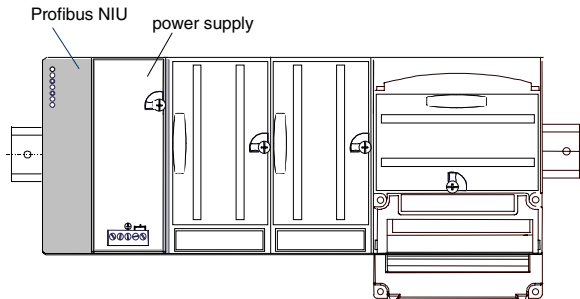


VersaMax® Profibus Network Interface Unit

June 2002

GFK-1552D

The Profibus Network Interface Unit is a Profibus 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



Specifications

Profibus network address	1 to 125
Profibus network data rate	9.6Kbaud to 12Mbaud , auto-detected
I/O data	375 bytes maximum. Up to 244 bytes of inputs or 244 bytes of outputs.
User diagnostic data	5 bytes maximum
Indicators (5)	Power LED indicates power OK LED indicates health of the NIU Fault LED indicates presence of faults Network LED indicates health of Profibus network Force LED(not used)
Number of I/O modules	64 I/O modules per NIU (Up to 8 Racks with a maximum of 8 I/O modules per rack.)
Power Consumption	+5V@250mA, +3.3V@10mA

Product Description

Revision:	CF
Firmware version:	2.20
GSD File version	GEF_086A.GSD Version 1.10
Firmware upgrades:	44A748011-G04
Profibus Certification:	Certified as derivative of version 1.00. Certificate available upon request

New Feature of this NIU Version

- This version of the Profibus NIU can be used with all VersaMax High-density Analog Modules.
Input Modules: IC200ALG261, IC200ALG262, IC200ALG263, IC200ALG264
Output Modules: IC200ALG325, IC200ALG326, IC200ALG327, IC200ALG328

Compatibility

- To be used in an expansion rack, analog modules IC200ALG320, 321, 322, and 432 must be revision B or later. Analog modules IC200ALG430 and 431 that are used in expansion racks must be revision C or later.
- This Profibus NIU is compatible with the AS-i Network Master module.
- Functional operation of discrete outputs has changed from previous releases. When upgrading firmware in an existing module, it may be necessary to alter the application program to accommodate this difference. See the section "Output Defaults" for more information.

Upgrading Previous Firmware Versions

This firmware release replaces all previous versions. The new firmware is backward-compatible with all previous module versions of the Profibus NIU. All previous versions of the PBI001 module must be upgraded to ensure correct operation of discrete outputs. An upgrade is available at GEFanuc.com. and can also be ordered on disk (order number 44A748011-G04) All firmware upgrades require cable IC200CBL002, which connects the module to the personal computer used to perform the upgrade.

This upgrade includes a new version of the GSD file (GEF_086A.GSD), which replaces all previous GSD file versions.

Output Default/Hold Last State Operation

The Default/Hold Last State Operation of outputs has changed from previous releases.

Warning

This may require application changes to account for the operational differences described below. Failure to account for this new operation of the DEFAULT/HOLD LAST STATE function of outputs could cause an unexpected equipment operation possibly resulting in personal injury or property damage.

The new operation is as follows:

For an Output Module Configured to Default

Outputs go to their configured default state when communication is lost with the Profibus master. Outputs **go to zero** when the Profibus master transitions from "Operate" to "Clear" mode. With a PLC Profibus master, the transition from "Operate" to "Clear" mode occurs when the PLC CPU transitions from "Run" to "Stop" mode.

Output Module Configured to Hold Last State

Outputs hold their last state when communication is lost with the Profibus master. Outputs **go to zero** when the Profibus master transitions from "Operate" to "Clear" mode. With a PLC Profibus master, the transition from "Operate" to "Clear" mode occurs when the PLC CPU transitions from "Run" to "Stop" mode

Operating Notes/Restrictions for this NIU Version

- The Profibus NIU is limited in the amount of configuration it can accept for I/O modules on it station. The maximum number of configuration identifiers allowed is 64. It is possible to exceed that maximum when using expansion racks. It is important to calculate the number of configuration identifiers required to configure a Profibus NIU system to determine if the system is within this limit. This can be done by summing the configuration identifiers for each I/O module in the station as listed in the Profibus NIU Users Manual. If the configuration size is exceeded, the Profibus NIU will flash an error code 0x41.
- When performing a firmware upgrade on an intelligent I/O module in the NIU station, the controller should be put into stop mode, or the network cable should be removed from the NIU.
- The main power supply for an NIU station and any booster power supplies that are used should be power cycled together. One power supply should be power cycled with the others.

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- If the Profibus Watchdog timer expires on a Profibus NIU that is reporting extended diagnostic information to a Profibus master (the PNIU is faulted), the extended diagnostic information is not reported to the master after the timeout. The PNIU remains in a faulted state but reports to the Profibus master that it has no extended diagnostic information (however, the correct fault information is reported via the NIU's Status/Control Bytes.). This condition persists until either the PNIU's fault table is cleared, or the current fault is read from the Status/Control Bytes.

Fixed for this Version

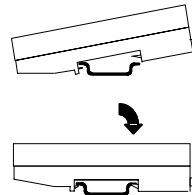
- During a firmware upgrade to an intelligent I/O module (ALG240, 331, 620, 630, and MDD841), outputs now either default or hold last state, according to their configuration.
- During a firmware upgrade of the Profibus NIU, outputs now either default or hold last state, according to their configuration.
- The NIU can clear faults generated by a module in slot 8.
- Profibus Global Control Clear Commands will consistently zero outputs that are configured to Hold Last State or to default to a non-zero value. (Profibus masters send this command when they transition from "Operate" to "Clear" Mode – this occurs in PLC masters when the PLC CPU transitions from "Run" to "Stop" Mode.)
- If a configuration store or an intelligent I/O module firmware update is performed on a Profibus NIU that is reporting extended diagnostic information to a Profibus master, the NIU will report the information after the configuration store or firmware update completes. The fault information is also reported via the NIU's Status/Control Bytes.
- The Profibus NIU clears the Profibus output buffer after it leaves the Data Exchange State. If a Read Output Data telegram (SAP 57) is sent to the PNIU before it enters Data Exchange again, the cleared output data is now returned.
- Outputs configured to Default will transition to their configured default value when the PNIU is processing a firmware upgrade to an intelligent I/O module.

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.

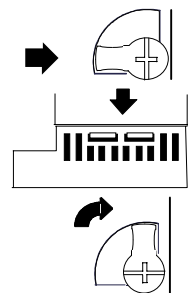


Note: The NIU and connecting carriers must be installed on the same section of 35mm x 7.5mm DIN rail.

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.**



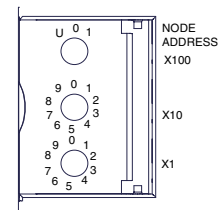
The latch on the power supply must be in the unlocked position.

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 X100, X10 and X1 select the hundreds, tens and units digits of the network address. Select any valid address in the range 1-125. Always cycle power to the NIU after changing the switch settings.



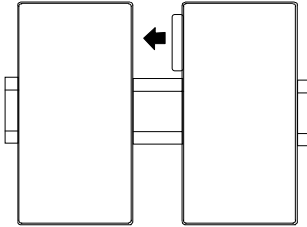
4. **Connect the communications bus to the** to the connector on the front of the Network Interface Unit. (Refer to the heading **Bus Installation Guidelines** for detailed bus installation instructions.)
5. **Remove the connector cover on the right-hand side of the NIU.** Do not discard this cover; 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.

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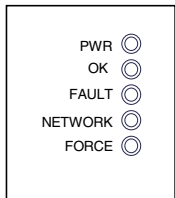
6. **Install additional modules** by mounting modules on their carriers and sliding them along the DIN rail to fully engage the connectors in the sides of the carriers.



7. **Power up the NIU.** The modules in the I/O station will automatically be configured, starting at slot 1 in each rack including expansion racks. If an empty slot or faulted module is encountered, autoconfiguration for that rack stops. Autoconfiguration then skips to the next rack and continues until all racks are configured.

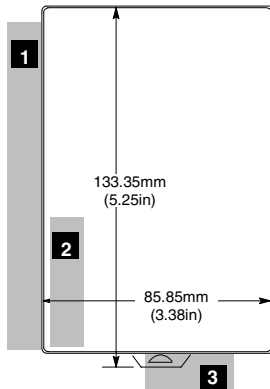
Note: If the I/O station includes any additional power supplies, those power supplies should be turned on at the same time.

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



PWR	Green indicates power is applied to the NIU.
OK	Green indicates the NIU firmware is operational.
FAULT	Amber indicates the NIU has detected a fault with itself or an I/O module.
NETWORK	Green indicates the NIU is successfully transferring I/O on the network. Amber indicates the NIU failed to be parameterized or rejected the configuration sent by the master device. Off indicates the NIU senses no communication with the master device.
FORCE	(future) indicates the presence of any forced I/O value. Always OFF.

General Module Installation Instructions



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.

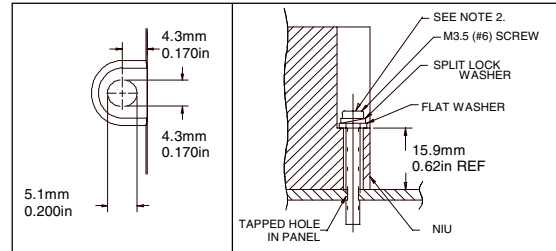
Panel-Mounting

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 DIN rail.

Bus Installation Guidelines

The proper cable for a Profibus network is a shielded twisted pair cable. Profibus cable is sold simply as "Profibus Network Cable". The twisted pair cable consists of a Green and a Red wire. Below are some of the characteristics of the Profibus network and cable.

Network Topology	Linear bus, terminated at both ends. Stubs possible.
Medium	Shielded twisted pair cable. Shielding may be omitted, depending on the environment.
Number of Stations	32 stations in every segment without repeaters. With repeaters, extendible up to 127.
Transmission Speed	9.6, 19.2, 93.75, 187.5, 500, 1500 Kbits, 3 Mbits, 6 Mbits, 12 Mbits.
Connector	9-pin D-sub connector
Cable Type	Profibus DP
Impedance	135 to 165 Ohms (3 to 20 MHz)
Capacity	< 30 pF per meter
Resistance	< 110 Ohms per Kilometer
Wire Gauge	> 0.64 mm
Conductor Area	> 0.34 mm ²

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Bus Length

The maximum bus length using shielded, twisted-pair cable for a single network segment is 1200 meters. Total network length may be increased with the use of repeaters, up to a maximum of 3 repeaters per network. Other cable types may be restricted to shorter bus lengths.

The maximum bus length also depends on the data rate, as shown in the following table.

Maximum Bus Length in Meters	Kbits per Second
1,200	9.6
1,200	19.2
1,200	93.75
600	187.5
400	500
200	1,500
100	3,000; 6,000; 12,000

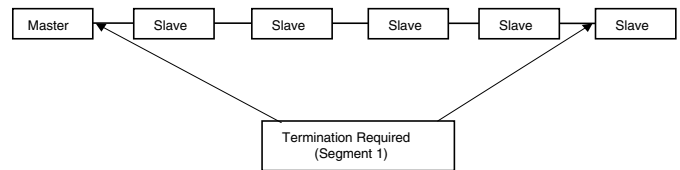
Often, it is the required bus length that determines the data rate. For data rates up to 500 kbits/second, follow the stub recommendations of Profibus Part 1. At 1500 kbits/second the overall drop capacity should be less than 0.2nF. The maximum length of the stub at 1500 kbits/second is 6.6 meters. Cable shielding is recommended at higher baud rates, to maintain communications integrity in the industrial environment.

Bus Connectors and Termination

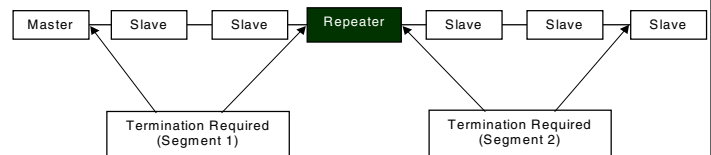
The Network Interface Unit provides the Profibus standard female 9-pin D subminiature connectors. Cable connectors are available from most fieldbus parts distributors as "Profibus 9-pin D connectors". These connectors often provide termination resistors and a switch on the connector to enable/disable termination. Connectors with and without termination are also available. The connectors generally label the connections for the twisted pair as cable A and cable B. The following table illustrates the proper assignment of wire to connector to pin to signal.

Wire Color	Connector	Pin	Signal
Red	B	3	RxD/TxD-P
		5	DGND
		6	VP
Green	A	8	RxD/TxD-N

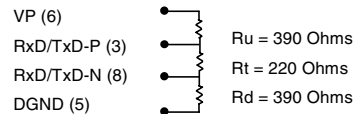
Termination resistors are needed, as defined in the Profibus Specification DIN 19245 Part 1 section 3.1.2.5.



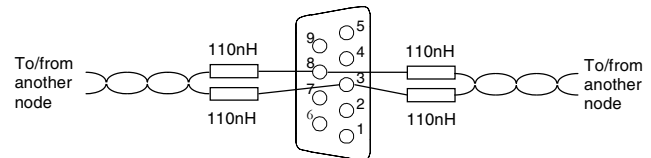
One terminator must be applied at each end of a network segment.



Important: For proper network termination, the terminating devices must provide and maintain power. Power is provided by the device on Pin 6 and Ground is provided on Pin 5. If power is lost to either terminating device, the network may not operate correctly. Generally, the network master device is one of the terminating devices. The other terminating device may be a critical slave device or a separately powered, stand-alone terminator.



In addition to the termination shown above, the following compensation should be added for 12 Mbit bus technology:



Bus Grounding

Generally, it is only necessary to ensure that the cable shields are attached to ground. In most cable connectors, the shield is attached to the metal housing of the conductor on the cable side and this is brought to ground by the metal connector on the NIU.

In some installations with large networks or higher data rates, large ground potentials (greater than $\pm 7V$) may arise. In these cases, it may be necessary to ensure all Profibus devices are attached to the same Protective Earth ground.

