NPort DE-311
Hardware Installation Guide

Third Edition, September 2006

www.moxa.com/product

NPort DE-311
Hardware Installation Guide

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Table of Contents

1
Introduction

Welcome to Moxa's NPort Express, a compact palm-sized communications device that allows you to control RS-232/422/485 serial devices over a TCP/IP Ethernet.

This chapter is an introduction to the NPort Express and includes the following sections:

❑ **Features**
❑ **Product Specifications**
❑ **Package Checklist**
❑ **Front/Top/Rear/Bottom Panel Views**

The NPort Express DE-311 provides a data communications solution for connecting Windows and Linux hosts to asynchronous serial devices over a TCP/IP Ethernet network. Using the NPort Express is like adding a serial port to your PC using a serial board, but with the added advantage of the TCP/IP network. With the NPort Express, Windows hosts can connect to a native serial port and PC-based Linux hosts can connect to a real tty port, all over a network. Virtually any serial device can be attached to the NPort Express to become network accessible, and the network can be configured to allow control of the device from any location in the world.

After driver installation, Windows will recognize the serial port on the NPort Express as a real COM port; Linux will recognize the port as a real tty port. The NPort Express provides basic transmit/receive data functions, as well as RTS, CTS, DTR, DSR, and DCD control signals.

The NPort Express can be used with your existing applications and comes with a software utility and maintenance wizard.

Features

- 3-in-1 RS-232/422/485 serial interface
- Auto-detecting 10/100 Mbps Ethernet connection
- Built-in Ethernet and TCP/IP protocol
- Compact size for easy integration
- Supports MAC based IP configuration
- Supports configuration store and copy for easy deployment
- Supports Windows Real COM drivers and Linux real TTY drivers
- Operation modes include TCP Server, TCP Client, UDP Server/Client, Ethernet Modem, and Pair Connection

Product Specifications

Hardware

Processor	16 bit CPU
Memory	512 KB
Connector	DB9 female

Interface

LAN	Auto-detecting 100BaseTX (10/100 Mbps)
Serial	RS-232/422/485 (DIP switch selectable)
No. of serial ports	1
Signals	RS-232: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
	RS-422: TxD+/-, RxD+/-, RTS+/-, CTS+/-, GND
	RS-485: Data+/-, GND

Performance

Speed	50 bps to 230.4 Kbps

Configuration

DE-311

Parity	None, Even, Odd
Data bits	7, 8
Stop bits	1, 2 (with parity setting of None)

DE-311 Rev. 2

Parity	None, Even, Odd, Space, Mark
Data bits	5, 6, 7, 8
Stop bits	1, 1.5, 2

Supported OS

Windows XP, Windows 2000, Windows NT, Windows 95/98/Me Real COM driver, Unix fixed tty driver for UnixWare SVR4.2, UnixWare 7 SVR5, SCO Open Server, SCO Unix, Linux real tty driver

Protocols

TCP, IP, UDP, Telnet, RTelnet, DHCP, ICMP, BootP

Operation Modes

Driver Mode, TCP Server, TCP Client, UDP Server/Client, Ethernet Modem, Pair Connection

Management
Serial console
Telnet console
NPort Configurator for Windows/Linux
Real COM Installer for Windows
Monitor Utility for Windows
Firmware upgrade function supported
NPort Admin for Linux tty driver

Power and Environment
Power requirements

DE-311	DC 9V to 20V, 400 mA (max.) at 9V
DE-311 Rev. 2	DC 9V to 30V, 300 mA (max.) at 9V
Operating temp.	0 to 55°C
Operating humidity	5 to 95% RH
Dimensions (W×D×H)	90 × 100.4 × 22 mm (including ears)
	67 × 100.4 × 22 mm (without ears)
Regulatory approvals	FCC, CE, UL, CUL, TÜV

Package Checklist

DE-311/110V	1 NPort Express DE-311 Universal Serial Device Server
DE-311/230V	1 NPort Express DE-311 Universal Serial Device Server

Both models include
- Windows 95/98/ME/NT/2000/XP Real COM driver, Linux real tty driver
- NPort Management Suite software
- Power adapter
- User's Manual, software CD-ROM
- DB9/M – DB9/M adapter

Optional Accessories

DIN rail mounting kit	For 35 mm DIN rail; includes 4 screws

Front/Top/Rear/Bottom Panel Views

Front Panel View

Top Panel View

Rear Panel View

Bottom Panel View
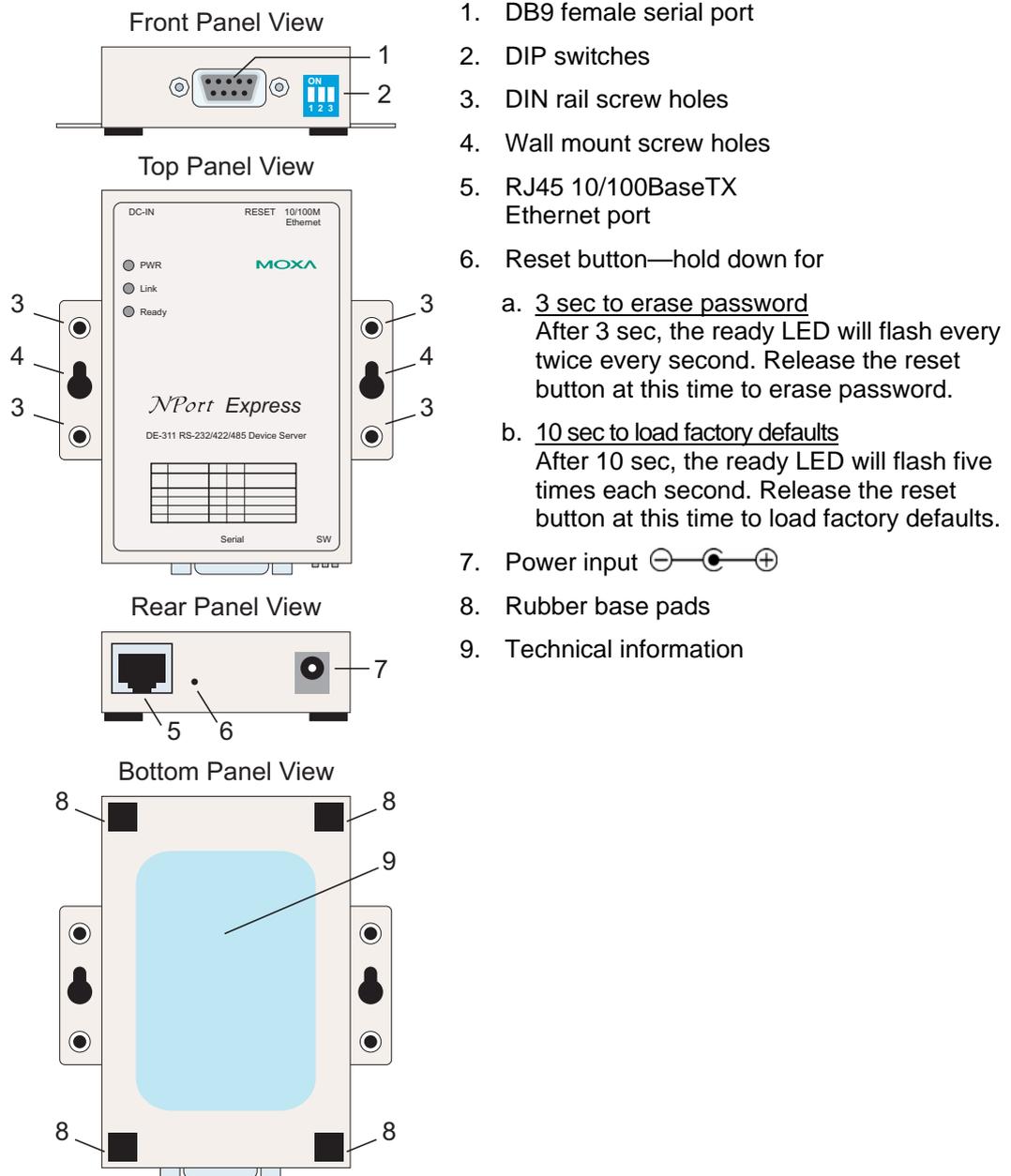
1. DB9 female serial port

2. DIP switches

3. DIN rail screw holes

4. Wall mount screw holes

5. RJ45 10/100BaseTX
   Ethernet port

6. Reset button—hold down for

   a. 3 sec to erase password
      After 3 sec, the ready LED will flash every twice every second. Release the reset button at this time to erase password.

   b. 10 sec to load factory defaults
      After 10 sec, the ready LED will flash five times each second. Release the reset button at this time to load factory defaults.

7. Power input ⊖—●—⊕

8. Rubber base pads

9. Technical information

2
Overview

The following topics are discussed in this chapter:

❑ **LED Indicators**

❑ **Housing**

  ➢ DIN Rail

  ➢ Wall Mount

LED Indicators

The NPort Express's top panel contains five LED indicators, as described in the following table.

LED Name	LED Color	LED Function
PWR	red	Power is on
	off	Power is off, or power error condition exists
Link	orange	10 Mbps Ethernet connection
	green	100 Mbps Ethernet connection
	off	Ethernet cable is disconnected, or has a short
Ready	green	The NPort Server is ready
	blinking	The NPort is requesting an IP address from the DHCP or BootP server. After receiving the IP, the LED will stop blinking. *Note: The LED will also blink while holding down the reset button; see page 1-5 for details.*
	off	The NPort Server has malfunctioned

Housing

DIN Rail

The DIN rail attachments provide a very convenient installation option for many industrial applications. Installation instructions are as follows:

STEP 1: Use the screws to attach the DIN rail mounts to the NPort Express's ears.
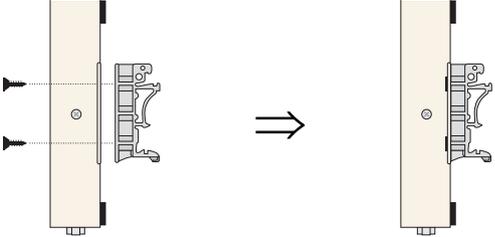
STEP 2: The two ends of the rail mount are named A and B. Hook the A end over the top edge of the rail.
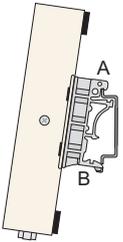
STEP 3: Push the unit against the rail. You should hear the B end clicking into place over the bottom edge of the rail.
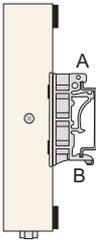
NOTE   The DIN rail-mounting kit is an optional accessory.

To remove the NPort Express from the DIN rail, simply reverse Steps 2 and 3 above. Use your fingers to pull down on the B end, which should release the bracket from the rail.

Wall Mount

Wall installation is another convenient installation option for many industrial applications. Installation instructions are as follows:

STEP 1: Obtain two screws with heads no greater than 6.5 mm in diameter and shafts no greater than 3 mm in diameter. At the desired wall location, drive the screws into the wall with 7.8 cm separation between the screws. Do not drive the screws all the way into the wall; leave about 2 mm clearance.

6.5 cm

7.8 cm
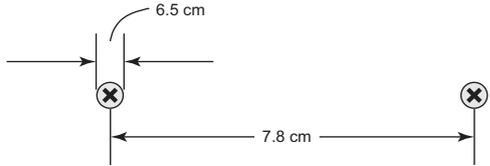
STEP 2: Hang the NPort Express on the two screws using the apertures on the ears, and then slide the unit downwards.
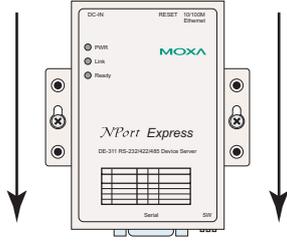
STEP 3: For added stability, simply tighten the two screws.

To remove the NPort Express from the wall mount, simply reverse Steps 2 and 3.

3
Serial Installation

The following topics are discussed in this chapter:

❏ **DIP Switch Settings**
❏ **DB9 Female Connector Pinouts**
  ➢ RS-232 Pinouts
  ➢ RS-232 Loopback Tester
  ➢ RS-422/485 Pinouts
  ➢ RS-422 Loopback Tester
  ➢ Mini Adapter

DIP Switch Settings

The top panel contains a table which describes how to configure the serial port using the three DIP switches.

SW1	Serial Connection	SW2	SW3	Serial Interface Mode
ON	Console (19200,N,8,1)	–	–	RS-232
OFF	Data Comm.	OFF	OFF	RS-232
		OFF	ON	RS-422
		ON	OFF	RS-485 by RTS
		ON	ON	RS-485 ADDC

The DIP switches are located on the rear panel. SW1 toggles the serial port between data and console operation (ON or up for serial console operation, and OFF or down for data communication). Data operation is the normal operating mode for controlling serial devices; console operation is for accessing the NPort Express configuration parameters. Note that after modifying SW1 settings, the NPort Express will reboot to initialize the new mode. You must wait a few seconds for the green Ready LED to blink off and then on again, indicating that the function of the serial port has been changed.

SW2 and SW3 control the serial port's data communication interface. Note that RTS stands for *Ready to Send* and ADDC stands for Automatic Data Direction Control.

Keep the following points in mind when setting the DIP switches.

- **RS-232 Console**
  To use the serial port as a console connection, such as when using MOXA PComm Terminal Emulator or HyperTerminal, set SW1 to the ON position.

- **Telnet Connection**
  Some configuration may be carried out through a Telnet connection, during which data is transmitted through the NPort Express's Ethernet port. However, you must set SW1 to the OFF position to establish a Telnet connection.

DB9 Female Connector Pinouts

RS-232 Pinouts

DB9 (Female)	PIN	RS-232
	1	DCD
	2	TxD
	3	RxD
5 4 3 2 1	4	DSR
	5	GND
	6	DTR
	7	CTS
9 8 7 6	8	RTS
	9	---

RS-232 Loopback Tester

PIN	Signal
1	DCD
2	TxD
3	RxD
4	DSR
5	GND
6	DTR
7	CTS
8	RTS

RS-422/485 Pinouts

DB9 (Female)	PIN	RS-422	RS-485
	1	RxD-(A)	---
	2	RxD+(B)	---
5 4 3 2 1	3	TxD+(B)	Data+(B)
	4	TxD-(A)	Data-(A)
	5	GND	GND
	6	CTS-(A)	---
	7	CTS+(B)	---
9 8 7 6	8	RTS+(B)	---
	9	RTS-(A)	---
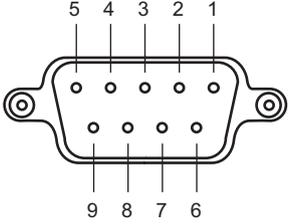
RS-422 Loopback Tester

PIN	Signal
1	RxD-(A)
2	RxD+(B)
3	TxD+(B)
4	TxD-(A)
5	GND
6	CTS-(A)
7	CTS+(B)
8	RTS+(B)
9	RTS-(A)

Mini Adapter

The NPort Express DE-311 accepts devices with both male and female connectors. A D-shell female serial connector is built-in, and a DB9 male null-modem adapter is included as a standard accessory.

If you want to make your own DB9 male to DB9 male null-modem (or crossover) cable, the correct pinouts are as follows:

DE-311's DB9 (Female) **RS-232 Signals**		DB9 (Male) Null-Modem Mini adapter **Cable Wiring**		Device's DB9 (Female) **RS-232 Signals**
DCD	1	————————————	1	DCD
TxD	2	————————————→	3	RxD
RxD	3	←————————————	2	TxD
DSR	4	←————————————	6	DTR
GND	5	————————————	5	GND
DTR	6	————————————→	4	DSR
CTS	7	←————————————	8	RTS
RTS	8	————————————→	7	CTS
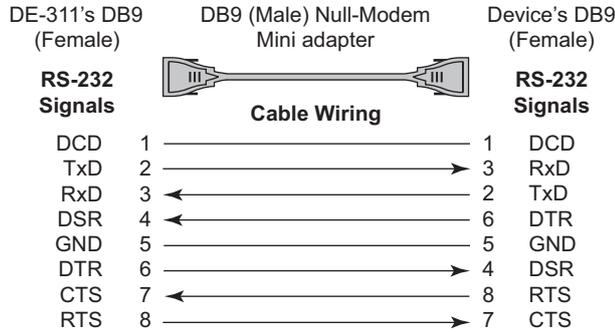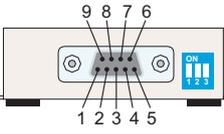
PIN	RS-232	RS-422	RS-485
1	DCD	RxD-(A)	---
2	TxD	RxD+(B)	---
3	RxD	TxD+(B)	Data+(B)
4	DSR	TxD-(A)	Data-(A)
5	GND	GND	GND
6	DTR	CTS-(A)	---
7	CTS	CTS+(B)	---
8	RTS	RTS+(B)	---
9	---	RTS-(A)	---

NOTE	The adapter is included with the DE-311 as a standard accessory.

4
Ethernet Installation

The following topics are discussed in this chapter:

❑ **Connecting to the Ethernet Port**
  ➢ Connecting to a Hub or Switch
  ➢ Connecting to a PC

Connecting to the Ethernet Port

Connecting to a Hub or Switch

For most applications, plug one end of your Ethernet cable into the NPort Express's 10/100BaseTX port, and the other end into a hub or switch that is connected to your network. In this case, you should use a standard straight-through Ethernet cable, which is readily available from many commercial vendors. You may also make your own cable by referring to the following cable wiring diagram.

```
                           Straight-Through Cable

NPort Express                                                      Hub

                RJ45 Plug Pin 1

 RJ45 Jack                                               RJ45 Jack
 Connector              Cable Wiring                     Connector
    Tx+              1  ──────────── 1                      Tx+
    Tx-              2  ──────────── 2                      Tx-
    Rx+              3  ──────────── 3                      Rx+
    Rx-              6  ──────────── 6                      Rx-
```
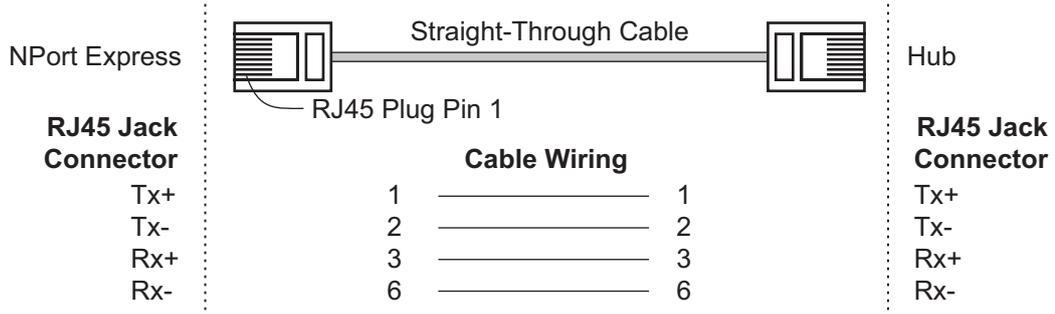
Connecting to a PC

If you are connecting the NPort Express directly to your PC's Ethernet port, use a crossover Ethernet cable. You can make your own crossover cable by referring to the following cable wiring diagram.

```
                           Cross-Over Cable

NPort Express                                                  PC LAN Card

                RJ45 Plug Pin 1

 RJ45 Jack                                               RJ45 Jack
 Connector              Cable Wiring                     Connector
    Tx+              1  ──────────── 3                      Rx+
    Tx-              2  ──────────── 6                      Rx-
    Rx+              3  ──────────── 1                      Tx+
    Rx-              6  ──────────── 2                      Tx-
```
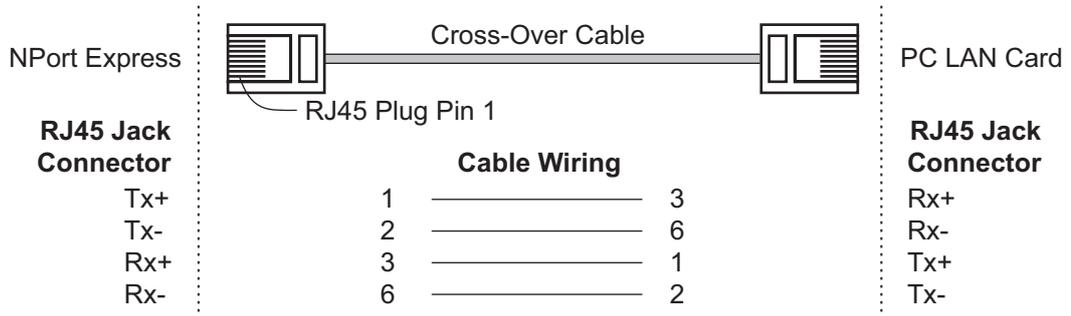
5

Power Connection

The following topics are discussed in this chapter:

❑ **Connecting the Power Adapter**
❑ **Power Status Check**

Connecting the Power Adapter

The following steps explain how to connect the NPort Express's power adapter:

1. Plug the power adapter's DC plug into the DC-IN jack on the NPort Express.
2. Plug the power adapter into an electrical outlet.

Note that there is no on/off switch. The NPort Express will turn on automatically as soon as power is supplied. The red PWR LED will glow to indicate that the unit is receiving power.
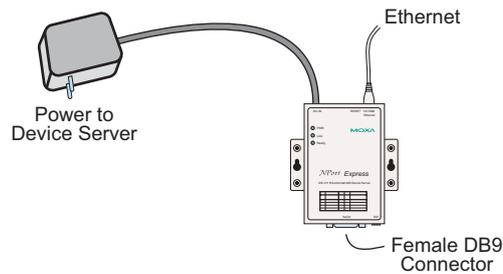
Power Status Check

Use the PWR LED to verify that the unit is receiving power. A red light indicates that power is being received. If the LED is off, no power is being received. If the unit is plugged in and the PWR LED does not light up, there may be a problem with the unit.

A

Telnet Console

The Telnet console is used to view and modify the unit's configuration. After installing the unit into a serial device, administrators configure their device remotely by opening a Telnet console session over the network. The following examples refer to a Telnet console session on a Windows 98 host, but the same instructions should apply to all Windows operating systems.

Opening the Telnet Console

A Telnet console session may be opened from the Windows Start menu. Select **Start** -> **Run…** to open a dialog box, and then enter the following:

> **telnet** *[unit's IP address]*

Click **OK** to begin the Telnet session.
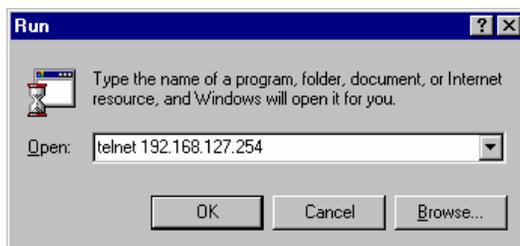
At the prompt, enter "**1**" for **ansi/vt100**, and then press **Enter**.
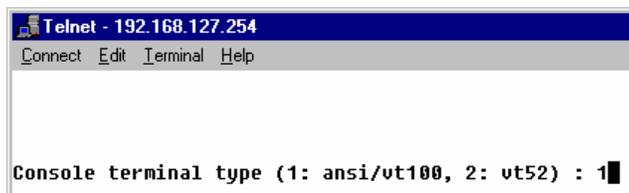
The main menu of the unit's Telnet console will appear as shown.
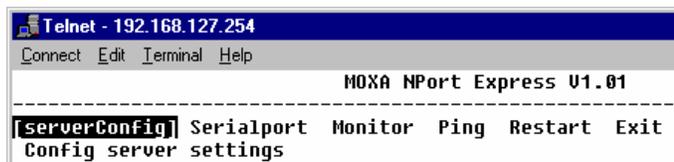
Navigating the Telnet Console

Once the Telnet console has been opened, you may navigate through the console using the following keys:

- **Arrow keys**: Use the arrow keys to navigate between different options. If the arrow keys do not respond, you may need to verify your terminal settings by selecting **Preferences** in the **Terminal** menu:
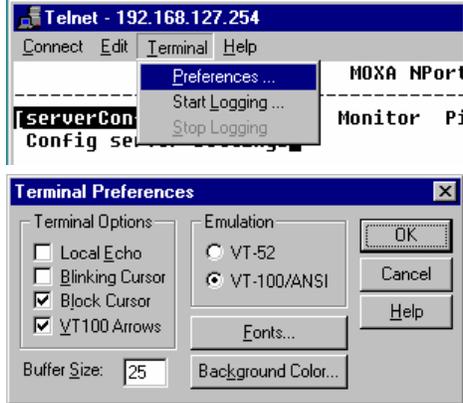
Make sure **VT100 Arrows** under **Terminal Options** is enabled (checked), and then click **OK** to return to the Telnet console.

- **Tab**: You may also use the tab key to navigate between different options in the Telnet console.

- **Enter**: Use the Enter key to select the item that is currently highlighted in the Telnet console. Depending on the item, the Enter key may open a submenu, select a field for modification, or perform an action, depending on the item.

- **Esc**: Use the Esc key to cancel a selection or action and return to the previous menu.

- **Alphanumeric keys**: Alphanumeric keys ("A" to "Z" and "0" to "9") are used when entering certain parameters such as IP address.

After making changes to the unit's configuration in the Telnet console, you will need to save the changes and restart the unit for the new configuration to take effect.

Main Menu

The main menu displays six categories for configuration: **serverConfig**, **Serialport**, **Monitor**, **Ping**, **Restart**, and **Exit**. Select the desired category and press **Enter** in order to view and configure the parameters within that category. Each parameter is listed with the parameter name on the left and current setting on the right. Settings that can be modified are displayed in brackets.

serverConfig

```
Telnet - 192.168.127.254
Connect  Edit  Terminal  Help
                         MOXA NPort Express V1.01
--------------------------------------------------------------------
[serverConfig] Serialport  Monitor  Ping  Restart  Exit
 Config server settings

 ESC: back to menu    Enter: select

     Server Model                DE-311
     Server Name              [XP81                         ]
     Serial Number            00081

     Operating Mode           [Host Based Mode       ]
     DHCP                     [Disable ]
     Ethernet Status          10M/Link
     MAC Address              00:90:E8:04:00:51
     IP Address               [192.168.127.254]
     Netmask                  [255.255.0.0    ]
     Gateway                  [192.168.1.254  ]
     Remote IP Begin          [              ]
     Remote IP End (Slave Only)  [              ]

     Password                 [              ]
```

Serialport

```
Telnet - 192.168.127.254
Connect  Edit  Terminal  Help
                         MOXA NPort Express V1.01
--------------------------------------------------------------------
serverConfig [Serialport] Monitor  Ping  Restart  Exit
 Config serial port settings

 ESC: back to menu    Enter: select

 Port Number                1

 Baud Rate(bps)            [115200  ]
 Parity                    [None    ]
 Data Bit                  [ 8      ]
 Stop Bit                  [ 1      ]
 Flow Control              [RTS/CTS ]
 Alive timeout(0-99 min)   [7 ]
 Tx FIFO                   [Enable  ]
```

A-3

Monitor

```
Telnet - 192.168.127.254
Connect  Edit  Terminal  Help
                        MOXA NPort Express V1.01
----------------------------------------------------------------
serverConfig  Serialport [Monitor] Ping  Restart  Exit
Monitor operating status for each serial port

ESC: back to menu   Enter: select

  Port Number              1

  Tx Char Count            0
  Rx Char Count            7
  Line Status              dtr,dsr
                           rts,cts
                           dcd█

  Baud Rate(bps)           1200
  Parity                   None
  Data Bit                 7
  Stop Bit                 1
  Flow Control             None
```

Ping

Ping is a standard network testing function that checks to see if a computer with a particular IP address is logged onto the network.

```
Telnet - 192.168.127.254
Connect  Edit  Terminal  Help
                        MOXA NPort Express V1.01
----------------------------------------------------------------
serverConfig  Serialport  Monitor [Ping] Restart  Exit
Ping a host
ESC: back to menu   Enter: select

        ESC: exit           Enter: start to ping


Input target IP address (e.g. 132.147.160.1)
-> █
```

Restart

This command will save all configuration changes and restart the unit with the new configuration in effect. You must select this option for any changes to go into effect.

Exit

This command will discard all configuration changes. The unit will be restarted with its original configuration.

Menu Tree

The following is a menu tree showing all options available in the Telnet console. Items that are starred are only viewable and cannot be changed by the user:

```
Main Menu
        serverConfig
                Server Model*
                Server Name
                Serial Number*
                Operating Mode
                DHCP
                Ethernet Status*
                MAC Address*
                IP Address
                Netmask
                Gateway
                Remote IP Begin
                Remote IP End (Slave Only)
                Password
        Serialport
                Port Number*
                Baud Rate (bps)
                Parity
                Data Bit
                Stop Bit
                Flow Control
                Alive timeout(0-99 min)
                Tx FIFO
        Monitor
                Port Number*
                Tx Char Count*
                Rx Char Count*
                Line Status*
                Baud Rate (bps)*
                Parity*
                Data Bit*
                Stop Bit*
                Flow Control*
        Ping
                exit
                start to ping
                target IP address
        Restart
                save and restart
        Exit
                discard changes and restart
```

B

Serial Console

The unit supports configuration through the serial console, which is similar to the Telnet console but is accessed through the RS-232 console port rather than through the network. Once you have entered the serial console, the configuration options and instructions are the same as if you were using the Telnet console.

The following instructions and screenshots show how to enter the serial console using PComm Terminal Emulator, which is available free of charge as part of the PComm Lite suite. You may use a different terminal emulator utility, but your actual screens and procedures may vary slightly from the following instructions.

1. Make sure the unit is powered off. Use a serial cable to connect the unit's serial port to your computer's male RS-232 serial port.
2. Set the SW1 DIP switch on the rear panel to ON for serial console operation.
3. From the Windows desktop select **Start → All Programs → PComm Lite → Terminal Emulator**.
4. The PComm Terminal Emulator window should appear. From the **Port Manager** menu, select **Open**, or simply click the **Open icon** as shown below:

5. The Property window opens automatically. Select the **Communication Parameter** tab, and then select the appropriate COM port for the connection (COM1 in the example below). Configure the parameters for **19200, 8, N, 1** (**19200** for Baud Rate, **8** for Data Bits, **None** for Parity, and **1** for Stop Bits).
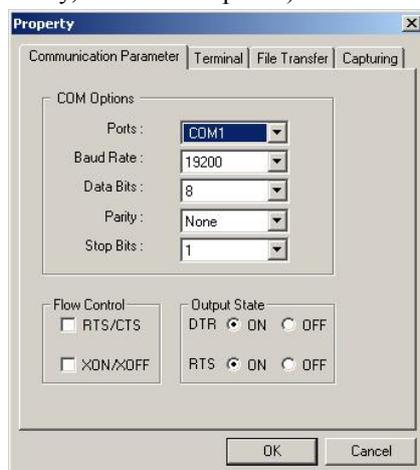
6. From the Property window's Terminal tab, select **ANSI** or **VT100** for **Terminal Type** and click **OK**.

7. In the PComm window, you will be prompted for the terminal type. Press **1** for **ansi/vt100** and then press **ENTER**. At this point, the console interface will be identical to the Telnet console. Please refer to Appendix A for details on the configuration options that are available.

```
Console terminal type (1: ansi/vt100, 2: vt52) : 1
```

C

Declaration of Conformity

Manufacturer's Name: Moxa Technologies Co., Ltd.

Manufacturer's Address: Fl.4, No.135, Lane 235, Pao-Chiao Rd.,
                          Shing Tien City, Taipei, Taiwan, R.O.C.

declares that the product:

Product Name: NPort Express

Model Number: DE-311

conforms to the following standards:

EMC: FCC Class B

           EN55022:1998 class B
           EN61000-3-2:1995 class B
           EN61000-3-3:1995
           EN55082-1:1997
           EN61000-4-2:1995

        Contact Discharge 4kV, Air Discharge 8 kV

           EN61000-4-3:1995
           EN61000-4-4:1995

        AC/DC Power supply 1kV, Data/Signal lines 5 kV

           EN61000-4-5:1995

        AC/DC Line to Line 1kV, AC/DC Line to Earth 2 kV

           EN61000-4-6:1995
           EN61000-4-8:1993

        3A/m at 50Hz

           EN61000-4-11:1994

Safety   UL/CUL, TUV

           EN60950

D

Service Information

This appendix contains information on how to obtain information or service from Moxa for this and other Moxa products. The following topics are covered:

❑ **MOXA Internet Services**
  ➢ Technical Support E-mail Address
  ➢ Website for Product Information
❑ **Problem Report Form**
❑ **Product Return Procedure**

MOXA Internet Services

Customer satisfaction is our top priority. To ensure that customers receive the full benefit of our products, MOXA Internet Services has been set up to provide technical support, driver updates, product information, and user's manual updates.

The following services are provided:

Technical Support E-mail Address

support@moxa.com

Website for Product Information

http://www.moxa.com

Problem Report Form

MOXA NPort DE-311

Customer name:	
Company:	
Tel:	**Fax:**
Email:	**Date:**

Select Product Model

1. Moxa Product: ☐ DE-311 (1 RS-232/422/485 port)
2. Interface: ☐ RS-232 ☐ RS-422 ☐ RS-485 (ADDC) ☐ RS-485 (by RTS)
3. Operation mode:
    ☐ Host Based   ☐ Pair Connection
    ☐ Raw Connection (TCP Server)   ☐ Raw Connection (TCP Client)
    ☐ UDP Server/Client   ☐ Ethernet Modem
4. Serial Number: _____
5. NPort Firmware Version: _____
6. NPort Manager Version: _____
7. NPort Configurator Version: _____
8. PC Host: Make _____   Model _____
9. Your Installation Type: ☐ Single-Host ☐ Custom
10. Problem Description: Please describe the symptoms as clearly as possible, including all error messages. Be complete, since we may need to follow your description to reproduce the symptoms.

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Product Return Procedure

For product repair, exchange, or refund, the customer must:

- Provide evidence of original purchase.

- Obtain a Product Return Agreement (PRA) from the sales representative or dealer.

- Fill out the Problem Report Form (PRF). Include as much detail as possible for a shorter product repair time.

- Carefully pack the product in an anti-static package and send it, pre-paid, to the dealer. The PRA should be visible on the outside of the package and should include a description of the problem along with the return address and telephone number.