NPS/1000

Hardware

Manual

Document number 80-001057-1

Revision D

NPS/1000

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Revision History

Date	Revision	Description
2/16/02	A	Alpha release
2/25/02	B	Updated name
6/10/02	C	Revised for 2-port
3/13/07	D	Fixed J5-25 and J5-26 error

Agency Notifications

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his / her own expense.

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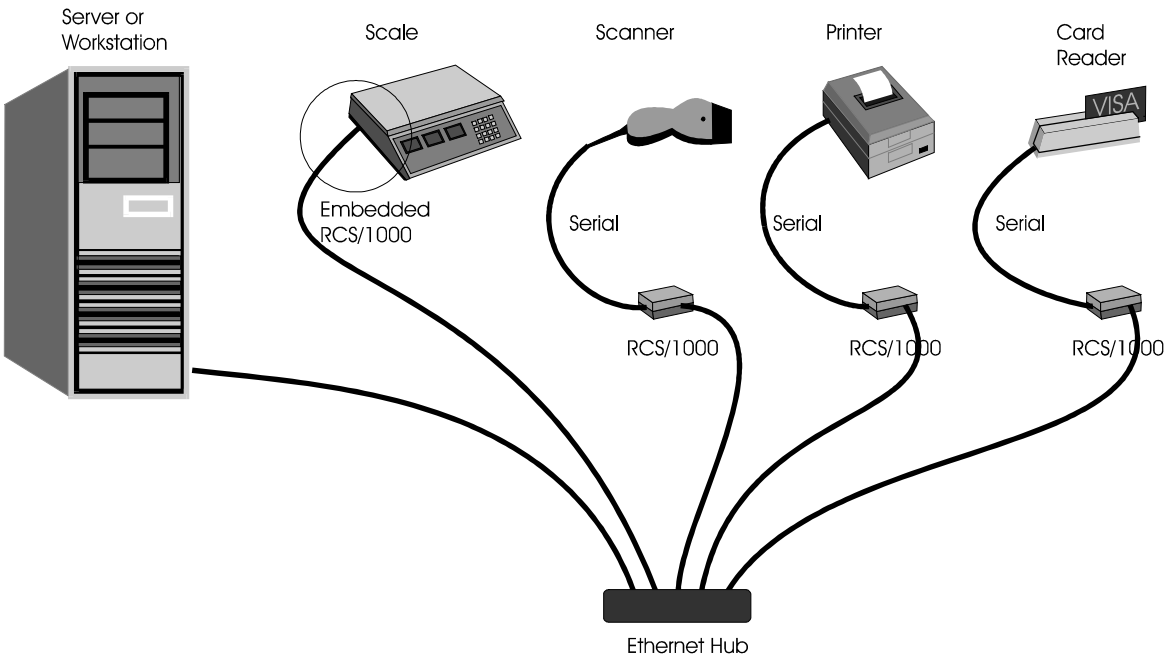
Chapter 1: Overview

The NPS/1000 port server provides communication between peripheral devices and computers connected to a network. When the NPS/1000 is connected to your LAN and to one or more peripherals, it manages network traffic, routing it to the correct device. For example, the network diagram below shows how the NPS/1000 might be used to allow one or more PCs to share expensive peripherals or to access peripherals that are located elsewhere on the local or remote network.

The NPS/1000 is available either as a standalone device (with RS-232/422/485 interfaces) or as an embedded module (via a TTL/UART interface). The embedded device can be mounted inside a custom device to Ethernet-enable a serial device.



NPS/1000 Features

The NPS/1000 offers the following features and benefits:

- Easy web-based set up and configuration
- Open systems communications for multi-site data networks
- Can be used in a variety of data communications applications
- Reduces cost and complexity
- 1 or 2 DB-9 serial ports with screw-down connectors (standalone version)
- RS-232 or RS-422/RS-485 models available (standalone version)
- Embedded version available to install inside devices (via TTL interface)
- An RJ-45, 10Base-T Ethernet port
- High-speed serial connections
- IP packet routing
- Operating system independent
- Complete remote diagnostics
- LEDs for each port, signaling port status and error conditions
- Industry standard interoperability
- Supports NativeCOM, allowing serial ports to appear as local Windows COM ports
- Supports generic TCP/IP access to serial ports without requiring special protocols or processing
- Standard support for LPR/LPD network printing under Windows and UNIX
- Telnet and reverse-telnet support for a variety of UNIX operating systems

Description of NPS/1000 Models

Model	Number of Serial Ports	Physical Interface	Type of connector
NPS/1001	1	TTL (via UART)	2mm header
NPS/1002	2	TTL (via UART)	2mm header
NPS/1101	1	RS-232	DB-9
NPS/1102	2	RS-232	DB-9
NPS/1181	1	RS-485/422	DB-9
NPS/1182	2	RS-485/422	DB-9

Using the NPS/1000

Using the NPS/1000 requires three steps:

1. Hardware installation
2. Configuration
3. Operation

Hardware installation is documented in this manual.

Refer to the **NPS/1000 Administrator's Guide** for configuration and operation.

Chapter 2: Installing the Hardware

This chapter describes installing the NPS/1000 hardware, including:

- Planning the installation
- Checking cables and connectors
- Sample configurations

Overview

Installing the standalone NPS/1000 hardware (models NPS/1101, NPS/1102, NPS/1181 and NPS/1182) includes the following steps:

1. **Plan the installation**
2. **Connect the NPS/1000 port server to your network**

   The most common connection method is through the 10BASET RJ-45 connector (which is labeled Ethernet) to your Ethernet LAN, using a standard straight-through Ethernet cable.
3. **Connect your peripheral device(s) to the NPS/1000 port server**

   Attach each peripheral device (e.g., cash register, card reader, modem) to a serial port (one of the DB-9 connectors).
4. **Plug the AC power supply adapter into the NPS/1000**

Planning the installation

Before installing the NPS/1000 remote communications server, consider the following:

- How will you configure your network—what types of devices will you connect and where will they be located? Identify the distances at which each device will be located from the NPS/1000 server.
- Verify that the locations selected for devices do not exceed cable specifications.
- Is there an acceptable source of AC power available near each device's proposed location?

NPS/1000 Panel Connectors

Figure 2-1 shows the connectors and LED locations for the standalone NPS models. There are one or two DB-9 serial ports and one RJ-45 Ethernet port.

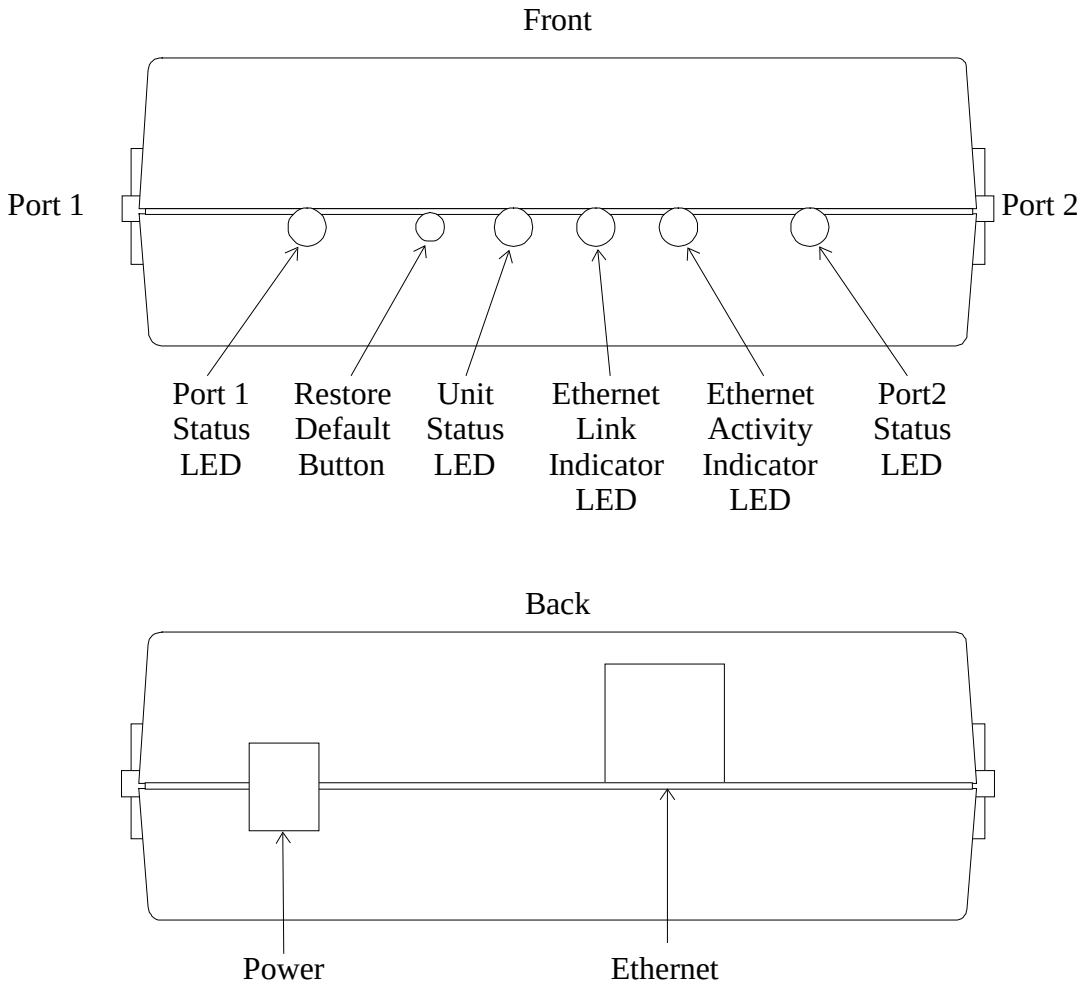


Figure 2-1: Standalone NPS/1000 Connectors

The Link and Activity LEDs indicate the status of the Ethernet connection. The Port Status LEDs indicate the status of the serial port(s) and the Unit Status LED indicates the overall status of the device. For information on interpreting the LED color and pattern displays, see **Troubleshooting**.

Depressing and holding the "Restore Default" button in while powering-on the port server will restore the default (factory) configuration to the unit.

Connecting Devices to the NPS/1000

The NPS/1000 is available in three versions: RS-232 (or EIA-232), RS-422/RS-485, and embedded (TTL). The connections provided with each version are described below.

Standalone RS-232 Models (NPS/1101 and NPS/1102)

The RS-232 versions of the NPS/1000 port server use a data terminal equipment (DTE) pinout on the DB-9 serial ports. Table 2-1 lists the pinouts of the DB-9 pins used for RS-232 serial communications.

DB-9 Pin Number	RS-232 Name	Direction	Signal Function
1	DCD	I	Signals NPS/1000 that the remote device has established a connection
2	RX	I	Serial data in, from remote device to NPS/1000
3	TX	O	Serial data out, from NPS/1000 to remote device
4	DTR	O	Signals remote device that NPS/1000 is attached and powered on
5	GND		Signal ground
6	DSR	I	Signals NPS/1000 that remote device is attached and powered on
7	RTS	O	Flow control, to enable remote device to send data
8	CTS	I	Flow control, to enable NPS/1000 to send data on TX
9	RI	I	Ring Indicator

Table 2-1: DB-9 Pinouts for RS-232

Table 2-2, Table 2-3, and Table 2-4 show cable diagrams for three common configurations. The cable shown in Table 2-2 may be used to connect terminals or printers with 25-pin connectors to the NPS/1000.

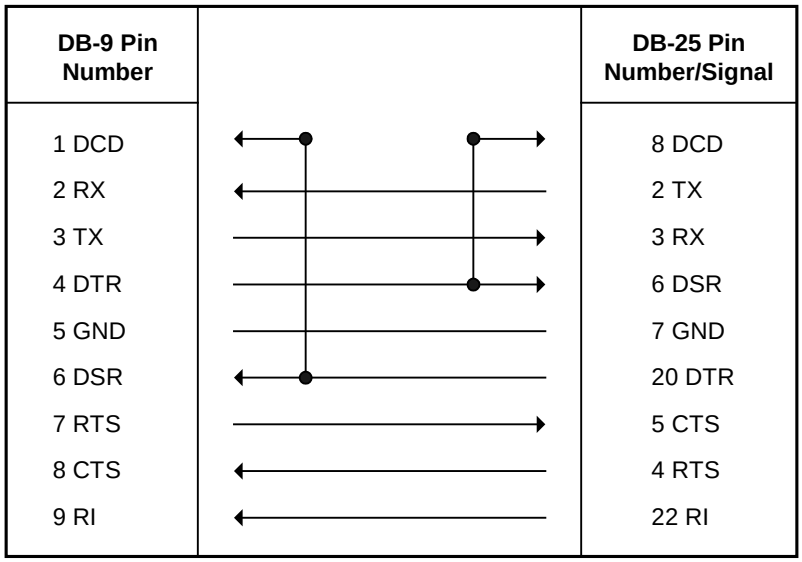


Table 2-2: DB-9 to DB-25 Terminal Cable

The cable shown in Table 2-3 may be used to connect modems with 25-pin connectors to the NPS/1000. Modems should be configured to switch their carrier detect signal (DCD) on and off in response to making and breaking telephone connections. This insures that the NPS/1000 terminates user sessions when they are disconnected.

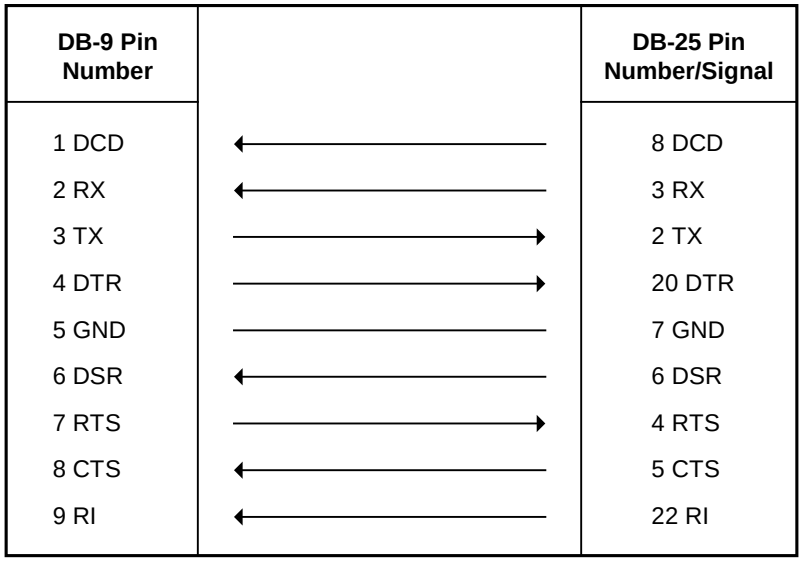


Table 2-3: DB-9 to DB-25 Modem Cable

The cable shown in Table 2-4 can be used to connect a DB-9 serial terminal (or standard PC COM port) directly to the NPS/1000. The DB-9 to DB-9 terminal cable diagrammed is a standard NULL modem connector, readily available as an off-the-shelf cable.

DB-9 Pin Number		DB-9 Pin Number
1 DCD		4 DTR
2 RX		3 TX
3 TX		2 RX
4 DTR		1 DCD
5 GND		5 GND
6 DSR		6 DSR
7 RTS		8 CTS
8 CTS		7 RTS
9 RI		9 RI

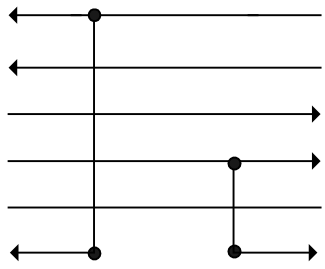
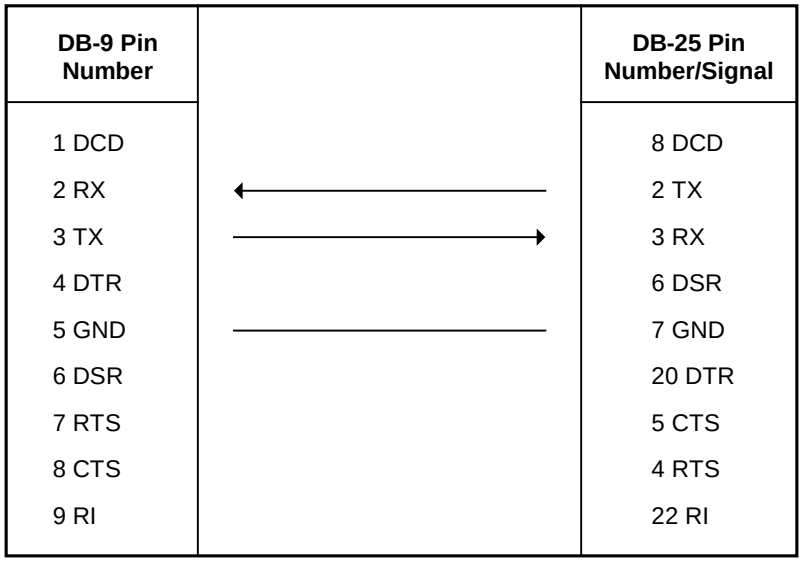


Table 2-4: DB-9 to DB-9 Terminal Cable

DB-9 to DB-9 modem cables (not diagrammed) require no special pinouts and use a straight-through cable.

The RS-232 versions of the NPS/1000 do not require the use of all 9 wires. Only pins 2, 3, and 5 are essential. DTR/DSR and RTS/CTS (pins 4, 6, 7, and 8) are generally only necessary for flow control. DCD (pin 1) is normally not required and RI (pin 9) is only required for modems that need a ring indicator. Table 2-5 shows a minimal 3-wire cable using only RX (pin 2, data in), TX (pin 3, data out), and GND (pin 5, ground).



DB-9 Pin Number		DB-25 Pin Number/Signal
1 DCD		8 DCD
2 RX	←	2 TX
3 TX	→	3 RX
4 DTR		6 DSR
5 GND	—	7 GND
6 DSR		20 DTR
7 RTS		5 CTS
8 CTS		4 RTS
9 RI		22 RI

Table 2-5: DB-9 to DB-25 3-wire Terminal Cable

Standalone RS-422/485 Models (NPS/1181 and NPS/1182)

Unlike RS-232, the RS-485 and RS-422 specifications do not have a standard set of pinouts. In general, whenever you use RS-422/485 devices you will need to make custom cables. The NPS/1000 DB-9 pinouts for RS-422 mode and for RS-485 4-wire mode are show in Table 2-6.

Pin #	Name	Direction
1	Not used	
2	RXB	Input
3	TXB	Output
4	Not used	
5	GND	
6	Not used	
7	TXA	Output
8	RXA	Input
9	Not used	

Table 2-6: DB-9 Pinouts for RS-422 and RS-485 (4-wire)

RS-485 2-wire mode uses the same pinouts, but receive and transmit pairs are shorted as shown in Table 2-7:

Pin #	Name	Direction
1	Not used	
2 or 3	RXB/TXB	Input/Output
4	Not used	
5	GND	
6	Not used	
7 or 8	RXA/TXA	Input/Output
9	Not used	

Table 2-7: DB-9 Pinouts for RS-485 (2-wire)

Note that some RS-422 and RS-485 devices refer to the differential pair of signals that make up the transmit and receive lines as "-" and "+" instead of the standard "A" and "B". In most cases, the "-" signal corresponds to the "A" signal and the "+" signal corresponds to the "B" signal, but some devices reverse this. Refer to the chapter on **Using RS-422 and RS-**

485 Devices for more information on wiring and using 2-wire and 4-wire RS-422/485 networks with the NPS/1000.

Embedded Models (NPS/1001 and NPS/1002)

The embedded versions of the NPS/1000 do not have any line drivers or receivers like those found in RS-232/422/485. The I/O signals for these models are TTL-compatible signals (0-5V) that are brought out on two 2x13 2mm connectors (J4 and J5).

The embedded models can be purchased as either 1-port or 2-port servers. The pinouts for each model are different and are not compatible with each other. The pinouts for the NPS/1001 (1-port) are shown in Table 2-8. The pinouts for the NPS/1002 (2-port) are shown in Table 2-9.

Pin	Name	Description
J4-1	GND	Ground
J4-2	VCC	5V
J4-3	PC0	UART TX Output
J4-4	PC1	UART RX Input
J4-5	PC2	RTS Output
J4-6	PC3	DCD Input
J4-7	TPOUT-	10BASE-T Out-
J4-8	TPOUT+	10BASE-T Out+
J4-9	LNK	10BASE-T Link LED
J4-10	PD3	CTS Input
J4-11	PD4	DTR Output
J4-12	PD5	DSR Input
J4-13	[Not Used]	NC
J4-14	[Not Used]	NC
J4-15	PE0	RI Input
J4-16	PE1	Status LED (Green)
J4-17	TPIN-	10BASE-T In-
J4-18	TPIN+	10BASE-T In+
J4-19	PE4	Status LED (Red)
J4-20	PE5	Port 1 Status (Green)
J4-21	ACT	10BASE-T Act LED
J4-22	PE7	Port 1 Status (Red)
J4-23	[Not Used]	NC
J4-24	[Not Used]	NC
J4-25	[Not Used]	NC
J4-26	[Not Used]	NC

Pin	Name	Description
J5-1	[Not Used]	NC
J5-2	[Not Used]	NC
J5-3	[Not Used]	NC
J5-4	[Not Used]	NC
J5-5	[Not Used]	NC
J5-6	[Not Used]	NC
J5-7	[Not Used]	NC
J5-8	[Not Used]	NC
J5-9	[Not Used]	NC
J5-10	[Not Used]	NC
J5-11	[Not Used]	NC
J5-12	[Not Used]	NC
J5-13	[Not Used]	NC
J5-14	[Not Used]	NC
J5-15	[Not Used]	NC
J5-16	[Not Used]	NC
J5-17	[Not Used]	NC
J5-18	[Not Used]	NC
J5-19	[Not Used]	NC
J5-20	[Not Used]	NC
J5-21	[Not Used]	NC
J5-22	[Not Used]	NC
J5-23	[Not Used]	NC
J5-24	[Not Used]	NC
J5-25	VCC	5V
J5-26	GND	Ground

Table 2-8: Embedded Pinouts for NPS/1001 (1-port)

Pin	Name	Description
J4-1	GND	Ground
J4-2	VCC	5V
J4-3	PC0	UART TX1 Output
J4-4	PC1	UART RX1 Input
J4-5	PC2	UART TX2 Output
J4-6	PC3	UART RX2 Input
J4-7	TPOUT-	10BASE-T Out-
J4-8	TPOUT+	10BASE-T Out+
J4-9	LNK	10BASE-T Link LED
J4-10	PD3	CTS1 Input
J4-11	PD4	DTR1 Output
J4-12	PD5	DSR1 Input
J4-13	[Not Used]	NC
J4-14	[Not Used]	NC
J4-15	PE0	RI1 Input
J4-16	PE1	Status LED (Green)
J4-17	TPIN-	10BASE-T In-
J4-18	TPIN+	10BASE-T In+
J4-19	PE4	Status LED (Red)
J4-20	PE5	Port 1 Status (Green)
J4-21	ACT	10BASE-T Act LED
J4-22	PE7	Port 1 Status (Red)
J4-23	[Not Used]	NC
J4-24	[Not Used]	NC
J4-25	[Not Used]	NC
J4-26	[Not Used]	NC

Pin	Name	Description
J5-1	[Not Used]	NC
J5-2	[Not Used]	NC
J5-3	[Not Used]	NC
J5-4	[Not Used]	NC
J5-5	PA4	RTS1 Output
J5-6	PA5	RTS2 Output
J5-7	PA6	Port 2 Status (Green)
J5-8	PA7	Port 2 Status (Red)
J5-9	[Not Used]	NC
J5-10	PB0	DCD1 Input
J5-11	PB2	CTS2 Input
J5-12	PB3	DSR2 Input
J5-13	PB4	DCD2 Input
J5-14	PB5	RI2 Input
J5-15	PB7	DTR2 Output
J5-16	[Not Used]	NC
J5-17	[Not Used]	NC
J5-18	[Not Used]	NC
J5-19	[Not Used]	NC
J5-20	[Not Used]	NC
J5-21	[Not Used]	NC
J5-22	[Not Used]	NC
J5-23	[Not Used]	NC
J5-24	[Not Used]	NC
J5-25	VCC	5V
J5-26	GND	Ground

Table 2-9: Embedded Pinouts for NPS/1002 (2-port)

The behavior of the input and output modem signals in the embedded models is software configurable. Physically, all the serial ports have a TTL interface to the host device. However, each port can be configured to behave as a "virtual" RS-232 / 422 / 485 port. This changes the behavior of the transmitter, the receiver, and all the modem signals. Each mode and its associated modem signal behavior is detailed in Table 2-10.

Signal	Direction	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)
TX	Output	Always enabled	Always enabled	Enable on transmit	Enable on transmit
RX	Input	Always enabled	Always enabled	Disable on transmit	Always enabled
RTS	Output	User-controlled	Assert on transmit	Assert on transmit	Assert on transmit
DTR	Output	User-controlled	Always enabled	Always enabled	Always enabled
CTS	Input	Configurable	Emulated ON	Emulated ON	Emulated ON
DSR	Input	Configurable	Emulated ON	Emulated ON	Emulated ON
DCD	Input	Configurable	Emulated ON	Emulated ON	Emulated ON
RI	Input	Configurable	Emulated ON	Emulated ON	Emulated ON

Table 2-10: Serial I/O Behavior for Embedded Models

In RS-232 mode, the treatment of the input modem signals can be configured via the web browser interface. By default, all these signals (CTS, DSR, DCD, and RI) are driven by the TTL values on their associated hardware pins. If these signals are not required for the operation of the host device, the software can be configured to emulate them as "always ON" and the associated hardware pins can be left unconnected. See the **Administrator's Guide** for more information.

EMI Considerations

The primary method for ensuring reasonable EMI behavior on the embedded NPS models is to provide adequate grounding. Sufficient grounding is usually obtained by properly connecting the two grounding pins (J4-1 and J5-25). However, in the event that your embedded application requires even better EMI performance, the embedded NPS modules support the following additional grounding points. Both of these grounding points are located at the edge of the PCB near the 10BASET connector, and can be identified by their silk-screen designators:

1. **GND:** This hole is connected directly to the module's ground plane and provides the best grounding.

2. **EGND:** The hole is connected to the module's ground plane via a zero-ohm resistor. It's grounding is slightly inferior to **GND**.

Ethernet LAN

The NPS/1000 is connected to your LAN using an Ethernet port. The Ethernet port on the NPS/1000 is a standard 10BASE-T RJ-45 jack. It can be connected to an Ethernet hub via a standard, straight-through Ethernet cable.

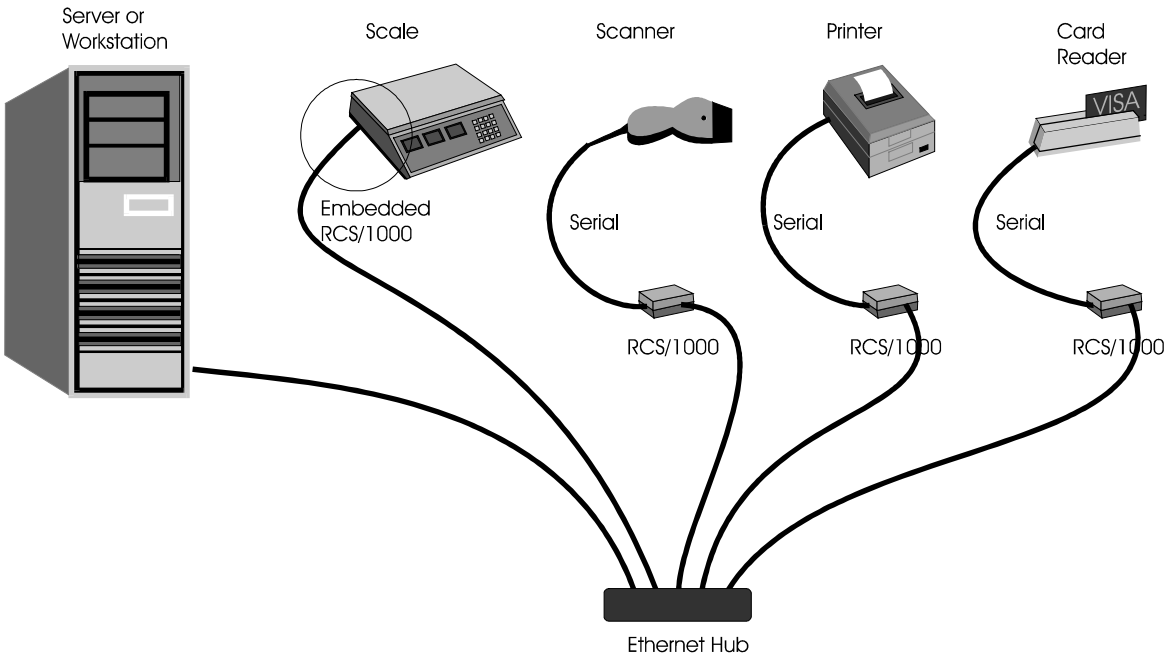


Figure 2-2: Network Topology Example

Starting the NPS/1000

When the NPS/1000 is powered up, the LEDs will flash to indicate normal operation. The following LED colors and patterns will be displayed during normal startup, if no errors are detected.

- **Status LED** – initially this LED will be solid yellow, but will quickly turn green. If the status LED is solid green, then the NPS/1000 doesn't have a permanent IP address and is trying to obtain one from a DHCP server. If the LED is blinking green, it means the NPS/1000 has obtained an IP address and is ready to use.
- **Ethernet LEDs** – these LEDs will either be off or green. If the Link LED is off it means the Ethernet cable is not properly connected. A green Link LED means that a good Ethernet link has been established and the unit is on the network. The activity LED will normally be off, and will blink green to show network activity.
- **Serial port LEDs** – these LEDs will be either yellow or green. Solid yellow indicates a port that is not in use. Green indicates a port that is in use. The green LED will blink when data is transmitted or received. It will blink 2 times per second when data is continuously transmitted or received.

If any of the LEDs turn red, an error condition was detected. For a full description of the LED patterns, see **Troubleshooting**.

Chapter 3: Using RS-422 and RS-485 Devices

The NPS/1000 can be used to communicate with RS-422 and RS-485 devices. This chapter describes connecting these devices and configuring the NPS/1000 to communicate in this mode.

Connecting RS-422/485 Devices

RS-422 and RS-485 modes are very similar, except that in RS-422 mode the transmitter remains enabled at all times; in RS-485 mode, the transmitter is disabled automatically when no data is being transmitted. Consequently, to transmit and receive data, RS-422 devices must be connected using a four-wire cable (i.e. with separate transmit and receive pairs). RS-485 devices may be connected with either two-wire or four-wire cables.

You can connect two RS-422/485 devices with a point-to-point connection, or more than two RS-485 devices in a bus configuration.

The only legal RS-422/485 cabling topology is a bus topology (including point-to-point connections)! All other topologies are expressly forbidden by the RS-422/485 specification. This includes the following illegal configurations:

- Connecting cables in any type of star topology (regardless of whether or not devices are attached to the ends of the cables). This includes using star-based patch panels or any other method that splits the physical cable off into multiple segments.
- Connecting RS-422/485 devices to the bus using cable stubs of any length

Due to the resilience of the RS-422/485 signaling specification, some of these illegal topologies may work in certain configurations. However, changing factors such as cable length, baud rate, number of devices, bus loading, etc. may cause such configurations to fail sporadically or to stop communicating entirely. **The only topology guaranteed to work in all cable configurations is a properly terminated bus topology.**

RS-422/485 Point-to-point Configuration

Point-to-point connections can be established between two RS-422 devices, an RS-422 and an RS-485 device, or two RS-485 devices. Figure 3-1 shows a four-wire, point-to-point connection between two devices.

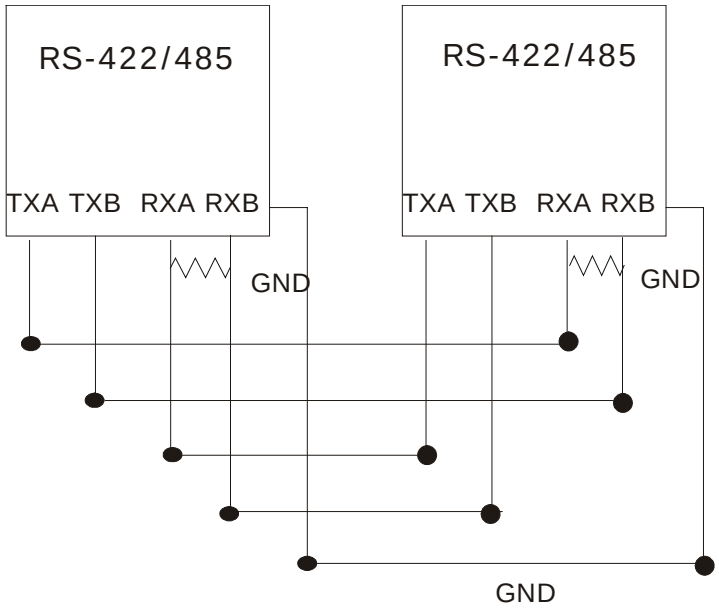


Figure 3-1: RS-422/485 point-to-point connection

Notice the termination on each end of the connection. The receiving end of the wire should be terminated with a resistance equal to the wire's characteristic impedance, generally 100-120 ohms.

RS-422/485 Bus Configurations

More than two RS-422/485 devices can be connected in a bus configuration. You can connect one RS-422 and several RS-485 devices on a bus or you can connect several RS-485 devices on a bus, but you cannot connect more than one RS-422 device on a single bus. If your configuration includes an RS-422 device, you must use a four-wire connection. Configurations including only RS-485 devices can use either two-wire or a four-wire communication.

When RS-422 and/or RS-485 devices are connected to a bus, they operate as one master and one or more slaves. In all configurations that include an RS-422 device, the RS-422 device is the master and the RS-485 devices are slaves.

Two-Wire System

In two-wire communication, all devices share the same pair of wires to both transmit and receive. All the devices connected to a two-wire system must be RS-485 devices. Figure 3-2 shows a typical two-wire system.

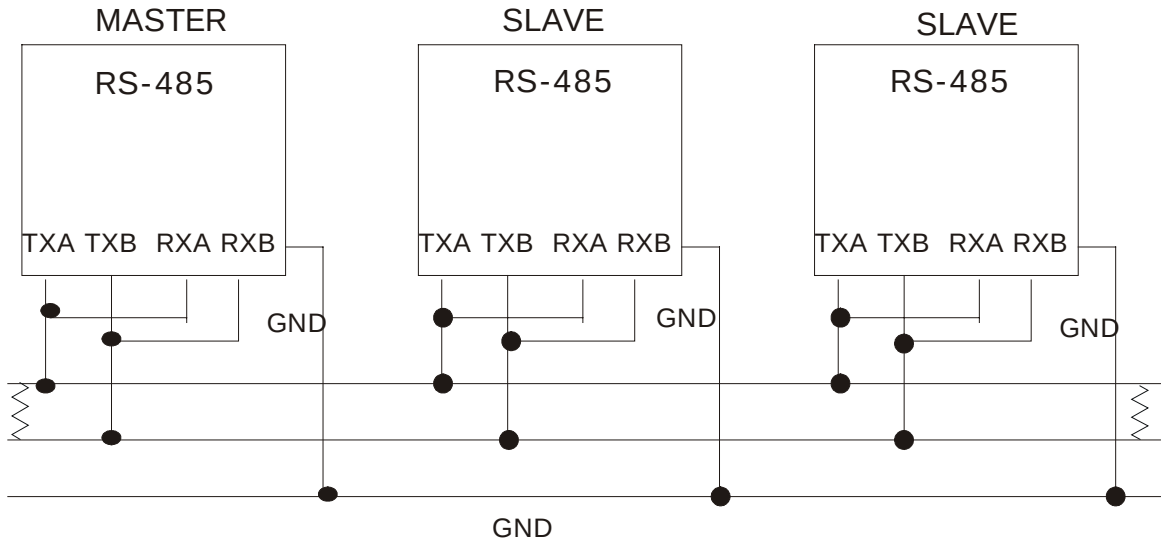


Figure 3-2: Two-wire RS-485 System

In the two-wire system diagrammed in Figure 3-2, one pair of transmit and receive lines (TXA and RXA) are connected to a single wire and the other pair of transmit and receive lines (TXB and RXB) are connected to the second wire. The device that is designated as the master manages the traffic on the lines.

As shown in the above diagram, the pair of transmit / receive lines needs to be terminated with 120 ohms at each end of the bus.

Four-Wire Systems

In four-wire communication, there are two pairs of transmit and receive lines, allowing full duplex communication. In most four-wire systems, an RS-422 device will serve as the master with several RS-485 devices as slaves. However, an RS-422 device is not required; an RS-485 device can serve as the master. Figure 3-3 shows a typical four-wire system.

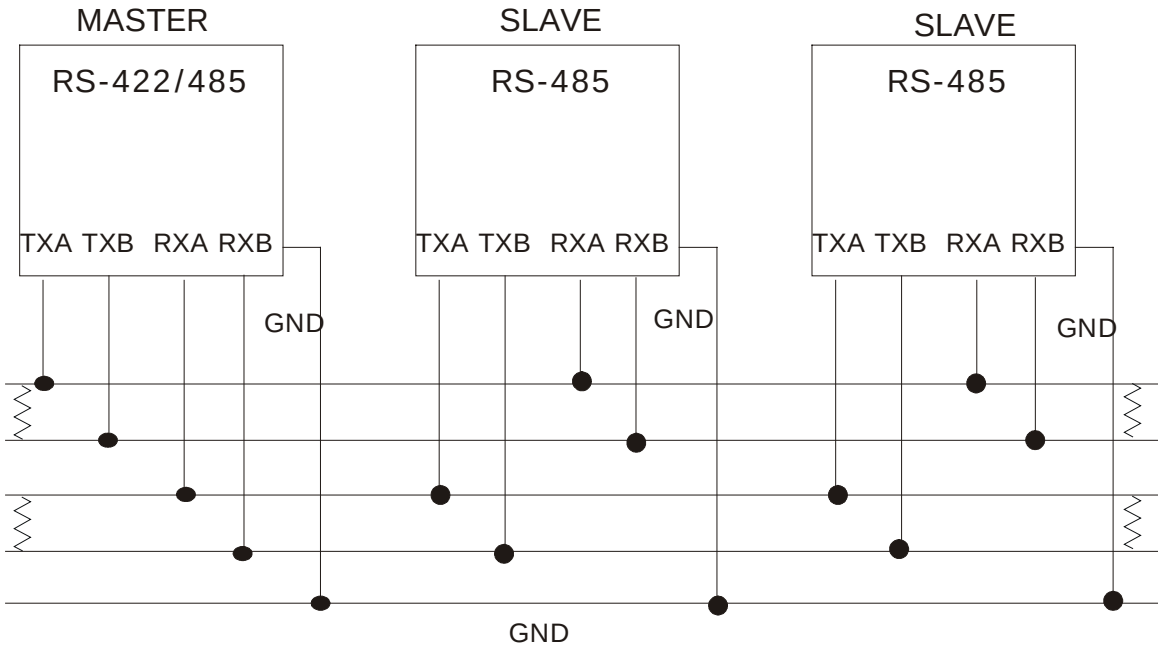


Figure 3-3: Four-wire RS-422/485 System

In most configurations, the device that is designated as the master will be an RS-422 device that constantly drives the transmit lines.

Both pairs of lines on the multi-drop wire must be terminated at each end of the bus with a resistance equal to the wire's characteristic impedance, generally 120 ohms. If the RX data pins are not terminated at all and have nothing attached, they may be susceptible to cross talk. Data from other lines on this serial port, or from other nearby ports, may be coupled back onto the unterminated receive lines. You should attach a simple 100- or 120-ohm termination resistor between the lines to avoid this.

Using the NPS/1000 in RS-422 or RS-485 Mode

The NPS/1000 can function as any of the devices in any of the configurations described above. The NPS can be connected to either an RS-422 or an RS-485 device in a point-to-point configuration. Or the NPS can be connected to a two-wire or four-wire bus, as either a master or a slave, and can communicate in either RS-422 or RS-485 mode. Typically, a single NPS/1000 is connected to the bus and functions as the master, but this is determined by the application.

Configuring an NPS/1000 serial port for RS-422/485

The RS-422/485 versions of the NPS/1000 are factory configured for RS-422 4-wire mode with standard termination and fail-safe biasing. To change these settings, you must open the enclosure by disconnecting the power cable, removing the screws from the cover, and lifting off the top. Avoid touching any of the components in the port server. Figure 3-4 illustrates the locations of the configuration switches and resistor locations.

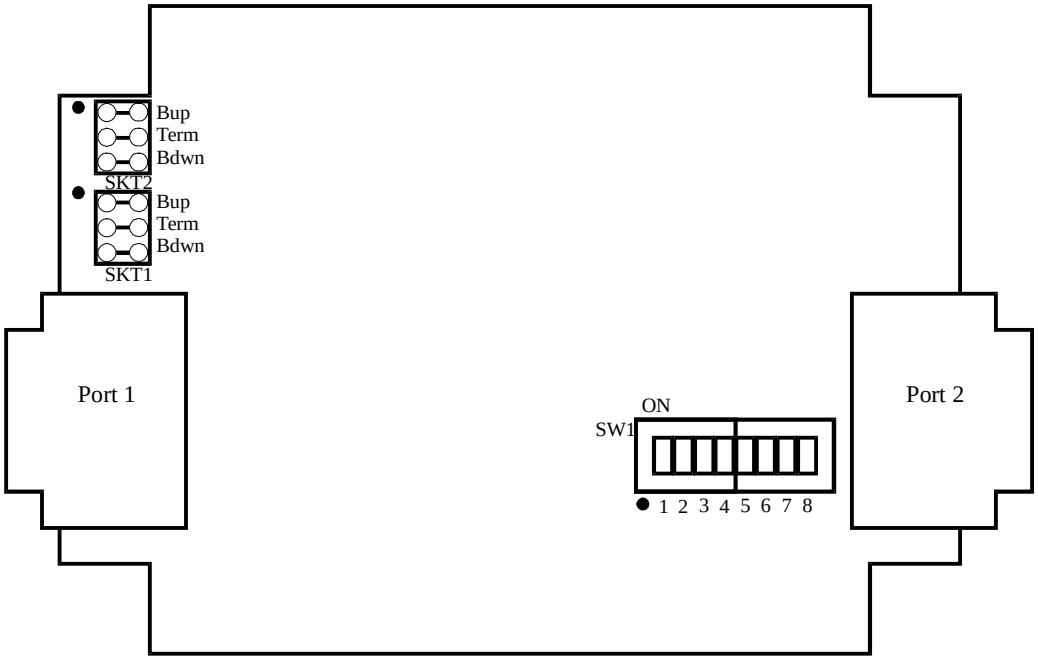


Figure 3-4: Switches and Resistors for RS-422/485

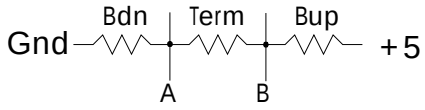
The switch SW1 controls the mode of each port, with four switches for each port. Switches SW1-1 through SW1-4 configure port 1; switches SW1-5 through SW1-8 configure port 2. Table 3-1 describes the proper switch settings for each mode; all other switch settings are invalid.

SW1-1 SW1-5	SW1-2 SW1-6	SW1-3 SW1-7	SW1-4 SW1-8	Description
ON	ON	ON	ON	RS-485 2 Wire Half-Duplex
OFF	OFF	OFF	ON	RS-422 4 Wire Full-Duplex (default)
OFF	OFF	ON	OFF	RS-485 4 Wire Full-Duplex

Table 3-1: RS-422/485 Switch Settings

The NPS/1000's RS-422/485 termination and biasing resistors are configurable via resistor sockets SKT1 and SKT2. Termination resistors are always required at the ends of the RS-422/485 bus as described in the previous sections.

The biasing resistors are required in RS-485 mode to prevent the bus from floating when no devices are driving the bus. Only one device on the RS-485 network should provide biasing. If you choose to use the NPS/1000 to provide biasing, you must also configure it with termination in order for the biasing circuit to function. This, in turn, requires that the NPS device be at the end of the RS-485 bus. The NPS/1000's termination and biasing circuit is shown in Figure 3-5.



Resistor	Usage	Default Value
Bup	Bias pull-up	2K ohm
Term	Bus termination	200 ohm
Bdn	Bias pull-down	2K ohm

Figure 3-5: Termination and Biasing Circuit

If necessary, you can remove or replace the biasing and termination with your own values.

Chapter 4: Troubleshooting

The standalone NPS/1000 has several LED indicators:

- **Status:** There is a status LED that indicates the overall status of the NPS/1000.
- **Serial ports:** There is an LED for each serial port connector.
- **Ethernet**: There are two LEDs for the Ethernet port.

The LEDs use red, yellow, and green blinking combinations to indicate the status of each of the NPS/1000's major components.

Status LED

The status LED indicates the overall status of the NPS/1000. The various states are described in Table 4-1.

Status LED Condition	Meaning
Blinking Green	The unit has an IP address and is operating normally
Solid Green	The unit is running, but it needs an IP address. It is trying to obtain one from DHCP/BOOTP.
Alternating Green/Yellow	If the "restore default" button was held-in during power-up, this LED sequence means that the factory default configuration was restored. This condition is temporary and will clear itself after a few moments. Otherwise, this means that the current configuration is corrupt and that the factory default configuration is being used.
Alternating Green/Red	A serious system error occurred. See the system log for more details.
Blinking Yellow	The unit is in the process of downloading new firmware. **Do not interrupt this process!**
Blinking Red	If a flash update operation fails, a series of red blinks will indicate the failure
Off	No power, or the unit is inoperative

Table 4-1: Status LED Conditions

Serial Port LEDs

Each serial port has a Port LED that describes port activity. Table 4-2 describes the various Port LED states.

Port LED Condition	Meaning
Solid Yellow	Port is closed
Solid Green	Port is open, but idle
Blinking Green	Port is open, and data is being transmitted or received. When data is being continuously transferred, this LED will blink approximately 2 times per second.
Red Blinks	Data errors will cause periodic red blinks. Persistent red blinks may imply a configuration problem (incorrect baud rate, parity settings, etc.)
Solid Red	Port hardware has failed
Off	No power, or some other hardware failure

Table 4-2: Port LED Conditions

Ethernet LEDs

The Ethernet port has two LEDs that describe the state of the network connection: one to indicate an Ethernet link (Table 4-3), and one to indicate Ethernet activity (Table 4-4).

Ethernet Link Condition	Meaning
Solid Green	Ethernet link is good
Off	The Ethernet cable is bad or not connected

Table 4-3: Ethernet Link Condition

Ethernet Activity Condition	Meaning
Green Blink	Network traffic was detected
Off	No network traffic is occurring

Table 4-4: Ethernet Activity Condition

Appendix: Specifications

NPS/1000 Hardware Specifications

- Embedded microprocessor module
- 256K bytes in-circuit boot flash and program memory
- 128K bytes SRAM
- 10 Mbps Ethernet connection over 10BASET physical lines
- One or two asynchronous serial ports with modem control and surge suppression
- Asynchronous port data rates of up to 115.2 Kbps
- Standalone models use DB-9 physical connectors and support RS-232 or RS-422 / RS-485
- Embedded models use 2x13 2mm connection headers and support TTL compatible signals
- Standalone - External 110 or 240 VAC power supply supplies +8V to +12V DC unregulated to NPS / 1000
- Embedded - +5V ±0.25V DC regulated power, 134mA
- Status LEDs for each port

Environmental Specifications

- Operating temperature range: 0 to 50°C
- Storage temperature range: -10 to 70°C
- Humidity range: 10% to 90% noncondensing

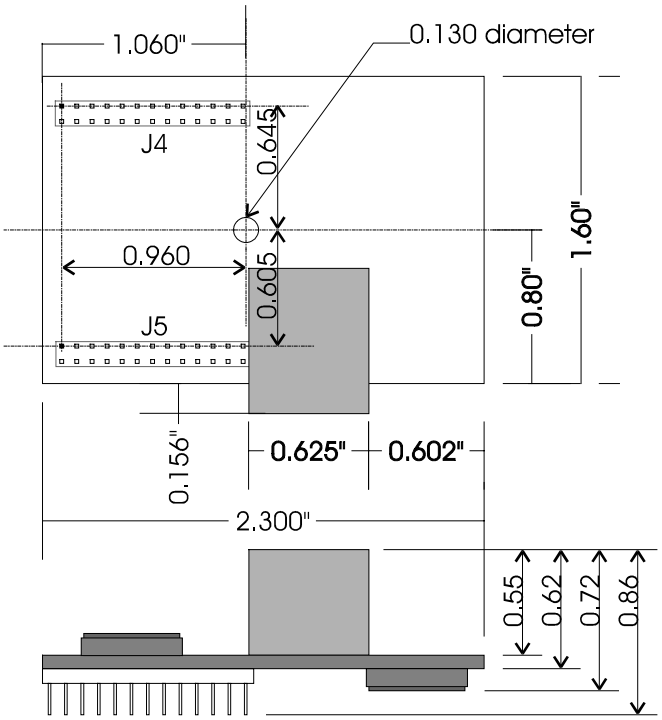
Product Dimensions

The standalone NPS/1000 models (NPS/1101, 1102, 1181 and 1182) measure:

4.37 inches x 3.25 inches x 1.5 inches (111 mm x 83 mm x 40 mm)

The embedded NPS/1000 models (NPS/1001 and 1002) measure:

2.3 inches x 1.6 inches x 0.86 inches (58 mm x 41 mm x 22 mm)



Model Numbers

NPS/1001	One Port, embedded, TTL compatible
NPS/1002	Two Port, embedded, TTL compatible
NPS/1101	One Port, standalone, RS-232
NPS/1181	One Port, standalone, RS-485/RS-422
NPS/1102	Two Port, standalone, RS-232
NPS/1182	Two Port, standalone, RS-485/RS-422

Ethernet cabling specifications

This section describes guidelines for using 10BASET twisted-pair cabling:

- Recommended cable is 22 to 26 AWG category 3 or category 5 unshielded solid copper twisted pair (standard telephone wire), at least Level 2 (two twists per foot)
- Ethernet cable pairs **must** be properly twisted: pins 1 and 2 must be a twisted pair, and pins 3 and 6 must be a twisted pair
- Maximum distance of a segment—from concentrator to node—is 100 meters (328 feet)
- Maximum of 5 segments between any two nodes

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