GE Fanuc Automation

Programmable Control Products

VersaPoint™ I/O System
Ethernet NIU

User's Manual

GFK-2087 *July 2003*

Warnings, Cautions, and Notes as Used in this Publication

Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information contained herein does not purport to cover all details or variations in hardware or software, nor to provide for every possible contingency in connection with installation, operation, or maintenance. Features may be described herein which are not present in all hardware and software systems. GE Fanuc Automation assumes no obligation of notice to holders of this document with respect to changes subsequently made.

GE Fanuc Automation makes no representation or warranty, expressed, implied, or statutory with respect to, and assumes no responsibility for the accuracy, completeness, sufficiency, or usefulness of the information contained herein. No warranties of merchantability or fitness for purpose shall apply.

The following are trademarks of GE Fanuc Automation North America, Inc.

Alarm Master	Genius	PowerTRAC	Series Six
CIMPLICITY	Helpmate	ProLoop	Series Three
CIMPLICITY 90–ADS	Logicmaster	PROMACRO	VersaMax
CIMSTAR	Modelmaster	Series Five	VersaPoint
Field Control	Motion Mate	Series 90	VersaPro
GEnet	PACSystems	Series One	VuMaster
	PowerMotion		Workmaster

Contents

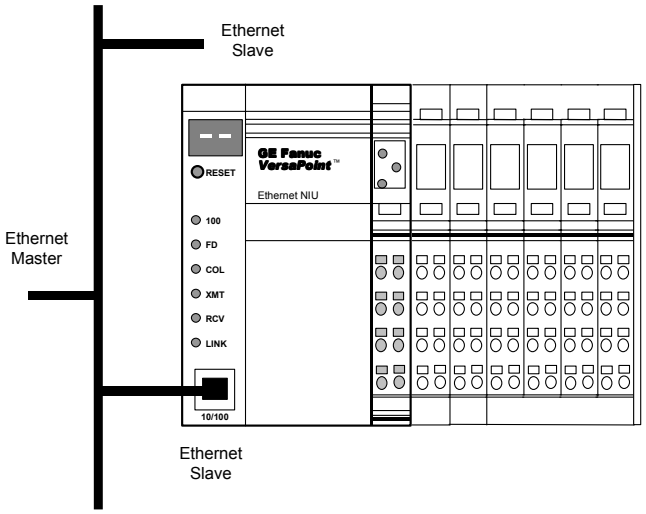
Contents

Contents

Chapter 1 Introduction

The VersaPoint product family is a modular automation system. With VersaPoint modules you can easily add one module to the next and build functional units that meet your automation requirements exactly.

A set of VersaPoint I/O modules can be selected to suit the application, and the set of modules can be connected as a slave on an Ethernet network. The interface between the Ethernet network and the modules is a VersaPoint Ethernet Network Interface Unit (NIU).



The NIU is located to the left of the other modules. Together, the NIU and the modules selected for the application function as an I/O Station. The I/O Station can include up to 63 I/O modules.

Within the VersaPoint I/O Station, the bus connection, power supply, and power distribution for the devices connected to the NIU are completed by connecting modules together on the DIN rail.

Sensors and actuators are easily wired to the VersaPoint I/O modules via spring-clamp terminals on the modules' removable connectors. These connectors can be keyed so that they cannot be mixed up. If a module must be exchanged the wiring does not need to be removed. Just remove the connector from the terminal.

1

Features

Characteristic VersaPoint features are:

- Modules can be easily installed/interconnected without tools.
- Automatic creation of isolated groups, current, data, and safety circuits
- Open, flexible, and modular structure
- Modules of varying point counts can be combined to create a VersaPoint station that optimizes unit space while minimizing unit cost.

Advantages

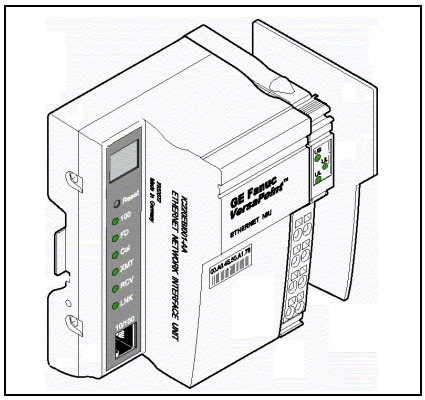
VersaPoint design offers the following advantages:

- Reduced control cabinet space.
- The amount of costly parallel wiring is reduced. Within a station, voltage and data routing can be carried out without additional wiring.
- The modular structure makes it possible to assemble standard function blocks in advance. Different parts of the system can be operated independently of one another. This means that pretests can be carried out when the system is set up and that the whole system can be adapted and expanded.

Finding the Information You Need

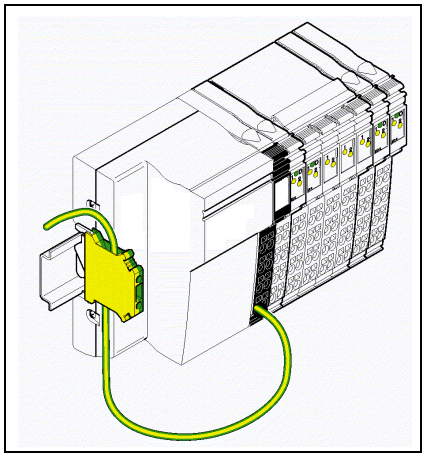
This manual contains the instructions and reference information needed to plan and install a VersaPoint I/O Station on a Ethernet network.

Features and Specifications of the Ethernet NIU



A VersaPoint I/O Station begins with of a Network Interface Unit (NIU). The NIU module is the first module on the DIN rail, at the left end of the I/O Station. The NIU performs all the data-handling and communications functions for the I/O Station. For information about the features, components, and specifications of the Ethernet NIU module (catalog number IC220EBI001), turn to chapter 2.

General Information about VersaPoint Modules in the I/O Station

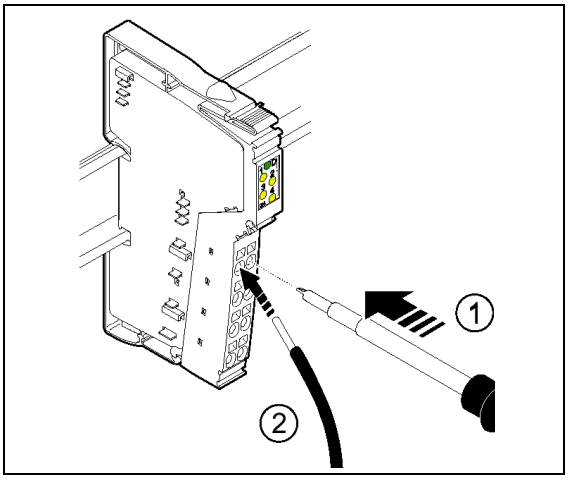


After the NIU, the rest of the station is made up of a group of I/O and power modules that can be selected to suit the needs of the application.

Chapter 3 describes the parts and dimensions of VersaPoint I/O and power modules for the I/O Station.

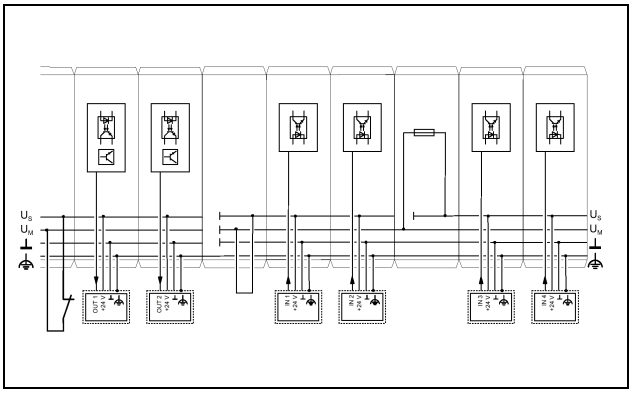
Detailed specifications, drawings, and data formats for specific modules are located in the individual module datasheets, which can be downloaded at no charge from www.GEFanuc.com.

Installation Instructions



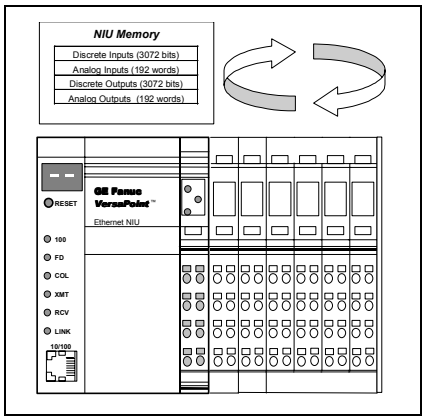
To install an I/O Station of VersaPoint modules, you need both the specific module information in the module datasheets (available from www.GEFanuc.com), and the system installation information in chapter 4 of this manual. Chapter 4 should be your primary reference for VersaPoint installation instructions.

Power for the I/O Station



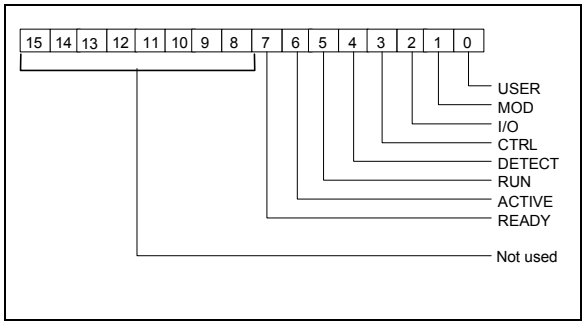
Logic and field power are distributed among VersaPoint I/O modules in an I/O Station on several dedicated power circuits. See chapter 5 for detailed information about how power is utilized by the station and routed among the modules.

Autoconfiguration and NIU Startup



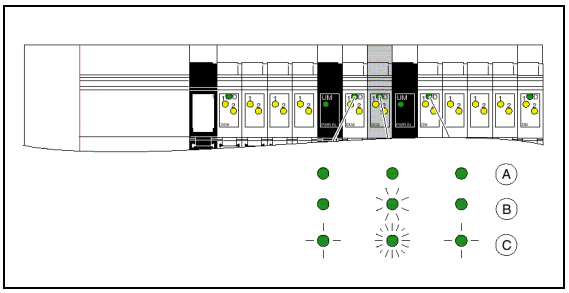
The NIU automatically performs several functions when it is initially started up. These include creating an Autoconfiguration for the modules it finds installed in the I/O Station, requesting an IP Address from the Ethernet Network, and automatically scanning the input and output data of the modules in the I/O Station. See chapter 6 for information about these basic operations of the Ethernet NIU.

Communications Between the Application Program and the Ethernet NIU



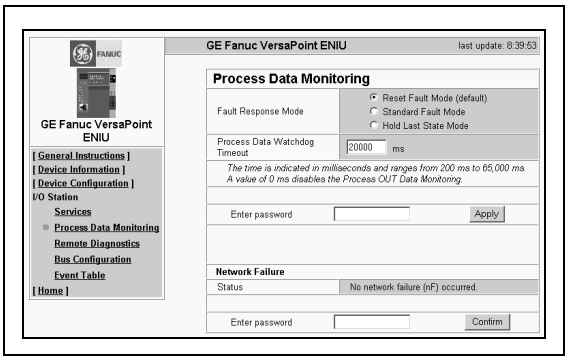
An application program can use Modbus/TCP messaging for all data exchanges with the Ethernet NIU. The information needed to read and write data, read diagnostics, clear faults, and configure some I/O module features from the application program is located in chapter 7.

Local Diagnostics at the I/O Station



LEDs and the NIU display provide detailed diagnostics information at the I/O Station. Chapter 8 describes how to read LED indications for the NIU, power modules, and I/O modules. It also explains how to read the NIU display.

Web-based Setup and Monitoring



Each Ethernet NIU has its own home page. Web-based management provides a quick, easy operator interface to system information from any computer. This utility can be used to set up the NIU and to monitor the system remotely. See chapter 9 for details and instructions..

Additional Reference Information

Appendix A. Reference Data, summarizes the standard data for the system..

Appendix B. Management Information Base describes the text file that lists the SNMP objects supported by the VersaPoint NIU.

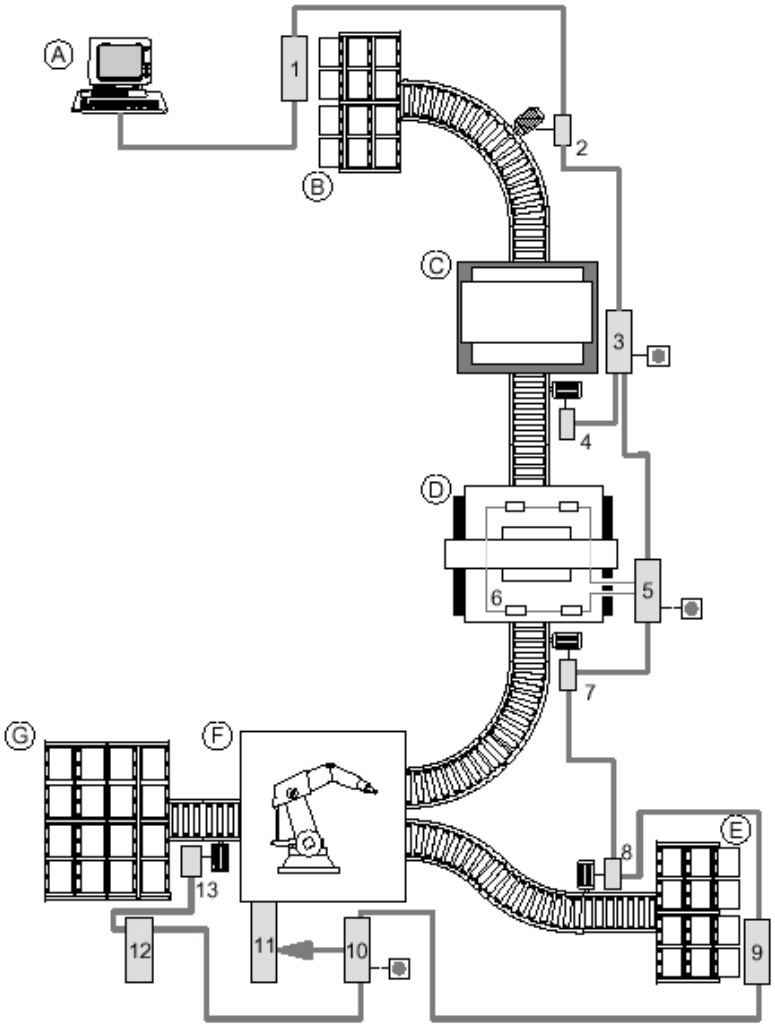
Other Documents You'll Need

Each VersaPoint module is fully described in its own datasheet. Module datasheets are provided on CD, and are available online at www.gefanuc.com. The following table lists the datasheets that are available as this manual is being released. Check the GE Fanuc website for the latest releases, as well as the most up-to-date document versions and other important product information.

Module Number	Module Description	Datasheet Number
Discrete Input Modules		
IC220MDL641	Input 24VDC Positive Logic 2 Points	GFK-1901
IC220MDL642	Input 24VDC Positive Logic 4 Points	GFK-1902
IC220MDL643	Input 24VDC Positive Logic 8 Points	GFK-2000
IC220MDL644	Input 24VDC Positive Logic 16 Points	GFK-2001
IC220MDL661	Input 24VDC Negative Logic 2 Points	GFK-2002
Discrete Output Modules		
IC220MDL721	Output 24VDC Positive Logic 2.0A 2 Points	GFK-1903
IC220MDL751	Output 24VDC Positive Logic 0.5A 2 Points	GFK-2003
IC220MDL752	Output 24VDC Positive Logic 0.5A 4 Points	GFK-1904
IC220MDL753	Output 24VDC Positive Logic 0.5A 8 Points	GFK-2004
IC220MDL754	Output 24VDC Positive Logic 0.5A 16 Points	GFK-1913
IC220MDL761	Output 24VDC Positive Logic 0.5A 2 Points	GFK-2005
IC220MDL930	Output Relay 3.0A, 1 Point	GFK-1905
IC220MDL940	Output Relay 3.0a 4 Points	GFK-2131
Analog Input Modules		
IC220ALG220	Analog In 15 Bit Voltage/Current 2 Channels	GFK-1906
Analog Output Modules		
IC220ALG320	Analog Out 16 Bit Voltage/Current 1 Channel	GFK-1907
IC220ALG321	Analog Out 13 Bit Voltage 1 Channel	GFK-1908
Power and Segment Terminals		
IC220PWR001	Power Terminal 24VDC	GFK-1909
IC220PWR002	Power Terminal Fused 24VDC	GFK-2006
IC220PWR003	Power Terminal Fused with Diag. 24VDC	GFK-2007
IC220PWR011	Segment Terminal 24VDC	GFK-1910
IC220PWR012	Segment Terminal Fused 24VDC	GFK-2008
IC220PWR013	Segment Terminal Fused W/Diag 24vdc	GFK-2009
IC220PWR014	Segment Terminal Elec Fused 24vdc	GFK-2010

Example Plant

The following example provide an illustration of how the VersaPoint I/O System may be applied. This example highlights the distributed nature of the VersaPoint product line as well as its ability to fit a variety of difficult applications within a single system.



Key:

A Plant control

B Material removal area 1

C Press

D Punching device

E Material removal area 2

F Welding robot

G Material area 3

1, 3, 5, 6, 9, 10, 12 VersaPoint™ stations

2, 4, 7, 8,13 Motor starter

11 Robot controller

Emergency stop switch

This example is a schematic diagram of a plant which is controlled by a host computer.

VersaPoint station 1 modules control the removal of material from area 1.

The motor starter (2) is directly connected to the remote bus. This controls a conveyor belt motor.

VersaPoint station 3 controls the press. As this machine must be particularly well protected, an emergency stop switch has been integrated.

VersaPoint station 5 controls the punching device. Station 6 is connected to station 5, and its modules monitor the status of the press. An emergency stop switch has also been provided here.

Two motor starters are connected at points (7) and (8). They control conveyor belt motors.

VersaPoint station 9 controls the removal of material from area 2.

A robot control system (11) is connected to the communications bus using VersaPoint station 10. An emergency stop switch has also been connected here.

VersaPoint station 12 controls the storage of material in area 3.

Motor starter 13 is directly connected to the remote bus and controls the conveyor belt motor.

1

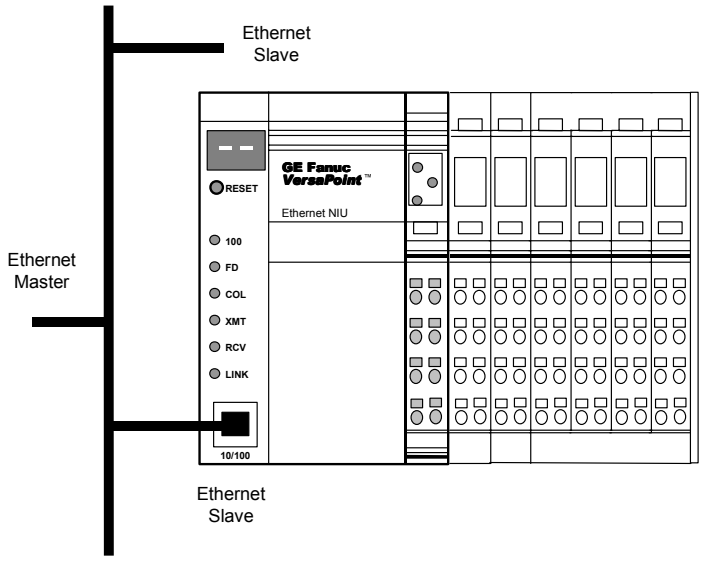
Chapter 2 The Ethernet NIU

This section describes the Ethernet Network Interface Unit module IC220EBI001.

- The Ethernet VersaPoint I/O Station
- The Ethernet Network Interface Unit
  - Features
  - Items Used with the NIU
  - Ordering Information
- Connectors on the NIU
  - Ethernet Connector
  - Line Terminal Resistors
  - Power Connector
- MAC Address
- Reset Pushbutton
- Displays on the NIU
  - LEDs on the NIU
  - Numeric Display
- NIU Specifications

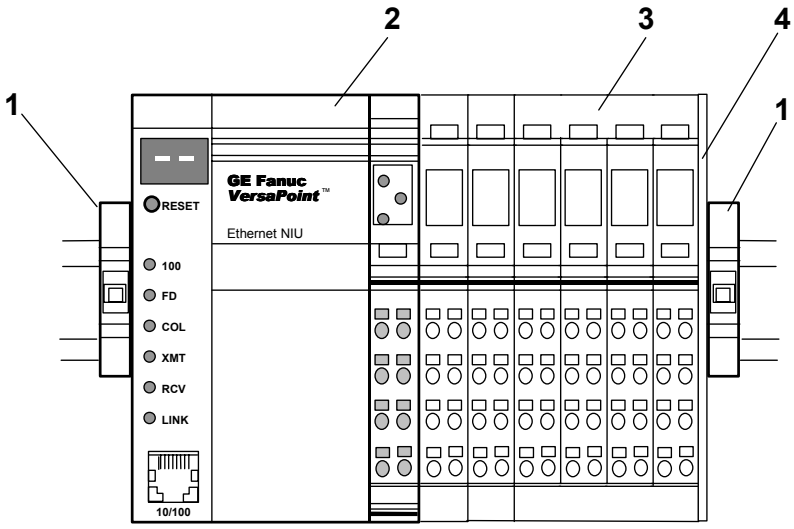
The Ethernet VersaPoint I/O Station

An Ethernet Network Interface Unit (NIU) connects a set of VersaPoint I/O modules to an Ethernet Network. The NIU operates as a slave on the network, exchanging process data with a master device. Modbus TCP is the Ethernet Application Protocol the ENIU uses for communications.



VersaPoint I/O stations can be constructed easily and quickly. Normally, it is only necessary for the power supply units integrated in the Ethernet NIU to be supplied with 24VDC on the input side. They generate the operating voltage required for the NIU itself and for the connected VersaPoint I/O modules.

Structure of a VersaPoint I/O Station



A VersaPoint station with a Ethernet NIU consists of:

– (1) End clamps (part number IC220ACC313, supplied with the NIU)

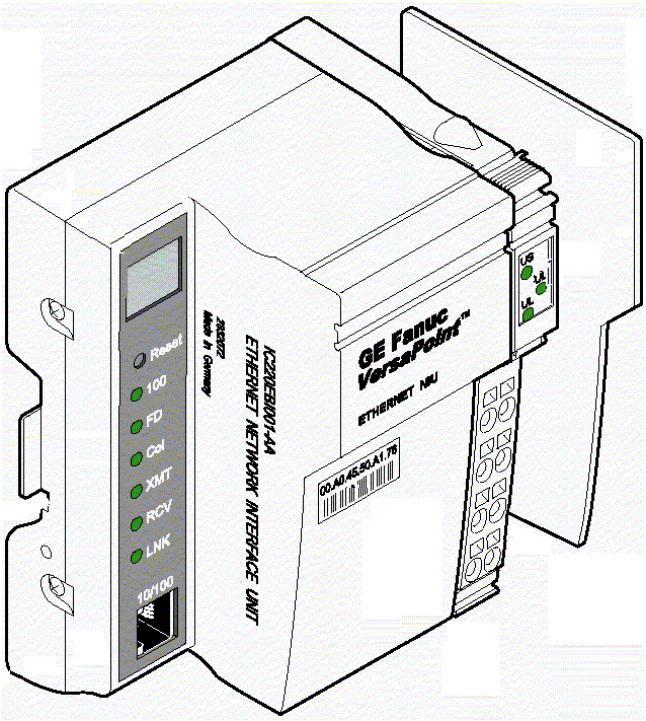
– (2) Ethernet Network Interface Unit

– (3) Modules appropriate to the application

– (4) End plate (supplied with the NIU)

The Ethernet Network Interface Unit

The VersaPoint ™ Ethernet Network Interface Unit (NIU), IC220EBI001, is the link between Ethernet and the VersaPoint station.



Features

The Ethernet Network Interface Unit provides the following features:

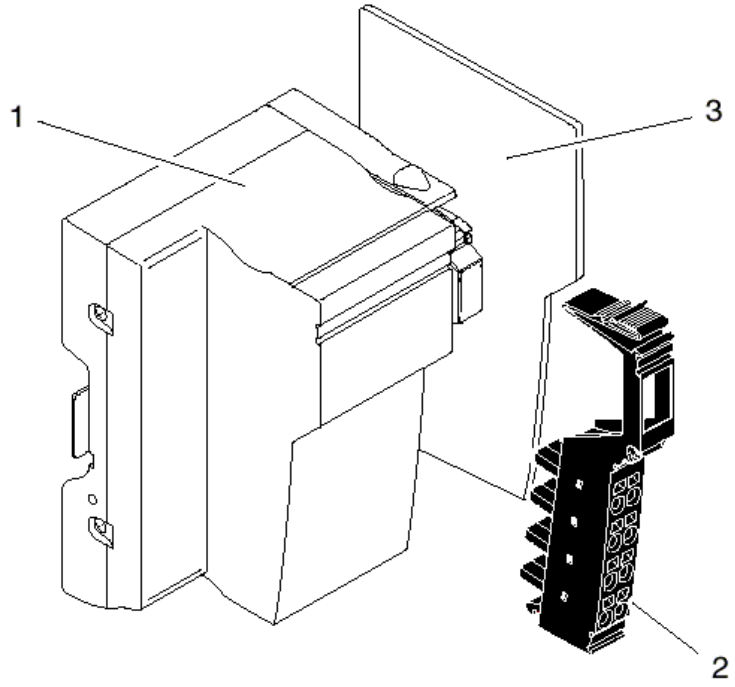
- Ethernet TCP/IP
  - 10/100 Base-T(X)
  - Management via SNMP
  - Integrated web server
- Modbus TCP Protcol
- Initial IP parameter setting via BootP,
- Web-based management (WBM) or SNMP of IP address and configuration
- A maximum of 63 VersaPoint I/O modules can be connected to Ethernet by simply plugging them in side by side via the NIU. The NIU and the VersaPoint modules create a station. Check chapter 5 to verify power consumption.

Items Used with the NIU

The Ethernet NIU (1 below) comes with an end plate (3) and one set of end clamps (not shown).

The end plate is installed at the end of the VersaPoint station, after the last module. It protects the station from electrostatic discharge and the user from dangerous voltage.

The power connector (2) is ordered separately. See the ordering information below.



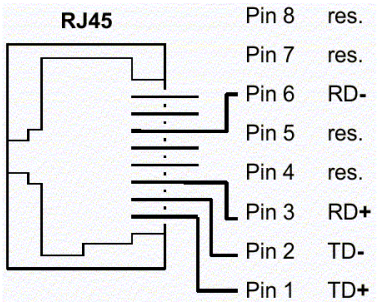
Ordering Information

IC220EBI001	Ethernet Network Interface Unit
IC220TBK082	Power connector (quantity 10)

Connectors on the NIU

Ethernet Connector

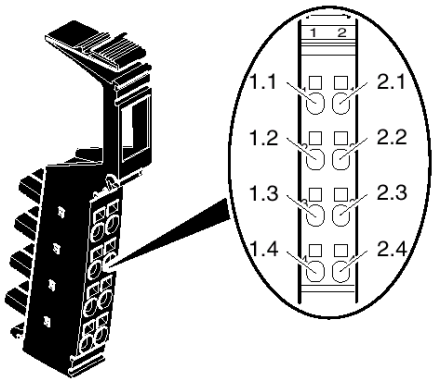
An RJ-45 port connects the NIU to the 10/100 Base T/Tx Ethernet cable.



Pin	Assignment
8	Reserved
7	Reserved
6	RD-
5	Reserved
4	Reserved
3	RD+
2	TD-
1	TD+

Power Connector

A power connector (IC220TBK082), ordered separately, is used to make power and ground connections to the NIU.



Pin assignments for this connector are listed below:

Assignment of the NIU terminal points

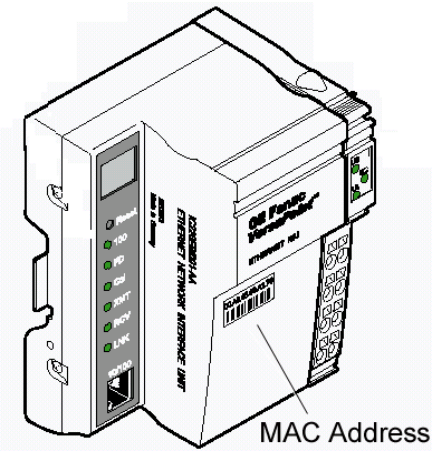
Terminal	Assignment	Description
1.1	24V segment supply	The supplied voltage is led directly to the voltage jumper.
1.2	24V supply	The communications power for the NIU and the connected devices is generated from this power. 24V analog power is also generated.
2.1, 2.2	Main voltage	Main voltage for the I/O Station.
1.3	Reference potential logic ground	The reference ground for the communications power
2.3	Reference potential	Ground reference for main and segment power.
1.4, 2.4	Functional earth ground (FE)	The functional earth ground must be connected to the 24V DC supply/functional earth ground connection. The contacts are directly connected to the potential jumpers and FE springs on the bottom of the housing. The NIU is grounded when it it snapped onto the DIN rail. Functional earth ground is used only to discharge interference.

NIU Power

The NIU acts as a power terminal, supplying the logic and module power for some or all of the of the I/O modules in the station, as well as the sensors and actuators. Some stations will also use additional power/segment terminals, depending on the needs of the application. See chapter 5 for additional details.

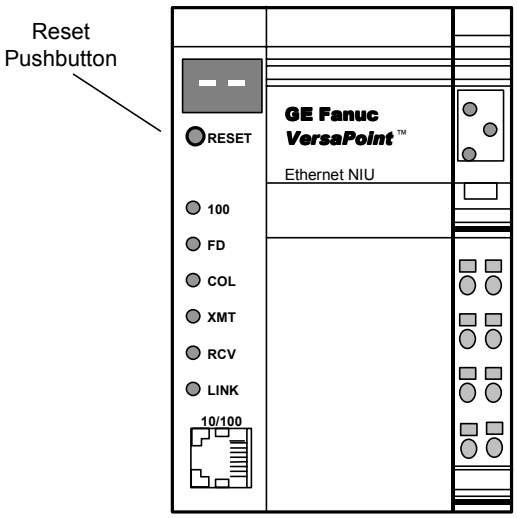
MAC Address

The NIU comes with its MAC address pre-set. The MAC address is shown on the module label.



Reset Pushbutton

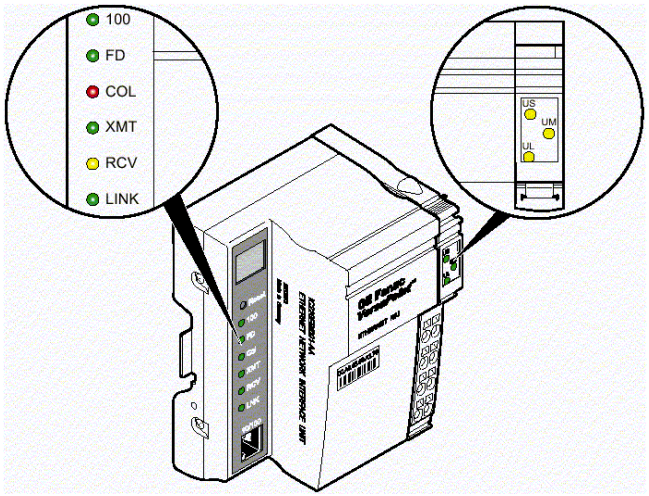
Pressing the Reset button initializes and starts the NIU. The outputs in the I/O station are reset and inputs are not read.



Displays on the NIU

The numeric display and LEDs on the NIU show the status of the module and of Ethernet communications. The diagnostic information provided by the numeric displays and LEDs is described in chapter 8.

LEDs



Numeric Display

The NIU's numeric display provides specific status information about the operation of the NIU. For example, "bF" for "bus Fault":

NIU Specifications

General	
Housing dimensions (width x height x depth)	90mm x 72mm x 116mm (3.543in. x 2.835in. x 4.567in.)
Degree of protection	IP 20, DIN 40050, IEC 60529
Class of protection	Class 3 VDE 0106, IEC 60536
Humidity, operation	5% to 90%, no condensation
Humidity, storage	5% to 95%, no condensation
Preferred mounting position	Perpendicular to a standard DIN rail

System Information	
Number of devices per station	63, maximum
Maximum NIU current for supplying the I/O module logic	2A at U_L
Maximum additional current for supplying the analog terminals	0.5A at U_{ANA}
Ethernet Interface	8-position RJ45 connector on the NIU. Twisted-pair cable with a conductor cross section of 0.14 mm^2 to 0.22 mm^2 (26 AWG to 24 AWG)

See appendix A for additional technical data for the Ethernet NIU.

Chapter 3

VersaPoint Modules

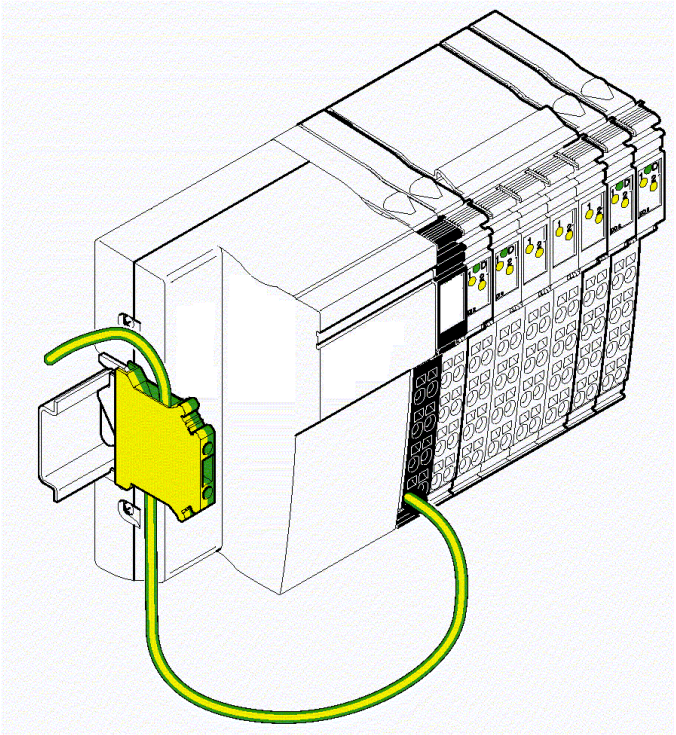
This chapter describes the parts and dimensions of VersaPoint modules.

- Modules in a VersaPoint Station
- Parts of a VersaPoint Module
- The Electronics Base
- Diagnostics and Status Indicators
- Connectors
- Module Labeling
- Module Dimensions

Modules in a VersaPoint Station

A VersaPoint I/O Station begins with of a Network Interface Unit (NIU). The NIU module is the first module on the DIN rail, at the left end of the I/O Station. It is shown here with the required grounding to the DIN rail. See chapter 2 for more information about the Ethernet Network Interface Unit. The NIU performs all the data-handling and communications functions for the I/O Station.

The rest of the station is made up of a group of I/O modules that can be selected to exactly fit the needs of the application.



Types of VersaPoint Modules

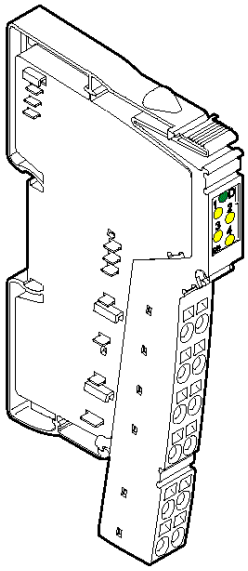
For additional module information, please go to www.GEFanuc.com.

Module Number	Module Description	Module ID
Discrete Input Modules		
IC220MDL641	Input 24VDC Positive Logic 2 Points	BE hex (190 decimal)
IC220MDL642	Input 24VDC Positive Logic 4 Points	BE hex (190 decimal)
IC220MDL643	Input 24vdc Positive Logic 8pt	BE hex (190 decimal)
IC220MDL644	Input 24vdc Positive Logic 16pt	BE hex (190 decimal)
IC220MDL661	Input 24vdc Negative Logic 2pt	BE hex (190 decimal)
Discrete Output Modules		
IC220MDL721	Output 24VDC Positive Logic 2.0A 2 Points	BD hex (189 decimal)
IC220MDL751	Output 24vdc Positive Logic 0.5a 2pt(	BD hex (189 decimal)
IC220MDL752	Output 24VDC Positive Logic 0.5A 4 Points	BD hex (189 decimal)
IC220MDL753	Output 24vdc Positive Logic 0.5a 8pt(	BD hex (189 decimal)
IC220MDL754	Output 24vdc Positive Logic 0.5a	BD hex (189 decimal)
IC220MDL761	Output 24vdc Positive Logic 0.5a 2pt	BD hex (189 decimal)
IC220MDL930	Output Relay 3.0A 1 Point	BD hex (189 decimal)
IC220MDL940	Output Relay 3.0A 4 Points	BD hex (189 decimal)
Special Function Modules		
IC220MDD840	High Speed Counter In, 1in/1out 24VDC	BF hex (191 decimal)
IC220MDD841	Absolute Encoder Module	BF hex (191 decimal)
IC220MDD842	Incremental Encoder Module	BF hex (191 decimal)
IC220STR001	Motor Started Direct 1.5kW,/ 400VAC	BF hex (191 decimal)
Analog Input Modules		
IC220ALG220	Analog In 15 Bit Voltage/Current 2 Channels	7F hex (127 decimal)
IC220ALG620	Analog In 16 Bit Rtd 2ch	7F hex (127 decimal)
IC220ALG630	Analog In 16 Bit Thermocouple 2ch	7F hex (127 decimal)
Analog Output Modules		
IC220ALG320	Analog Out 16 Bit Voltage/Current 1 Channel	7D hex (125 decimal)
IC220ALG321	Analog Out 13 Bit Voltage 1 Channel	7D hex (125 decimal)
IC220ALG322	Analog Out 13 Bit Voltage 2ch	5B hex (91 decimal)
Power and Segment Terminals		
IC220PWR001	Power Terminal 24VDC	
IC220PWR002	Power Terminal Fused 24vdc	
IC220PWR003A	Power Terminal Fused W/Diag 24vdc	
IC220PWR011	Segment Terminal 24VDC	
IC220PWR012A	Segment Terminal Fused 24vdc	
IC220PWR013A	Segment Terminal Fused W/Diag 24vdc	
IC220PWR014A	Segment Terminal Elec Fused 24vdc	

Input/Output Modules

Many different types of I/O modules are available. This enables you to build the station in a modular way so that it meets the application's requirements.

Example of a digital input module: IC220MDL642



Terminal Points

Depending on the module, input/output modules have terminal points to accommodate 2-, 3-, and 4-wire sensors or actuators. Connections are made to Terminal Strips, which are ordered separately.

Protection

For output modules, surge voltage protection is provided by a fuse in the Power Terminal module, or by an external fuse. The value of the fuse must be such that the maximum load current is not exceeded. For the maximum permissible load current of an I/O module please refer to the module's data sheet.

LEDs

The diagnostic and status indicators on I/O modules provide information on the status of inputs and outputs.

Interfacing to Functional Earth Ground (FE)

There is no interfacing to functional earth ground (FE) in the module, i.e. no direct connection is made with FE when the module is mounted on a grounded DIN rail.

Grounding

A module is grounded via the voltage jumper FE when snapping it onto the previous module. Additional I/O module grounding is not required.

Electrical Isolation

Electrical isolation is not provided by VersaPoint I/O modules. A Power Terminal module must be used for this purpose.

Voltage Ranges

Low-level signal terminals are available for different voltage ranges. To utilize different voltage ranges within a station, a new power terminal must be used for each range.

Power Losses for I/O Modules

Power Loss of the Electronics

The electronics power loss of an I/O module can be calculated following the formula in the module's datasheet. The power loss of the module must not exceed the power loss of the housing.

Power Loss of the Housing

The power loss of the housing indicates the maximum power loss allowed. The maximum power loss is indicated in the module's datasheet. This power loss can be dependent or independent of the ambient temperature. If the power loss of the housing depends on the ambient temperature, a permissible operating temperature range can be calculated using the formula in the module's datasheet.

Permissible Operating Temperature Range

Depending on the power loss of the housing and the power loss of the electronics at a certain current, the temperature up to which the module can be operated with this current can be calculated. Please see the module datasheets for specific information.

See appendix C for example calculations.

Analog Modules

Shield

The connectors of analog modules have a special shield connection to shield the cables.

Configuration

The modules for analog signals operate with a set of default parameters unless they are reconfigured for the application. Each module's defaults are listed in its datasheet.

Diagnostics for Analog Input Modules

Analog input modules have overrange recognition in all measuring ranges. Open circuit diagnostics are also available for some analog input modules. If extended diagnostics are available for a specific module, they are listed in the module's datasheet. Analog error messages include:

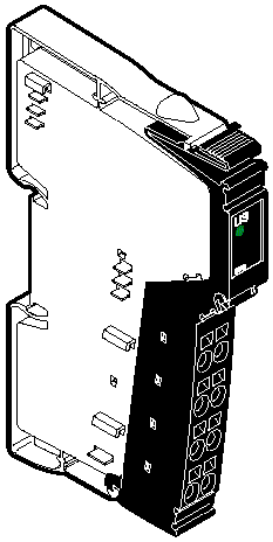
- Under-range
- Open circuit
- Measured value invalid
- Configuration invalid
- Terminal defective
- Over-range.

Power Terminal Modules

Power Terminal modules can be placed in an I/O Station to provide additional power, to electrically isolate different circuits, or to create areas with different voltages (ie: 24VDC versus 120VAC) within a station. Multiple Power Terminal modules can be used in an I/O station.

A Power Terminal module supplies voltage for both the main circuit and the segment circuit. See chapter 5 for more details.

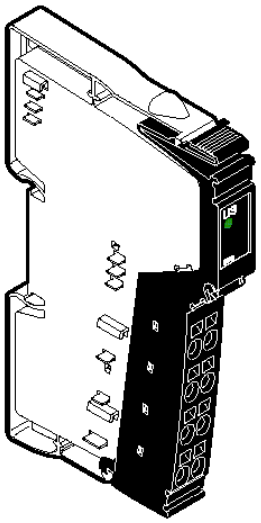
Example: 24VDC Power Terminal



The main power circuit should be protected. If a protected Power Terminal (IC220PWR002 or PWR003) is not used, the 24V supply must be externally protected.

Segment Terminal Modules

Segment Terminal modules can be used to create a segment circuit within the main circuit. The segment circuit allows the separate supply of power outputs (e.g., motor contactors), digital actuators, and digital sensors. With a segment terminal you can also control the segment circuit and switch it on or off, e.g., using emergency stop loops. Segment Terminal modules can only be used with 24V power.



Segment Terminals do NOT provide electrical isolation. A Power Terminal module must be used for that purpose.

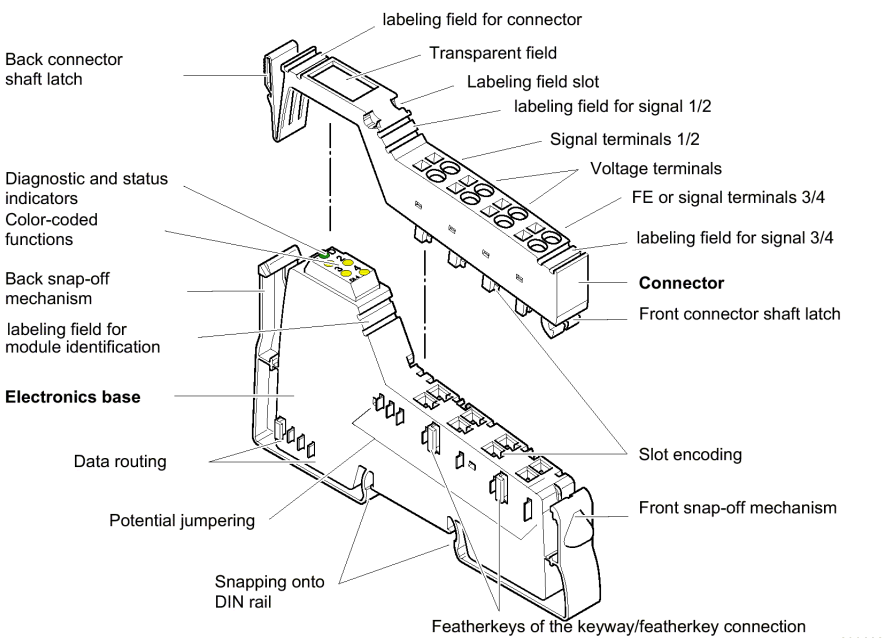
Segment terminals can only be used with 24V power.

The connection between the main circuit and the segment / auxiliary supply requires a jumper wire or external switch. Segment terminals have terminal points for the connection of a jumper or switch. When using a standard segment terminal, (IC220PWR011), the segment circuit is not protected! The 24V supply must be externally protected. See "Power Terminals".

Segment terminals with internal fuse protection (IC220PWR012, 013, and 014) are also available.

Parts of a VersaPoint Module

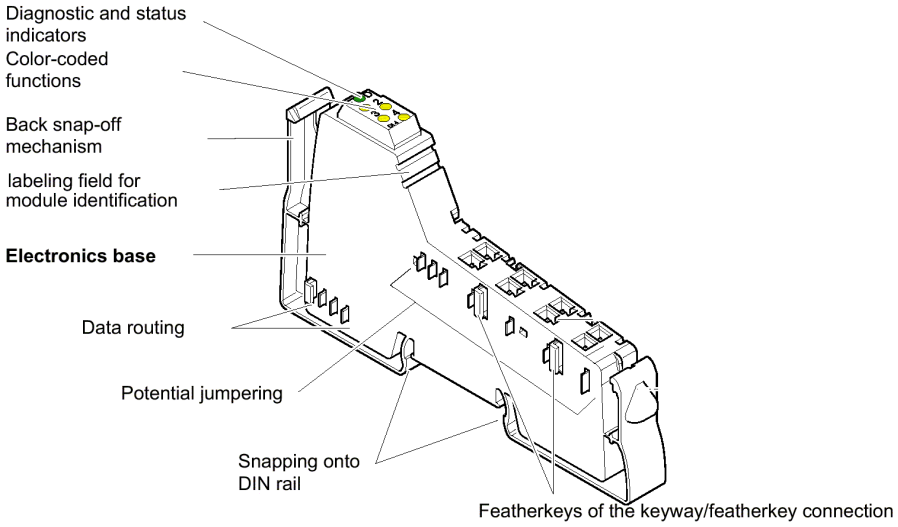
A VersaPoint I/O or power module consists of an electronics base and plug-in connector.



The Electronics Base

The electronics base holds the entire electronics for the VersaPoint module and the voltage and data routing.

As all the modules are snapped onto the DIN rail, there is a secure interface between the modules. Voltage and current for station operation are routed through the jumpers on each module, which are indicated in the following illustration. This functionality is explained in detail in chapter 5.



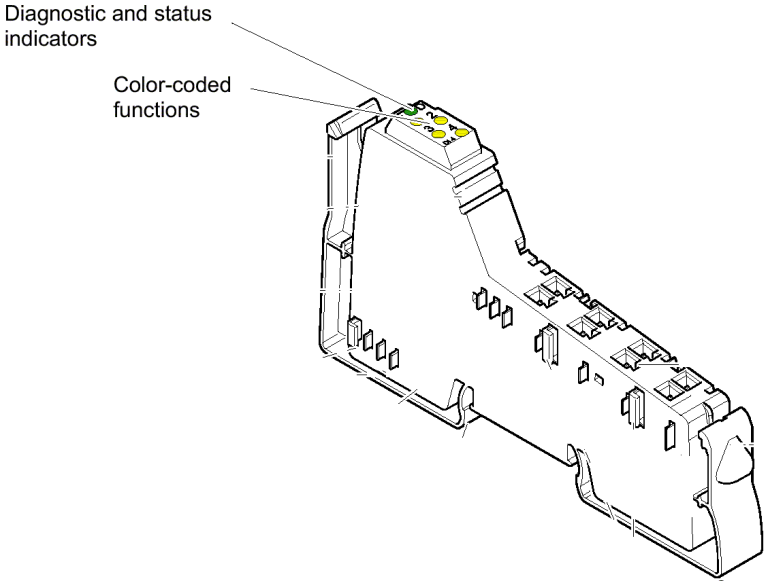
Built-in snapping mechanisms on the electronics base make it easy to install on the DIN rail without the use of tools. (Please see the installation instructions in chapter 4).

Diagnostic and Status Indicators

All modules have diagnostic and status indicators for rapid local error diagnostics.

The diagnostic indicators (red/green) indicate the status of the modules. A module is operating normally if all its Diagnostic (D) LEDs are solid green.

The status indicators (yellow) display the status of the relevant inputs/outputs for the connected device. LEDs are described in detail in chapter 6.



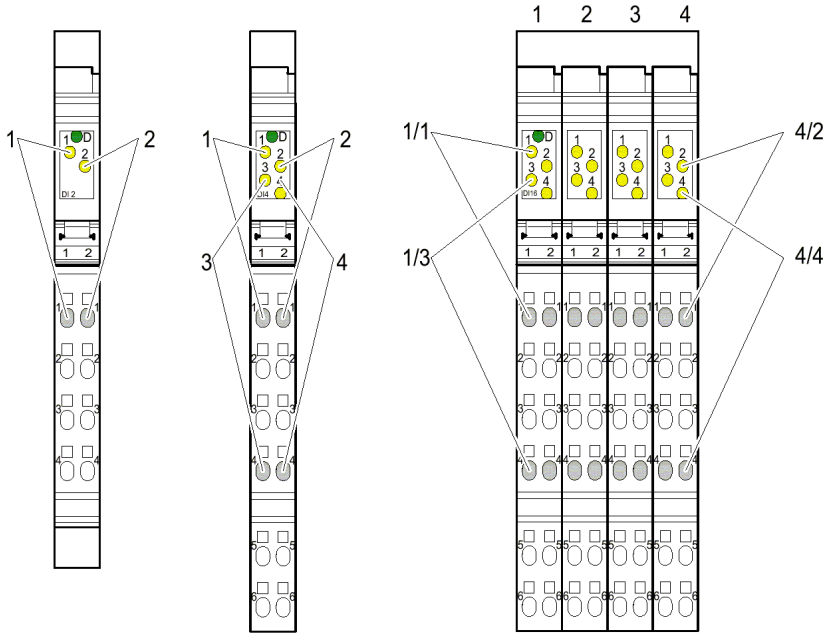
Module Color Coding

The area surrounding each module's LEDs is color-coded to provide an indication of the module's function. The following table explains this color-coding.

Color	Function
Gray	Analog
Blue	Digital - DC
Red	Special function
Orange	Digital mixed
Black	Power terminal / segment terminal / NIU

Status LEDs and I/O Points

The illustration below shows the relationship between the status LEDs on a module and the module inputs or outputs.



In general, an I/O module's status LEDs appear over their associated terminals. In cases where two I/O points are terminated in the same column (for 4 and 16 point modules), the LED's relative position (top or bottom) indicates the I/O point it is associated with.

For a single-width module with 4 inputs or outputs (middle module in the illustration above), the LEDs and terminal points are associated as follows:

LED 1	Terminal point 1.1
LED 2	Terminal point 2.1
LED 3	Terminal point 1.4
LED 4	Terminal point 2.4

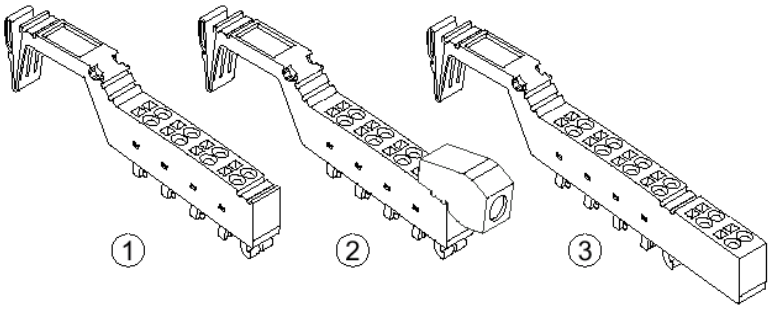
On the four-slot module, LED 2 on slot 4 is indicated. The LED belongs to input 14 on terminal point 4/2.1 (slot 4 / terminal point 2.1)

Connectors

The connection of the I/O or supply voltages is made by using a connector that can be plugged on or off the modules.

Connector Types

The following connector types are available:



(1) Standard connector (IC220TBK082, 085, 087)

The standard connector is used for the connection of two signals in 4-wire format (e.g., digital input/output signals). The standard connector housing is also used for power and segment terminals and relay terminals, although the types are NOT interchangeable.

(2)Shield connector (IC220TBK061)

This connector is used for signals connected using shielded cables (e.g., analog I/O signals, high-speed counter inputs, network cable). The FE or shielding is connected by a shield clamp.

(3) Extended, connector (IC220TBK122, TBK123)

This connector is used for the connection of four signals in 3-wire format (e.g., digital input/output signals).

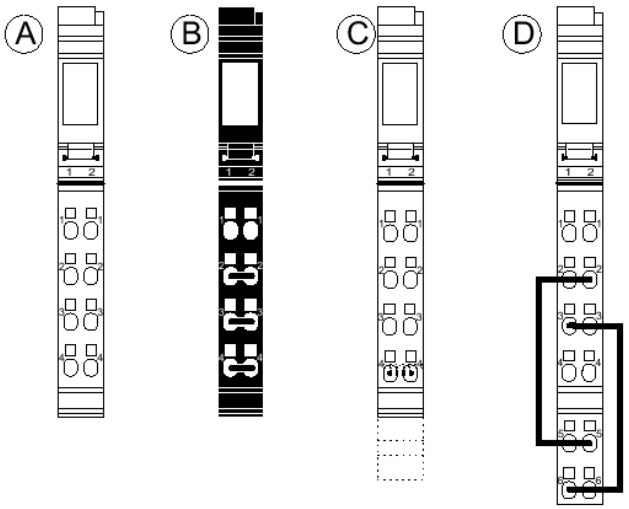
Regardless of the width of the electronics base, the connectors are provided with a standard width. Wider modules may require multiple connectors.

Connector Identification

Connectors have terminal points that are color coded corresponding to their functions:

Color	Terminal point signal
Red	+
Blue	–
Green	Functional earth ground

Internal Structure of the Connector



A Standard connector (IC220TBK082, 085)
B Connector for power and segment terminals (IC220TBK087)
C Shield connector (IC220TBK061) for analog modules
D Extended connector (IC220TBK122, TBK123)

The dark lines shown on connectors B and D above indicate jumper connections. These jumpers are internal to the connectors.

The shield connector is jumpered through the shield connection. All other connectors are jumpered through module point connection.

To avoid a malfunction, only snap a suitable connector on a module that is appropriate for this connector. Refer to the module-specific data sheet to select the correct connectors.

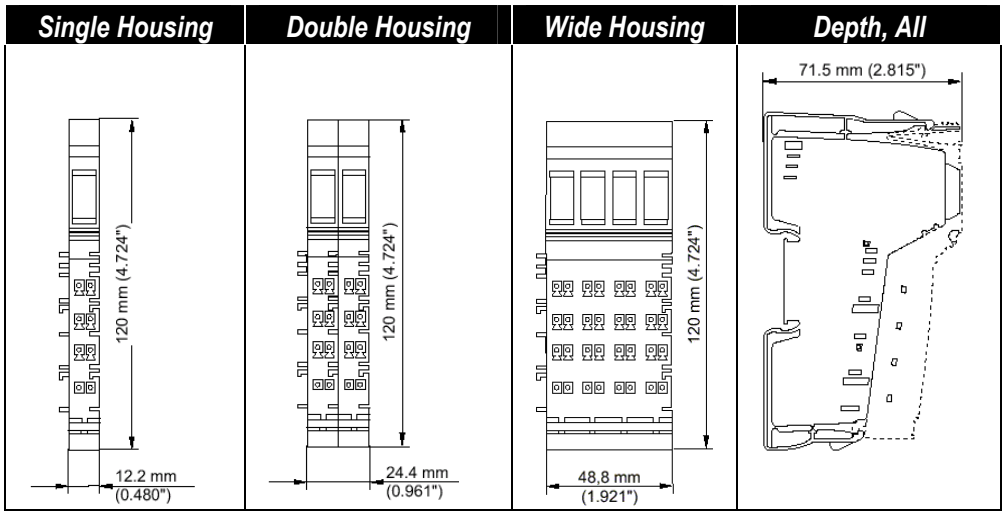
A supply connector must not be placed on a module that is to be used with an extended connector. This will cause a short circuit between two signal module points (1.4 - 2.4).

Place only supply connectors on supply modules. Do not use the standard connectors! When the terminal points are jumpered in the supply connector, power is carried through the jumpering in the connector and not through the printed circuit board of the module.

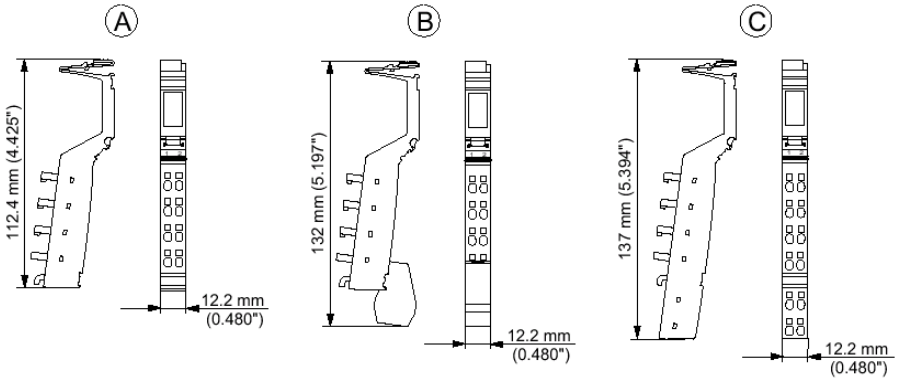
Module Dimensions

The module dimensions are determined by the dimensions of the electronics base and the dimensions of the connector.

When a connector is plugged in, each module depth is 71.5mm (2.795 in.). The height of the module depends on the connector used.



Connector Dimensions



Key:

A. Standard connector (IC220TBK082, IC220TBK085, IC220TBK087)
B. Shield connector (IC220TBK061)
C. Extended connector (IC220TBK122, IC220TBK123)

The depth of the connector does not influence the overall depth of the module.

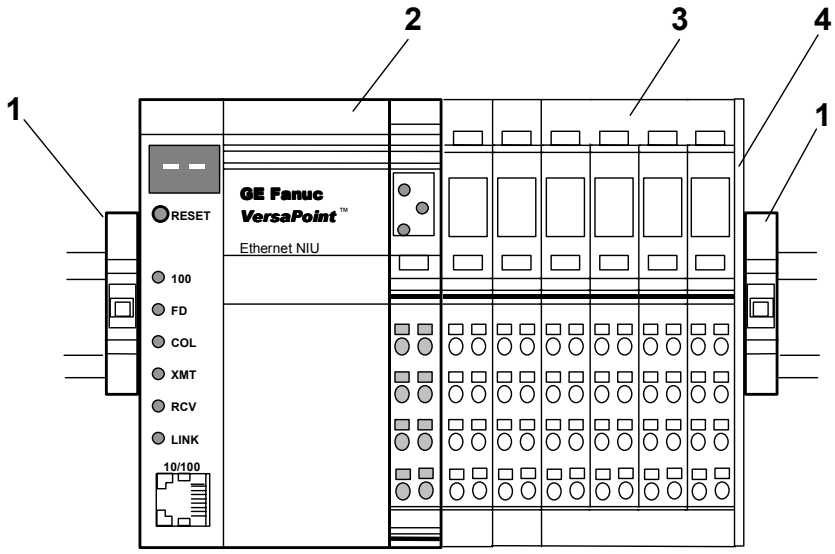
Chapter 4 Installation

This chapter describes basic VersaPoint module installation and cable connections. Please refer to chapter 5 for more information about power connections for the I/O Station.

- Parts of a VersaPoint I/O Station
- Planning module sequence in the I/O Station
- Power for the station
- Setting the NIU switches
- Keying
- Installing modules on the DIN rail
- Removing modules
- Connecting unshielded cables
- Connecting shielded cables
- Grounding
- Connecting the Ethernet cable at the NIU
- Connecting power at the NIU
- Replacing power and segment terminal fuses
- Connecting sensors and actuators
- Module labeling

Parts of a VersaPoint I/O Station

A VersaPoint station with an Ethernet Network Interface Unit consists of:
– (1) End Clamps (supplied with NIU)
– (2) Ethernet NIU
– (3) Modules appropriate to the application
– (4) End Plate (supplied with the NIU)



Mount modules side by side on a 35mm (1.378in.) standard DIN rail. No tools are required.

Do not set up the station while the power is connected. Before setting up a VersaPoint station or inserting a module, be sure the entire station is disconnected from the power. Be sure the entire station is reassembled before switching power on.

End Plate

The VersaPoint I/O Station must be terminated using the end plate that is supplied with the Network Interface Unit module. The end plate does not have an electrical function. It protects the station from ESD pulses and the user from dangerous voltages.

End Clamps

Install end clamps on both ends of the station to hold it in place on the DIN rail. End clamps are supplied with the NIU. If additional clamps are required, they are available as GE Fanuc part number IC220ACC313.

Planning Module Sequence in the I/O Station

The NIU is the first module in the station. The sequence of the other modules should be planned carefully. Within a main circuit, place the I/O modules with the highest current consumption (U_S) first. This approach is advantageous in that the high supply current does not flow through the entire main circuit. See chapter 5 for a list of the current consumptions of VersaPoint modules.

Locations for Analog Modules

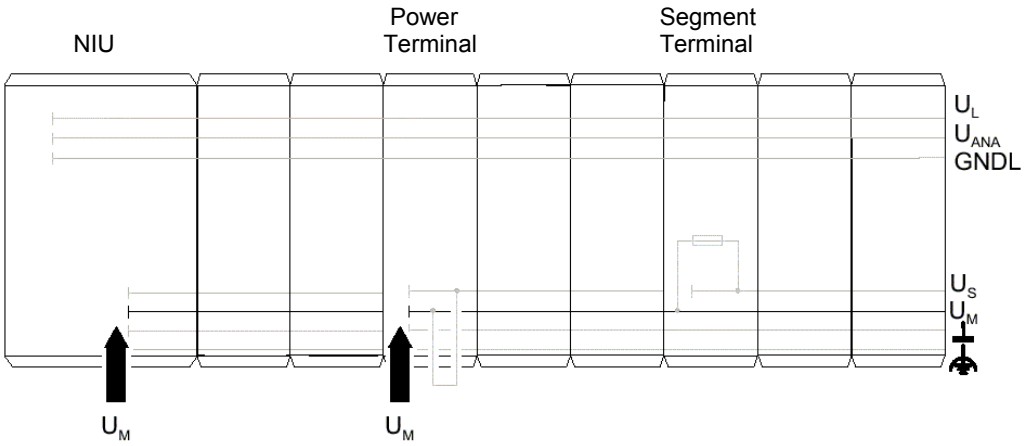
High current flowing through voltage jumpers U_M and U_S increases the temperature of the voltage jumpers and the inside of the module. Note the following instructions to keep the current flowing through the voltage jumpers of the analog modules as low as possible:

It is recommended that each analog module have a separate main circuit. If this is not possible and it is necessary to use analog modules in a main circuit together with other modules, place the analog modules at the end of the main circuit(to the right of other modules).

This practice is particularly important for the thermocouple module IC220ALG630. Internal module heating falsifies the temperature of the internal cold junction. Therefore, position this module after all of the other modules to minimize the current flowing through all voltage jumpers.

Power for the Station

The Ethernet NIU provides the main circuit with the main voltage. A station may also include one or more Power Terminal and Segment Terminal modules. Power Terminal modules must be connected to external power. Segment Terminal modules draw their power from the main supply within the station, and are not connected to external power.



Voltage supplies are connected using unshielded cables as described previously.

Please see chapter 5 for more information about station power.

Electrical Isolation

If electrical isolation is required between logic and I/O you must provide the NIU supply U_M and the I/O supply U_S from separate power supplies.

If various electrically isolated areas are required within a VersaPoint station, additional power terminals that draw their current from separate power supplies must be used.

The correct method of providing and distributing power to the station depends on the needs of the application. See chapter 5 for detailed information about power sources and power distribution in the VersaPoint I/O station.

Use power supplies with safe isolation!

Use power supplies that ensure safe isolation between primary and secondary circuit (according to EN 50178).

For additional voltage supply specifications refer to the data sheets of the power terminals.

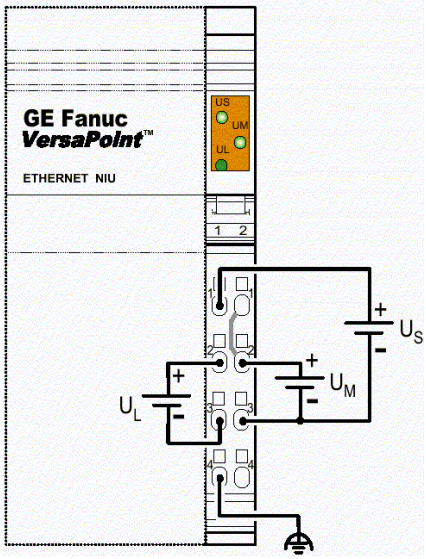
Voltage supplies are connected using unshielded cables as described previously. For the connector assignment of the supply voltage connections please refer to the module-specific data sheets of NIU, power terminals, and segment terminals.

Dangerous voltage!

When the power terminal is removed, the metal contacts are freely accessible. With 120V or 230V power terminals, it should be assumed that dangerous voltage is present. You **must** disconnect power to the station **before removing** a terminal!

If these instructions are not followed, there is a danger of damage to health and danger of a life-threatening injury.

Connecting Power at the NIU



Terminal	Assignment	Description
1.1	24V segment supply	The supplied voltage is led directly to the voltage jumper.
1.2	24V supply	The communications power for the NIU and the connected devices is generated from this power. 24V analog power is also generated.
2.1, 2.2	Main voltage	Main voltage for the I/O Station.
1.3	Reference potential logic ground	The reference ground for the communications power
2.3	Reference potential	Ground reference for main and segment power.
1.4, 2.4	Functional earth ground (FE)	The functional earth ground must be connected to the 24V DC supply/functional earth ground connection. The contacts are directly connected to the potential jumpers and FE springs on the bottom of the housing. The NIU is grounded when it it snapped onto the DIN rail. Functional earth ground is used only to discharge interference.

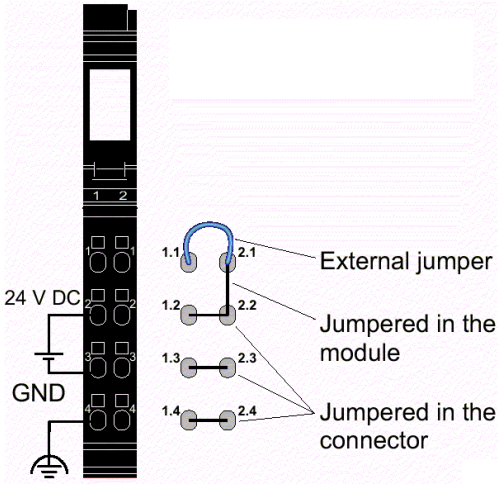
Providing the 24V Segment Supply (U_S) at the NIU

You can supply/generate the segment voltage at the NIU or a Power Terminal module. There are several ways of providing the segment voltage on the NIU or at a power terminal:

1. You can provide the segment voltage separately on the terminal points 1.1/2.1 and 1.3/2.3 (GND) of the NIU Terminal Strip.
2. You can jumper the points 1.2/2.3 on the connector if the same reference potential will be used for the communications power and segment voltage.
3. With a switch between the terminal points 1.1/ 2.1 you can create a segment circuit (e.g., an emergency stop circuit).

CAUTION: To minimize heat generation, use both of the adjacent contacts to provide the main voltage and to provide/tap the segment voltage.

Adjacent power connectors can be used only when all the voltages supplied to the NIU have the same reference potential. Simply insert the external jumper to correctly connect all the supply points.



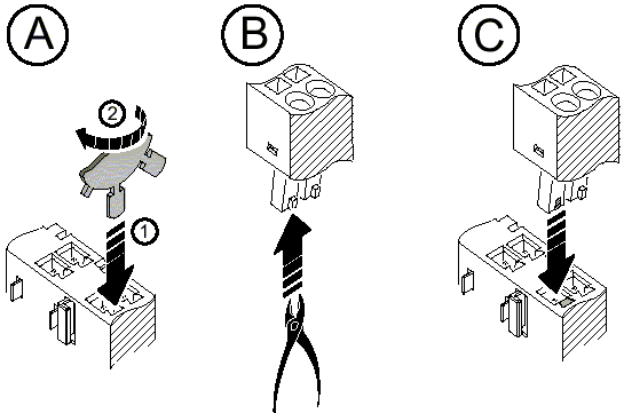
Fusing for Short Circuit Protection

Both the segment supply U_S and the main supply U_M have the same reference potential. Therefore, an isolated voltage area on the I/O side cannot be created. Both the main supply and the segment supply are protected against polarity reversal and surge voltage.

CAUTION: The main supply and the segment supply integrated into the NIU do not have short circuit protection. You must install fusing for short circuit protection. The rating of the fuse must be such that the maximum permissible load current is not exceeded.

Keying Connectors and Modules

You can prevent the mismating of any connector by keying the base and the connector using module keys (ordered separately, IC220ACC005 quantity 100).



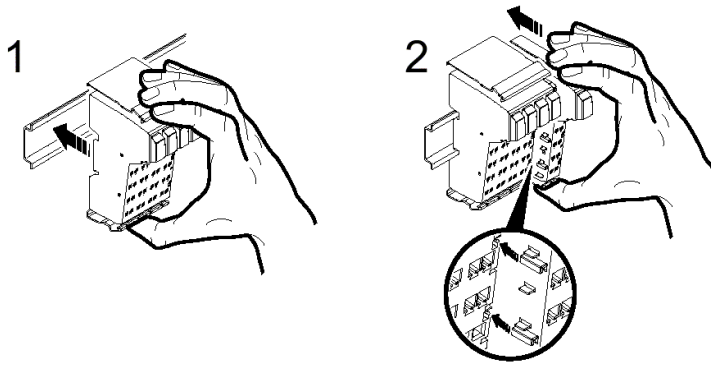
A. Plug a coding key into the keyway in the base (1) and turn it away from the small plate.
B. Use a pair of cutters to cut off the keying tab from the connector.

Installing Modules on the DIN Rail

Mount modules side by side on a 35mm (1.378 in.) standard DIN rail.

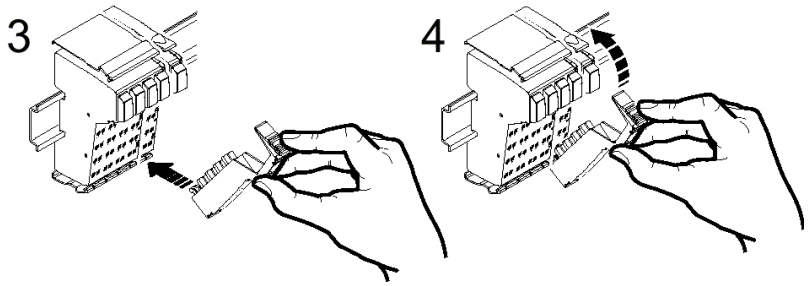
- First, attach the electronics bases to the DIN rail by pushing the base straight-in towards the rail (1).

  Be sure that **all** featherkeys and keyways on adjacent modules are interlocked (2). First, align the featherkey of the module with the keyway of the previous module. Then, attach the new module to the DIN rail by pushing it straight in toward the rail. Do not twist or pivot the module during installation; that may damage the modules.



- Next, attach the Terminal Strip to the module.

  First, place the front latch in the front snap-on mechanism (3).



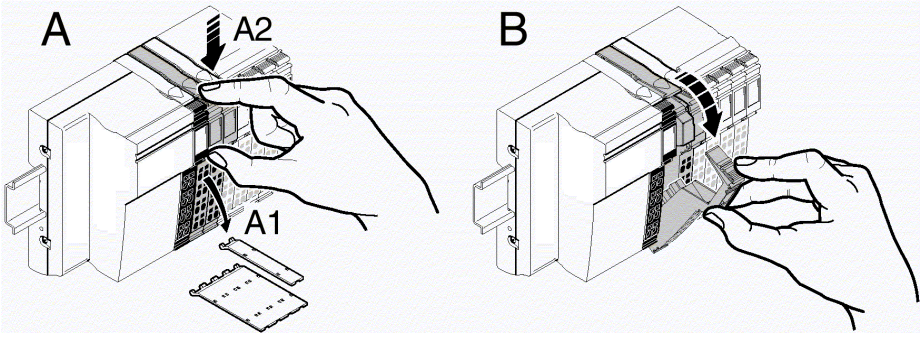
  Then pivot the top of the Terminal Strip towards the module until the back latch snaps into place (4).

The keyways of a module do not continue on the Terminal Strip. When snapping on an module, there must be no Terminal Strip on the left-hand side of the module. If a Terminal Strip is present, remove it before installing the next module.

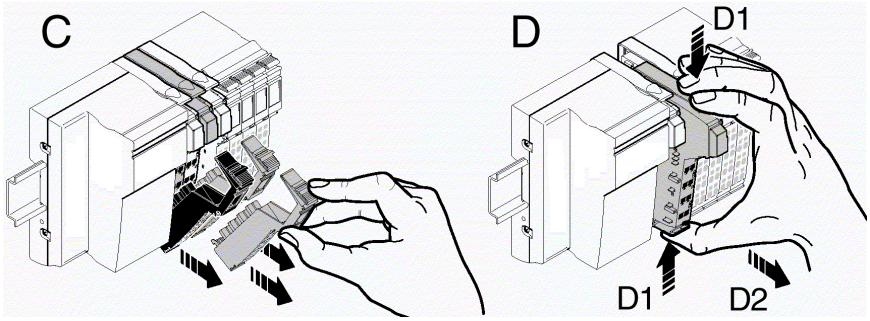
Removing Modules

When removing a module, follow the steps shown below. Do not remove/replace modules with power connected. Disconnect power to the entire station. Be sure the entire station is reassembled before switching power on. Failure to observe this precaution may damage the equipment. When a power terminal is removed, the metal contacts are freely accessible. You must disconnect power before removing a terminal.

- If there is a module label present, remove it (A-1, below). If the module has more than one Terminal Strip, all of the these must be removed. The following describes how a single-slot module is removed.



- Lift the Terminal Strip by pressing on the connector latch (A-2). Remove the Terminal Strip (B).
- Remove the left-adjacent and right-adjacent Terminal Strips of the neighboring modules (C). This prevents the potential routing featherkeys and the keyway/featherkey connection from being damaged and creates more space for accessing the module.



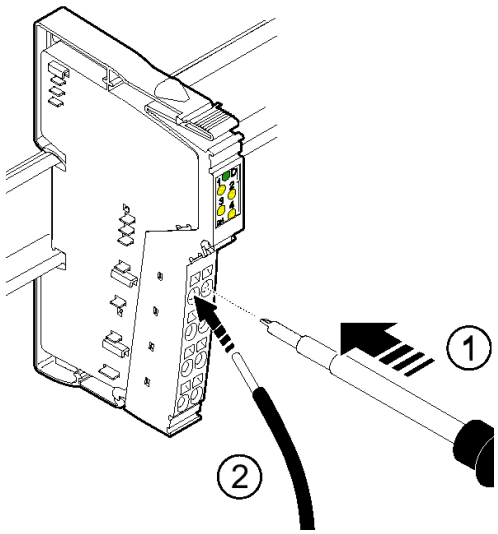
- Press the release mechanism, and remove the module from the DIN rail by pulling it straight back (D-2).
- To remove the NIU, the left end clamp must be removed first.

Replacing a Module

If you want to replace a module within the VersaPoint station, reverse the removal procedure above.

Connecting Unshielded Cables

Unshielded cables for I/O devices and supply voltages are connected using the spring-clamp terminals. Signals up to 250VAC/DC and 5A with a conductor cross-section of $0.2mm^2$ to $1.5mm^2$ (AWG24 – 16) can be connected.



For terminal assignments, please consult the appropriate module data sheet.

Follow these steps when wiring:

- Strip 8mm (0.3in.) off the cable. Module wiring is normally done without ferrules. However, it is possible to use ferrules. If using ferrules, make sure they are properly crimped.
- Push a screwdriver into the slot for the appropriate connection (#1 above) so that you can plug the wire into the spring opening.
- Insert the wire (#2 above). Pull the screwdriver out of the opening. The wire is clamped.

After installation, you should label the wires and Terminal Strips as described later in this chapter.

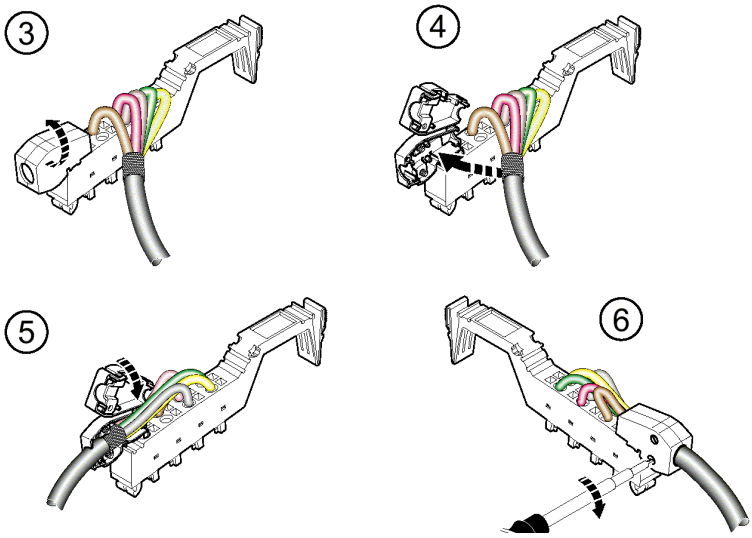
Connecting Shielded Cables

Observe the following when installing shielding:

- Strip the outer cable sheath to the desired length (#1a below). The appropriate length depends on the connection position of the wires and whether there should be a large or a small space between the connection point and the shield connection.

- Shorten the braided shield to 15mm (0.6 in.) (#1 above).
- Fold the braided shield back over the outer sheath. (#2 above)
- Remove the protective foil.
- Strip 8mm (0.3in.) off the wires. (#2 above)

Connecting Shielded Cables to the Shielded Terminal Strip



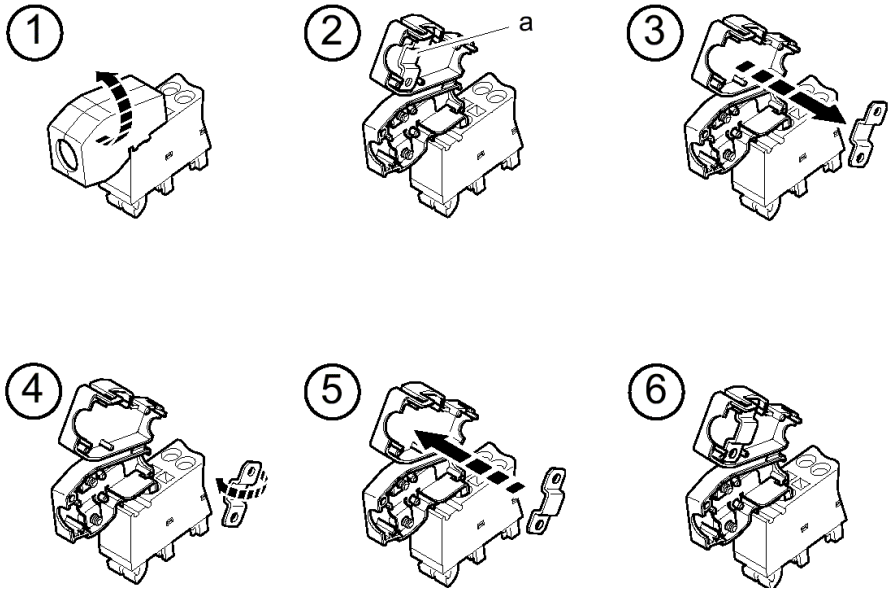
- Open the shield connector (#3 above).
- Check the orientation of the shield clamp in the Shielded Terminal Strip and change its position if necessary (see below for instructions).
- Place the cable with the folded braided shield in the shield connector. (#4 above)
- Close the shield connector (#5 above).
- Fasten the screws for the shield connector using a screwdriver. (#6 above).

Repositioning the Shield Clamp

The shield clamp (2a, below) in the shield connector can be adjusted to accommodate thin or thick cable. The shield connection is delivered with the clamp positioned for the connection of thicker cables (#2 below). In that position, the bend in the clamp faces away from the cable. For thinner cables the bend in the clamp faces towards the cable (#6 below).

If you need to change the alignment of the shield clamp, proceed as shown below:

- Open the shield connector housing (#1).
- Remove the clamp (#3), turn the clamp according to the cross-section of the cable (#4) and then reinsert the clamp. (#5)



Grounding

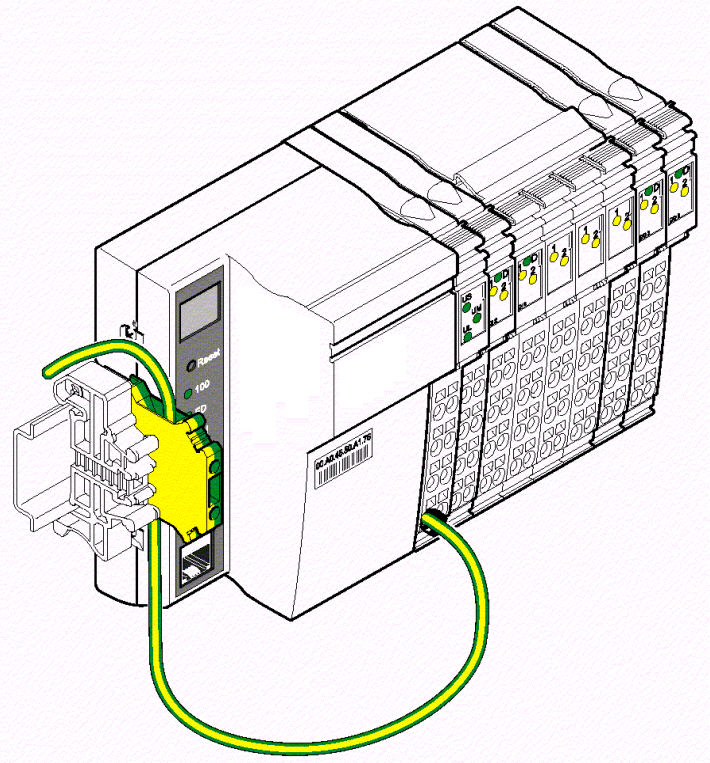
All devices in a VersaPoint station must be grounded so that possible signal interference is shielded and discharged to ground. A wire of at least 1.5mm^2 (16 AWG) must be used for grounding.

Grounding the NIU and Power Modules

The NIU, power terminals, and segment terminals have an FE spring (metal clip) on the bottom of the electronics base. These springs create an electric connection to the DIN rail. VersaPoint I/O modules are automatically grounded via the FE voltage jumper when they are connected to other modules. The FE voltage jumper (functional earth ground) runs from the NIU through the entire VersaPoint station. The function of FE is to discharge interference. It does not provide shock protection.

Required Additional Grounding

To ensure a reliable ground connection even if the DIN rail is dirty or the metal clip damaged, GE Fanuc recommends grounding the NIU to a DIN rail-mounted grounding terminal block, via the FE terminal point.



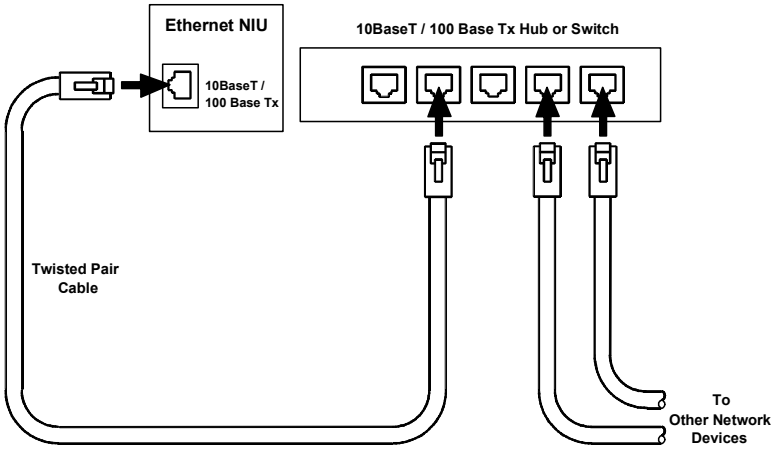
Connecting the Ethernet Cable at the NIU

The 10Base-T / 100Base-TX RJ-45 port on the Ethernet NIU connects directly to a network without an external transceiver. Connect the port to an external 10Base-T / 100Base-TX hub or switch using a twisted pair cable with 100 Ohms impedance. The Ethernet NIU automatically senses whether it is connected to a 10BaseT or 100BaseTX network, and whether communications are half-duplex or full duplex. The Ethernet port on the NIU will detect a pair of incorrectly-connected receiving cables (RD+ / RD-) and compensate using Auto Polarity Correction.

To avoid the flow of compensating currents, connect a suitably-sized equipotential bonding cable parallel to the Ethernet cable.

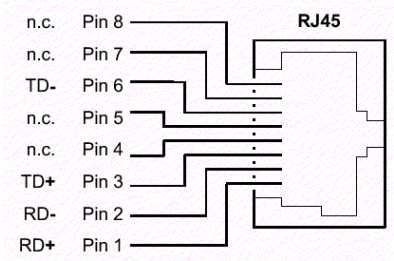
Network Connection

Connection of the Ethernet Interface to a 10Base-T or 100Base-TX network is shown below. Each cable drop can be up to 100 meters long if Category 5 cable is used.



Port Pin Assignments

Port pin assignments are shown below.

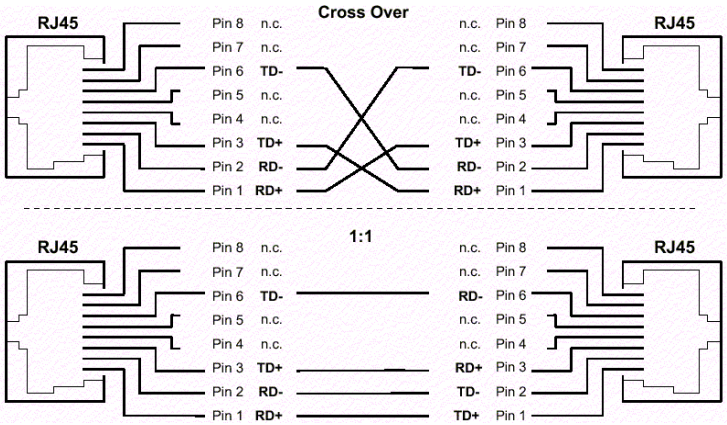


Connecting Cables Between Ethernet Components

To connect Ethernet components devices with one another, crossover cables or straight-through cables (1:1) are used. The choice of cable type depends on the port pin assignments of specific network devices. You should refer to the cabling information for specific Ethernet devices for more information if necessary.

The normal connection for Ethernet is to connect each device to a Hub or Switch. The ENIU, like other Ethernet devices, uses a straight-through cable to connect to a hub or switch.

Connecting the Ethernet NIU directly to to PLC or personal computer without using a hub or switch requires a crossover cable.



Ethernet Cable Type

10Base-T / 100Base-TX cables are readily available from commercial distributors. GE Fanuc recommends purchasing rather than making cables. Cables must meet the applicable IEEE 802.3 or 802.3u standard, noted in the table below.

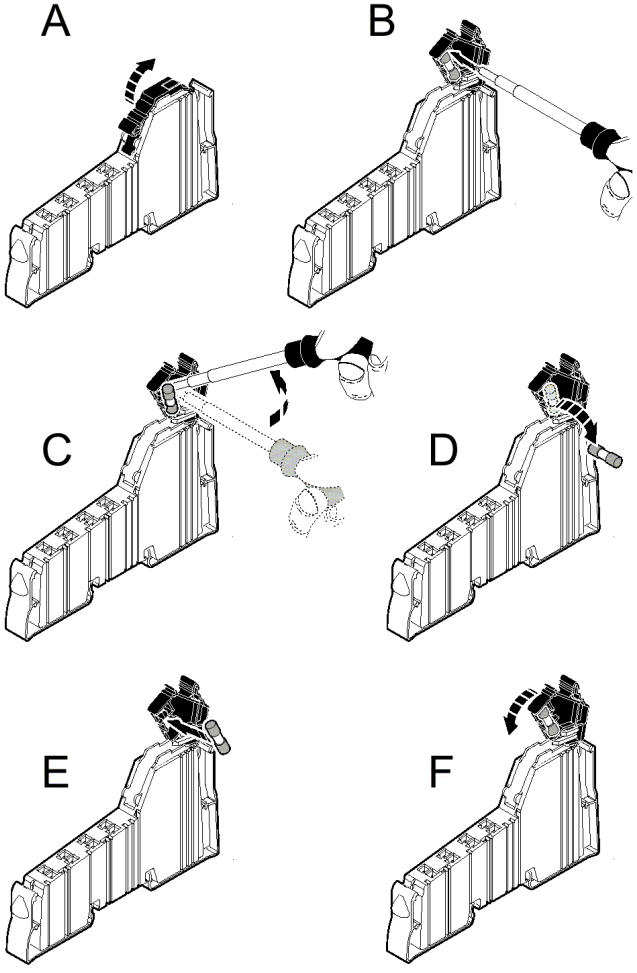
Category 5 cable is required for 100Base-TX operation. GE Fanuc recommends using Category 5 cable even for 10Base-T, because it is a higher quality cable and it will support a later system upgrade to 100Base-TX.

Unshielded Twisted Pair Ethernet Cables				
Cable Category	**Rating**	**Max. Drop Length**	**Standard**	**Suitable for:**
Category 5	100 Mbits/sec.	100 Meters	IEEE 802.3u	100Base-TX 10Base-T
Category 4	20 Mbits/sec.	100 Meters	IEEE 802.3	10Base-T
Category 3	16 Mbits/sec.	100 Meters	IEEE 802.3	10Base-T

Replacing Power and Segment Terminal Fuses

For VersaPoint Power and Segment Terminal modules that have built-in fusing, if a fuse is not present or defective, you must insert or exchange the fuse. Follow the steps below to replace a fuse:

1. Lift the fuse lever (A).
2. Insert the screwdriver behind a metal contact of the fuse (B).
3. Carefully lift the metal contact of the fuse (C).
4. Carefully lift the fuse on one side and remove it by hand(D).
5. Insert a new fuse (E).
6. Push the fuse lever down again until it snaps into place with a click (F).



Connecting Sensors and Actuators

Each module-specific data sheet indicates the appropriate Terminal Strip(s) for that module.

Connecting Discrete Devices

VersaPoint discrete modules allow the connection of sensors and actuators in 2-wire, 3-wire, or 4-wire technology (ability varies by module). A single Terminal Strip can support the following connection methods:

– 2 sensors or actuators in 2-, 3-, or 4-wire technology

– 4 sensors or actuators in 2- or 3-wire technology

– 2 sensors or actuators in 2- or 3-wire technology with shielding (for analog sensors or actuators)

The tables below summarize the connection options for 24V modules. A connection example is given in every module-specific data sheet.

Connections for Discrete Input Modules

Connection	Abbreviation	2-Wire	3-Wire	4-Wire
Sensor signal I_N	IN	X	X	X
Sensor supply U_S / U_M	US (+24V)	X	X	X
Ground (GND)	GND (⊥)	–	X	X
Ground/FE shielding	FE	–	–	X

Connections for Discrete Output Modules

Connection	Abbreviation	2-Wire	3-Wire	4-Wire
Actuator signal OUT	OUT	X	X	X
Actuator supply U_S	U_S (+24V)	–	–	X
Ground (GND)	GND (⊥)	X	X	X
Ground/FE shielding	FE	–	X	X

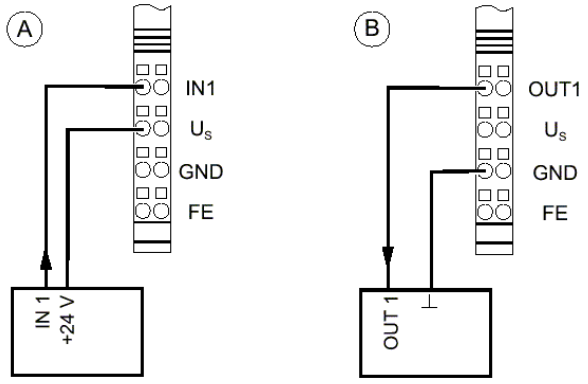
X Used
-- Not used

In the following figures U_S is the supply voltage. Depending on which voltage jumper is accessed, the main voltage U_M or the segment voltage U_S is the supply voltage.

Connecting 2-Wire Discrete Sensors and Actuators

Example A below shows the connection of a 2-wire sensor. The sensor signal is carried to the module point IN1. Sensor power is supplied through the voltage U_S.

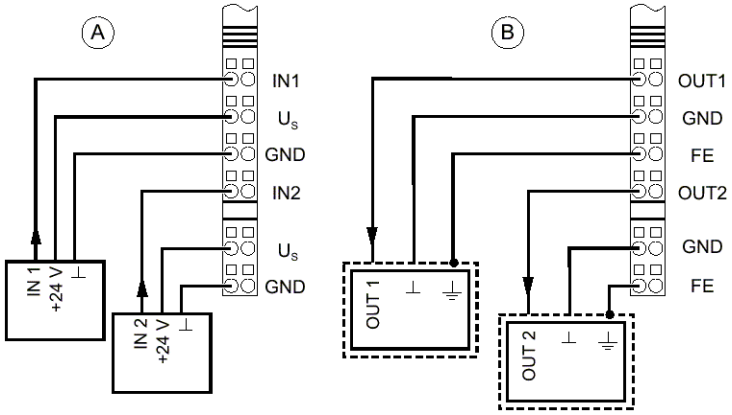
Example B below shows the connection of an actuator. The actuator power is supplied through output OUT1. The load is switched directly by the output. The maximum current carrying capacity of the output must not be exceeded.



Connecting 3-Wire Discrete Sensors and Actuators

Example A below shows the connection of a 3-wire sensor. The sensor signal is carried to the module point IN1 (IN2). The sensor is supplied with power using the module points U_S and GND.

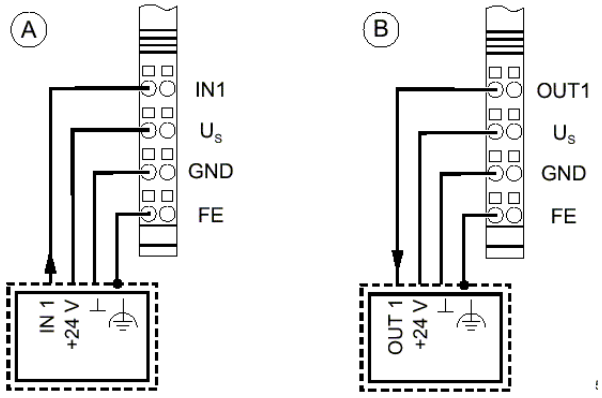
Example B below shows the connection of a shielded actuator. The actuator is supplied through output OUT1 (OUT2). The load is switched directly by the output. The maximum current carrying capacity of the output must not be exceeded.



Connecting 4-Wire Discrete Sensors and Actuators

Example A below shows the connection of a shielded 3-wire sensor. The sensor signal is carried to the module point IN1. The sensor is supplied with power using the module points U_S and GND. The sensor is grounded with the FE (Functional Earth Ground) module point.

Example B below shows the connection of a shielded actuator. By providing the supply voltage U_S, even actuators that require a separate 24V supply can be connected directly to the module. The maximum current carrying capacity of the output must not be exceeded.



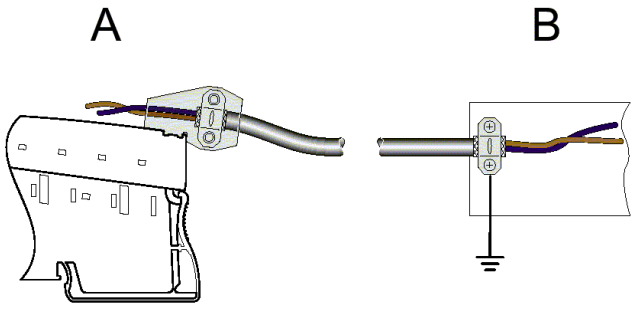
Connecting Analog Devices

Refer to the module datasheets for detailed instructions when connecting analog sensors and actuators. For maximum noise immunity, always use shielded, twisted-pair cables.

Connecting Field Devices to an Analog Input Module

For an analog input module:

- Within the module, grounding is connected with FE through an RC element
- For cable up to 10m (32.8 ft), connect the shield to the Shielded Terminal Strip as described previously.
- For cable longer than 10m (32.8 ft), connect the sensor directly to PE (protective earth ground) as shown below.



- When connecting the shield of the sensor with PE potential, ensure a large surface connection.

When using analog modules with more than one analog channel, there are different ways of connecting the shield. This depends on the wire diameter.

1. The preferred method for all wire diameters is to use a Terminal Strip with dual shield connectors (IC220TBK062).
2. Use a multi-wire cable for the connection of both sensors and connect the shield as described above to the shield connector (IC220TBK061).
3. Use a thin cable for the connection of each sensor and connect the shields of both cables together to the shield connector.

Connecting a Thermocouple Analog Input Module

1. Connect the shield to the shield connector.
2. Cut the braided shield off at the sensor or cover it with shrink tubing.

Connecting Field Devices to an Analog Output Module

For maximum noise immunity, always connect analog actuators with shielded, twisted-pair cables. For an analog output module:

- Connect the shield to the shield connector as described previously.
- When connecting the shield with FE potential, ensure a large surface connection.

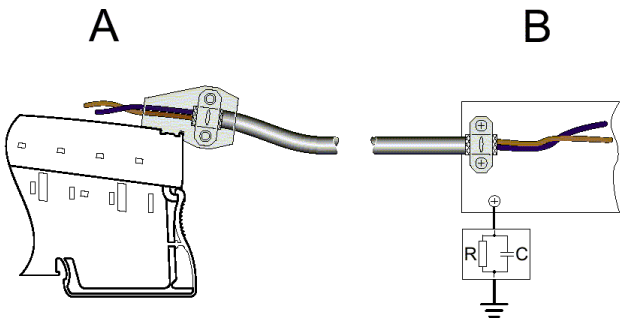
Danger of creating ground loops!

The shielding must be directly connected with ground potential at only one point.

For **cable lengths exceeding 10 meters (32.8 ft.)** the actuator side should always be isolated by means of an RC element.

- The capacitor C should typically have values of 1nF to 15nF.
- The resistor R should be at least 10MΩ.

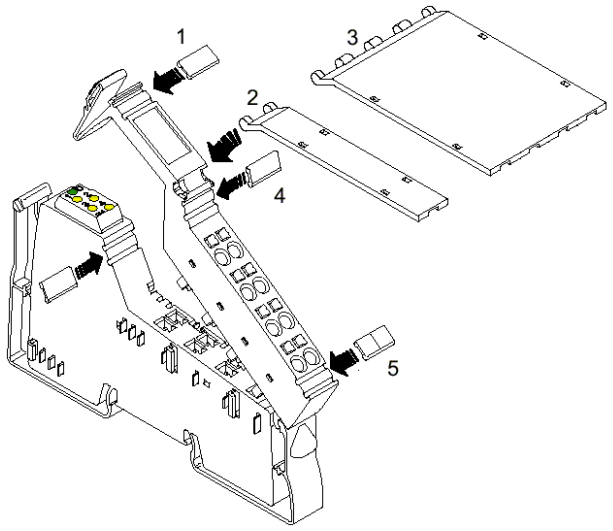
Connection of actuators for Signal Cables Longer than 10 Meters (32.8 Ft)



A Module side **B Actuator side**

Module Labeling

You can identify the slots, terminal points, and connections using point labels and module labels.



Various options are available for labeling slots and module points:

1	Each Terminal Strip can be labeled individually with point labels (numbered labels: IC220ACC003 numbered 1-100, qty 10 sets, or blank labels: IC220ACC004, qty 1000).
2 / 3	Another option is to use module labels. These are available in two widths, to cover one Terminal Strip (IC220ACC001, qty.10) or four Terminal Strips (IC220ACC002, qty. 10).
	The Terminal Strip has a keyway for attaching a module label. A small latch holds the module label in place.
4 / 5	Each signal can be labeled individually using point labels. On an Extended Double Terminal Strip, the higher keyway (4) is designed for labeling signals 1/2 and the lower keyway (5) is for signals 3/4. (Numbered labels: IC220ACC003 numbered 1-100, qty 10 sets, or blank labels: IC220ACC004, qty 1000).

Chapter 5

Power for the Station

This section explains how power is utilized by the station and routed among the modules.

- Supply of the Ethernet Network Interface Unit
  - The Logic Circuit
  - The Analog Circuit
  - The Main Circuit
  - Segment Circuit
  - Example of a Circuit Diagram
- Electrical Isolation
  - Electrical Isolation: Ethernet
  - Electrical Isolation: I/O
  - Electrical Isolation: Discrete Modules
  - Electrical Isolation: Analog Modules
  - Electrical Isolation: Other
- Summary of I/O Module Current Consumptions
- Station Configuration Example

Supply of the Ethernet Network Interface Unit

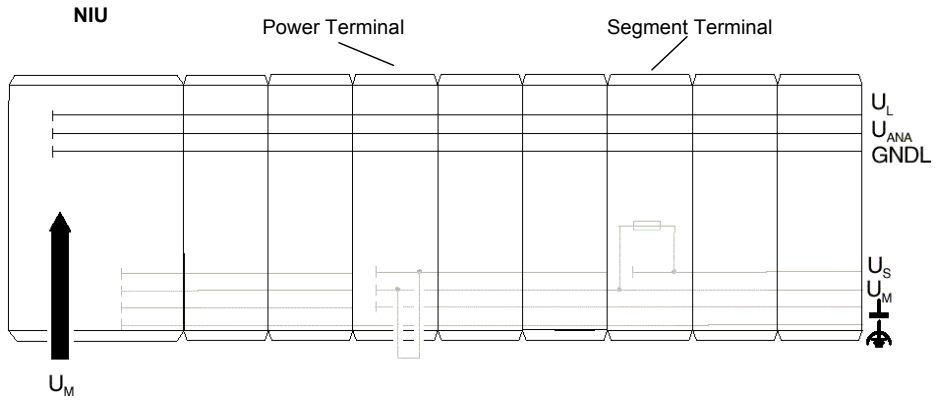
Logic and field power are distributed among VersaPoint I/O modules on several dedicated power circuits.

These are:

- The main power circuit (U_M), which powers all modules that do not need to be separately switchable from the main circuit. The main power circuit begins at the power terminal integrated into the NIU. It may also include additional Power Terminal modules as appropriate.
- The segment voltage (U_S) is drawn from the main power circuit at the NIU, at a Power Terminal module, or at a Segment Terminal module. A 24V segment circuit can be used to power I/O modules that must be separately switchable from the main voltage. One or more segment circuits might be created for discrete input modules without individual short-circuit protection, for discrete output modules, and to control power switches and contactors.
- Logic Voltage (U_L) is generated from the main power circuit at the NIU and provides communications power for all I/O modules in the station. This voltage is not augmented by the addition of extra power terminals.
- Analog Voltage (U_{ANA}) is supplied by the NIU and used to power the analog modules in the I/O Station. This voltage is not augmented by the addition of extra power terminals.

Each of these power circuits is described in this section.

The ***main power*** U_M and the ***segment voltage*** U_S for the station are connected at the Network Interface Unit. The main power generates internal voltages for the logic circuit U_L and analog signals U_{ANA}. The segment voltage supplies the sensors and actuators.



The Logic Circuit: U_L

The logic circuit with communications power U_L starts at the NIU. The logic circuit is fed through all modules of a station. The logic circuit cannot be supplied via another supply terminal.

Function: Logic Circuit U_L	Provides the communications power for all modules in the station.
Voltage of U_L	7.5V
Generation of U_L	U_L is generated from the main power U_M of the NIU. The communications power is not electrically isolated from the 24V input voltage for the NIU.
Current carrying capacity of U_L	2A, maximum. (See Summary of I/O Module Current Consumption at the end of this chapter).

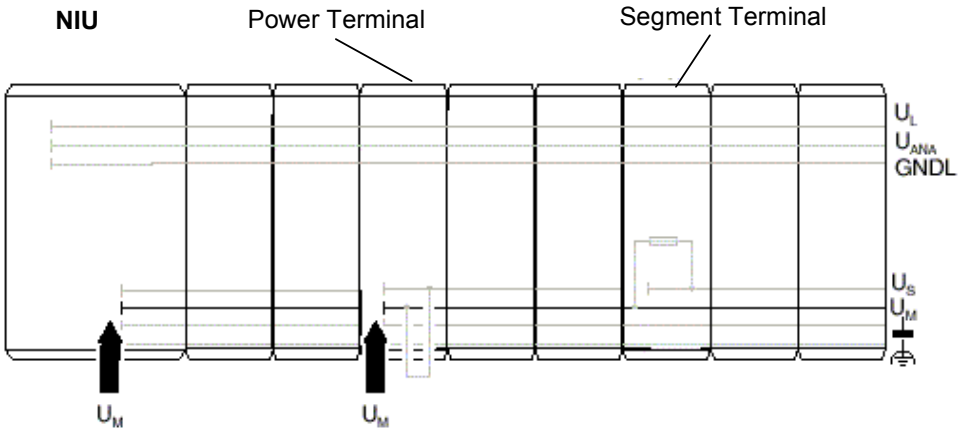
The Analog Circuit: U_{ANA}

Power for the analog modules (here also called analog voltage) U_{ANA} is supplied at the NIU. It is fed through all the modules in a VersaPoint station.

Function: Analog Circuit U_{ANA}	Provide power for analog modules
Voltage of U_{ANA}	24V.
Generation of U_{ANA}	U_{ANA} is generated from the main power U_M of the NIU.
Current carrying capacity of U_{ANA}	0.5A, maximum. (See Summary of I/O Module Current Consumption at the end of this chapter).

The Main Circuit: U_M

The main circuit with the main power U_M starts at the NIU or a power terminal.



U_M is fed through all subsequent modules until it reaches the next power terminal. A new circuit that is electrically isolated from the previous one begins at the next power terminal.

Multiple power terminals can be used within one station.

Function of U_M	Several independent segments can be created within the main circuit. The main circuit provides the main power for these segments. For example, a separate supply for the actuators can be provided in this way.
Voltage of U_M	The maximum voltage of this circuit is 24VDC. The voltage in this circuit can be up to 250VAC when using special power modules.
Current carrying capacity of U_M	The current carrying capacity is 8A, maximum (total current with the segment circuit). If the limit value of the voltage jumpers U_M and U_S is reached (total current of U_S and U_M), a new power terminal must be used.

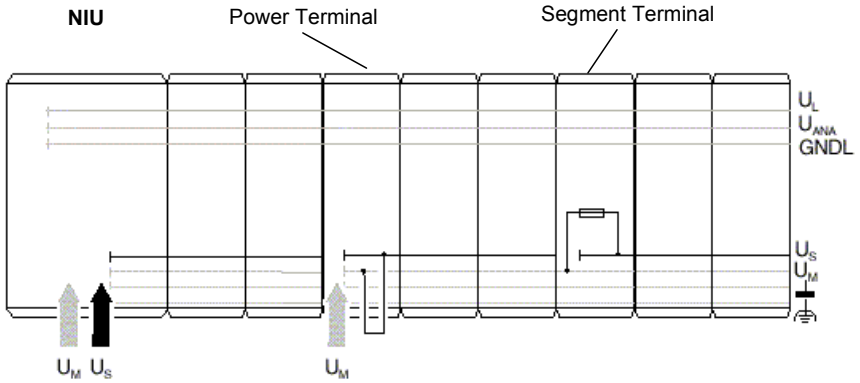
Generation of U_M

For many applications, the capacity of the U_M supply integrated into the Ethernet NIU is sufficient to power the station. If necessary, U_M can also be supplied via a power terminal. A power terminal must be used if:

1. Different voltage ranges (e.g., 120 V) are needed
2. Electrical isolation is required.
3. The maximum current carrying capacity of a voltage jumper (U_M or U_S) is reached.

Segment Circuit: U_S

A segment circuit or auxiliary circuit with segment voltage U_S starts at the NIU or at a supply terminal (power terminal or segment terminal). It is fed through all subsequent modules as far as the next supply terminal.



Function of U_S	You can use several segment terminals within a main circuit, and therefore segment the main circuit. It has the same ground reference as the main circuit. This means that circuits with different fuses can be created within the station without external wiring.
Voltage of U_S	24VDC maximum.
Current carrying capacity of U_S	8A, maximum (total current with the main circuit). If the limit value of a voltage jumper U_M or U_S is reached (total current of U_S and U_M), a new power terminal must be used. (See summary of I/O module current consumption in this chapter).

The segment circuit supplies all modules that need to be separately switchable from the main voltage e.g., on an emergency stop. This includes discrete input modules without individual short-circuit protection, discrete output modules, and auxiliary supply voltage for controlling power switches and contactors. The segment circuit can be switched off or fused using the emergency stop or segment terminals. It has the same ground reference as the main circuit. This means that emergency stop circuits or circuits with different fuses can be created within the station without external wiring.

Generation of U_S

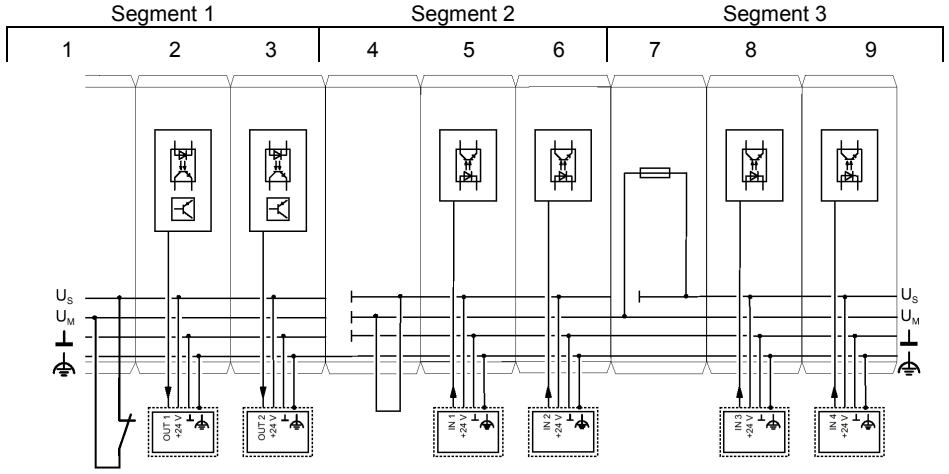
There are various ways of providing the segment voltage U_S:

1. You can supply the segment voltage at the NIU or at a power terminal.
2. You can tap the segment voltage from the main power at the NIU or a power terminal using a jumper or a switch.
3. You can use a segment terminal and tap the segment voltage from the main power.

With 120V and 230V voltage levels, segments cannot be created. In this case, only the main circuit is used.

Example of a Circuit Diagram

The diagram below shows part of a VersaPoint I/O Station.



Module	Type	Part Number	Max. Current Consumption of the Example Terminal from U_S
1	Network Interface Unit	IC220EBI001	2A
2	Discrete output module	IC220MDL753	4A
3	Discrete output module	IC220MDL721	4A
4	Power terminal	IC220PWR001	–
5	Discrete input module	IC220MDL643	2A
6	Discrete input module	IC220MDL642	1A
7	Fused Segment terminal	IC220PWR012	
8	Discrete input module	IC220MDL641	500mA
9	Discrete input module	IC220MDL641	500mA

Segment 1

The NIU supply and the main supply U_M are supplied at the NIU (1).

The supply voltage of the logic U_L and the supply voltage of the analog modules U_{ANA} are generated from the NIU supply (U_L and U_{ANA} are not considered in the figure).

Electrical isolation between logic and I/O is given through the separate supply of the NIU and U_M . The segment supply U_S for segment 1 is tapped from the main supply U_M. In this case, this happens through a switch located at the corresponding terminal points of the bus module. The digital output modules (2 and 3) are located in a switched segment circuit.

As the two output modules consume a maximum of 8A, the main voltage U_M must be reinjected behind these two modules to prevent the current carrying capacity of the voltage jumpers from being exceeded.

Segment 2

The supply voltage U_M is reinjected at the power terminal (4).

Using a jumper, the segment voltage U_S for segment 2 is tapped at this module from the main voltage U_M.

Segment 3

Segment 3 is created though a segment terminal with fuse (7).

In a segment terminal with fuse the segment voltage is automatically tapped from the main voltage. This segment circuit is protected by an internal fuse. Because of this fuse the circuit is suitable for the connection of input terminals without internal fusing (8 and 9) or for the connection of output terminals (not present in this example).

Segment Circuits have the advantage of isolating errors

- In this example, a short circuit in input module 8 would not affect the modules of the first or second segment. Because of the fuse in segment terminal 7, only the third segment is switched off.
- If an error occurred in the system, the discrete output modules 2 and 3 could be switched on or off without affecting modules of other segments.

Electrical Isolation

The Ethernet NIU and the VersaPoint system have a defined voltage and grounding concept. This avoids an undesirable effect on I/O devices in the logic area, suppresses undesirable compensating currents and increases noise immunity.

Electrical Isolation: Ethernet

The Ethernet interface is electrically isolated from the station electronics. The Ethernet cable shielding is directly connected with the function earth ground. The NIU has two functional earth ground springs that have contact to the DIN rail and are used to lead off interference, rather than as a protective earth ground. To ensure discharge of interference, even for dirty DIN rails, connect the functional earth ground directly to terminal points 1.4 or 2.4. This also sufficiently grounds the I/O Station up to the first segment terminal.

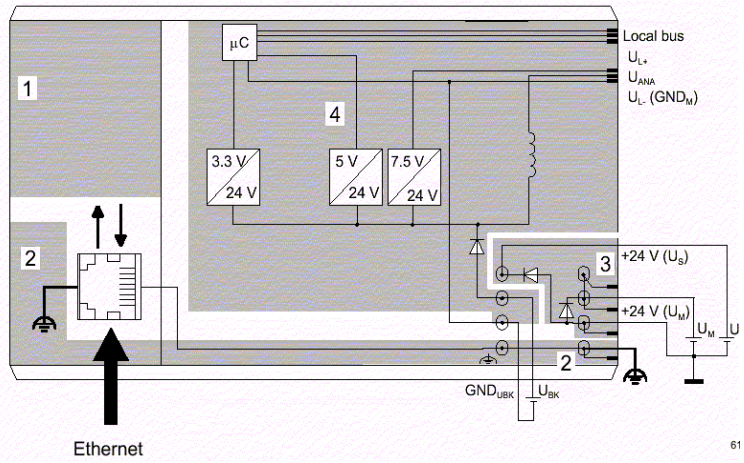
A 120VAC or 230VAC power terminal interrupts the FE potential jumper. Therefore, a subsequent 24VDC power terminal must also be grounded using FE.

To avoid the flow of compensating currents, a suitably-sized equipotential bonding cable must be connected parallel to the Ethernet cable.

Electrical Isolation: I/O

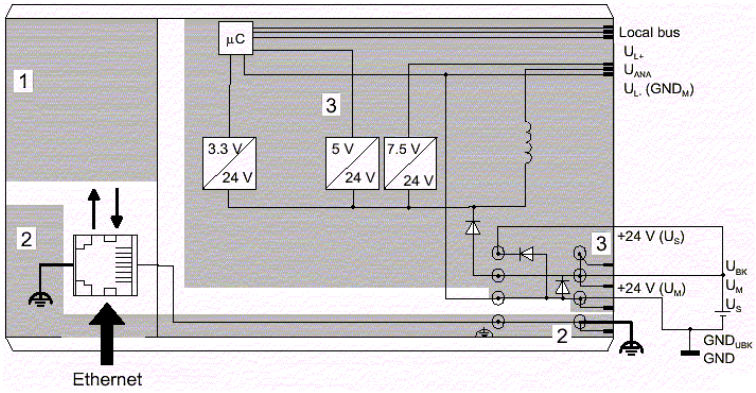
The NIU does not have electrical isolation for the VersaPoint module communications power. U_{BK} (24 V), U_L (7.5 V), and U_{ANA} (24V) are not electrically isolated. The logic and I/O devices can be supplied by separate power supply units. If you wish to use different potentials for the communications power (U_{BK}) and the segment/main voltage (U_S /U_M), do not connect the GND and GND_{UBK} grounds of the supply voltages.

The NIU main voltage and the I/O supply can be separately provided with the same ground potential from two voltage supplies as shown here:



The diagram shows the Ethernet interface area (1), the functional earth ground and shield Ethernet interface area (2), the main voltage U_M and I/O voltage U_S area (3), and the VersaPoint communications power (4).

The NIU main voltage and I/O supply can also be provided using a single voltage source:



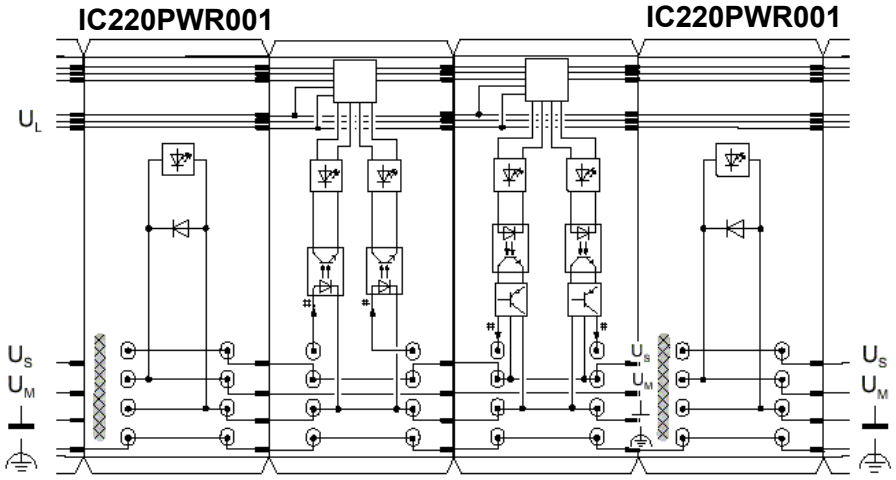
If isolation of these voltages is required, a separate power terminal with a separate isolated power supply must be used. Providing isolated power supplies for U_M and U_S on the same power terminal is insufficient as the two circuits share a ground.

Electrical Isolation: Discrete Modules

Isolation of the I/O circuit of a discrete module from the communications power requires a separate IC220PWR001 power module The voltages for the power terminal and the NIU are provided by isolated power supply units. The 24V power supply units must not be connected to one another.

The power terminal interrupts all voltage jumpers from the previous terminal and creates the voltage jumpers for the main circuit U_M, the segment circuit U_S and reference potential of the supply voltage GND. An example of this is shown below.

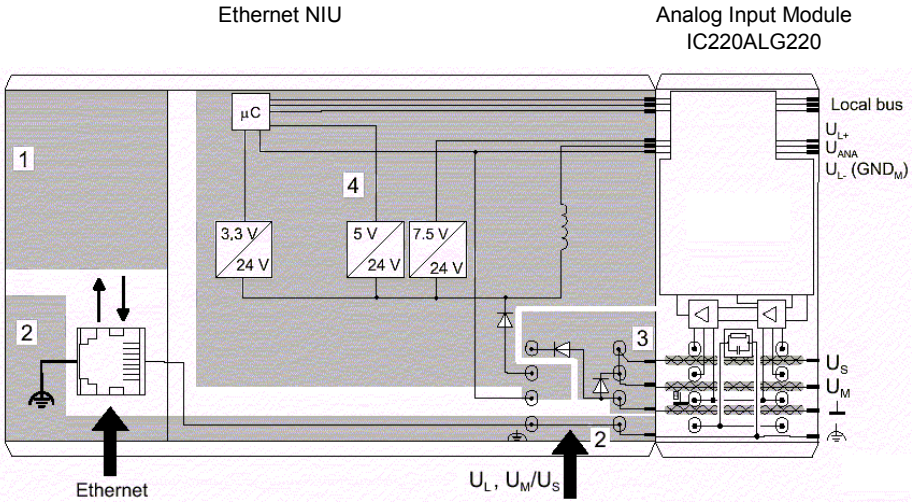
Example: Interruption/creation of the voltage jumpers with a power terminal



The areas hatched in the figure show the points at which the voltage jumpers are interrupted.

Electrical isolation: Analog module

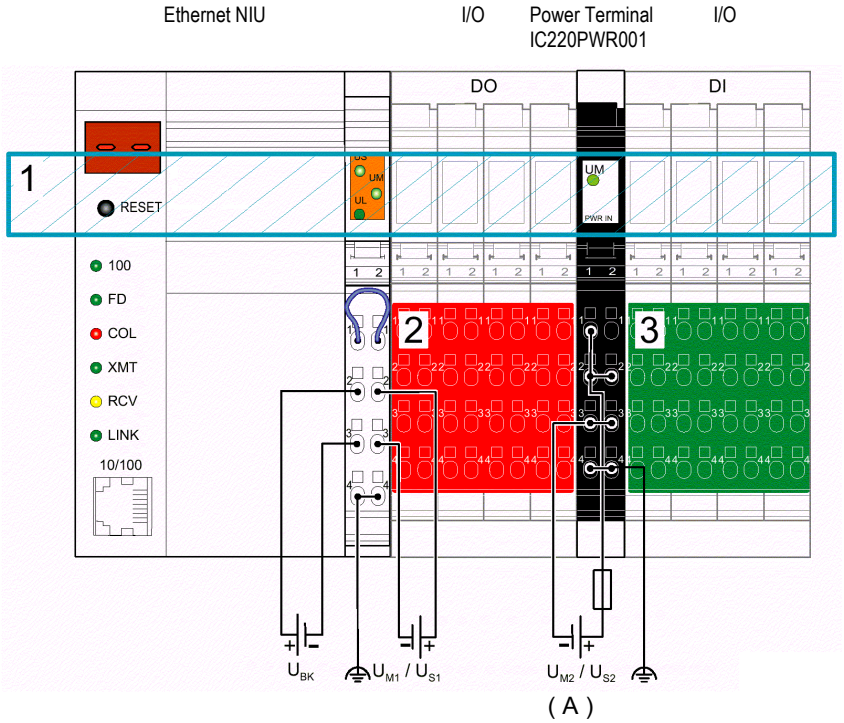
The I/O circuit of an analog module receives electrically isolated power from the 24V supply voltage U_{ANA}. The power supply unit with electrical isolation is a component of an analog module. The voltage U_{ANA} is carried through in each module and is available to the next module.



The voltage jumpers hatched **XXXX** in the figure are not used in the analog module. This means that the 24V supply of the NIU (U_M) or the power terminal are electrically isolated from the I/O circuit (measurement amplifier) of the analog module. The I/O circuit of the analog module is supplied by the analog circuit U_{ANA}.

Electrical isolation: Other

Other electrical isolation depends on how the supply voltages are provided. For instance, electrical isolation can be provided by inserting a new 24V supply using a power terminal. During this process the 24V power supply units must not be connected to one another. One method of electrical isolation using a power terminal is illustrated below. Connection between the ground of a supply voltage (U_S or U_M) and functional earth ground should only be made at one point within the station (point A). If a number of grounds are connected to the functional earth ground, the electrical isolation is lost.



Electrically isolated areas within the station:

1 Bus logic of the station

2 Isolated I/O

3 Isolated I/O

Summary of I/O Module Current Consumption

The following table provides a summary of the current that each VersaPoint module requires from the various power circuits. For information about additional VersaPoint module as they become available available, please consult the GE Fanuc website at WWW.GEFANUC.COM.

Module Number	Module Description	Current Consumption of:			
		U_L	U_{ANA}	U_S Channel/Module	U_M
Discrete Input Modules					
IC220MDL641	Input 24VDC Positive Logic 2 Points	35mA	-	250mA / 500mA	-
IC220MDL642	Input 24VDC Positive Logic 4 Points	40mA	-	250mA / 1A	-
IC220MDL643	Input 24VDC Positive Logic 8 Points	50mA	-	250mA / 2A	-
IC220MDL644	Input 24VDC Positive Logic 16 Points	60mA	-	250mA / 4A	-
IC220MDL661	Input 24VDC Negative Logic 2 Points	35mA	-	250mA / 500mA	
Discrete Output Modules					
IC220MDL721	Output 24VDC Positive Logic 2.0A 2 Points	35mA	-	2A / 4A	-
IC220MDL751	Output 24VDC Positive Logic 0.5A 2 Ppoints	33mA	-	500mA / 1A	-
IC220MDL752	Output 24VDC Positive Logic 0.5A 4 Points	40mA	-	500mA / 2A	-
IC220MDL753	Output 24VDC Positive Logic 0.5A 8 Points	60mA	-	500mA / 4A	-
IC220MDL754	Output 24VDC Positive Logic 0.5A 16 Points	90mA	-	500mA / 8A	-
IC220MDL761	Output 24VDC Positive Logic 0.5A 2 Points	32mA	-	500mA / 1A	
IC220MDL930	Output Relay 3.0A, 1 Point	60mA	-	3A / 3A	-
IC220MDL940	Output Relay 3.0A, 4 Points	22mA	-	3A / 12A	-
Special Function Modules					
IC220MDD840	High Speed Counter In 1 in/1 out 24VDC	50mA	-	500mA	500mA
Analog Input Modules					
IC220ALG220	Analog In 15 Bit Voltage/Current 2 Channels	88mA	15mA	-	-
IC220ALG620	Analog In 16 Bit RTD 2 Channels	43mA	11mA	-	-
IC220ALG630	Analog In 16 Bit Thermocouple 2 Channels	43mA	11mA	-	-
Analog Output Modules					
IC220ALG320	Analog Out 16 Bit Voltage/Current 1 Channel	35mA	25mA	-	-
IC220ALG321	Analog Out 13 Bit Voltage 1 Channel	35mA	25mA	-	-
IC220ALG322	Analog Out 13 Bit Voltage 2 Channels	35mA	28mA	-	-

Module Number	Module Description	Current Consumption of:			
		U_L	U_{ANA}	U_S Channel/Module	U_M
Power and Segment Terminals					
IC220PWR001	Power Terminal 24VDC	-	-	-	-
IC220PWR002	Power Terminal Fused 24VDC	-	-	-	-
IC220PWR003	Power Terminal Fused with Diag. 24VDC	25mA	-	-	-
IC220PWR011	Segment Terminal 24VDC	-	-	-	-
IC220PWR012	Segment Terminal Fused 24VDC	-	-	-	-
IC220PWR013	Segment Terminal Fused W/Diag 24vdc	25mA	-	-	-
IC220PWR014	Segment Terminal Elec Fused 24vdc	30mA	-	-	-

VersaPoint Power Consumption Example

When configuring a VersaPoint Station it is important to consider the current requirements of each module in the I/O system. These current requirements are described in the table "Summary of VersaPoint I/O Current Consumption" on the previous pages, and in the individual module data sheets. As mentioned:

- If the current load limit is reached at U_S or U_M a new Power Terminal must be inserted
- If the current load limit is reached for U_L or U_{ANA} a new VersaPoint I/O station must be built using another Network Interface Unit.

The following example shows how the current consumptions of a VersaPoint I/O station can be determined. It also illustrates the requirement for additional I/O terminals.

Consider an application which requires the following VersaPoint modules:

Catalog Number	Description
IC220MDL721(Qty 3)	Output, 24VDC Positive Logic, 2.0A, 2 Points
IC220MDL751	Output, 24VDC Positive Logic, 0.5A, 2 Points
IC220MDL752	Output, 24VDC Positive Logic, 0.5A, 4 Points
IC220MDL641(Qty 2)	Input, 24VDC Positive Logic, 2 Points
IC220MDL644	Input, 24VDC Positive Logic, 8 Points
IC220ALG620	Analog In, 15 Bit RTD, 2 Channel
IC220PWR014	Segment Terminal with Electronic Fuse

Using the table "Summary of VersaPoint I/O Current Consumption" in this chapter, the following current consumption table can be generated:

Module	No.	Current Consumption of				
		U_L (module)	U_L (total)	U_{ANA}	U_S (module)	U_S (total)
IC220MDL644	1	50mA	50mA		2A	2A
IC220MDL641	2	35mA	70mA		500mA	1A
IC220PWR014	1	30mA	30mA			
IC220MDL752	1	40mA	40mA		2A	2A
IC220MDL751	1	33mA	33mA		1A	1A
IC220MDL721	2	35mA	70mA		4A	8A
IC220MDL721	1	35mA	35mA		1.2A	1.2A
IC220ALG620	1	43mA	43mA	11mA		
Current Load			371mA	11mA		15.2A
Permissible current consumption of the voltage jumper			2A	0.5A		8A

The current requirements for U_L and U_{ANA} are within the supply capability of the Ethernet NIU. The current requirement of U_S exceeds the supply capability of the NIU, so additional power terminals must be used. The number of additional power terminals to be used depends on the arrangement of the modules.

As discussed in chapter 4, the recommended sequence of the modules in this example is:

	IC220EBI001	IC220MDL721	IC220MDL721	IC220MDL721	IC220MDL752	IC220MDL751	**IC220PWR014**	IC220MDL643	IC220MDL641	IC220MDL641	IC220ALG620
U_S/U_M:	4A	1.2A	4A	2A	1A		2A	0.5A	0.5A		
	5.2A		4A	2A	1A		3A				

If this arrangement must be maintained, two additional power terminals are needed:

	IC220EBI001	IC220MDL721	IC220MDL721	**IC220PWR001**	IC220MDL721	IC220MDL752	IC220MDL751	**IC220PWR001**	**IC220PWR014**	IC220MDL643	IC220MDL641	IC220MDL641	IC220ALG620
U_S/U_M:	4A	1.2A		4A	2A	1A				2A	0.5A	0.5A	
	5.2A			7A						3A			

If a system design goal is to use as few terminals as possible, the module sequence must be changed. In this case, only one additional power terminal would be needed:

	IC220EBI001	IC220MDL721	IC220MDL721	IC220MDL752	**IC220PWR001**	IC220MDL721	IC220MDL751	**IC220PWR014**	IC220MDL643	IC220MDL641	IC220MDL641	IC220ALG620
U_S/U_M:	4A	1.2A	2A		4A	1A		2A	0.5A	0.5A		
	7.2A				8A							

Please note that while the I/O modules must be rearranged in order to minimize the number of power terminals required, the recommended module sequence is preserved downstream of each power terminal.

Chapter 6 NIU Startup and Configuration

This chapter provides basic information related to starting up the NIU:

- Plug and Play Mode - Autoconfiguration for the I/O Station
  - Enabling Plug and Play Mode
  - Disabling Plug and Play Mode
  - Changing Module Parameters
- Establishing Network Parameters
  - Entering the MAC Address in a BootP Server
  - Reading the IP Address at Startup
  - Module Data Exchanged on the Ethernet Network
  - Setting a Temporary IP Address with the BootP Server
- Exchanging Data with Modules in the I/O Station
  - Input Data at Startup
  - Output Data at Startup
  - Output Data Following Loss of Ethernet Communications

6

Plug and Play Mode - Autoconfiguration for the I/O Station

Autoconfiguration occurs at powerup if the ENIU is in Plug and Play Mode. It does not require the use of a programmer, and the NIU does not need to be connected to the network. Plug and Play Mode is indicated by the display showing “PP” or “PP.”.

- When it is powered up, if there is a previous configuration, the NIU begins operating with that configuration. If the configuration does not match the actual I/O the ENIU switches to Stop mode.
- If the NIU does not have a configuration at powerup, the ENIU defaults to Plug and Play Mode and automatically creates a configuration for the I/O Station. The NIU assigns memory addresses to I/O modules in ascending order. Modules that have multiple data types are assigned reference addresses individually. Memory mapping in the NIU is described in detail in chapter 8.
- The NIU retains a configuration until it is powered up with Plug and Play Mode enabled.
- If the configuration changes during operation, e.g., due to an error, the NIU switches to Stop mode.

Enabling Plug and Play Mode

To Enable Plug and Play Mode:

1. The ENIU must have been configured with an IP Address.
2. With your WEB Browser connect to the ENIU
3. Select the I/O Station on the ENIU WEB page
4. Click the Radio Button to Enable Plug and Play Mode
5. Enter the password in the Plug and Play section (default is “private’), then click either Apply or Apply and Reboot. The ENIU will enter Plug and Play Mode the next time it powers up or reboots.

Disabling Plug and Play Mode

To clear an existing Autoconfiguration:

1. The ENIU must have been configured with an IP Address.
2. With your WEB Browser connect to the ENIU
3. Select the I/O Station on the ENIU WEB page
4. Click the Radio Button to Disable Plug and Play Mode
5. Enter the password in the Plug and Play section (default is “private”), then click Apply. The ENIU will immediately exit Plug and Play Mode.

Establishing the Network Parameters

Before the NIU can communicate with other devices on the network, its Ethernet parameters must be set up.

Entering the MAC Address in the BootP Server

The NIU must get its IP Address from a BootP server or a DPCP server which is configured to respond to BootP requests. Typically the IT department will take care of the BootP server functionality for the site. To set up a BootP server to supply an IP address, the BootP server needs to have the MAC Address of the device and the IP address the device is to use. This information is entered into the BootP server. See documentation for your BootP server for the details on how to do this.

The MAC address of the NIU is printed on the front of the unit.. The MAC address is in the form: 00.A0.45.xx.xx.xx. All characters in the MAC Address are HEX (0-9, A-F).

The BootP server will have a table that lists MAC addresses and the corresponding IP address for each device.

Feature	Description
IP Address	The IP Address is the unique address of the Ethernet NIU as a node on the network.
Subnet Mask	The Subnet Mask identifes the section of the overall network the NIU is on.
Gateway IP Address	IP address of the default gateway (router) device to be used when the NIU is unable to locate the desired remote device on the local sub-network.

Reading the IP Address at Startup

The VersaPoint NIU requests an IP Address from the BootP server every time it powers up or is reset. The first time a ENIU powers up it needs a BootP server to give it an IP Address before it can be used. If it receives a response from BootP server it will use the IP Address and Subnet Mask that it receives. Subsequent times that the ENIU powers up it will request an IP address from a BootP server. If it receives an IP Address from a BootP server it will use the IP Address. If it does not receive an IP address from a BootP server it will use the IP address if last received from a BootP server.

Once the NIU has an IP address, it can be accessed from a computer on the network, using a standard web browser. Its web address is, http://"IP Address". It is possible to change its Ethernet parameters including the IP Address. Note if the IP address is changed using a web browser the IP Address will still be set by a BootP server on the next Power up unless the BootP function is disabled.

Setting a Temporary IP Address with the BootP Server

If you don't know the present IP address and need to change the IP address using the web utility, follow the steps below to set a new IP address.

1. Set up a BootP server to supply a known IP address to the NIU. You will need the MAC address of the NIU from the label on the front.
2. From a personal computer on the network with the NIU, make a static entry into the arp table by entering the following at the command prompt:

   C:> arp –s <IP Address> MAC Address of the NIU

   Use the same IP Address you set up in the BootP server. For example:

   C:> arp –s 10.10.10.2 00-A0-45-00-iC-C2
3. Verify that the entry was accepted:

   C:> arp –a

   The new static entry should appear in the list.
4. From the command prompt, send a telnet command to the IP Address and port 1. For example:

   C:> Telnet 10.10.10.20 1

   This command will fail on the computer. even if the NIU received the message. However, you can tell whether the NIU received the message by checking its display window. The display alternately blinks “bP” and the previous code it was showing.

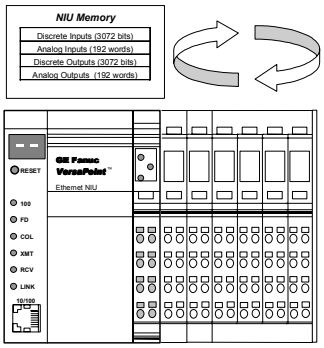
   Note: Steps 2 thru 4 can be done with the SetIP utility which is part of CIMPLICITY™ Machine Edition.
5. If the NIU is reset by pushing the Reset button within 2 minutes, it reverts back to looking for an IP address from a BootP server.

This process can be repeated if necessary after resetting the NIU.

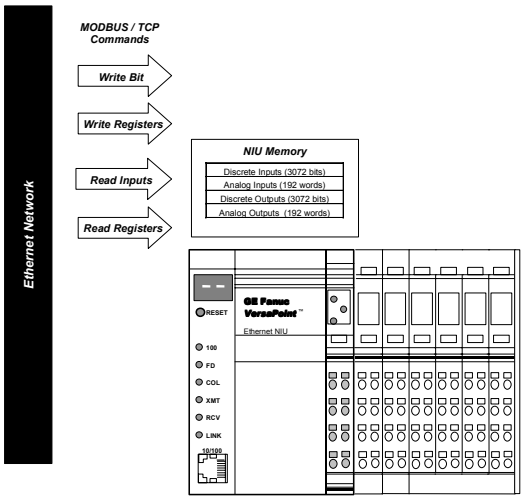
Exchanging Data with Modules in the I/O Station

The Ethernet NIU starts communicating with modules in the I/O Station as soon as it is powered up or reset, whether or not it is communicating on the network.

The NIU stores module I/O data in its internal memories. It continually refreshes input addresses with new input data from the hardware inputs such as sensors and switches that are connected to modules in the station. It also continually sends outputs from its internal memory to hardware devices such as actuators and indicators connected to module output terminals.



The NIU exchanges data on the Ethernet network by responding to Modbus/TCP commands. These Modbus/TCP commands can read or write any single data item or multiple data items as often as needed for the application. Chapter 8 describes data memory and Modbus/TCP commands in detail.



Input Data at Startup

The NIU updates its internal memory with real input data from the modules as soon as it is available in the modules. Therefore, the first time the application requests input data from the NIU, it receives real input values from the modules.

Output Data at Startup

After startup, the NIU begins sending outputs from its internal memory to the modules in the I/O Station. It sends zeros until it receives real output data from the network. As the NIU receives output data from the network, it begins providing real output data to the modules.

Example: an I/O Station has: an analog output module with 2 output words (AO), a digital output module with 16 bits (DO 16) and a digital output module with 2 output bits (DO 2). After powerup all module outputs are zero:

Module	AO	DO 16	DO 2
Value	0x0000	0x0000	0x0000

In the first write after powerup, 0x0200 is written to the output table for the DO16 module. The NIU sends the following values to the module outputs:

Module	AO	DO 16	DO 2
Value	0x0000	0x0200	0x0000

Subsequent write requests include writing 0x0010 to the analog output module, 0x0001 to the DO2 module and 0xACDC to the DO16 module. At this point, the NIU is sending the following values to the modules' outputs:

Module	AO	DO 16	DO 2
Value	0x0010	0xACDC	0x0001

Output Data Following Loss of Ethernet Communications

Operation of outputs if communications are lost is configurable, as described in chapter 9:

Mode	Discrete Outputs	Analog Outputs
Output Reset Mode (Default).	Set to zero	Go to a selected fault state (default is zero)
Hold Last State Mode	Hold last state	

Although it is not receiving communications on the network, the NIU continues to provide outputs to the modules in the I/O Station, according to the configured output default.

When communications are restored, the NIU begins to receive new output data from the network. It places those outputs in memory. As it updates the I/O module outputs, it provides the most recent data from memory, whether or not fresh data has been received from the network. Even if the NIU is configured for default to zero operation, it stops sending zeros when communications are restored.

Chapter 7 Local Diagnostics

This chapter describes in detail the indications of the NIU and module LEDs, as well as additional diagnostics features of the VersaPoint station.

- Displays on the NIU
  - LEDs
  - The NIU Numeric Display
- Power and Segment Terminal LEDs
- I/O Module LEDs
- LED Diagnostics Example

Additional Diagnostics Information

In addition to the diagnostics information available to operators from the LEDs and NIU display, detailed diagnostics are also available to operators and to the application program.

Additional Operator Diagnostics

The Ethernet NIU's web-based utility can be used to display diagnostic information in a graphical, easy-to-read format. See chapter 9 for information.

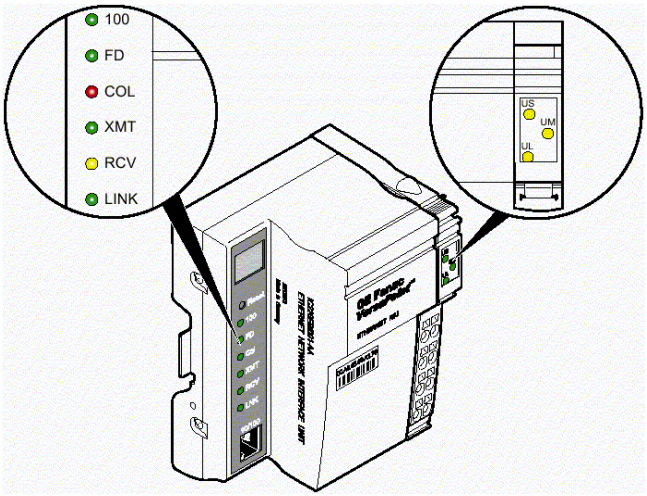
Diagnostics for the Application Program

In addition, the application program in a controller can read diagnostic information from the NIU using Modbus/TCP commands. Modbus commands can also be used to clear the fault table and to reset the NIU after a network failure. For details, see chapter 8.

Displays on the NIU

The numeric display and LEDs on the NIU show the status of the module and of Ethernet communications.

LEDs



NIU LED	Color	Meaning when ON
U_L	Green	24V supply and 7V communications power/interface supply present.
U_M	Green	24V supply main circuit and 7V communications power/interface supply present.
U_S	Green	24 V segment circuit supply present
100	Green	On: Operation at 100Mbits/s Off: Operation at 10Mbps if LNK LED is on
FD	Green	On: Indicates full duplex operation Off: Indicates half-duplex operation if LNK LED is on
COL	Red	On: Collision of data telegrams Off: Transmission of data telegrams without collision if LNK LED is on
XMT	Green	On: Data telegrams being sent Off: Data telegrams not being sent
RCV	Yellow	On: Data telegrams being received Off: Data telegrams not being received
LNK	Green	On: Network connection ready to operate Off: Network connection not ready to operate

The NIU Numeric Display

The NIU's numeric display provides specific status information about the operation of the NIU. For example, "bF" for "bus Fault":

Displays during startup/operation

Display	Meaning
01	Boot Loader is started, IP address requested from BootP server
Bo	Decompressing the firmware from Flash into RAM.
02	Firmware is started
--	Normal operation. No faults.
--.	Normal operation. No faults, at least one Modbus/TCP client is connected.

Additional Information

Display	Meaning
PP	Plug and Play mode
PP.	Plug and Play mode, at least one Modbus/TCP client is connected.

Displays during firmware update

Display	Meaning
03	The firmware download started
04	The firmware is being downloaded to Flash
05	The firmware transfer to Flash is complete

Boot Loader Error Messages

Display	Meaning	Remedy
17	The transfer of the firmware failed during tftp download (display changes from "03" to "17")	- Check the physical connection - Establish a point-to-point connection - Make sure that the file with the specified file name exists and is in the correct directory - Check the IP address of the tftp server - Activate the tftp server - Repeat the download
19	The download completed successfully, but the file is not a valid firmware version for the NIU	- Provide a valid firmware version with the previously specified file name (website: www.gefanuc.com) - Repeat the download

Firmware Error Messages

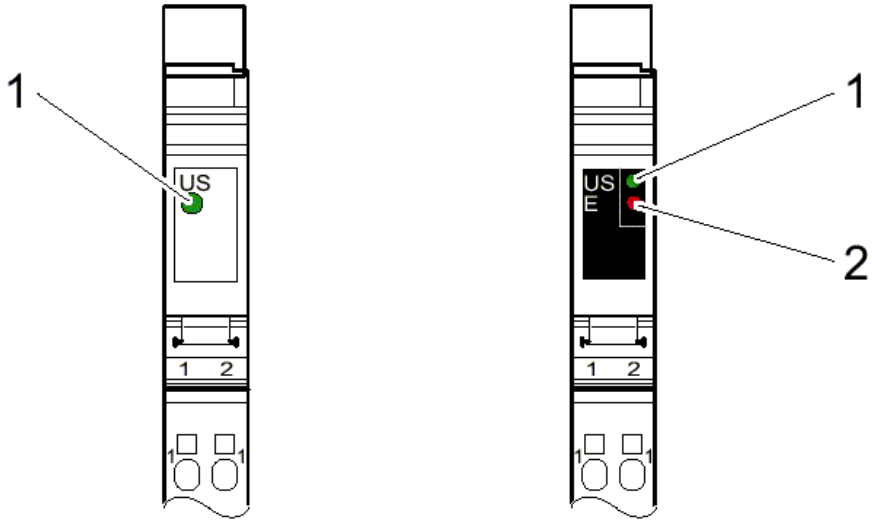
Display	Meaning	Remedy
80	An error occurred in the firmware	- Restart the device (power up or reset)
81	An error occurred when accessing EEPROM	- Restart the device (power up or reset)
82	The current configuration could not be activated	- Using a WEB browser, check I/O Station, Remote Diagnostics & Bus Configuration - From Controller, read Diagnostic Status Register and Diagnostic Parameter Register using Modbus Read Holding Register command
83	The current configuration could not be activated because the current configuration and the reference configuration are not the same	- Activate Plug & Play mode to have the ENIU automatically create a new configuration.
8A	Event watchdog occurred	
BF	I/O Station error	- Using a WEB browser, check I/O Station, Remote Diagnostics & Bus Configuration - From Controller, read Diagnostic Status Register and Diagnostic Parameter Register using Modbus Read Holding Register command
bF.	I/O Station error with at least one Modbus client connected	- Using a WEB browser, check I/O Station, Remote Diagnostics & Bus Configuration - From Controller, read Diagnostic Status Register and Diagnostic Parameter Register using Modbus Read Holding Register command
NF	Ethernet network failure	- Check the Ethernet connection, monitoring function active
NC	Ethernet not connected. All Modbus/TCP connections lost.	

Multiple Errors

If multiple errors occur simultaneously, the display shows the message with the highest priority, as listed below:

Priority	Message	Meaning
1	8x	General Firmware Error
2	BF	Bus error, the bus was stopped due to an error
3	nF / nC	Network error / last modbus/tcp connection was lost
4	PF	Peripheral Fault on a I/O module
5	PP	Plug & Play Mode active

Power and Segment Terminal LEDs



On Power and Segment Terminals with fusing, the green LED indicates that the main or segment voltage is present. In the case of fused terminals (illustration right above), the green LED indicates the main voltage is present at the line side of the fuse. If the red LED is also on, there is no voltage on the load side of the fuse.

Power Terminal LEDs

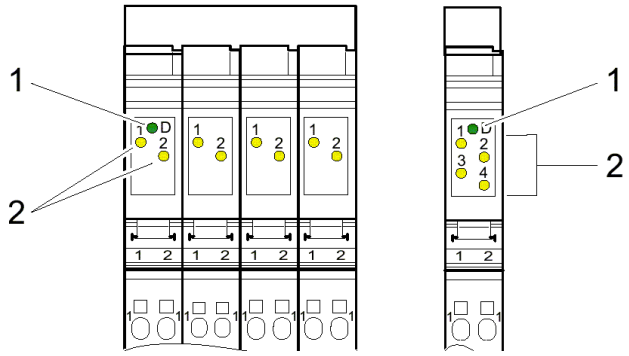
US (1)	Green LED	Supply voltage in the main circuit
	ON:	Supply voltage present in the main circuit
	OFF:	Supply voltage not present in the main circuit
E (2)	Red LED	On fused modules: fuse status
	ON:	Fuse not present or blown
	OFF:	Fuse OK

Segment Terminal LEDs

US (1)	Green LED	Supply voltage in segment circuit
	ON:	Supply voltage present in segment circuit
	OFF:	Supply voltage not present in segment circuit
E (2)	Red LED	On fused modules: fuse status
	ON:	Fuse not present or blown
	OFF:	Fuse OK

I/O Module LEDs

I/O modules have both diagnostic (1) and status (2) LEDs. All input/output module LEDs are electrically located in the logic area.



Diagnostics LEDs on I/O Modules

The diagnostic indicators (red/green) indicate the status of the modules. A module is operating normally if its diagnostic LED (D) is on and green. If an error is detected, the LEDs immediately display the current status.

D (1)	Green LED	Diagnostics
	ON:	Station is active
	Flashing:	
	0.5 Hz: (slow)	Communications power present, backplane not active
	2 Hz: (medium)	Communications power present, backplane active, I/O error
	4 Hz: (fast)	Communications power present Backplane communications has failed with the module or between the module and the preceding module.
	OFF:	Communications power not present, backplane not active

Status LEDs on I/O Modules

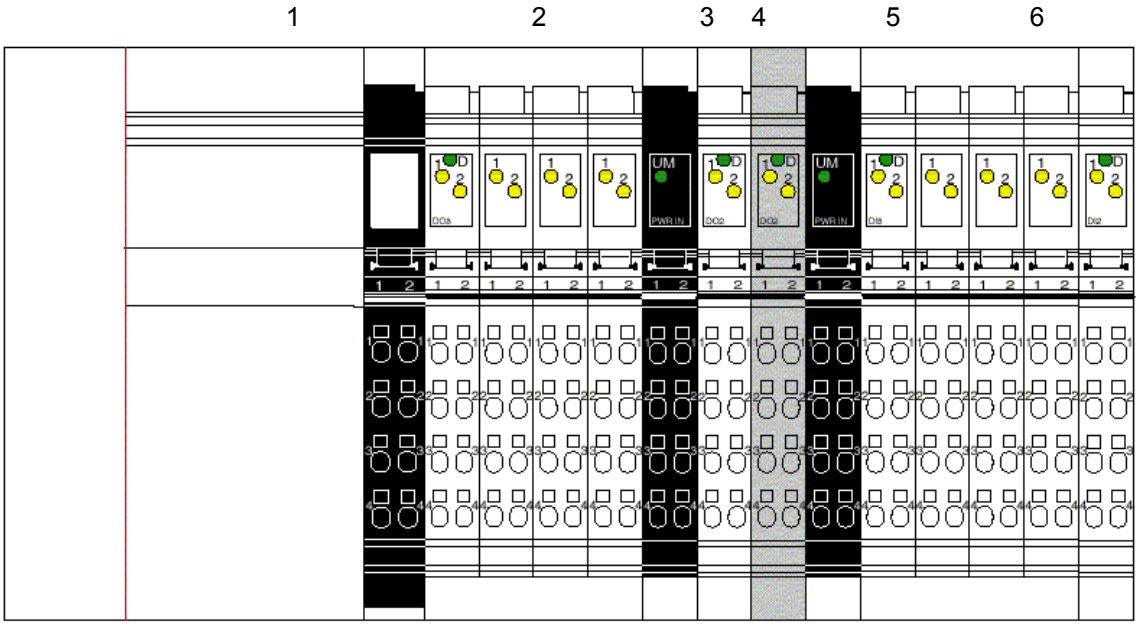
The status indicators (yellow) display the status of the relevant inputs/outputs.

1, 2, 3, 4 (2)	Yellow LED	Status of the input/output
	ON:	Associated input/output ON
	OFF:	Associated input/output OFF

LED Diagnostics Example

The following example provides an indication of how the module LEDs of a VersaPoint station will react in the presence of different types of errors. Two specific errors are shown, an I/O error and a backplane error.

Example Station for Error Identification

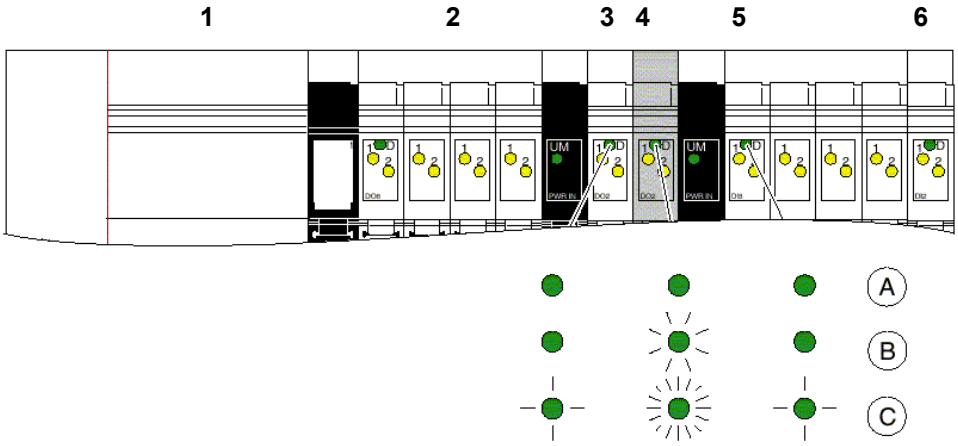


Modules used in the example station:

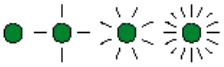
1	IC220EBI001	4	IC220MDL751
2	IC200MDL753	5	IC220MDL643
3	IC220MDL751	6	IC220MDL641

In this illustration, the power terminals are not numbered because they do not include diagnostics and therefore report no data to the NIU. If modules including diagnostics had been selected these modules would report data to the NIU and would be numbered.

The example below shows error states. Either errors have been detected on module 5 or module 4 has broken down. The illustration below shows the behavior of the diagnostic indicators on the adjacent modules.



A No error
B I/O error
C Backplane error



LED on or flashing at 0.5Hz / 2Hz / 4Hz (On / slow / medium / fast)

I/O Error

Error:	Short circuit on module 4 (IC220MDL751)
Effect:	
Control system:	Error message to the control system (I/O error)
NIU:	Indicators remain unchanged
Module 4:	Green D LED flashes at 2Hz
Other modules:	Remain unchanged

Backplane Error

Error:	Incoming bus after module 2 and before module 4 has been interrupted
Effect:	
Control system:	Error can be located by the control system
Bus module:	Red LD LED (Local bus Disabled) on
Module 4:	Green D LED flashes at 4Hz (bus error)
Other modules:	Green D LEDs on all other modules flash at 0.5Hz

Chapter 8

Exchanging Data

This section explains how an application can use Modbus/TCP commands to exchange data with a VersaPoint Ethernet NIU.

- Modbus Communications for the Ethernet NIU
- How Data is Stored in the NIU
- Modbus/TCP Message Format
- Read Coils (Function Code 1). Use this command to read discrete outputs.
- Read Discrete Inputs (Function Code 2). Use this command to read discrete inputs.
- Read Multiple Registers (Function Code 3). Use this command to read:
  - input and output data
  - the NIU status
  - the Diagnostic Status registers
  - the Fault Table
- Read Input Registers (Function Code 4). This command is the same as the Read Multiple Registers command.
- Write Coil (Function Code 5). Use this command to set or clear one output bit.
- Write Single Register (Function Code 6). Use this command to:
  - write one analog output value
  - write a value representing the states of 16 discrete outputs
  - place the NIU in Plug & Play mode
  - reset the NIU following a network failure
  - clear all the faults in the Fault Table
- Read Exception Status (Function Code 7) (future)
- Write Multiple Registers (Function Code 16). Use this command to write:
  - discrete and/or analog outputs
  - configuration parameters for some types of modules
  - an optional timeout value for monitoring the Ethernet connection

Modbus / TCP Communications for the Ethernet NIU

Devices on the network can use several types of Modbus /TCP messages to read inputs and diagnostic information from the I/O Station, and to send outputs and commands to the NIU. The following table lists the types of operations that can be performed with each Modbus command. Commands are described in detail in this chapter.

Operations that are Performed with Modbus Commands

To Perform this Operation:	Use this Modbus Command:	Command Number
Reading one or more discrete outputs	Read Coils	1
Reading one or more discrete inputs	Read Discrete Inputs	2
Reading discrete or analog data Reading the NIU status word Reading the Diagnostic Status words Reading the Fault Table	Read Multiple Registers	3
Reading one or more input words	Read Register Inputs	4
Setting or clearing one output bit	Write Coil	5
Writing one analog output word Writing a word of discrete outputs (16bits) Placing the NIU in Plug & Play mode Resetting the NIU after a network failure Clearing the Fault Table	Write Single Register	6
(future)	Read Exception Status	7
Writing discrete or analog outputs Writing an timeout value for Ethernet monitoring Configuring some modules	Write Multiple Registers	16

Modbus Support for the NIU

The Ethernet NIU supports:

- Modbus communication via Modbus industry standard port 502.
- Modbus Conformance classes 0 and 1.
- Up to eight simultaneous connections
- The ‘CRC-16’ or ‘LRC’ check fields associated with Modbus are not used in Modbus/TCP, the Ethernet TCP CRC is used instead.

Sending a Write Command Following a Network Failure

Attempting to write to the NIU when it is in network fail mode causes an error . Operation can be restored in 2 ways.

1. To restore operation, go to the I/O Station, Data Processing Monitoring web page. The network failure status appears at the bottom of the page. To clear the status, enter the password then click "confirm". The NIU will again start sending outputs to the modules in the I/O Station. For more information about accessing and using the ENIU web pages, please turn to chapter 9.

2. The network status can also be reset by using the Write Single Register command (function code 6) as described in this chapter.

Exception Codes to Modbus Messages

If the ENIU receives an incorrect request or if a module communications failure occurs within the I/O Station, the NIU sends an error message called an exception to the Modbus master.

Exception codes are created by adding 80 hex to the function code of the request and following this byte by one informational byte. The exception may be:

Exception Code	Indicates	Possible Causes
01H	Illegal Function	▪ Unsupported Modbus function code. ▪ NIU in the wrong state to process the request.
02H	Illegal Data Address	Offset not in range for the function; invalid combination of offset and length.
03H	Illegal Data Value	A value contained in the message data field is not permissible for the NIU
04H	Device Failure	NIU is not able to exchange data.

How Data is Stored in the NIU

Data memory in the Ethernet NIU is arranged by data type and assigned the Modbus addresses shown below. The NIU automatically assigns data within these memory areas in the same sequence in which the modules are autoconfigured.

As shown in the table, all data is stored in register (word) memory. Discrete inputs and discrete outputs are also re- mapped into bit-type input and output tables.

Data Types	Modbus Registers (16-bit Words)	Modbus Discrete Input Table (Bits)	Modbus Discrete Output Table (Bits)
Discrete Inputs (3072 bits) (NIU Status Word)	40001 - 40192 (40192)	00001 - 03072 (03057 - 03072)	
Analog Inputs (192 words) (Diagnostic Registers)	40193 - 40384 (40383, 40384)		
Discrete Outputs (3072 bits)	40385 - 40576		00001 - 03072
Analog Outputs (192 words) (NIU Command Word)	40577 – 40768 (40768)		
Fault Table (64 words =32 faults) (Clear Fault Table)	41025 - 41088 (41025)		
Optional timeout value for Ethernet connection monitoring (1 word)	41281		

A host controller that exchanges data with the NIU can assign the data to any references that are suitable for its own application. However, such application references are not used by the NIU and are not meaningful in the Modbus commands.

Modbus commands reference the addresses shown above in the form of offsets. An offset equals the Modbus address minus one. Offsets for each Modbus command are described later in this chapter.

Memory Requirements for Individual VersaPoint Modules

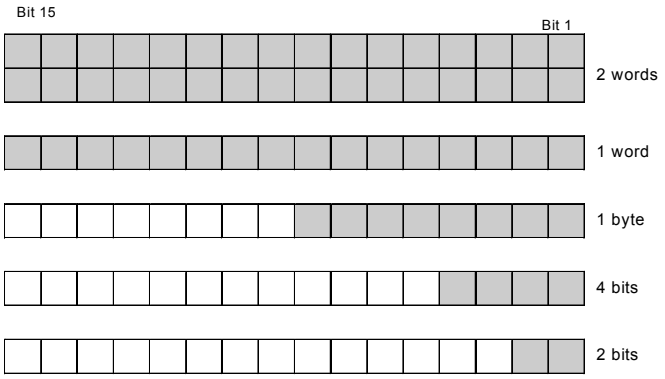
The NIU reserves 3072 bits in memory for discrete inputs and 3072 bits for discrete outputs. It also reserves 192 16-bit words for discrete inputs, 192 words for analog inputs, 192 words for discrete inputs, and 192 words for analog outputs. However, these limits will not be reached. The maximum number of I/O modules per I/O Station is 63. If an I/O Station had 63 discrete 16-point modules of the same type (input or output), their data would use only 1008 bits (63 words) of memory. Similarly, most analog modules use only 1 or 2 registers of inputs and/or outputs. If the station had 63 analog 2-channel modules, it would only use 126 registers.

Module Number	Module Description	Discrete Inputs	Discrete Outputs	Analog Input Words	Analog Output Words
Discrete Input Modules					
IC220MDL641	Input 24VDC Positive Logic 2 Points	2			
IC220MDL642	Input 24VDC Positive Logic 4 Points	4			
IC220MDL643	Input 24vdc Positive Logic 8 Points	8			
IC220MDL644	Input 24vdc Positive Logic 16pt	16			
IC220MDL661	Input 24vdc Negative Logic 2pt	2			
Discrete Output Modules					
IC220MDL721	Output 24VDC Positive Logic 2.0A 2 Pts		2		
IC220MDL751	Output 24vdc Positive Logic 0.5a 2 Pts		2		
IC220MDL752	Output 24VDC Positive Logic 0.5A 4 Pts		4		
IC220MDL753	Output 24vdc Positive Logic 0.5a 8 Pts		8		
IC220MDL754	Output 24vdc Positive Logic 0.5a 16 Pts		16		
IC220MDL761	Output 24vdc Positive Logic 0.5a 2 Pts		2		
IC220MDL930	Output Relay 3.0A 1 Point		2		
IC220MDL940	Output Relay 3.0A 4 Points		4		
Special Function Modules					
IC220MDD840	High Speed Counter In, 1in/1out 24VDC			2	2
IC220MDD841	Absolute Encoder Module			2	2
IC220MDD842	Incremental Encoder Module			2	2
IC220STR001	Motor Started Direct 1.5kW,/ 400VAC	8	8		
Analog Input Modules					
IC220ALG220	Analog In 15 Bit Voltage/Current 2 Ch.			2	2
IC220ALG620	Analog In 16 Bit RTD 2 Ch.			2	2
IC220ALG630	Analog In 16 Bit Thermocouple 2 Ch.			2	2
Analog Output Modules					
IC220ALG320	Analog Out 16 Bit Voltage/Current 1 Ch.				1
IC220ALG321	Analog Out 13 Bit Voltage 1 Ch.				1
IC220ALG322	Analog Out 13 Bit Voltage 2 Ch.			2	2

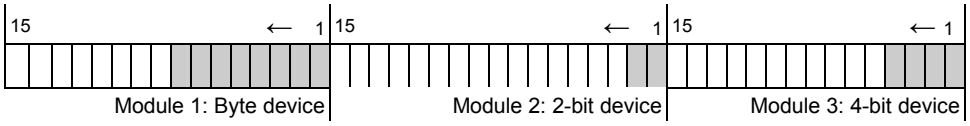
Module Data in the NIU

Data memory in the NIU is word-oriented. The NIU stores data in memory on a per-module basis, depending on the amount of data for the module.

The diagram below shows how data bits for discrete input and output modules are stored in these word-based memory areas. Formats are shown for modules with 2 words, 1 word, 1 byte, 4 bits, or 2 bits of data. Bits not used for module data are filled with zeros.



Data is stored in memory in the same order as modules of that type are Autoconfigured in the I/O Station. The NIU exchanges data on the network in the same sequence, as shown below. Unused bits filled with zeros. For example, data for three discrete input modules in an I/O Station might look like this:



← ***Example Discrete Input Data sent on Network***

Similarly, discrete outputs should be padded with zeros when writing multiple registers.

Modbus Byte Order

When more than one byte is sent, the most significant byte is sent first. For example:

- The quantity 0x1234 would be transmitted in the order 0x12 0x34
- The quantity 0x12345678 would be transmitted in the order 0x12 0x34 0x56 0x78

Modbus Bit Order

If a series of bits is read as a register, such as 1 to 16, the highest numbered bit (16 in this example) is the least significant, and the lowest numbered bit (1 in this example) is the most significant.

Read Coils (Function Code 1)

The Modbus Read Coils command can be used to read one or more bits from the Modbus Discrete Output (Coil) table. These bits correspond to the hardware outputs for modules in the I/O Station.

Modbus Coil Table (Bits)	Offsets
00001 – 03072	0 - 3071

Read Coils Request

The Read Coils request has this format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 1
Byte 8 - 9	Coil Table Offset (offset is zero-based, enter address minus one)
Byte 10 - 11	Bit Count (1-2000)

Read Coils Response

The response to a Read Coils request is: replies also start at byte 7

Byte 0	Function Code = 1
Byte 1	Byte count of response; B = (bit count of request + 7)/ 8
Byte 2 – (B + 1)	Bit Values (least significant bit is first coil)

If the request contains an invalid offset, an invalid bit count, or a combined offset and count that produce an offset above 3071, the NIU returns this Exception Response:

Byte 0	Function Code = 0x81
Byte 1	Exception Code = 2 (Illegal Data Address)

Read Coils Examples

- To read discrete output 1, enter Coil Table Offset = 0 and Bit Count = 1.
- To read discrete outputs 1 to 32, enter Coil Table Offset = 0 and Bit Count = 32. Note That the 32 output bits are padded with zeros if the output modules are smaller that 16 bits
- To read 5 to 17, enter Coil Table Offset = 4 and Bit Count = 13.

Read Discrete Inputs (Function Code 2)

The Read Discrete Inputs command can be used to read one or more bits from the Modbus Discrete Input table.

Modbus Discrete Input Table (Bits)	Offsets
00001 - 03072	0 - 3071

Read Discrete Inputs Request

The Read Discrete Inputs request has this format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 2
Byte 8-9	Input Discrete Table Offset (offset is zero-based, enter address minus 1)
Byte 10-11	Bit Count (1-2000)

Read Discrete Inputs Response

The response to a Read Discrete Inputs request is:

Byte 0	Function Code = 2
Byte 1	Byte count of response (B = (bit count of request + 7)/8)
Byte 2 – (B + 1)	Bit Values (least significant bit is first coil)

If the request accesses an invalid offset, an invalid bit count, or a combined offset and count that produce an offset above 3071, the NIU returns this Exception Response:

Byte 0	Function Code = 0x82
Byte 1	Exception Code = 2 (Illegal data address)

Read Discrete Inputs Examples

- To read discrete input 1, enter Offset = 0 and Bit Count = 1.
- To read discrete inputs 1 to 32, enter Offset = 0 and Bit Count = 32. Note That the 32 output bits are padded with zeros if the output modules are smaller that 16 bits
- To read discrete inputs 5 to 17, enter Offset = 4 and Bit Count = 13.

Read Multiple Registers (Function Code 3)

The Modbus Read Multiple Registers command reads data from the Modbus Register table. Because all of the NIU's I/O information is remapped into the Modbus Register table, this message can be used to read:

- any input and output data
- the NIU Status word, which shows the current operating status of the NIU itself
- the Diagnostic Status registers
- the Fault Table
- the optional Timeout Value for Ethernet connection monitoring

Data Types	Modbus Registers	Offsets
Discrete Inputs (3072 bits) (NIU Status Word)	40001 - 40192 (40192)	0 - 191 (191)
Analog Inputs (192 words) (Diagnostic Registers)	40193 - 40384 (40383, 40384)	192 - 383 (382 - 383)
Discrete Outputs (3072 bits)	40385 - 40576	384 - 575
Analog Outputs (192 words)	40577 - 40768	576 - 767
Fault Table (64 words =32 faults)	41025 - 41088	1024 - 1087
Optional timeout value for Ethernet connection monitoring (1 word)	41281	1280

Read Multiple Registers Request

The Read Multiple Registers request has this basic format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 3
Byte 8-9	Register Table Offset
Byte 10-11	Word Count (1-125) (16-bit words)

Read Multiple Registers Response

The response to a Read Multiple Registers request is:

Byte 0	Function Code = 3
Byte 1	Byte Count of response (B = 2 x word count of request)
Byte 2 – (B + 1)	Register Values

If the request contains an invalid offset, an invalid length, or a combined offset and count that produce an offset between 767 and 1024, the NIU returns this Exception Response:

Byte 0	Function Code = 0x83
Byte 1	Exception Code = 2 (Illegal data address)

Read Multiple Registers Examples

- To read discrete inputs 1-32 from the Register Table, enter Offset = 0 and Count = 2.
- To read the first analog input from the Register Table, enter Offset=192 and Count=1.

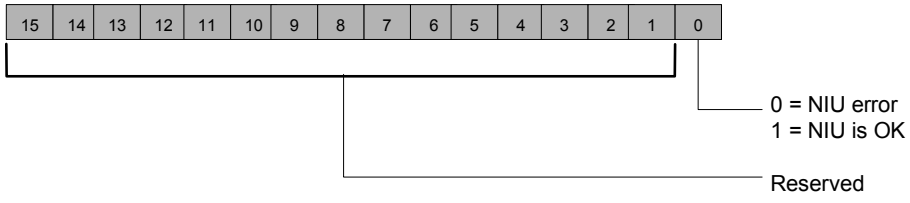
Using Read Multiple Registers to Read the NIU Status Word

The NIU Status Word contains one meaningful bit that indicates the error status of the NIU itself.

The Read Multiple Registers request to read the NIU Status Word has this format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 3
Byte 8-9	Register Table Offset = 191
Byte 10-11	Word Count = 1

Bit 0 of the NIU Status Word shows the status of the NIU:



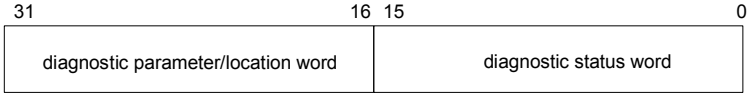
Using Read Multiple Registers to Read the Diagnostics Status Words

Two Diagnostic Status words provide information about I/O Station faults.

The Read Multiple Registers request to read the Diagnostic Status wordrs has this format:

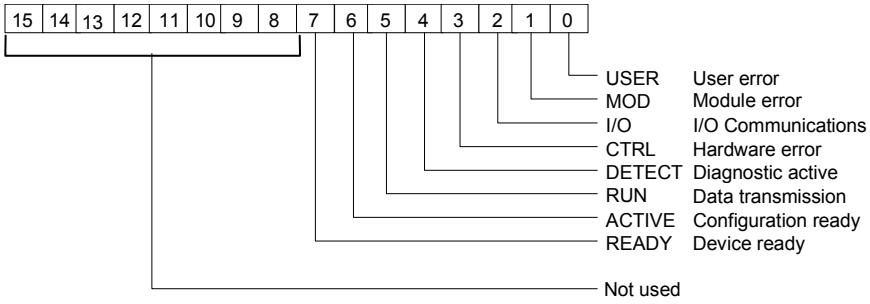
Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 3
Byte 8-9	Register Table Offset = 382
Byte 10-11	Word Count = 2

The NIU returns the two words of diagnostic information in this order.



Diagnostic Status Word

The first word (Diagnostic Status) shows the current operating state of the NIU and I/O Station:



Normal Indications

The Ready, Active and Run bits are set during normal operation. When these bits are set, the Diagnostic Parameters word is filled with zeros.

Ready Ready = 1 means the NIU has completed its powerup self-test and is ready for operation.

Active Active = 1 means the NIU has been successfully configured.

Run Run = 1 means the NIU is exchanging data with modules.

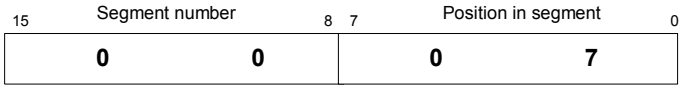
Error Indications

When an error bit is set, additional information is available to the application logic in the Diagnostic Parameters word. Note that the same information is also available in readable form on the NIU's web-based interface, as described in chapter 9.

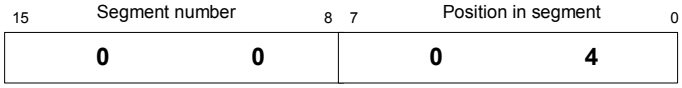
Detect Detect = 1 means that an error has occurred and the NIU diagnostics are looking for the cause. The NIU also sets the outputs in the I/O Station to zero. When the cause of the error has been found, the Detect bit is cleared to 0, and one of the following bits is set.

User Error User bit = 1 indicates a user error, such as incorrect parameters.

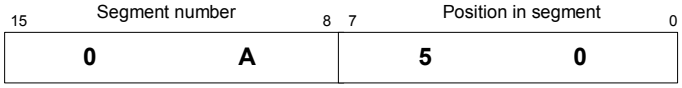
Module Fault Mod bit = 1indicates a fault such as an output short-circuit or a missing sensor or actuator. For example, here the Diagnostic Parameters indicate a short-circuit on module 7. A segment is a section of the I/O Station with its own power.



I/O Comms Error I/O bit = 1 indicates an error in the I/O station such as a module missing in the configuration. For example here the Diagnostic Parameters indicate that device 4 is missing from the configuration.



Hardware Error If the CTRL bit = 1, it indicates a probable hardware error, such as an address overlap. The Diagnostic Parameters describe the error. For example:



Using Read Multiple Registers to Read the Fault Table

The Ethernet NIU internal fault table can store up to 32 faults. When fault 33 occurs, fault 1 is dropped from the table.

When reading the Fault Table, the entire 64-word fault table must be read.

The Read Multiple Registers request to read the Fault Table has this format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 3
Byte 8-9	Register Table Offset = 1024
Byte 10-11	Word Count = 64

The NIU returns the 64-word contents of the Fault Table. Partial read access of the fault table is not permitted. Empty fault table entries are filled with zeros. The most recent fault is located at register 1024.

Faults listed in this table are informational only; they do not stop operation of the NIU. Fault definitions are the same as those shown on the previous two pages.

If a User Error, Module Fault, I/O Communications Error, and/or Hardware Error occurs (see the definitions on the previous page), a new Fault Table entry is added. The structure of the Fault Table is shown below:

Fault Table Entries		
Fault No.	*Fault Entry (2 Words)*	
1	Diagnostic parameter/location register	Diagnostic status register
2	Diagnostic parameter/location register	Diagnostic status register
3	Diagnostic parameter/location register	Diagnostic status register
.....	.....	.....
32	Diagnostic parameter/location register	diagnostic status register

The Write Single Register command can be used to clear the entire Fault Table by writing a zero to the first register (1024) of the fault table. No other writing to the Fault Table is possible.

Read Input Registers (Function Code 4)

This command reads from 1 to 125 16-bit words from the Modbus Register table. This command is handled exactly as the Read Multiple Registers command.

Read Input Registers Request

The Read Input Registers request has this format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 4
Byte 8-9	Register Table Offset
Byte 10-11	Word Count (1-125) (16-bit word)

Read Input Registers Response

The response to a Read Input Registers request is:

Byte 0	Function Code = 4
Byte 1	Byte Count of response (B = 2 x word count of request)
Byte 2 – (B + 1)	Register Values

If the request accesses an invalid offset or it contains an invalid length, the NIU returns Exception Response in the following form:

Byte 0	Function Code = 0x84
Byte 1	Exception Code = 2 (Illegal data address)

Read Input Registers Examples

- To read discrete inputs 1 to 32, enter Register Table Offset = 0 and Word Count = 2
- To read analog input 1, enter Register Table Offset = 193 and Word Count = 1

Write Coil (Function Code 5)

The Modbus Write Coil command can be used to sets or clear a bit in the Modbus Discrete Output (Coil) table. These bits correspond to the hardware outputs in the I/O Station.

Modbus Coil Table (Bits)	Offsets
00001 – 03072	0 - 3071

Write Coil Request

The Write Coil request has this format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 5
Byte 8-9	Coil Table Offset (offset is zero-based, enter address minus one)
Byte 10	0xFF to turn the coil ON 0 to turn the coil OFF
Byte 11	Must be 0

Write Coil Response

The response to a Write Coil request is:

Byte 0	Function Code = 5
Byte 1-2	Coil Table Offset (same as request)
Byte 3	= 0xFF to turn coil ON, = 0 to turn coil OFF (same as request)
Byte 4	0

If the request accesses an offset above 3071, the NIU returns this Exception Response:

Byte 0	Function Code = 0x85
Byte 1	Exception Code = 2 (Illegal data address)

Write Coil Examples

- To turn on coil 1, enter Coil Table Offset = 0 and Value = 0xFF
- To turn coil 1 off, enter Coil Table Offset = 0 and Value = 0

Write Single Register (Function Code 6)

The Modbus Write Single Register command writes one 16-bit word to the sections of the Modbus Register table that correspond to the discrete and analog outputs. This message can be used to:

- write one analog output value
- write a value representing the states of 16 discrete outputs
- place the NIU in Plug & Play mode (can also be done from NIU's web-based interface)
- reset the NIU following a network failure (can also be done from NIU's web-based interface)
- clear all the faults in the Fault Table

Data Types	Modbus Registers	Offsets
Discrete Outputs (3072 bits)	40385 - 40576	384 - 575
Analog Outputs (192 words)	40577 - 40767	576 - 766
NIU Command Word	40768	767
First Word of the Fault Table	41025	1024

Write Single Register Request

The Write Single Register request has this basic format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 6
Byte 8 - 9	Register Table Offset (offset is zero-based): 384 - 575 to write one word of discrete outputs 576 - 766 to write one analog output 767 to place the NIU in Plug & Play mode 767 to take the NIU out of network failure mode 1024 to clear the Fault Table
Byte 10 - 11	Value to be Written. Enter the discrete or analog output value, or: Enter 0 to clear the Fault Table. Enter 1 for Plug & Play mode Enter 2 to take the NIU out of network failure mode

Write Single Register Response

The response to a Write Single Register request is:

Byte 0	Function Code = 6
Byte 1-2	Register Table Offset (same as request)
Byte 3-4	Register Value (same as request)

If the request accesses an offset that is not either in the range 384 to 767 or the single value 1024, the response is an Exception Response in the following form:

Byte 0	Function Code = 0x86
Byte 1	Exception Code = 2 (Illegal data address)

Write Single Register Examples

- To clear the fault table, enter Register Table Offset = 1024 and register value = 0
- To set or clear 32 discrete bits from 1 to 32, enter a register value that represents those outputs, and Register Table Offset = 384.
- To write a value to analog output 1, enter Register Table Offset = 576.

Read Exception Status (Function Code 7)

(Future) Command response is now all zeros.

This command will be used to read one 8-bit status word from the Ethernet NIU.

Read Exception Byte Status Request

The Read Exception Status request has this format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 7

Read Exception Byte Status Response

The response to a Read Exception Status is:

Byte 0	Function Code = 7
Byte 1	Exception Status

Exception Status Data Bits

7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
Unused	Fault Present						

Write Multiple Registers (Function Code 16)

The Modbus Write Multiple Registers command writes up to 100 16-bit words to the output portions of the Modbus Register table. This message can be used to write:

- discrete and/or analog outputs
- configuration parameters for some types of modules
- an optional timeout value to be used by the NIU for monitoring the Ethernet connection

Data Types	Modbus Registers	Offset
Discrete Outputs (3072 bits)	40385 - 40576	384 - 575
Analog Output (192 words)	40577 - 40768	576 - 767
Timeout table	41281	1280

Write Multiple Registers Request

The Write Multiple Registers request has this format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 0x10 (16 decimal)
Byte 8 - 9	Register Table Offset
Byte 10 - 11	Word Count (1-100)
Byte 12	Byte Count (enter 2 times the word count)
Byte 13 – (B + 5)	Register Values

Write Multiple Registers Response

The response to a Write Multiple Registers request is:

Byte 0	Function Code = 0x10
Byte 1-2	Register Table Offset (same as request)
Byte 3-4	Word Count (same as request)

If the request accesses an invalid offset or it contains an invalid length, or if the combination of offset and word count accesses an offset outside the range shown above, the NIU returns this Exception Response:

Byte 0	Function Code = 0x90
Byte 1	Exception Code = 2 (Illegal data address)

Write Multiple Registers Examples

- To set or clear discrete outputs 1 to 32, enter two Register Values equivalent to the intended discrete bits, and specify Register Table Offset = 384 and Word Count = 2.
- To write the first analog output word, enter the value to be written and specify Register Table Offset = 576 and Word Count = 1.

Using a Write Multiple Registers Request for Configuration

Some VersaPoint modules have configurable parameters, which are described in their module datasheet. When an I/O Station is initially Autoconfigured, these modules operate with their default parameter settings. The Write Multiple Registers command can be used to send configuration data to these modules via their output registers. Configuration data formats are shown in the module datasheets.

Using a Write Multiple Registers Request to Set or Cancel Connection Monitoring

The Ethernet NIU can detect certain network errors through the use of a connection timeout period.

The Write Multiple Registers command can be used to write an appropriate timeout value to Modbus register 1280. To set up a timeout, enter a Register Value from 200 (ms) to 65000 (ms). To deactivate a timeout, set register 1280 to 0. Values between 1 and 199 ms and values bigger than 65000 ms cause Modbus exception 3 (Illegal Data Value).

The Write Multiple Registers request to set up or cancel monitoring has this format:

Byte 0 – 1	Transaction Identifier – unique ID generated by the client.
Byte 2 – 3	Protocol Identifier = 0
Byte 4	Length Field (upper byte) = 0 (all msgs < 256)
Byte 5	Length Field (lower byte) = number of bytes following
Byte 6	Unit Identifier
Byte 7	Function Code = 0x10 (16 decimal)
Byte 8 - 9	Register Table Offset
Byte 10 - 11	Word Count = 1
Byte 12	Byte Count = 2
Byte 13 – (B + 5)	Register Values = 200 to 65000 to establish, 0 to cancel

Timeout monitoring starts after the next read or write command from the same connection. Issue another command immediately to start the monitoring right away. Subsequent accesses must be executed within the set timeout or the NIU sets outputs to their defaults and closes all its Modbus/TCP connections.

If the connection that was used to set up the timeout is closed, the monitoring function is also closed and the value in the Timeout table is set to zero.

Chapter 9

Web-based Management

This section describes the web-based configuration and monitoring features of the VersaPoint Ethernet NIU. The NIU must already have an IP Address assigned to use the web monitoring functions. If the NIU does not yet have an IP Address, please see chapter 6 for more information.

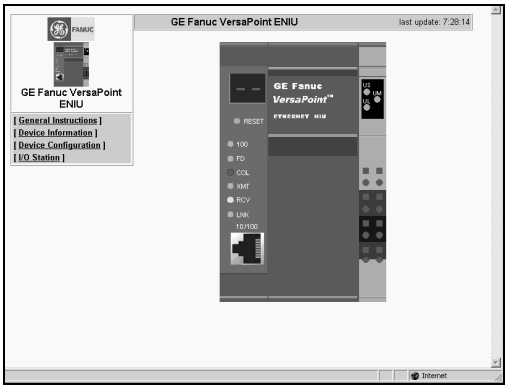
Topics in this chapter:

Accessing the NIU Homepage

Either must get Default gateway for access from internet. Each Ethernet NIU has its own homepage, with a built-in web server. The NIU home page and its web-based features are easily accessed from any standard web browser. Web-based management provides a quick, easy user interface to system information from any computer.

To go to the Ethernet NIU homepage, enter the URL "http://ip-address".

For example: http://192.168.2.81

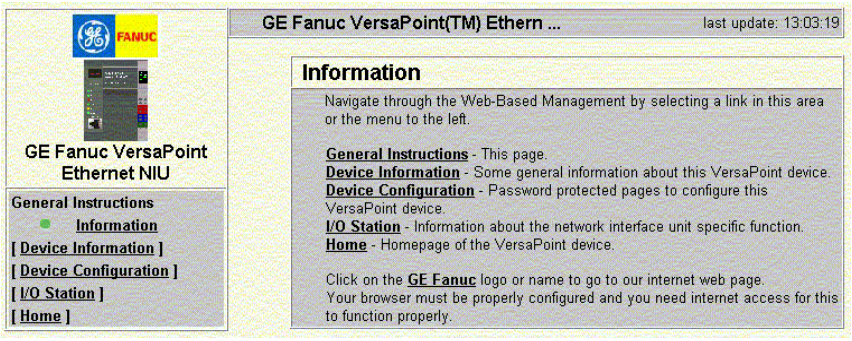


On the left side of the homepage, click to select:

- **General Instructions:** for an overview of the website
- **Device Information:** to view the IP address, NIU version information, technical data, a wiring diagram, LED assignments, and other NIU details.
- **Device Configuration:** to view or change the setup of the Ethernet NIU after supplying the appropriate passwords.
- **I/O Station:** to view and control the operation of the NIU and I/O Station over the network after supplying the appropriate passwords.

Navigating from the Main Menu

From the homepage, click on General Instructions for more information about the online functions:



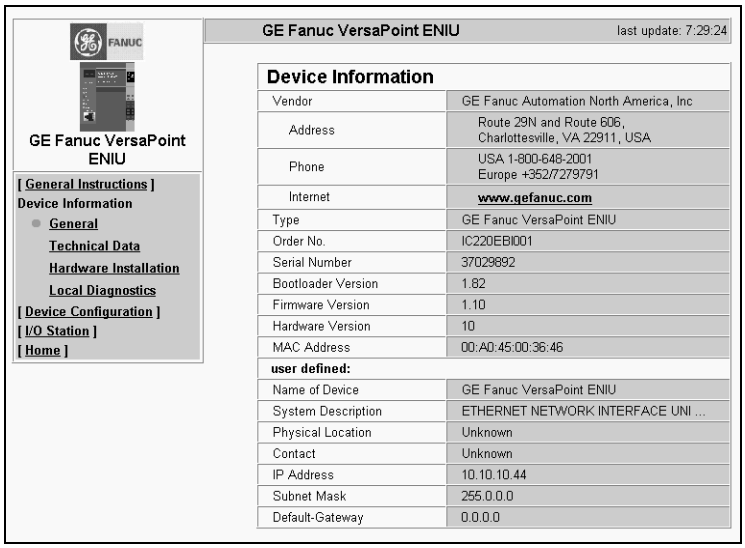
This page provides linked descriptions of the online functions.

Viewing Information about the NIU

Click on Device Information for details about the Ethernet NIU. No password is needed to read these pages.

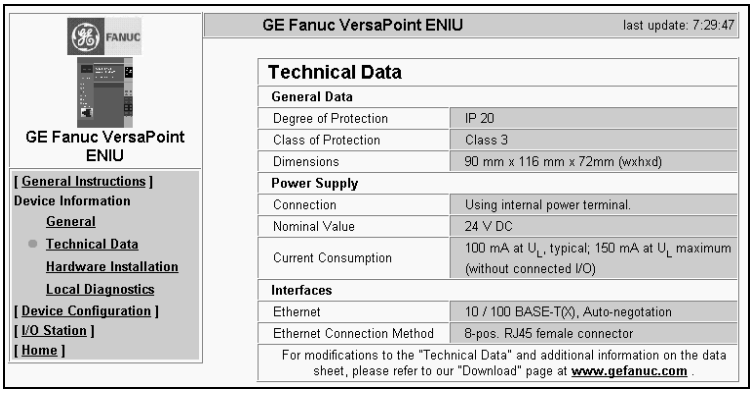
General Information

Go to the General device information page to view (but not change) the information shown below.



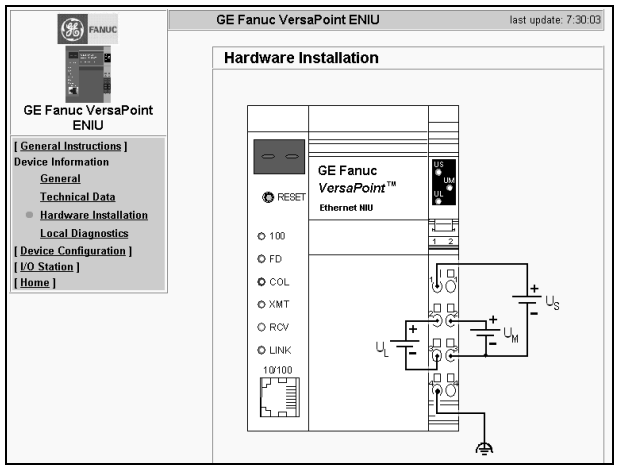
Technical Data

Go to the Technical Data device information page for additional reference information.



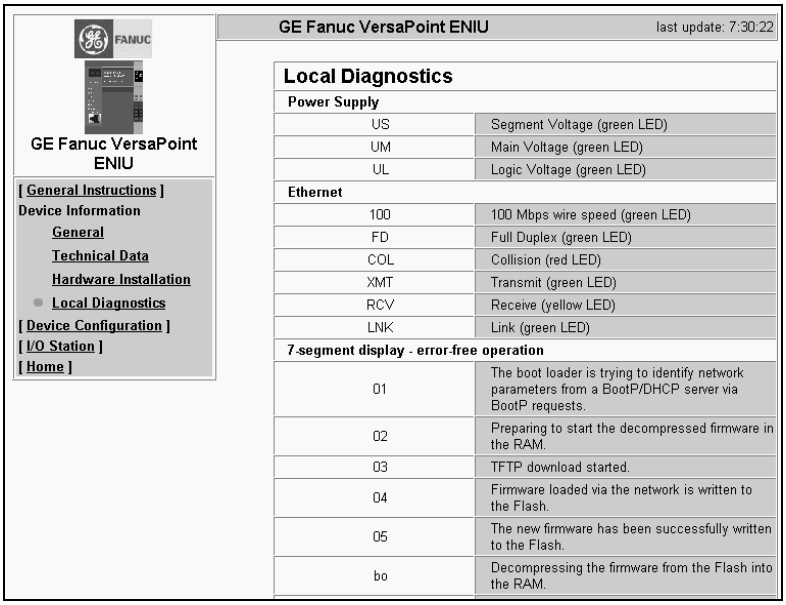
NIU Wiring Diagram

Go to the Hardware Installation device information page to see the NIU wiring diagram. See chapter 4 of this manual for specific installation instructions.



LEDs and Display

Go to the Local Diagnostics device information page to check definitions of the NIU LEDs and the operating codes that appear on the NIU display.



Local Diagnostics

Power Supply	
US	Segment Voltage (green LED)
UM	Main Voltage (green LED)
UL	Logic Voltage (green LED)
Ethernet	
100	100 Mbps wire speed (green LED)
FD	Full Duplex (green LED)
COL	Collision (red LED)
XMT	Transmit (green LED)
RCV	Receive (yellow LED)
LNK	Link (green LED)
7-segment display - error-free operation	
01	The boot loader is trying to identify network parameters from a BootP/DHCP server via BootP requests.
02	Preparing to start the decompressed firmware in the RAM.
03	TFTP download started.
04	Firmware loaded via the network is written to the Flash.
05	The new firmware has been successfully written to the Flash.
bo	Decompressing the firmware from the Flash into the RAM.

Scroll down for more error code definitions

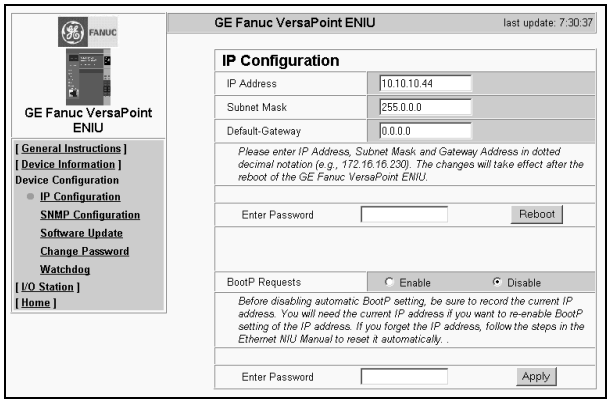
Viewing the IP Configuration

As part of the initial setup of the NIU, its MAC address must be entered in a network BootP server. The BootP server then automatically creates the IP Address, Subnet Mask, and Gateway for the NIU. Each time the NIU is powered up or reset with the Reset pushbutton, the NIU requests the IP Address from the BootP server. If it receives a response from BootP server, it will use the IP Address and Subnet Mask it receives.

On the IP Address Configuration web page, you can view or change the IP addressing setup. For most applications, the IP Address, Subnet Mask, and Gateway should not be changed here.

Setting the IP Address from the Webpage

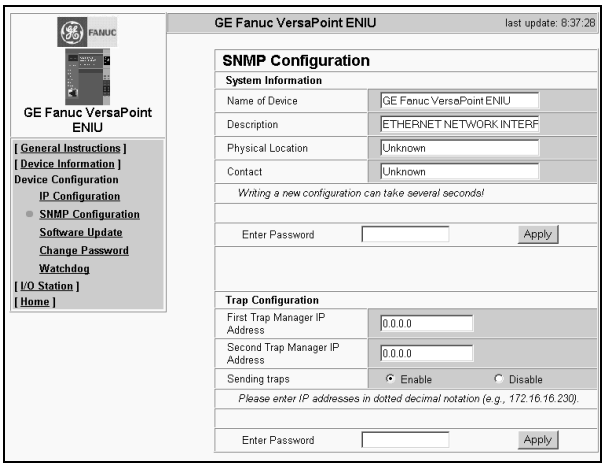
If you need to change the IP Address, Subnet Mask and Gateway, it is important to follow the specific steps described below. The IP Configuration parameters must be set correctly for the NIU to communicate on the network. Ordinarily, these values should be assigned by a network administrator. (If you need to change the IP address using the web utility because BootP Update was previously disabled, but you don't know the present IP address, follow the instructions in chapter 6 to set a new IP address from a BootP server.)



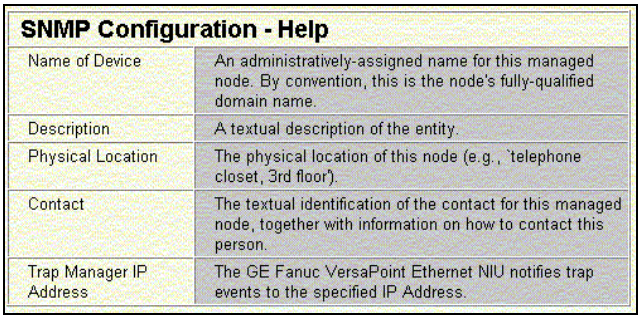
1. Enter the password.
2. Enter the new IP Address. The IP Address change is temporary; it will only be used until the NIU is reset or powered up again, unless BootP Update is disabled.
3. If you want the Ethernet NIU to always use the IP Address entered on the web utility, and not use the IP Address sent by the BootP server, *be sure to record the web-entered IP Address*. If you disable BootP update you must know the current IP address to use the web utility to change the IP address in the future.
4. Use the checkbox to disable the BootP update.

Setting Up Monitoring on the Network

On the SNMP Configuration page, you can identify two network nodes to receive information about NIU events. You can also identify a contact person to be notified if significant events occur.



If you need more information about SNMP configuration, click on the ? box to open its page of definitions.



SNMP Configuration - Help	
Name of Device	An administratively-assigned name for this managed node. By convention, this is the node's fully-qualified domain name.
Description	A textual description of the entity.
Physical Location	The physical location of this node (e.g., `telephone closet, 3rd floor').
Contact	The textual identification of the contact for this managed node, together with information on how to contact this person.
Trap Manager IP Address	The GE Fanuc VersaPoint Ethernet NIU notifies trap events to the specified IP Address.

The two network nodes identified here will act as "trap managers". The NIU will automatically notify them about the following events:

- Cold Start - this message is sent twice each time the NIU is restarted.
- Password Change - sent after the NIU password is changed successfully.
- FW Health - sent after any changes to the firmware operating status.
- Configuration - sent after any changes to the hardware configuration.

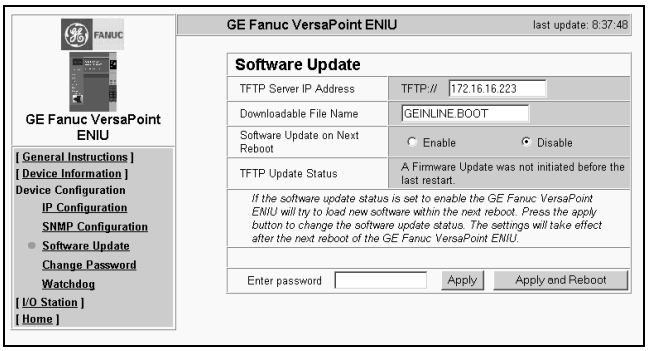
By monitoring these events, a network administrator can act quickly to ensure network availability.

Updating the NIU Firmware

You can easily update the NIU firmware online. In order to complete the update, the new firmware is sent to the ENIU by a TFTP (Trivial FTP) server. When firmware updates occur they will be placed on the GE Fanuc Technical Support WEB Site.

Updating the firmware requires the appropriate password.

1. From the homepage, click on "Device Configuration" and then "Software Update".



2. Enter the IP address of the tftp server in the "TFTP Server IP Address" field.
3. Enter the file name of the firmware and the path name, if necessary, in "Downloadable File Name".
4. In the "Software Update on Next Reboot" field, click on "Enable".
5. Enter your password
6. Now, you can either click "Apply" if you want to reboot at a later time; or click on "Apply and Reboot" for the update to take effect immediately.
7. The display on the NIU indicates "03" (requesting firmware download at tftp server), then "04" (downloading firmware to memory) and finally "05" (firmware transfer to memory complete). The NIU is then automatically restarted.

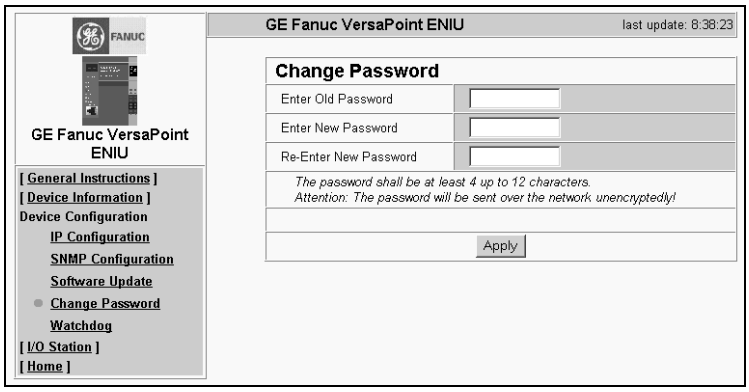
Changing a Password

The NIU's online functions are protected by two passwords (case-sensitive). The default password for read access is "public". The default password for read and write access is "private".

Status changes to the NIU are only possible after the password for read and write access has been entered.

A password can be changed at any time. Your unique password must be between four and twelve characters long.

If you forget the password, the device can be re-enabled by GE Fanuc. Be sure you have the exact device designation and serial number ready when you contact GE Fanuc.



Enabling the Watchdog Timer

An additional feature of the Ethernet NIU that can be set up online from the Device Configuration page is the Watchdog timer. For most applications, the Watchdog Timer should be disabled. If enabled, the Watchdog Timer is useful if the Ethernet has so much traffic that if cannot service and update the I O. If the Watchdog Timer expires, the NIU will set outputs to their preconfigured defaults (set up as described earlier in this chapter).

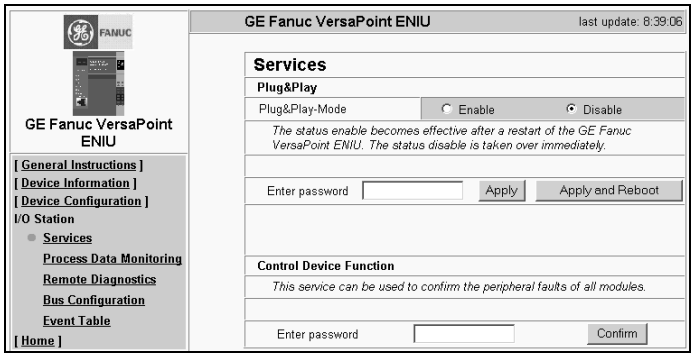
Monitoring I/O Station Operation

Click on I/O Station to monitor and control system setup and system operation over the network.

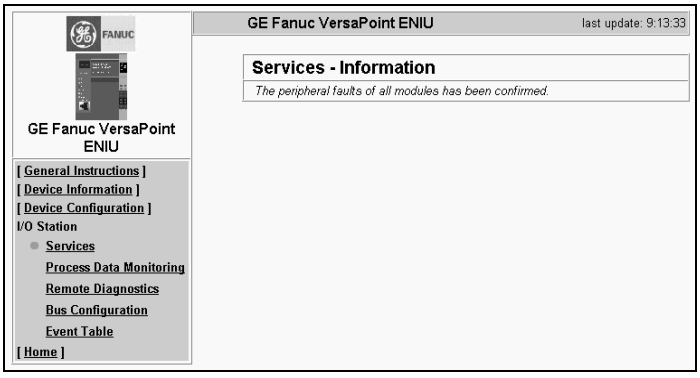
Services

Go to the Services page to enable/disable Plug & Play Mode. With Plug and Play mode enabled the ENIU will do an autoconfigure of its I/O on the next power up or reboot.

Also on this page, you can confirm peripheral faults of I/O modules.

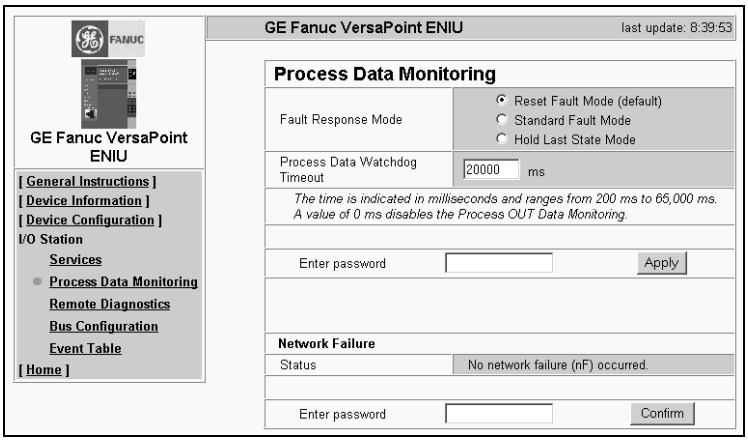


Confirm of Peripheral Faults gives this display or a list of unconfirmed peripheral faults.



Setting Up I/O Defaults

On the Process Data Monitoring page, you can set up the Fault Response mode for outputs, and specify the length of the optional Timeout period for monitoring the Ethernet connection.



Configuring the Fault Response Mode for Discrete Outputs

By default, the NIU operates in Reset mode, resetting discrete outputs to zero if network communications are lost. This operation can be changed to either Standard Fault mode or Hold Last State mode on the Process Data Monitoring screen. The table below compares the operation of discrete outputs in Reset Fault mode and Hold Last State mode. Analog outputs are the same for both modes. For analog outputs with configurable parameters, an output state can be configured using the Modbus/TCP commands described in chapter 8.

Mode	*Discrete Outputs*	*Analog Outputs*
Reset Fault Mode	Set to zero	Go to a selected fault state (default is zero)
Hold Last State Mode	Hold last state	

Configuring a Process Data Watchdog Timeout

The Ethernet NIU can detect certain network errors through the use of a connection timeout period.

To set up a timeout, enter a value from 200 (ms) to 65000 (ms). To deactivate a timeout, enter 0.

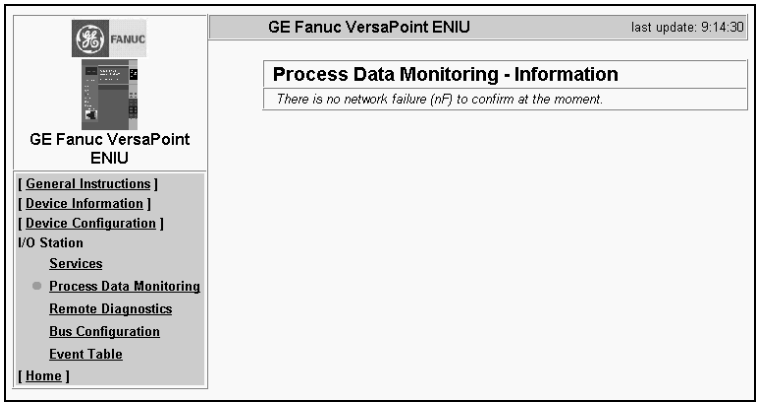
When a Timeout is enabled, monitoring starts after the next Modbus/TCP read or write command from the same connection. Subsequent accesses must be executed within the set timeout or the NIU sets outputs to their defaults and closes all its Modbus/TCP connections.

The Timeout period can also be set or cleared using the Write Multiple Registers request, as explained in chapter 8.

Resetting the Network Failure Status

If a network failure occurs, the Network Failure Status can be used to reset the status. When this is done, the Ethernet NIU again starts sending the outputs to the modules in the I/O Station. The network status can also be reset from the application using a Modbus/TCP command as described in chapter 8.

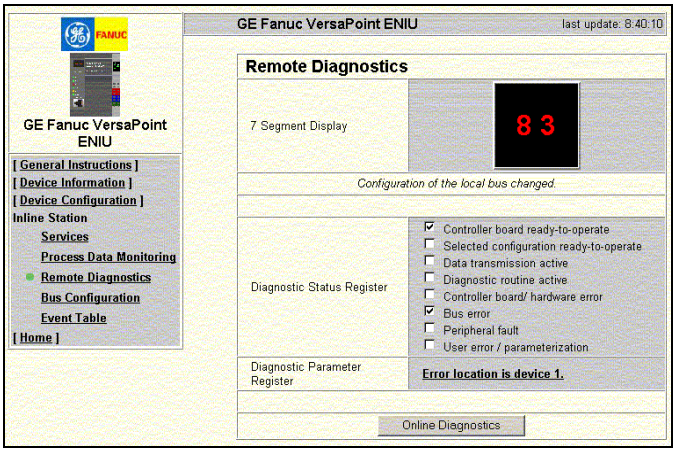
To see whether there is a network failure, go to the Process Data Monitoring Information page:



If a network failure has occurred, the NIU is no longer able to receive output data from the application program. It therefore sets outputs to their configured defaults, as described previously.

Remote Diagnostics from the NIU

On the Remote Diagnostics page, you can view the current status of the NIU display over the network.



The display shown on the Remote Diagnostics page remains the same once it appears. It is not updated dynamically. Error code are listed below.

Remote Diagnostics Summary

Display	Meaning
01	Boot Loader is started, BootP requests are sent
bo	Decompressing the firmware from Flash into RAM.
02	Firmware is started
--	Normal operation. No faults.
--.	Normal operation. No faults, at least one Modbus/TCP client is connected.
PP	Plug and Play mode
PP.	Plug and Play mode, at least one Modbus/TCP client is connected.
03	The firmware download started
04	The firmware is being downloaded to Flash
05	The firmware transfer to Flash is complete
17	The transfer of the firmware failed during download
19	Download completed successfully, but the file is not a valid version for the NIU
80	An error occurred in the firmware
81	An error occurred when accessing EEPROM
82	The current configuration could not be activated
83	Current configuration and the reference configuration are not the same
8A	Event watchdog occurred
bF	I/O Station error
bF.	Bus error in Modbus/TCP mode
nF	Ethernet network failure
nC	Ethernet not connected. All Modbus/TCP connections lost.

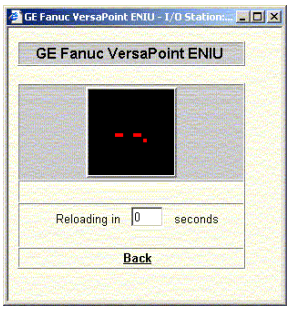
Diagnostics Status Register and Parameters Summary

The Diagnostic Status Register and Diagnostic Parameter Register sections display information about the operating status of the NIU and the I/O Station. The same information is also available to the controller via Modbus commands, as described in chapter 8.

Controller Board Ready to Operate	The NIU has completed its powerup self-test and is ready for operation.
Selected Configuration Ready to Operate	The NIU has been successfully configured.
Data Transmission Active	The NIU is exchanging data with modules.
Diagnostic Mode Active	An error has occurred and the NIU is are looking for the cause. The NIU sets the outputs in the I/O Station to zero.
User Error	User error, such as incorrect parameters.
Peripheral Fault	A device fault such as an output short-circuit or a missing sensor or actuator has occurred. The Diagnostic Parameters indicate the problem.
Bus Error	Indicates an error in the I/O station such as a module missing in the configuration. The Diagnostic Parameters indicate the problem. (This diagnostic does not detect Ethernet bus errors).
Controller board / Hardware Error	Probable hardware error, such as an address overlap. The Diagnostic Parameters describe the error.

Updating the Content of the NIU Display on the Webpage

You can refresh the NIU display on the NIU webpage by clicking the Online Diagnostics button:

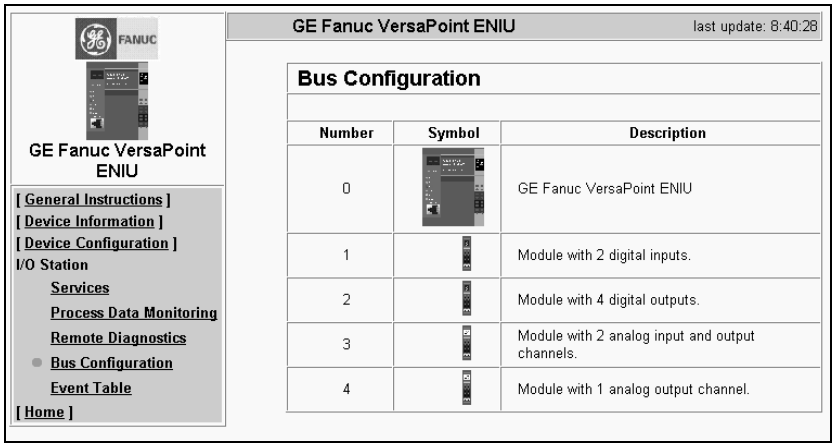


To view a reference list of the diagnostic codes that can appear on the display, click on Local Diagnostics.

On the Remote Diagnostics page, checkboxes indicate the NIU's current operating status. These checkboxes correspond to the NIU's internal status data.

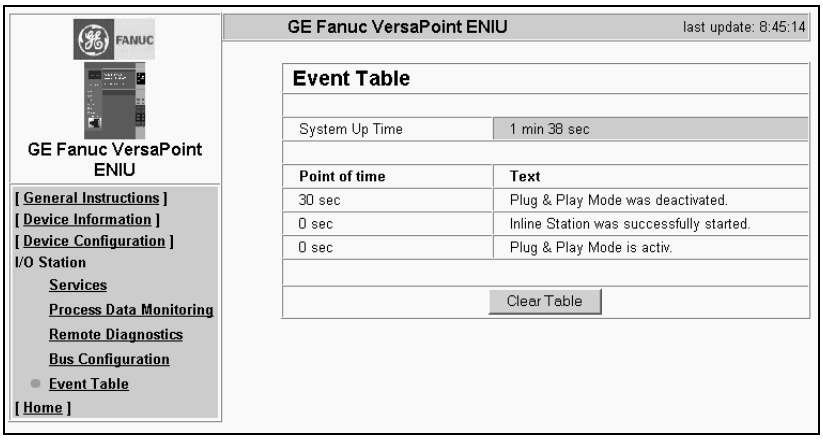
Viewing the I/O Station Configuration

Go to the Bus Configuration page to view the modules in the I/O Station.



Viewing or Clearing the Event Table

To display and clear the NIU's table of events, click on I/O Station, Event Table.



Appendix A Reference Data

This section summarizes the standard data for a VersaPoint Ethernet I/O system. Please refer to the module-specific data sheets for additional information.

- Network Specifications
- I/O Station Information
- Ambient conditions
- Mechanical Demands
- Noise Immunity Test
- Electrical Specifications
- Cables
- I/O Modules
- Air and Creepage Distances
- Test Voltages

The data is valid for the preferred mounting position (vertical).

I/O Station Information

I/O Station	
Interface	Local bus
Electrical isolation	No
Number of I/O modules that can be connected	
Limitation through software	63, maximum
Limitation through power supply unit	Maximum logic current consumption of the connected local bus modules: $I_{max} \leq 2A$ DC
Observe the logic current consumption of each device on the individual voltage jumpers when configuring a VersaPoint station. This information is given in every module data sheet. The current consumption may differ depending on the individual module. If the maximum current carrying capacity of a voltage jumper (8A) is reached, a new power terminal must be used.	

Ethernet Interface	
Number	One
Connection method	8-pos. RJ45 female connector on the NIU
Connection medium	Twisted-pair cable with a conductor cross section of $0.14mm^2$ to $0.22mm^2$ (26AWG to 24AWG)
Cable impedance	100 Ohms
Transmission rate	10/100 Mbps
Maximum network segment expansion	100m (328.084ft.)

Protocols/MIBs	
Supported protocols	TCP/UDP SNMP BootP TFTP HTTP
Supported standard MIB	RFC 1213 (MIB II)
Supported private MIBs	GE Fanuc MIB

Ambient Conditions

General Data	
Housing dimensions (width x height x depth)	90mm x 72mm x 116mm (3.543in. x 2.835in. x 4.567in.)
Ambient temperature Ambient temperature (operation) Ambient temperature (storage/transport)	 0°C to +55°C (32°F to +131°F) -25°C to +85°C (-13°F to +185°F)
Degree of protection	IP 20, DIN 40050, IEC 60529
Class of protection	Class 3 VDE 0106; IEC 60536
Operating Humidity	5% to 90%, no condensation
Storage Humidity	5% to 95%, no condensation
Preferred mounting position	Perpendicular to a standard DIN rail
Connection to protective earth ground	The functional earth ground must be connected to the 24VDC supply/functional earth ground connection. The contacts are directly connected with the potential jumper and FE springs on the bottom of the housing. The terminal is grounded when it is snapped onto a grounded DIN rail. Functional earth ground is only used to discharge interference.
Environmental compatibility	Free from substances that would hinder coating with paint or varnish (according to VW specification)

Electrical Specifications

24 V Main Supply/24 V Segment Supply	
Connection method	Spring-clamp terminals
Recommended cable lengths	30m (98.43 ft.), maximum; do not route cable through outdoor areas
Voltage continuation	Through potential routing
Special demands on the voltage supply	The supplies U_M/U_S and the NIU supply U_{BK} do not have the same ground potential because they are supplied by two separate power supply units.
Behavior in the event of voltage fluctuations	Voltages (main and segment supply) that are transferred from the NIU to the potential jumpers follow the supply voltages without delay.
Nominal value	24VDC
Tolerance	-15%/+20% (according to EN 61131-2)
Ripple	±5%
Permissible range	19.2V to 30V
Current carrying capacity	8A, maximum (total current of U_S and U_M)
Safety devices	
Surge voltage	Input protective diodes (can be destroyed by permanent overload) Pulse loads up to 1500V are short circuited by the input protective diode.
Polarity reversal	Parallel diodes against polarity reversal; in the event of an error the high current through the diodes causes the preconnected fuse to blow.
This 24 V area must be fused externally. The power supply unit must be able to supply 4 times the nominal current of the external fuse, to ensure that the fuse blows safely in the event of an error.	

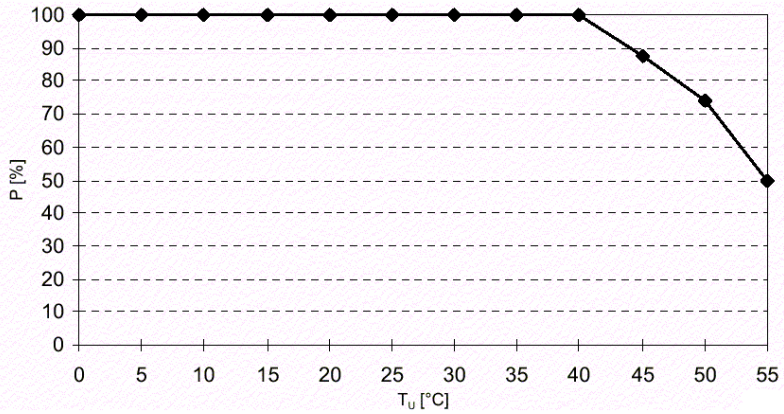
Safety Devices	
Surge voltage (segment supply/main supply/NIU supply)	Input protective diodes (can be destroyed by permanent overload) Pulse loads up to 1500 V are short circuited by the input protective diode.
Polarity reversal (segment supply/main supply)	Parallel diodes against polarity reversal; in the event of an error the high current through the diodes causes the preconnected fuse to blow.
Polarity reversal (NIU supply)	Serial diode in the lead path of the power supply unit; in the event of an error only a low current flows. In the event of an error the fuse in the external power supply unit does not trip. Ensure a 2 A fuse protection to the external power supply unit.

24V NIU Supply	
Connection method	Spring-clamp terminals
Recommended cable lengths	30m (98.43ft.), maximum; do not route cable through outdoor areas
Voltage continuation	Via potential routing U_L,U_{ANA}
Safety devices	
Surge voltage	Input protective diodes (can be destroyed by permanent overload). Pulse loads up to 1500V are short circuited by the input protective diode.
Polarity reversal	Serial diode in the lead path of the power supply unit; in the event of an error only a low current flows. In the event of an error the fuse in the external power supply unit does not trip. Ensure a 2A fuse protection to the external power supply unit.
Observe the logic current consumption of each device when configuring the station. This information is given in every module-specific data sheet. The current consumption may differ depending on the individual module. The permissible number of devices that can be connected depends on the specific station structure.	
Nominal value	24 V DC
Tolerance	-15%/+20% (according to EN 61131-2)
Ripple	±5%
Permissible range	19.2V to 30V
Minimum current consumption at nominal voltage	92mA (At no-load operation, i.e., Ethernet connected, no I/O Station devices are connected, bus inactive)
Maximum current consumption at nominal voltage	1.5A (loading the 7.5V communications power with 2A, the 24V analog voltage with 0.5A)

24 V Module Supply	
- Communications Power (Potential Jumper)	
Nominal value	7.5VDC
Tolerance	±5%
Ripple	±1.5%
Maximum output current	2A DC (observe derating)
Safety devices	Electronic short-circuit protection
- Analog Supply (Potential Jumper)	
Nominal value	24VDC
Tolerance	-15% / +20%
Ripple	±5%
Maximum output current	0.5A DC (observe derating)
Safety devices	Electronic short-circuit protection

Derating / Power Dissipation

Derating of the Communications Power and the Analog Terminal Supply



P [%] Loading capacity of power supply unit for communications power and analog supply in %

T_U [°C] Ambient temperature in °C

Power Dissipation

Formula to Calculate the Power Dissipation of the Electronics

$$P_{tot} = P_{BUS} + P_{PERI}$$

$$P_{tot} = 2.6\ W + \left(1.1 \frac{W}{A} \times \sum_{n=0}^{a} I_{Ln}\right) + \left(0.7 \frac{W}{A} \times \sum_{m=0}^{b} I_{Lm}\right)$$

Where

P_{tot}	Total power dissipation of the terminal
P_{BUS}	Power dissipation for the bus operation without I/O load (permanent)
P_{PERI}	Power dissipation with I/O connected
I_{Ln}	Current consumption of the device *n* from the communications power
n	Index of the number of connected devices (n = 1 to a)
a	Number of connected devices (supplied with communications power)
$\sum_{n=0}^{a} I_{Ln}$	Total current consumption of the devices from the 7.5V communications power. (2A, maximum)
I_{Lm}	Current consumption of the device *m* from the analog supply
m	Index of the number of connected analog devices (m = 1 to b)
b	Number of connected analog devices (supplied with analog voltage)
$\sum_{m=0}^{b} I_{Ln}$	Total current consumption of the devices from the 24 V analog supply (0.5A, maximum)

Power Dissipation/Derating

Using the maximum currents 2A (logic current) and 0.5A (current for analog terminals) in the formula to calculate the power dissipation when the I/O is connected gives the following result:

P_{PERI} = 2.2W + 0.35W = 2.55W

2.55W corresponds to 100% current carrying capacity of the power supply in the derating curves shown previously.

Make sure that the indicated nominal current carrying capacity in the derating curve is not exceeded when the ambient temperature is above 40 °C (104°F). According to the formula, the total load of the connected I/O is relevant (P_{PERI}). If, for example, no current is drawn from the analog supply, the percentage of current coming from the communications power can be increased.

Example: Ambient temperature: 55°C (131ºF)

1. Nominal current carrying capacity of the communications power and analog supply: 50% corresponding with the diagram

   I_{LLogic} = 1A, $I_{LAnalog}$ = 0.25A

   P_{PERI} = 1.1W + 0.175W

   P_{PERI} = 1.275W (equals 50% of 2.55W)

2. Possible logic current if the analog supply is not loaded:

   P_{PERI} = 1.1W/A x I_{LLogic} + 0W

   P_{PERI}/1.1W/A = I_{LLogic}

   I_{LLogic} = 1.275W/1.1W/A

   I_{LLogic} = 1.159A

Mechanical/ EMC Conformance

Mechanical Tests	
Shock test according to IEC 60068-2-27	Operation: 25g, 11 ms period, half-sine shock pulse Storage/transport: 50g, 11 ms period, half-sine shock pulse
Vibration resistance according to IEC 60068-2-6	Operation/storage/transport: 5g, 150Hz, Criterion A
Free fall according to IEC 60068-2-32	1m (3.281ft.)

Conformance With EMC Directives	
Developed according to IEC 61000-6.2	
IEC 61000-4-2 (ESD)	Criterion B 6kV contact discharge 6kV air discharge (without labeling field) 8kV air discharge (with labeling field in place)
IEC 61000-4-3 (radiated-noise immunity)	Criterion A
IEC 61000-4-4 (burst)	Criterion B
IEC 61000-4-5 (surge)	Criterion B
IEC 61000-4-6 (conducted noise immunity)	Criterion A
IEC 61000-4-6 (noise immunity against magnetic fields)	Criterion A
EN 55011 (noise emission)	Class A
Warning: Portable radiotelephone equipment ($P \geq 2W$) must not be operated any closer than 2m (6.562ft). There should be no strong radio transmitters or ISM devices in the vicinity.	

Appendix B Management Information Base

This appendix shows the content of the Management Information Base (MIB) for the Ethernet NIU.

The Management Information Base is a text file that lists the SNMP objects supported by the VersaPoint Ethernet NIU. It has two parts:

- Standard MIB: this part contains the basic Ethernet communications functions of the NIU
- GE Fanuc MIB: this part contains device specifics.

Standard MIB

System Group (1.3.6.1.2.1.1)

The system group contains information about device management.
(1) interfaces

-- (1) sysDescr
-- (2) sysObjektID
-- (3) sysUpTime
-- (4) sysContact
-- (5) sysName
-- (6) sysLocation
-- (7) sysServices

Interface Group (1.3.6.1.2.1.2)

The interface group contains information about device interfaces.

(2) interfaces

-- (1) ifNumber
-- (2) ifTable
-- (1) if Entry
-- (1) ifIndex
-- (2) ifDescr
-- (3) ifType
-- (4) ifMtu
-- (5) ifSpeed
-- (6) ifPhysAddress
-- (7) ifAdminStatus
-- (8) ifOperStatus
-- (9) ifLastChange
-- (10) ifInOctets
-- (11) ifInUcastPkts
-- (12) ifInNUcastPkts
-- (13) ifInDiscards
-- (14) ifInErrors
-- (15) ifInUnknownProtos
-- (16) ifOutOctets
-- (17) ifOutUcastPkts
-- (18) ifOutNUcastPkts
-- (19) ifOutDiscards
-- (20) ifOutErrors
-- (21) ifOutQLen
-- (22) ifSpecific

Address Translation Group - AT (1.3.6.1.2.1.3)

The address translation group has mandatory characters for all systems. It contains information about the address assignment.

(3) at

-- (1) atTable
-- (1) atEntry
-- (1) atIfIndex
-- (2) atPhysAddress
-- (3) atNetAddress

Internet Protocol Group - IP (1.3.6.1.2.1.4)

The Internet protocol group has mandatory characters for all systems. It contains information about IP switching.

(4) ip
- -- (1) ipForwarding
- -- (2) ipDefaultTTL
- -- (3) ipInReceives
- -- (4) ipInHdrErrors
- -- (5) ipInAddrErrors
- -- (6) ipForwDatagrams
- -- (7) ipInUnknownProtos
- -- (8) ipInDiscards
- -- (9) ipInDelivers
- -- (10) ipOutRequests
- -- (11) ipOutDiscards
- -- (12) ipOutNoRoutes
- -- (13) ipReasmTimeout
- -- (14) ipReasmReqds
- -- (15) ipReasmOKs
- -- (16) ipReasmFails
- -- (17) ipFragOKs
- -- (18) ipFragFails
- -- (19) ipFragCreates
- -- (20) ipAddrTable
- -- (1) ipAddrEntry
  - -- (1) ipAdEntAddr
  - -- (2) ipAdEntIfIndex
  - -- (3) ipAdEntNetMask
  - -- (4) ipAdEntBcastAddr
  - -- (5) ipAdEntReasmMaxSize
- -- (21) ipRouteTable
- -- (1) ipRouteEntry
  - -- (1) ipRouteDest
  - -- (2) ipRouteIfIndex
  - -- (3) ipRouteMetric1
  - -- (4) ipRouteMetric2
  - -- (5) ipRouteMetric3
  - -- (6) ipRouteMetric4
  - -- (7) ipRouteNextHop
  - -- (8) ipRouteType
  - -- (9) ipRouteProto
  - -- (10) ipRouteAge
  - -- (11) ipRouteMask
  - -- (12) ipRouteMetric5
  - -- (13) ipRouteInfo
- -- (22) ipNetToMediaTable
- -- (1) ipNetToMediaEntry
  - -- (1) ipNetToMediaIfIndex
  - -- (2) ipNetToMediaPhysAddress
  - -- (3) ipNetToMediaNetAddress
  - -- (4) ipNetToMediaType
- -- (23) ipRoutingDiscards

ICMP Group (1.3.6.1.2.1.5)

The Internet control message protocol group has mandatory characters for all systems. It contains information about error treatment and control in Internet data traffic.

(5) icmp

-- (1) icmpInMsgs
-- (2) icmpInErrors
-- (3) icmpInDestUnreachs
-- (4) icmpInTimeExcds
-- (5) icmpInParmProbs
-- (6) icmpInSrcQuenchs
-- (7) icmpInRedirects
-- (8) icmpInEchos
-- (9) icmpInEchoReps
-- (10) icmpInTimestamps
-- (11) icmpInTimestampReps
-- (12) icmpInAddrMasks
-- (13) icmpInAddrMaskReps
-- (14) icmpOutMsgs
-- (15) icmpOutErrors
-- (16) icmpOutDestUnreachs
-- (17) icmpOutTimeExcds
-- (18) icmpOutParmProbs
-- (19) icmpOutSrcQuenchs
-- (20) icmpOutRedirects
-- (21) icmpOutEchos
-- (22) icmpOutEchoReps
-- (23) icmpOutTimestamps
-- (24) icmpOutTimestampReps
-- (25) icmpOutAddrMasks
-- (26) icmpOutAddrMaskReps

Transfer Control Protocol Group - TCP (1.3.6.1.2.1.6)

The transfer control protocol group has mandatory characters for all systems that implement TCP. Instances for objects that provide information about a specific TCP connection apply for as long as the connection is established.

(6) tcp
- -- (1) tcpRtoAlgorithm
- -- (2) tcpRtoMin
- -- (3) tcpRtoMax
- -- (4) tcpMaxConn
- -- (5) tcpActiveOpens
- -- (4) ipRouteMetric2
- -- (6) tcpPassiveOpens
- -- (7) tcpAttemptFails
- -- (8) tcpEstabResets
- -- (9) tcpCurrEstab
- -- (10) tcpInSegs
- -- (11) tcpOutSegs
- -- (12) tcpRetransSegs
- -- (13) tcpConnTable
- -- (1) tcpConnEntry
  - -- (1) tcpConnState
  - -- (2) tcpConnLocalAddress
  - -- (3) tcpConnLocalPort
  - -- (4) tcpConnRemAddress
  - -- (5) tcpConnRemPort
- -- (14) tcpInErrs
- -- (15) tcpOutRsts

User Datagram Protocol Group - UDP (1.3.6.1.2.1.7)

The user datagram protocol group has mandatory characters for all systems that implement UDP.

(7) udp
- -- (1) udpInDatagrams
- -- (2) udpNoPorts
- -- (3) udpInErrors
- -- (4) udpOutDatagrams
- -- (5) udpTable
- -- (1) udpEntry
  - -- (1) udpLocalAddress
  - -- (2) udpLocalPort

EGP (1.3.6.1.2.1.8)

The EGP group has mandatory characters for all systems that implement EGP.

(8) egp

-- (1) egpInMsgs

-- (2) egpInErrors

-- (3) egpOutMsgs

-- (4) egpOutErrors

-- (5) egpNeighTable

-- (1) egpNeighEntry

-- (1) egpNeighState

-- (2) egpNeighAddr

-- (3) egpNeighAs

-- (4) egpNeighInMsgs

-- (5) egpNeighInErrs

-- (6) egpNeighOutMsgs

-- (7) egpNeighOutErrs

-- (8) egpNeighInErrMsgs

-- (9) egpNeighOutErrMsgs

-- (10) egpNeighStateUps

-- (11) egpNeighStateDowns

-- (12) egpNeighIntervalHello

-- (13) egpNeighIntervalPoll

-- (14) egpNeighMode

-- (15) egpNeighEventTrigger

-- (6) egpAs

Simple Network Management Protocol Group (1.3.6.1.2.1.11)

The simple network management protocol group has mandatory characters for all systems. In SNMP devices that are optimized to support either a single agent or a single management station, some of the listed objects will be overwritten with the value "0".

(11) snmp

-- (1) snmpInPkts
-- (2) snmpOutPkts
-- (3) snmpInBadVersions
-- (4) snmpInBadCommunityNames
-- (5) snmpInBadCommunityUses
-- (6) snmpInASNParseErrs
-- (7) not used
-- (8) snmpInTooBigs
-- (9) snmpInNoSuchNames
-- (10) snmpInBadValues
-- (11) snmpInReadOnlys
-- (12) snmpInGenErrs
-- (13) snmpInTotalReqVars
-- (14) snmpInTotalSetVars
-- (15) snmpInGetRequests
-- (16) snmpInGetNexts
-- (17) snmpInSetRequests
-- (18) snmpInGetResponses
-- (19) snmpInTraps
-- (20) snmpOutTooBigs
-- (21) snmpOutNoSuchNames
-- (22) snmpOutBadValues
-- (23) not used
-- (24) snmpOutGenErrs
-- (25) snmpOutGetRequests
-- (26) snmpOutGetNexts
-- (27) snmpOutSetRequests
-- (28) snmpOutGetResponses
-- (29) snmpOutTraps
-- (30) snmpEnableAuthenTraps

VersaPoint Ethernet NIU MIB

This MIB contains all information relevant to the function of the NIU. This private GE.FANUC.VPEIO MIB (OID = 1.3.6.1.4.1.2910) describes part of the device (OID = 1.3.6.1.4.1.2910.2) group.

MIB structure:

(1) Modules
    (3) DeviceModule
(2) VersaPoint
    (1) Device
    -- (1) Basic
    -- (1) BasicName
    -- (2) BasicDescr
    -- (3) BasicUrl
    -- (4) BasicSerialNumber
    -- (5) BasicHWRevision
    -- (11) BasicCompMaxCapacity
    -- (12) BasicCompCapacity
    -- (2) Components
    -- (1) ComponentsTable
    -- (1) ComponentsEntry
    -- (1) ComponentsIndex
    -- (2) ComponentsOID
    -- (3) ComponentsURL
    -- (4) ComponentsDevSign
    -- (5) ComponentsPowerStat
    -- (11) ComponentsStrongReset
    -- (3) Traps
    -- (0) sTrapsDelemeter
    -- (1) FWPasswdAccess
    -- (2) FWHealth
    -- (3) FWConf
    -- (11) Firmware
    -- (1) FWInfo
    -- (1) FWInfoVersion
    -- (2) FWInfoState
    -- (3) FWInfoDate
    -- (4) FWInfoTime
    -- (5) FWInfoCopyright
    -- (6) FWInfoBootVersion
    -- (7) FWInfoBootState
    -- (8) FWInfoBootDate
    -- (9) FWInfoBootTime
    -- (11) FWInfoOperStatus
    -- (12) FWInfoHealthText
    -- (2) FWCtrl

-- (1) FWCtrlBasic
-- (1) FWCtrlReset
-- (2) FWCtrlTrapDestCapacity
-- (2) FWCtrlTrapDest
-- (1) FWCtrlTrapDestTable
-- (1) FWCtrlTrapDestEntry
-- (1) FWCtrlTrapDestIndex
-- (2) FWCtrlTrapDestIPAddr
-- (3) FWCtrlPasswd
-- (1) FWCtrlPasswdSet
-- (2) FWCtrlPasswdSuccess
-- (4) FWCtrlUpdate
-- (1) FWCtrlUpdateEnable
-- (2) FWCtrlTftpIPAddr
-- (3) FWCtrlTftpFile
-- (5) FWCtrlConf
-- (1) FWCtrlConfStatus
-- (11) FWInfo
-- (1) FWParamSaveConfig
-- (12) Rptr

BasicName

OID 1.3.6.1.4.1.2910.2.1.1.1
Syntax DisplayString
Access Read/write
Description Contains the device name (corresponds to "sysName" in the Standard MIB)

BasicDescr

OID 1.3.6.1.4.1.2910.2.1.1.2
Syntax DisplayString
Access Read/write
Description Contains a brief description (corresponds to "sysDescr" in the standard MIB)

BasicName

OID 1.3.6.1.4.1.2910.2.1.1.3
Syntax DisplayString
Access Read
Description Contains the URL of the device web page for WBM

BasicSerialNumber

OID 1.3.6.1.4.1.2910.2.1.1.4

Syntax Octet String (12)

Access Read

Description Contains the serial number of the device

BasicHWRevision

OID 1.3.6.1.4.1.2910.2.1.1.5

Syntax Octet String (4)

Access Read

Description Contains the hardware version of the device

BasicCompMaxCapacity

OID 1.3.6.1.4.1.2910.2.1.1.11

Syntax Integer32 (1...1024)

Access Read

Description Contains the maximum possible number of devices that can be connected

BasicCompCapacity

OID 1.3.6.1.4.1.2910.2.1.1.12

Syntax Integer32 (1...1024)

Access Read

Description Contains the actual number of connected devices

ComponentsTable - ComponentsEntry

OID 1.3.6.1.4.1.2910.2.1.2.1.1
Syntax
Access
Description Generates a table with the description of individual components
ComponentsIndex
OID 1.3.6.1.4.1.2910.2.1.2.1.1.1
Syntax Integer32 (1 ... 1024)
Access Read
Description Contains the index for the component
ComponentsOID
OID 1.3.6.1.4.1.2910.2.1.2.1.1.2
Syntax OBJECT IDENTIFIER
Access Read
Description Contains the designation of OIDs/complete path entries
flComponentsURL
OID 1.3.6.1.4.1.2910.2.1.2.1.1.3
Syntax DisplayString
Access Read
Description Contains the URL of the web page for this component with additional information
ComponentsDevSign
OID 1.3.6.1.4.1.2910.2.1.2.1.1.4
Syntax INTEGER (0 ... 255)
Access Read
Description Contains the index entry for the component
ComponentsPowerStat
OID 1.3.6.1.4.1.2910.2.1.2.1.1.5
Syntax INTEGER
Access Read
Description Contains status information about the connected supply voltages:
- Unknown 1
- No voltage available 2
- Supply voltage 1 OK 3
- Supply voltage 2 OK 4
- Supply voltage 1 and 2 OK 5
ComponentsStrongReset
OID 1.3.6.1.4.1.2910.2.1.2.1.1.11
Syntax INTEGER
Access Read/write
Description With write access, a reset can be executed with "2". With read access, the value is always "1" - no reset.

FWInfoVersion

OID 1.3.6.1.4.1.2910.2.1.11.1.1

Syntax Octet String (4)

Access Read

Description Contains the firmware version as a string. Example for version "3.97":
0x33, 0x2e, 0x39, 0x37

FWInfoState

OID 1.3.6.1.4.1.2910.2.1.11.1.2

Syntax Octet String (6)

Access Read

Description Contains the firmware release as a string. Example for "beta":
0x62, 0x65, 0x64, 0x61

FWInfoDate

OID 1.3.6.1.4.1.2910.2.1.11.1.3

Syntax Octet String (6)

Access Read

Description Contains the creation date of the firmware version as a string. Example for "21.05.2001":
0x32, 0x31, 0x30, 0x35, 0x30, 0x31

FWInfoTime

OID 1.3.6.1.4.1.2910.2.1.11.1.4

Syntax Octet String (6)

Access Read

Description Contains the creation time of the firmware version as a string. Example for "14:10:20":
0x31, 0x34, 0x31, 0x30, 0x32, 0x30

FWInfoCopyright

OID 1.3.6.1.4.1.2910.2.1.11.1.5

Syntax DisplayString (6)

Access Read

Description Contains the owner of the firmware copyright.

FWInfoBootVersion

OID 1.3.6.1.4.1.2910.2.1.11.1.6

Syntax Octet String (4)

Access Read

Description Contains the version of the Boot Loader as a string. Example for version "2.65":
0x32, 0x2e, 0x36, 0x35

FWInfoBootState

OID 1.3.6.1.4.1.2910.2.1.11.1.7

Syntax Octet String (6)

Access Read

Description Contains the Boot Loader release as a string. Example for "beta":
0x62, 0x65, 0x64, 0x61

FWInfoBootDate

OID 1.3.6.1.4.1.2910.2.1.11.1.8

Syntax Octet String (6)

Access Read

Description Contains the creation date of the Boot Loader version as a string. Example for "09.03.2001":
0x32, 0x31, 0x30, 0x35, 0x30, 0x31

FWInfoBootTime

OID 1.3.6.1.4.1.2910.2.1.11.1.7

Syntax Octet String (6)

Access Read

Description Contains the creation time of the Boot Loader version as a string. Example for "14:10:20":
0x31, 0x34, 0x31, 0x30, 0x32, 0x30

FWInfoBootStatus

OID 1.3.6.1.4.1.2910.2.1.11.1.11

Syntax Integer

Access Read

Description Contains the operating state of the firmware.
- Problem 1
- No error 2

FWInfoHealthText

OID 1.3.6.1.4.1.2910.2.1.11.1.12
Syntax DisplayString
Access Read
Description Contains additional information/error states for the firmware.

FWCtrlReset

OID 1.3.6.1.4.1.2910.2.1.11.2.1.1

Syntax Integer

Access Read/write

Description With write access, a reset can be executed with "2". With read access, the value is always "1".

FWCtrlTrapDestCapacity

OID 1.3.6.1.4.1.2910.2.1.11.2.1.2
Syntax Integer32 (1 ... 1024)
Access Read
Description Contains the number of devices to which the traps are sent.

FWCtrlTrapDestTable - FWCtrlTrapDestEntry

OID 1.3.6.1.4.1.2910.2.1.11.2.2.1.1
Syntax
Access
Description Generates a table with the IP addresses of the trap managers
FWCtrlTrapDestIndex
OID 1.3.6.1.4.1.2910.2.1.11.2.2.1.1.1
Syntax Integer32 (1 ... 1024)
Access Read
Description Contains the index of the target component, which should receive the traps
FWCtrlTrapDestIPAddr
OID 1.3.6.1.4.1.2910.2.1.2.1.1.2
Syntax IPAddress
Access Read/write
Description Contains the IP address of the target component, which should receive
the traps

FWCtrlPasswdSet

OID 1.3.6.1.4.1.2910.2.1.11.2.3.1

Syntax Octet String (2 ... 24)

Access Read/write

For security reasons, the response is always "*****" with read access.

Description A new password can be entered here with a maximum of 12 characters. Example:
- Your new password should be "factory3".
- The password must be entered a second time for confirmation.
- Your entry is "factory3factory3".
- Your password for write access is now: "factory3"

FWCtrlPasswdSuccess

OID 1.3.6.1.4.1.2910.2.1.11.2.3.2

Syntax Integer

Access Read

Description A messaged is displayed, which informs you whether the last change of password was successful.
- Unknown 1
- Failed 2
- Successful 3

FWCtrlUpdateEnable

OID 1.3.6.1.4.1.2910.2.1.11.2.4.1

Syntax Integer

Access Read/write

Description A firmware update can be executed here on the next manual restart/reset of the device:
- Start with existing firmware 1
- Execute firmware update 2

FWCtrlTftpIPAddr

OID 1.3.6.1.4.1.2910.2.1.11.2.4.2

Syntax IpAddress

Access Read/write

Description Enter the IP address of the tftp server, where the (new) firmware can be found.

FWCtrlTftpFile

OID 1.3.6.1.4.1.2910.2.1.11.2.4.3

Syntax Octet String (0 ... 64)

Access Read/write

Description Enter the file name of the (new) firmware here.

FWCtrlConfStatus

OID 1.3.6.1.4.1.2910.2.1.11.2.5.1

Syntax INTEGER

Access Read

Description Contains a status message about the current hardware configuration:
- Configuration OK 1
- Configuration faulty 2
- Configuration saved 3

FWParamSaveConfig

OID 1.3.6.1.4.1.2910.2.1.11.11.1

Syntax INTEGER

Access Read/write

Description The current configuration can be saved in the EEPROM:
- Do not save configuration 1 (has no effect)
- Save configuration 2

With read access, the value is always "1".

B

Index

H

I

J

K

L

M

N

O

P