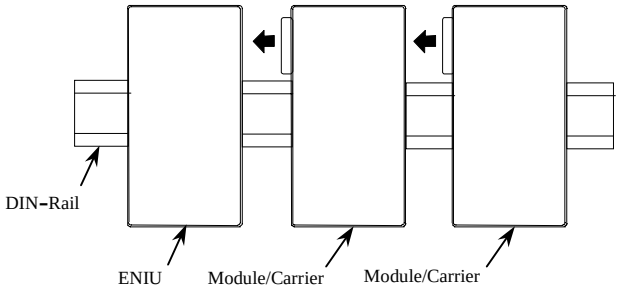
A Telnet window will appear. After several seconds, a "Connect Failed!" dialog box will appear; regardless, the ENIU will change its IP address to the one designated in the Telnet command. (NOTE: If it takes more than 15 seconds for the Connect Failed box to appear, the Telnet command probably didn't work.)

NOTE: Step 4 sets a temporary IP address that will be lost if power is cycled. To set a permanent (non-volatile) address, use VersaPro 1.5 (or later) or Remote I/O Manager 1.5 (or later) software and "store" a configuration containing the correct IP address. NOTE: A device will need to be configured in the VersaPro communications setup for the temporary IP address to allow you to perform the configuration store.

5. **Connect the communications** bus to the connector on the front of the ENIU. (Refer to the heading **Bus Installation Guidelines** for detailed bus installation instructions.)

6. **Remove the connector cover on the right-hand side of the ENIU**. 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.

7. **Install additional modules.** Mount a module on its carrier and slide it to the left along the DIN-rail to fully engage the connector on the adjacent carrier or ENIU. Repeat for other modules, and install the connector cover (see Step 6) on the last carrier.



8. **Configuration.** A configuration can be stored by VersaPro or Remote I/O Manager software, or the ENIU can be autoconfigured. When power is applied to the ENIU for the very first time, the ENIU will autoconfigure the modules physically present in the I/O station, starting at Slot 1. Autoconfiguration stops at the first empty slot or faulted module. If the autoconfiguration is unsuccessful or a new autoconfiguration is required, it is necessary to first clear the existing configuration from the ENIU. This is done by powering down the ENIU, disconnecting the ENIU from the first I/O carrier, and powering up the ENIU.

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

9. **Observe the Module LEDs**. The LEDs indicate the presence of power and show the operating mode and status of the ENIU. The following section discusses LED operation.

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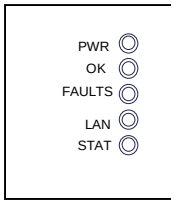
LED Operation



PWR Green indicates power is applied to the ENIU.

OK Green indicates the ENIU firmware is operational.

FAULTS Amber indicates the ENIU has detected a fault with itself or an I/O module. Blinking amber indicates a Fatal Fault with the ENIU

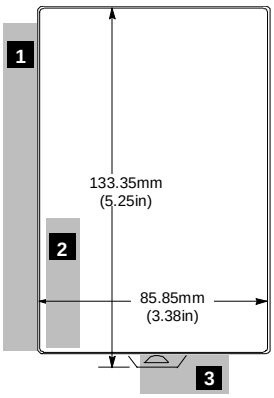
LAN Green (solid or blinking) indicates network packets are being received or transmitted. Indicates received data addressed to ENIU as well as broadcast data.

STAT **Modbus Mode.** Solid Green indicates a Modbus connection. Amber blinking at 1/sec rate indicates an IP address problem.

EGD Mode. Solid Green indicates exchanges are being received. Amber blinking at 1/sec rate indicates an IP address problem.

NOTE: Refer to Chapter 6 of the User's Manual for details on using the LEDs for troubleshooting.

Module Installation



Modules must be mounted on a horizontal DIN-rail.

1. Allow sufficient finger clearance for opening ENIU door.
2. Allow adequate clearance for Ethernet cable.
3. Allow adequate space for power wiring.

The ENIU 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 ENIU module.

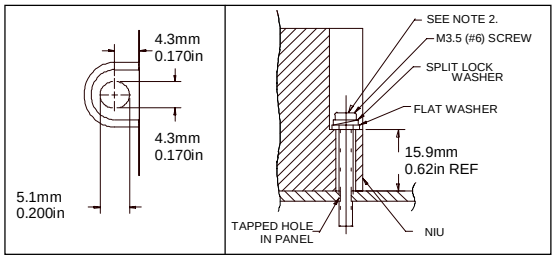
Panel-Mounting

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 ENIU 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 ENIU from the DIN-rail

1. Turn off power to the power supply.
2. Remove the power supply module. If the ENIU is attached to the panel with a screw, remove the panel-mount screw.
3. Slide the ENIU to the left, until the connector on the ENIU's right side disengages from the next carrier.
4. Use a small flathead screwdriver to pull the DIN-rail latch downward to release it, then pull the bottom of the ENIU forward until it is free of the rail; finally, lift the ENIU off the top rail.

Bus Installation Guidelines

The proper cable for an Ethernet 10Base-T/100Base-TX network is a four twisted-pair, "Category 5" Ethernet cable. The following table summarizes key characteristics of the Ethernet network and cable.

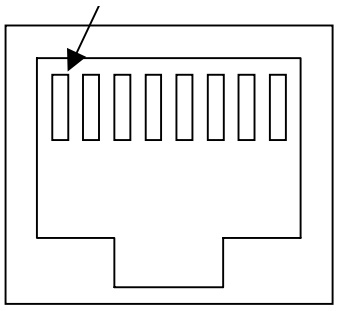
Network Topology	Point-to point Ethernet 10Base-T/100Base-TX connections with no termination. "Points" can be hubs or switches. If only 2 nodes are present, a crossover cable should be used to connect them.
Point-to point distance	Maximum of 100 meters.
Medium	Four twisted-pair unshielded cable. Shielding is permissible, but not required.
Transmission Speed	10 Mbit/s (10Base-T) or 100 Mbit/s (100Base-TX)
Connector	RJ-45
Cable Type	Category 5 ("Cat 5")
Termination	No termination required

Bus Connector

RJ-45 Connector Pin Assignment

Pin	Signal	I/O	Description
1	Tx+	O	+Transmit output
2	Tx-	O	- Transmit output
3	Rx+	I	+ Receive input
4	FGND	-	Frame Ground
5	FGND	-	Frame Ground
6	Rx-	I	- Receive Input
7	FGND	-	Frame Ground
8	FGND	-	Frame Ground

Pin 1



Ethernet MAC Address

The MAC physical address for the ENIU is labeled on the ENIU module.

New Features for Release 1.1

1. **Ethernet Global Data (EGD).** Supports one produced exchange and one consumed exchange. All configured input data are in the produced exchange, and all configured output data are in the consumed exchange. EGD must be configured explicitly and is not available when the ENIU is autoconfigured.
2. **Expansion I/O**. Up to seven expansion racks may be connected to one ENIU with a total of 64 modules supported.
3. **Hot Insertion**. I/O modules may be inserted or removed with power applied to the rack.
4. **High Density Analog Modules**. These may be used in an ENIU rack. However, VersaPro 2.0 or later is required to configure these modules.

Operation Notes

1. **Power Cycle Conditions**. For both discrete and analog Output or Mixed modules, if the ENIU loses power but the Output or Mixed modules do not lose power, the Hold Last State parameter does not work as might be expected. Upon ENIU power loss, outputs configured for Hold Last State go to the Last State value on modules that still have power. When power is restored to the ENIU, outputs go to the Default value. When communications are reestablished and the ENIU receives a Write message, outputs go to the values in the ENIU's Output Table.

Restrictions and Open Problems

1. **Verify or Clear Fails.** On rare occasions, a verify or clear operation from the programmer will fail. Retry to correct.
2. **Invalid Network Parameters.** Certain invalid network parameters, such as an IP address of zero in the local subnet, are not rejected.