

# NET232+ Serial to Ethernet Adapter



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Operation of this equipment in a residential area is likely to cause interference in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

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| Date     | Rev. | Author | Comments                                   |
|----------|------|--------|--|
| 06-02-14 | A    | GR     | Preliminary Release                        |
| 07-01-14 | B    | GR     | Add info for TTL signals, compliance notes |
| 07-16-14 | C    | GR     | New Pictures                               |

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# 1. NET232+

The NET232 has been re-designed to lower production costs and to provide additional features. Some of the new design features include:

## Enhanced Firmware

- Multiple TCP connections (up to 4) or a mixture of TCP and UDP access to the serial port.

- Additional DNS support to allow the configuration of a domain name to address the remote host in place of specifying a fixed IP address.

- Email authentication option with configurable user name and password.

- Email serial triggers expanded to support up to a 6-byte match sequence.

- Email trigger option added using a modem dial command where serial data can be placed in the email body.

- Idle Gap Time option of 3 ms for less delay in data delivery with packing enabled.

- UDP datagram mode 2 and 12.

- Debug option in Monitor Mode

## Reset to Defaults Push Button

Holding the Reset to Defaults push button for 3 seconds or longer will cause the NET232+ to reset all configuration parameters, including network settings, back to factory defaults and then restart.

## Status LED Control

The Status LED on the NET232+ is used as a diagnostic tool to report current status and error conditions.

## Debug Trace

The tunnel debug trace will display the serial and network data received by the NET232+. The direction of the serial data, the elapsed time in ms and the data will be displayed. The serial data will be displayed in both hex and ASCII. Trace messages will also be generated when TCP connections are open or closed and when other noteworthy events happen.

The tunnel debug trace feature is accessed by entering Monitor Mode via Telnet to port 9999. The monitor mode command 'DB' is used to start the debug output. The debug function will return immediately with a non-zero value if Encryption is enabled. Sending any character back on the Telnet connection will exit debug and return the user to the Monitor Mode prompt.

## Web Manager

A custom web manager is now standard for the NET232+. The new web page uses Grid Connect colors and logos. A new link is provided to the Grid Connect technical support web page and home page.

## 2. Overview

The NET232+ connects serial devices to Ethernet networks using the IP protocol family. Configuration of the NET232+ can be done from the serial port connection, a web page, or a Telnet connection.

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### 2.1 Additional Documentation

The following guides are available on the product CD. You can browse the folders on the CD for various technical publications and application notes.

| Title                              | Description  | File Name            |
|------------------------------------|--|----------------------|
| <b>NET232+ User Guide</b>          | This manual in PDF format.   | NET232+_UG.pdf       |
| <b>Device Installer User Guide</b> | Information about installing and using Device Installer Utility.                                   | DevInst_232+_UG.pdf  |
| <b>Quick Start Guide</b>           | Quick steps to get the unit up and running.  | QuickStart_232+.pdf  |
| <b>Comm Port Redirector Guide</b>  | Provides information on using the Windows based utility to create a virtual com port.              | Redirector_UG.pdf    |
| <b>UDP Configuration Guide</b>     | How to use UDP to configure the unit.<br>How to acquire and use setup records to configure a unit. | UDPconfig_800238.pdf |
| <b>Application Note</b>            | Serial Tunneling   | AN_SerTun_800304.pdf |
| <b>Technical FAQ</b>               | Frequently Asked Questions   | Technical FAQ.pdf    |

## 3. Introduction

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### 3.1 Procedures for setup

The NET232+ is a device for connecting a serial device to the Ethernet. You will therefore have to know some technical facts about the serial device you are trying to connect. You can generally find that information in the manufacturer's technical manual or from a set of schematics for the product.

This section of the user manual has detailed information about the RS232 signals provided by the NET232+ and how they should be connected to another RS232 serial device. See Table 1 – Data and Control Signals.

You will have to provide an IP address for the NET232+. Using DHCP protocol, the NET232+ can get a temporary IP address from your server but a fixed IP address is required for permanent installation. The port used to transfer data is called the Local Port and has a default setting of 10001.

The software CD contains a program called Device Installer, which is used to locate the NET232+ on your network. You can use it to assign the IP address and port number, setup the serial port parameters, and view all the configuration information.

We highly suggest using the Quick Start Guide to get your unit quickly configured. The User Manual has more detailed information about all the options available. Almost all the configuration settings are already configured for best performance so all you need to do is supply the IP address and setup the serial port parameters.

If you have problems, please review the steps in the Quick Start Guide, review the information in the User Manual, or give our Technical Support team a call.

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### 3.2 Tips from Tech Support

We would like to believe you can connect the NET232+ to any RS232 device. We have a track record of being able to connect to almost any RS232 device, however, there are some that just can't or won't work. So here are some things to think about before you start trying to connect a NET232+ to your device. If you are not sure, give us a call.

#### What are the RS232 signals on the target device?

Typically you will have TXD for transmit, RXD for receive, and GND for ground. If you have a schematic or a user manual, find the specifications for the serial port and note the signals being used. You will need to know if the target device has a male or female connector, and which pins are used for each signal name.

#### Does the target device use Hardware Flow Control?

Hardware flow control requires the use of two signal pins, RTS and CTS. One unit sends a Request to Send and the other sends a Clear to Send. These are old modem control signals that are now used to control the flow of data between two devices that may not be able to maintain a fast data transfer. Most modern devices can easily transfer high speed data but some still require the use of flow control. You will have to enable these signals on the NET232+ since they are turned off at the factory.

#### Does the target device require the use of a DTR signal?

Some devices need to see the DTR signal to indicate they are connected. DTR is not enabled on the NET232+ but there are ways to provide the signal so you can make it work. Devices that use DTR may also have a DSR signal that can be tied to the DTR line to simulate a DTR active signal.

#### Do any of the pins on the target device provide power?

Some target devices have a pin dedicated to power in or power out. Power pins are sometimes used to power other RS232 devices attached to the target device. RS232 specifications do not allow power on any

pins but that does not stop a designer from applying power to an unused pin. You should know about any power pins before connecting the NET232+ to a target device.

#### What is the Baud Rate, Data Bits, Parity and number of Stop Bits required by the target device?

You must know the communication parameters to setup the NET232+ properly. In a typical device, you might see the baud rate set to 9600, the data bits set to 8, the parity set to none, and the stop bits set to 1. This is the default setting for the NET232+ serial port. If your target device has something different, you will have to change the serial port configuration.

#### Do you want your software application to run like it does when your PC is connected to the target device with an RS232 cable?

Since the NET232+ will be using an Ethernet connection to connect your PC to a target device, you will need some way for your software application to think it is still using a COM port instead of an Ethernet application. This is done with a software package called COM Port Redirector. It redirects a virtual com port to an Ethernet port.

Your application will change from a physical port, like COM2, to a virtual comm port like COM20. Your application does not know the difference. Instead of sending your program data to a physical port, your program data now goes to a virtual port. The virtual port is an Ethernet port assigned by Comm Port Redirector software. You tell Comm Redirector the IP address and the port number of the NET232+ and it takes care of routing the data from your application to the Ethernet port.

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## 3.3 Protocol Support

The NET232+ uses the Internet Protocol (IP) for network communications and the Transmission Control Protocol (TCP) to assure that no data is lost or duplicated, and that everything sent to the connection arrives correctly at the target.

Other supported protocols include:

- ARP, UDP, TCP, ICMP, Telnet, TFTP, AutoIP, DHCP, HTTP, and SNMP for network communications and management.
- TCP, UDP, and Telnet for connections to the serial port.
- TFTP for firmware and web page updates.
- IP for addressing, routing, and data block handling over the network.
- User Datagram Protocol (UDP) for typical datagram applications in which devices interact with other devices without maintaining a point-to-point connection.

---

## 3.4 Addresses and Port Number

### Hardware Address

The Ethernet address is also referred to as the hardware address or the MAC address. The first three bytes of the Ethernet Address are fixed and read 00-20-4A, identifying the manufacturer of the product. The fourth, fifth, and sixth bytes are unique numbers assigned to each unit.

00-20-4A-14-01-18 or 00:20:4A:14:01:18

*Note: The MAC address is printed on the ID label.*

### IP Address

Every device connected to an IP network must have a unique IP address. This address is used to reference the specific unit. The NET232+ is automatically assigned an IP address on DHCP-enabled networks, as it is DHCP-enabled by default. [However, you must assign it a permanent IP address during the configuration process.](#)

### Port Numbers

Every TCP connection and every UDP datagram is defined by a destination IP address and a port number.

The unit's serial channel (port) can be associated with a specific TCP/UDP port number. [The default port setting is 10001.](#)

Port number 9999 is reserved for access to the unit's Setup (configuration) Mode window. For more information on reserved port numbers, see [Table 12 - Reserved Ports](#) on page 5-14.

---

## 3.5 Serial Interface

The table below lists the data and control signals for the NET232+. The RS232 interface is a 9-pin D-style connector. Male connectors are wired as DTE and female connectors are wired as DCE.

**Table 1 – Data and Control Signals**

| NET232+ Signal | Direction (J3) | DTE DB-9 Male Pin # | DCE DB-9 Female Pin # |
|----------------|----------------|---------------------|-----------------------|
| Data Out (TXD) | Out (3)        | 3                   | 2                     |
| Data In (RXD)  | In (4)         | 2                   | 3                     |
| Ground         | (1)            | 5                   | 5                     |
| CTS            | In (6)         | 8                   | 7                     |
| RTS            | Out (5)        | 7                   | 8                     |
| DSR            | In (8)         | 6                   | 4                     |
| DTR            | Out (9)        | 4                   | 6                     |
| +5-24Vdc       | In (10)        | 9                   | 9                     |
| No Connection  | (7)            | 1                   | 1                     |
| Frame Ground   | (2)            | Shield              | Shield                |

Units can be ordered with TTL level signals, which are connected in the same manner as the RS232 versions.

The NET232+-DCE kit includes a 9-pin Male/Male Gender Changer if you need a male connector. The NET232+-DTE kit includes a 9-pin Female/Female Null Modem Adapter.

*Note: RTS and CTS control lines have been enabled at the factory. See Flow on page 5-11.*

The DB9 RS232 connector can be used to power the NET232+ through Pin 9.

---

## 3.6 Cisco Console Interface

The NET232+CC provides remote access over Ethernet TCP/IP to routers, switches, servers, and other equipment that have a serial RJ45 console port or management port. The NET232+CC is a serial to Ethernet device server, especially designed for use with equipment following the Cisco® RJ45 console port pinout. Any Cisco equipment that uses the Cisco 72-3383-01 (DB-9 to RJ45) Console Cable, can use the NET232+CC instead.

Examples of Cisco products that use this type of console port are the Catalyst® 2350 Series switches, Catalyst 6500 Series switches and the Cisco ASA 5500-X Series firewalls.

Other manufacturers use the same RJ45 pinout as Cisco console port. For example, the IBM® Power 710, Power 730 and Power 8 Servers have a system port that can be used with the NET232+CC.

This table shows the pinout of the Cisco RJ45 Console Port, the 72-3383-01 cable, and the NET232+CC control signals.

### Pinout of Cisco RJ45 Console Port

| RJ45 Port |     |
|-----------|-----|
| 1         | RTS |
| 2         | DTR |
| 3         | TXD |
| 4         | GND |
| 5         | GND |
| 6         | RXD |
| 7         | DSR |
| 8         | CTS |

### Pinout of Cisco 72-3383-01 Cable

| DB9 Female |   | RJ45 Male |     |
|------------|---|-----------|-----|
| RXD        | 2 | 3         | TXD |
| TXD        | 3 | 6         | RXD |
| RTS        | 7 | 8         | CTS |
| CTS        | 8 | 1         | RTS |
| DTR        | 4 | 7         | DSR |
| DSR        | 6 | 2         | DTR |
| GND        | 5 | 5         | GND |
| Not Used   | 1 | 4         | GND |
| Not Used   | 9 |           |     |

### NET232+CC RJ45 Control Signals

| NET232+CC Internal |   | RJ45 Male |     |
|--------------------|---|-----------|-----|
| RXD                | - | 3         | TXD |
| TXD                | - | 6         | RXD |
| RTS                | - | 8         | CTS |
| CTS                | - | 1         | RTS |
| Not Used           | - | 7         | DSR |
| Not Used           | - | 2         | DTR |
| GND                | - | 4         | GND |

The NET232+CC can be powered from a nearby USB Port by using the optional “USB to Barrel Jack” cable. This cable simply takes the 5VDC power from the USB Port to power the NET232+CC. It can also be optionally powered by a wall supply (US 110V or Euro 220V).

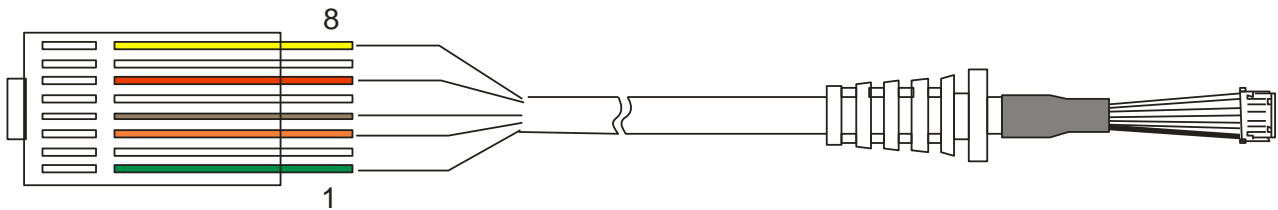


The table below lists the data and control signals for the NET232+ with the Cisco Console cable. The RS232 interface is an 8-pin RJ45-style connector.

*Note: This cable must be ordered at the time of purchase. NOT a field upgrade.*

**Table 2 – Cisco Console Data and Control Signals**

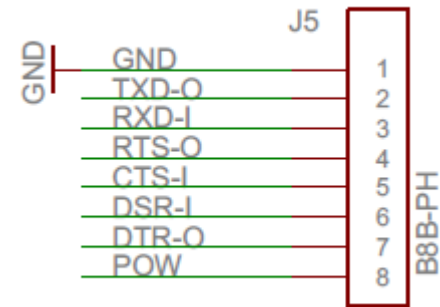
| NET232+ Signal | Direction (J3) | RJ45 Pin # |
|----------------|----------------|------------|
| Data Out (TXD) | Out (3)        | 6          |
| Data In (RXD)  | In (4)         | 3          |
| Ground         | (1)            | 4          |
| CTS            | In (6)         | 1          |
| RTS            | Out (5)        | 8          |



### 3.7 OEM Module

The NET232+ module can be supplied as an OEM module. The module has an 8-pin header to connect the module to a motherboard.

*Note: OEM Modules must be ordered in quantities of 25 or more.*



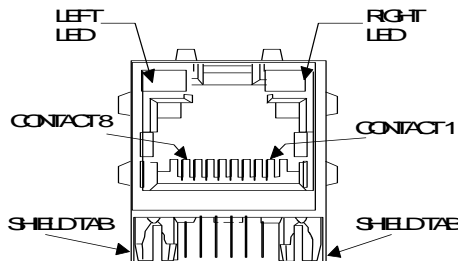
---

## 3.8 Ethernet Interface

### 3.8.1 LEDs

The device contains the following LEDs:

- 10BaseT/100BaseTX (Bi-color, Left LED)
- Full/Half Duplex (Bi-color, Right LED)



**Table 3 - NET232+ LED Functions**

| Left LED    | Right LED      | Meaning              |
|-------------|----------------|----------------------|
| Solid Amber |                | 10BASE-T             |
| Solid Green |                | 100BASE-Tx           |
|             | Blinking Amber | Half Duplex Activity |
|             | Blinking Green | Full Duplex Activity |

---

## 3.9 Status LED and Reset to Defaults Button

The system status LED is located on the end of the unit, next to the Ethernet jack. The YELLOW LED is used to indicate system status.

At power on, the System LED blinks quickly while trying to obtain an IP address from the DHCP server. Following network initialization the application is started and the NET232+ firmware changes the function of the SYS\_LED pin to a Channel 1 Status LED function.

Following initialization the Status LED is normally ON. It will blink slowly or turn OFF, depending on configuration, when a TCP connection is made with the Channel 1 port(s) (default 10001).

If a TCP connection is active and the firmware detects an RS232 Invalid condition, then the Status LED will alternate between a slow blink and being OFF to indicate the error.



Holding the Reset to Defaults push button for 3 seconds or longer will cause the NET232+ to reset all configuration parameters, including network settings, back to factory defaults and then restart.

*Note: You will need to configure the unit again for proper operation.*

*Note: Use a paperclip or similar device to reach the reset button behind the hole in the case.*

---

## 3.10 Power Supply

The NET232+ can use any DC power source from 5VDC to 24VDC, marked LPS or Class 2. A typical power cube sent with the unit can supply 9VDC at 500 mA. However, there are other units that can be used as long as they are in the range of 5-24VDC and supply the proper wattage. At 9VDC, the NET232+ will draw approximately 110mA (.99W) so a 2 Watt power source ( 9V at 200mA) should be adequate.

NOTE: The NET232+ is designed to be used with any properly rated power adapter from 5VDC to 24VDC, 2W maximum, marked Class 2 or LPS.

NOTE: The NET232+ power adapter is a 2.1mm positive center power jack. The jack is equivalent to a CUI Inc. PJ-002A power jack.

The power supply LED is located on the end of the module, next to the Ethernet jack. When power is normal, the GREEN LED will be ON.

Grid Connect can supply a special cable adapter to connect the NET232+ to a USB jack for +5VDC power.

You can also order the NET232+ with a Phoenix right angle power connector. The unit is supplied with a mating Phoenix terminal block plug.

---

## 3.11 Product CD

The product CD sent with the NET232+ contains Device Installer software, Com Port Redirector software, Application Notes, user guides and other technical documents.

---

## 3.12 Technical Specifications

**Table 4 - Technical Specs**

| Category            | Description  |
|---------------------|--|
| CPU                 | DSTni-EX 186 CPU   |
| Firmware            | Upgradeable via TFTP and serial port   |
| Reset Circuit       | 200msec power up/down reset pulse. Power drop reset at 2.6V.   |
| Serial Interface    | RS232. Baudrate software selectable from 300 to 921600 bps   |
| Serial Line Formats | 7 or 8 data bits, 1-2 Stop bits, Parity: odd, even, none   |
| Modem Control       | CTS, RTS, DTR, DSR   |
| Flow Control        | XON/XOFF (software), CTS/RTS (hardware), None  |
| Network Interface   | RJ45 Ethernet 10Base-T or 100Base-TX (Auto-sensing)  |
| Compatibility       | Ethernet: Version 2.0/IEEE 802.3   |
| Protocols Supported | ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, SMTP, and HTTP                            |
| LEDs                | 10Base-T & 100Base-TX Activity, Full/half duplex, PWR, System Status   |
| Management          | Internal web server, SNMP (read only)<br>Serial login, Telnet login  |
| Security            | Password protection, Locking features, optional Rijndael 256-bit encryption                                    |
| Internal Web Server | Serves static web pages and Java applets   |
| Weight              | 2.2oz  |
| Material            | Case: Flame Retardant  |
| Power               | 2 W. See Power Supply section. +5 to +24VDC.   |
| Temperature         | Operating range: -40°C to +85°C (-40°F to 185°F) High performance mode has an upper temperature limit of 75°C. |

| <b>Category</b>   | <b>Description</b>   |
|-------------------|--|
| Relative Humidity | Operating: 5% to 95% non-condensing  |
| Warranty          | 1-year limited warranty  |
| Included Software | Windows™ 98/NT/2000/XP based Device Installer configuration software, Windows™ based Comm Port Redirector. |
| EMI Compliance    | See Declaration of Conformity for xPico.   |

## 4. Getting Started

This chapter covers the required steps to get the NET232+ Serial to Ethernet adapter on-line and working. The NET232+ contains a complete device server that controls the network communications.

*Note: See the Quick Start Guide for a quick setup procedure.*

---

### 4.1 Quick Rundown

For the unit to operate correctly on a network, it must have a unique IP address on the network. There are three basic methods for logging into the device server and assigning the IP address:

- **DHCP:** By default, Dynamic Host Configuration Protocol (DHCP) is enabled on the device server. DHCP allows a DHCP server to automatically assign an IP address to the device server. If you use DHCP, the device server is assigned a new IP address each time it boots.
- **Device Installer:** You can manually assign the IP address using a graphical user interface (GUI) on a PC attached to a network.
- **Serial Port Login:** With this method, you connect a terminal or a PC running a terminal emulation program to the unit's serial port.

All of the methods for assigning an IP address will be discussed in [Methods of Assigning the IP Address](#) on page 4-2.

It is important to consider the following points before logging into and configuring the device server:

- The device server's IP address must be configured before a network connection is available.
- Only one person at a time may be logged into the network port. This eliminates the possibility of several people simultaneously attempting to configure the device server.
- Network port logins can be disabled. The system manager will not be able to access the unit. This port can also be password protected.

For the unit to operate correctly with your device, you must configure the serial port properties. See Channel 1 on page 5-10.

---

### 4.2 Physically Connecting the Unit

1. Connect an active network Ethernet cable to the NET232+'s Ethernet port.
2. Supply power to your unit using the power supply that was included in the packaging.

*Note: If you are using a NET232+ unit with a Phoenix Connector, the input power is +5 to +24VDC.*

You can connect the serial cable to your PC serial port, if you want to configure the NET232+ over a serial link. This method is reliable, but more difficult than using the web browser method. If you have a NET232+-DTE (DB9Male), use a null modem adapter to connect the serial cable to a COM port on your PC. If you have a NET232+-DCE (DB9Female), connect the serial cable to a COM port on your PC.

---

## 4.3 Methods of Assigning the IP Address

The unit's IP address must be configured before a network connection is available. You have several options for assigning an IP to your unit, however, **we recommend** [Device Installer](#) on page 4-3.

| Method            | Description   |
|-------------------|---|
| Device Installer  | You manually assign the IP address using a Graphical User Interface on a PC attached to the network.<br>See <i>Device Installer</i> on page 4-3.  |
| Serial Port Login | You initially configure the unit through a serial connection.<br>See <i>Configuration Using Telnet or Serial Port</i> on page 5-4.  |
| Telnet            | You manually assign the IP address and other network settings at a command prompt using a UNIX or Windows-based system. Only one person at a time can be logged into the configuration port (port 9999). This eliminates the possibility of several people simultaneously attempting to configure the unit. See <i>Using a Telnet Connection</i> on page 5-4. |

### 4.3.1 Hardware Address

You need to know the unit's hardware address (also known as MAC address), which is on the manufacturers ID label on the bottom of the unit. It is in the format: 00-20-4a-XX-XX-XX, where the XXs are unique numbers assigned to the product.

Hardware Address: 00-20-4a- \_\_\_\_ - \_\_\_\_ - \_\_\_\_

### 4.3.2 IP Address

Your NET232+ must have a unique IP address on your network. The systems administrator generally provides the IP address and corresponding subnet mask and gateway. The IP address must be within a valid range, unique to your network, and in the same subnet as your PC.

IP Address:     \_\_\_\_    \_\_\_\_    \_\_\_\_    \_\_\_\_

Subnet Mask:    \_\_\_\_    \_\_\_\_    \_\_\_\_    \_\_\_\_

Gateway:       \_\_\_\_    \_\_\_\_    \_\_\_\_    \_\_\_\_

### 4.3.3 DHCP

The unit ships with a default IP address of 0.0.0.0, which automatically enables DHCP.

Provided a DHCP server exists on the network, it will provide the unit with an IP address, gateway address, and subnet mask when the unit boots up.

You can use the **Device Installer** software to search the network for the IP address your unit has been assigned by the DHCP server and add it to the managed list. See [Device Installer](#) later in this chapter.

### 4.3.4 AutoIP

The unit ships with a default IP address of 0.0.0.0, which automatically enables Auto IP within the unit. AutoIP is an alternative to DHCP that allows hosts to automatically obtain an IP address in smaller networks that may not have a DHCP server. A range of IP addresses (from 169.254.0.1 to 169.254.255.1) has been explicitly reserved for AutoIP-enabled devices. The range of Auto IP addresses is not to be used over the Internet.

If your unit cannot find a DHCP server, and you have not manually assigned an IP address to it, the unit automatically selects an address from the AutoIP reserved range. Then, your unit sends out a (ARP) request to other nodes on the same network to see whether the selected address is being used.

- If the selected address is not in use, then the unit uses it for local subnet communication,
- If another device is using the selected IP address, the unit selects another address from the AutoIP range and reboots. After reboot, the unit sends out another ARP request to see if the selected address is in use, and so on.

AutoIP is not intended to replace DHCP. The unit will continue to look for a DHCP server on the network. If a DHCP server is found, the unit will switch to the DHCP server-provided address and reboot.

*Note: If a DHCP server is found, but it denies the request for an IP address, the unit does not attach to the network, but waits and retries.*

AutoIP can be disabled by setting the unit's IP address to 0.0.1.0. This setting enables DHCP but disables AutoIP.

---

## 4.4 Device Installer

Device Installer is a Windows-based utility for configuring embedded device servers found in products such as the NET232+, NET232jr and NET485 Serial to Ethernet adapters. Device Installer supports several functions such as setting network parameters, pinging a network device, and changing baud rate. The first operation you must do is to locate the device on your network and assign the device a fixed IP address. Once the unit has a fixed IP address, you can use several methods to setup the unit for your specific application.

Please locate and read the **Device Installer User Guide** found on the product CD. The manual can be read by clicking the **Device Installer Manual** button on the software page of the product CD. You can also browse the CD to find the manual. Locate the **doc** folder and double-click on **DevInst\_232+\_UG.pdf**.

## 5. Configuration Using Telnet or Serial Port

You must configure the unit so that it can communicate on a network with your serial device. The unit's configuration is stored in nonvolatile memory and is retained without power. You can change the configuration at any time. The unit performs a reset after the configuration has been changed and stored.

### 5.1.1 Using the Serial Port

If you want to initially configure the unit through a serial connection, follow these steps:

1. Connect a console terminal or PC running a terminal emulation program to your unit's serial port. The power-on setup mode serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.
2. To enter Setup Mode, reset the unit by cycling the unit's power (power off and back on). The setup mode self-test will begin and will run for about 5 seconds. **You have 5 seconds** to enter three lowercase **x** characters (**xxx**).

*Note: The easiest way to enter Setup Mode is to hold down the **x** key at the terminal (or emulation) while turning the power off and on.*

3. At this point, the screen display is the same as when you use a Telnet connection. To continue with a serial port login, skip ahead to *5.1.3 Telnet and Serial Port Messages* on page 5-4.

### 5.1.2 Using a Telnet Connection

To configure the unit over the network, establish a Telnet connection to port 9999.

*Note: If you use the Telnet Configuration tab on Device Installer OR a serial port login to establish the connection, skip steps 1 and 2.*

1. From the Windows Start menu, click **Run** and type the following command, where x.x.x.x is the IP address and 9999 is the unit's fixed network configuration port number.

```
telnet x.x.x.x 9999
```

*Note: Be sure to include a space between the IP address and 9999.*

2. Click **OK**.

### 5.1.3 Telnet and Serial Port Messages

At this point, the telnet and serial port messages are the same.

3. The window displays:

```
MAC address 0080A3934000
Software version V6.8.0.5GCB1 (140505) XPICO  (Yours may be different)
AES library version 1.8.2.1
Press Enter for Setup Mode
```

4. To enter the Setup Mode, **you must press Enter within 5 seconds**. The configuration settings will appear.
5. Select an option on the menu by entering the number of the option in the **Your choice ?** field and pressing **Enter**.
6. To enter a value for a parameter, type the value and press **Enter**, or to confirm a current value, just press **Enter**.
7. When you are finished, save the new configurations (option **9**). The unit will reboot.



```

*** basic parameters
Hardware: Ethernet TPI
IP addr 0.0.0.0/DHCP/BOOTP/AutoIP, no gateway set
DNS Server not set
Backup DNS Server not set
DHCP device name : not set
DHCP FQDN option: Disabled

*** Security
SNMP is                enabled
SNMP Community Name: public
Telnet Setup is        enabled
TFPT Download is       enabled
Port 77FEh is          enabled
Web Server is          enabled
Web Setup is           enabled
ECHO is                disabled
Encryption is          disabled
Enhanced Password is disabled

*** Channel 1
- Serial Settings
Baudrate 9600, I/F Mode 4C, Flow 00
Flush Mode : 00

- Connection 1
Port 10001
Connect Mode : C0
Send '+++' in Modem Mode enabled
Show IP addr after 'RING' enabled
Auto increment source port disabled
Remote Host : --- none ---, Port 00000
Disconn Mode : 00

- Connection 2
Port 10002
Connect Mode : C0
Send '+++' in Modem Mode enabled
Show IP addr after 'RING' enabled
Auto increment source port disabled
Remote Host : --- none ---, Port 00000
Disconn Mode : 00

- Connection 3,4
Port 10003
Connect Mode : C0

*** Expert
TCP Keepalive      : 45s
ARP cache timeout : 600s
CPU performance   : Regular
Monitor Mode @ bootup : enabled
HTTP Port Number  : 80
SMTP Port Number  : 25
MTU Size: 1400
TCP Re-transmission timeout: 500 ms
Alternate MAC: disabled
Ethernet connection type: auto-negotiate

*** E-mail
Mail server: --- none ---

```

```
SMTP User   : , Password not set!
Unit        :
Domain      :
Recipient 1:
Recipient 2:

- Modem Dial Trigger
Serial modem dial trigger: disabled
Message :

- Trigger 1
Serial trigger input: disabled
  Channel: 1
  Match: 00,00
Trigger input1: X
Trigger input2: X
Trigger input3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval : 0 s

- Trigger 2
Serial trigger input: disabled
  Channel: 1
  Match: 00,00
Trigger input1: X
Trigger input2: X
Trigger input3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval : 0 s

- Trigger 3
Serial trigger input: disabled
  Channel: 1
  Match: 00,00
Trigger input1: X
Trigger input2: X
Trigger input3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval : 0 s

Change Setup:
  0 Server
  1 Channel 1
  3 E-mail
  5 Expert
  6 Security
  7 Defaults
  8 Exit without save
  9 Save and exit
Your choice ?
```

**Figure 1 - Setup Mode Window**

---

## 5.2 Server Configuration (Network Configuration)

These are the unit's basic network parameters. The following parameters are displayed when you select **Server**(Option 0).

```
IP Address : (000) .(000) .(000) .(000)
Set Gateway IP Address (N)
Netmask: Number of Bits for Host Part (0=default)  (0)
Set DNS Server IP addr  (N) ?

Set Backup DNS Server IP addr  (N) ?
Change Telnet/Web Manager password  (N) ?
Change DHCP device name (not set) ? (N) ?
Enable DHCP FQDN option: (N) ?
```

### 5.2.1 IP Address

If DHCP is not used to assign IP addresses, enter the IP address manually. The IP address must be set to a unique value in the network. Enter each octet and press **Enter** between each section. The current value displays in parentheses.

If DHCP is used, the third octet of the IP address sets the BootP/DHCP/AutoIP options. The following table shows the bits you can manually configure to force the XPort to disable AutoIP, DHCP, or BootP. To disable an option, set the appropriate bit.

| Options | Bit |
|---------|-----|
| AutoIP  | 0   |
| DHCP    | 1   |
| BootP   | 2   |

For example, if the third octet is 0.0.5.0, the AutoIP and BootP options are disabled; only DHCP is enabled. (The value 5 results from adding the binary equivalents of 0 and 2.) This is the most common setting when using DHCP.

### 5.2.2 Set Gateway IP Address

The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the unit. The gateway address must be within the local network. The default is **N** (No), meaning the gateway address has not been set. To set the gateway address, type **Y** and enter the address.

### 5.2.3 Netmask: Number of Bits for Host Part

A netmask defines the number of bits taken from the IP address that are assigned for the host section.

*Note: Class A: 24 bits; Class B: 16 bits; Class C: 8 bits.*

The unit prompts for the number of host bits to be entered, then calculates the netmask, which is displayed in standard decimal-dot notation when the saved parameters display (for example, 255.255.255.0).

**Table 5 - Standard IP Network Netmasks**

| Network Class | Host Bits | Netmask       |
|---------------|-----------|---------------|
| A             | 24        | 255.0.0.0     |
| B             | 16        | 255.255.0.0   |
| C             | 8         | 255.255.255.0 |

**Table 6 - Netmask Examples**

| Netmask         | Host Bits |
|-----------------|-----------|
| 255.255.255.252 | 2         |
| 255.255.255.248 | 3         |
| 255.255.255.240 | 4         |
| 255.255.255.224 | 5         |
| 255.255.255.192 | 6         |
| 255.255.255.128 | 7         |
| 255.255.255.0   | 8         |
| 255.255.254.0   | 9         |
| 255.255.252.0   | 10        |
| 255.255.248.0   | 11        |
| ...             | ...       |
| 255.128.0.0     | 23        |
| 255.0.0.0       | 24        |

#### 5.2.4 Set DNS Server IP Address

The DNS server allows the name of a remote machine to be resolved automatically. The default is N (No), indicating the DNS server address has not been set. To set the DNS server address, type Y. At the prompt, enter the DNS server address. If the device is DHCP enabled, the DHCP server provides the DNS server IP address, which will override this configured value.

*Note: This setting is applicable only in Manual Connection mode*

#### 5.2.5 Set Backup DNS Server IP addr

The Backup DNS server allows the name of a remote machine to be resolved automatically in cases where the primary DNS server is unavailable. The default is N (No), indicating the Backup DNS server address has not been set. To set the Backup DNS server address, type Y. At the prompt, enter the backup DNS server address. If the device is DHCP enabled, the backup DNS server will be used if the primary DNS server supplied by the DHCP server is unavailable or unable to resolve the name.

#### 5.2.6 Change Telnet/Web Manager password

Setting the Telnet/Web Manager password prevents unauthorized access of the setup menu via a Telnet connection to port 9999 or through Web pages. The password is limited to 4 characters. An enhanced password setting of 16 characters is available under Security Settings for Telnet access only.

*Note: No password is required to access the Setup Mode window via a serial connection.*

#### 5.2.7 Change DHCP device name

If a DHCP server has automatically assigned the IP address and network settings, you can discover the unit by using the Device Installer network search feature.

There are 3 methods for assigning DHCP names to these products.

1) **Default DHCP name.** If you do not change the DHCP name, and you are using an IP of 0.0.0.0, then the DHCP name will default to CXXXXXX (XXXXXX is the last 6 digits of the MAC address shown on the label on the bottom/side of the unit). For example, if the MAC address is 00-20-4A-12-34-56, then the default DHCP name is C123456.

2) **Custom DHCP name.** You can create your own DHCP name on these products. If you are using an IP address of 0.0.0.0, then the last option in "Server configuration" will be "Change DHCP device name". The "Change DHCP device name" option will allow you to change the DHCP name to an alpha-numeric name.

```
Change DHCP device name (not set) ? (N) Y
Enter new DHCP device name : LTX
```

3) **Numeric DHCP name.** You are able to change the DHCP name by specifying the last octet of the IP address. When you use this method, the DHCP name will be LTXYY where YY is what you chose for the last octet of the IP address. If the IP address you specify is 0.0.0.12, then the DHCP name will be LTX12. This method will only work with 2 digit numbers (0-99).

### 5.2.8 Enable DHCP FQDN option

FQDN is the fully qualified domain name of the remote host

Dynamic update enables a DHCP server to register address (A) and pointer (PTR) resource records on behalf of a DHCP client by using DHCP Client FQDN option 81. Option 81 enables the DHCP client to provide its FQDN to the DHCP server. The DHCP client also provides instructions to the DHCP server describing how to process DNS dynamic updates on behalf of the DHCP client.

Note: In the current version of firmware, Manual Mode is the only outbound connection method that allows a device server to make a connection to an IP host via hostname.

Manual Mode can be enabled by setting ConnectMode to any value of “x4” (eg, 04, 14, C4, D4, etc) in the Channel1 Menu of the device server’s Telnet Configuration menu.

To test Manual Mode, do the following:

- Set the Connect Mode to any Manual Mode setting, for example, D4 (Manual Connection with Character Response)
- Connect a terminal to the serial port of the device server and start a session.
- Reboot the device server, and soon, you will receive a ‘D’ from the device server (meaning ‘disconnected’).
- Make an outbound connection in Manual Mode by typing:

C<ip\_address:tcpport> or C<FQDN:tcpport>

followed by a carriage return

(where FQDN is the fully qualified domain name of the remote host).

Note: You may also use / (slash) in place of : (colon) to separate IP and TCP port.

C<ip\_address/tcpport> or C<FQDN/tcpport>

For example:

CSunfirev240.support.int.lantronix.com/23, or  
CSunfirev240.support.int.lantronix.com:23

followed by a carriage return makes a telnet connection to a host named Sunfirev240 on the network.

A DNS server must be configured in the device server setting for connection via hostname to work. The DNS server is configured in the telnet configuration menu option 0 – Server setting.

When Connect Mode D4 is used, a successful connection will return a ‘C’ on the screen (‘connected’) connecting you to a login prompt from the Sunfirev240.

A failed connection will come back as an ‘N’ (‘no connection’).

To disconnect from a Manual Connection, you can:

- configure Disconnect Mode to drop with DTR (DisConnMode=80), or
- disconnect with EOT (^D) (DisConnMode=60), or
- have the network peer drop the TCP connection, or
- reboot the device server.

---

## 5.3 Channel 1 Serial Settings

This section describes how to setup the serial port. The following parameters are displayed when you select **Channel 1** (Option 1).

```

Baudrate (9600)
I/F Mode (4C)
Flow (00)
FlushMode (00)
SendChar 1 (00)
SendChar 2 (00)

```

### 5.3.1 Baudrate

The unit and attached serial device must agree on a speed or baud rate to use for the serial connection. Valid baud rates are 300, 600, 1200, 2400, 4800, 9600 (default), 19200, 38400, 57600, 115200, and 230400 bits per second. NET232+ supports high-performance baud rates of 460800 and 921600 bps.

### 5.3.2 I/F (Interface) Mode

The Interface (I/F) Mode is a bit-coded byte that you enter in hexadecimal notation.

**Table 7 - Interface Mode Options**

| I/F Mode Option           | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---------------------------|---|---|---|---|---|---|---|---|
| RS-232C <sup>(1)</sup>    |   |   |   |   |   |   | 0 | 0 |
| RS-422/485                |   |   |   |   |   |   | 0 | 1 |
| RS-485 2-wire             |   |   |   |   |   |   | 1 | 1 |
| 7 Bit                     |   |   |   |   | 1 | 0 |   |   |
| 8 Bit                     |   |   |   |   | 1 | 1 |   |   |
| No Parity                 |   |   | 0 | 0 |   |   |   |   |
| Even Parity               |   |   | 1 | 1 |   |   |   |   |
| Odd Parity                |   |   | 0 | 1 |   |   |   |   |
| 1 Stop bit                | 0 | 1 |   |   |   |   |   |   |
| 2 Stop bit <sup>(1)</sup> | 1 | 1 |   |   |   |   |   |   |

(1) 2 stop bits are implemented by software. This might have influence on performance.

The following table demonstrates how to build some common Interface Mode settings:

**Table 8 - Common Interface Mode Settings**

| Common I/F Mode Setting                 | Binary    | Hex |
|---|-----------|-----|
| RS-232C, 8-bit, No Parity, 1 stop bit   | 0100 1100 | 4C  |
| RS-232C, 7-bit, Even Parity, 1 stop bit | 0111 1000 | 78  |

### 5.3.3 Flow

Flow control sets the local handshaking method for stopping serial input/output.

**Table 9 - Flow Control Options**

| Flow Control Option                              | Hex |
|--|-----|
| No flow control                                  | 00  |
| XON/XOFF flow control                            | 01  |
| Hardware handshake with RTS/CTS lines (see note) | 02  |
| XON/XOFF pass characters to host                 | 05  |

*Note: RTS and CTS control lines are not enabled at the factory. See Device Installer on page 4-3. You must use the web manager to configure the hardware handshake signals.*

### 5.3.4 Flush Mode (Buffer Flushing)

Using this parameter, you can control line handling and network buffers with connection startup and disconnect. You can also select between two different packing algorithms.

**Table 10 - Flush Mode Options**

| Function   | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|--|---|---|---|---|---|---|---|---|
| <b>Input Buffer (Serial to Network)</b>                                  |   |   |   |   |   |   |   |   |
| Clear with a connection that is initiated from the device to the network |   |   |   | 1 |   |   |   |   |
| Clear with a connection initiated from the network to the device         |   |   | 1 |   |   |   |   |   |
| Clear when the network connection to or from the device is disconnected  |   | 1 |   |   |   |   |   |   |
| <b>Output Buffer (Network to Serial)</b>                                 |   |   |   |   |   |   |   |   |
| Clear with a connection that is initiated from the device to the network |   |   |   |   |   |   |   | 1 |
| Clear with a connection initiated from the network to the device         |   |   |   |   |   |   | 1 |   |
| Clear when the network connection to or from the device is disconnected  |   |   |   |   |   | 1 |   |   |
| <b>Alternate Packing Algorithm (Pack Control)</b>                        |   |   |   |   |   |   |   |   |
| Enable   | 1 |   |   |   |   |   |   |   |

### 5.3.5 Pack Control

Two firmware-selectable packing algorithms define how and when packets are sent to the network. The standard algorithm is optimized for applications in which the unit is used in a local environment, allowing for very small delays for single characters while keeping the packet count low. The alternate packing algorithm minimizes the packet count on the network and is especially useful in applications in a routed Wide Area Network (WAN). Adjusting parameters in this mode can economize the network data stream.

Pack control settings are enabled in **Flush Mode**. Set this value to **00** if specific functions are not needed.

**Table 11 - Pack Control Options**

| Option                            | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|-----------------------------------|---|---|---|---|---|---|---|---|
| <b>Packing Interval</b>           |   |   |   |   |   |   |   |   |
| Interval: 12ms                    |   |   |   |   |   |   | 0 | 0 |
| Interval: 52ms                    |   |   |   |   |   |   | 0 | 1 |
| Interval: 250ms                   |   |   |   |   |   |   | 1 | 0 |
| Interval: 5sec                    |   |   |   |   |   |   | 1 | 1 |
| <b>Trailing Characters</b>        |   |   |   |   |   |   |   |   |
| None                              |   |   |   |   | 0 | 0 |   |   |
| One                               |   |   |   |   | 0 | 1 |   |   |
| Two                               |   |   |   |   | 1 | 0 |   |   |
| <b>Send Characters</b>            |   |   |   |   |   |   |   |   |
| 2-Byte Send Character Sequence    |   |   |   | 1 |   |   |   |   |
| Send Immediately After Send chars |   |   | 1 |   |   |   |   |   |



**Packing Interval:** Packing Interval defines how long the unit should wait before sending accumulated characters. This wait period is between successive network segments containing data. For alternate packing, the default interval is 12 ms.

**Trailing Characters:** In some applications, CRC, Checksum, or other trailing characters follow the end-of-sequence character; this option helps to adapt frame transmission to the frame boundary.

**Send Characters:** If 2-Byte Send Character Sequence is enabled, the unit interprets the sendchars as a 2-byte sequence; if not set, they are interpreted independently.

If **Send Immediately After Send Characters** is not set, any characters already in the serial buffer are included in the transmission after a "transmit" condition is found. If set, the unit sends immediately after recognizing the transmit condition (sendchar or timeout).

*Note: A transmission might occur if status information needs to be exchanged or an acknowledgment needs to be sent.*

### 5.3.6 Send Characters

You can enter up to two characters in hexadecimal representation in the parameters "sendchar." If a character received on the serial line matches one of these characters, it is sent immediately, along with any awaiting characters, to the TCP connection. This minimizes the response time for specific protocol characters on the serial line (for example, ETX, EOT, etc.). Setting the first sendchar to **00** disables the recognition of the characters. Alternatively, the two characters can be interpreted as a sequence (see [Pack Control](#) on page 5-12).

---

## 5.4 Connection 1 and Connection 2

Connection 1 and Connection 2 setup menus are the same except that Connection 1 port default setting is 10001 and Connection 2 port default setting is 10002. The ConnectMode setting for Connection 2 is set to 00.

```

- Connection 1
Port No (10001)
ConnectMode (C0)
Send '+++\' in Modem Mode (Y) ?
Show IP addr after 'RING\' enabled
Auto increment source port (N) ?
Remote Host :
Remote Port (0) ?
DisConnMode (00) ?
DisConnTime (00:00) ?:

- Connection 2
Port No (10002)
ConnectMode (00)
Send '+++\' in Modem Mode (Y) ?
Show IP addr after 'RING\' enabled
Auto increment source port (N) ?
Remote Host :
Remote Port (0) ?
DisConnMode (00) ?
DisConnTime (00:00) ?:

```

### 5.4.1 Port Number

The setting represents the source port number in TCP connections. It is the number used to identify the channel for remotely initiating connections. Default setting for Connection 1 Port is 10001. Default setting for Connection 2 Port is 10002. Range: 1-65535 except for the following reserved port numbers:

**Table 12 - Reserved Ports**

| Port Numbers | Reserved for                       |
|--------------|------------------------------------|
| 1 – 1024     | Reserved (well known ports)        |
| 9999         | Telnet setup                       |
| 10001        | Default Setting for Connection 1   |
| 10002        | Default Setting for Connection 2   |
| 10003        | Default Setting for Connection 3/4 |
| 14000-14009  | Reserved for Comm Port Redirector  |
| 30704        | Reserved (77F0h)                   |
| 30718        | Reserved (77FEh)                   |

*Warning: We recommend that you not use the reserved port numbers for this setting as incorrect operation may result.*

The port number functions as the TCP/UDP source port number for outgoing packets. Packets sent to the unit with this port number are received to this channel. The port number selected is the Incoming TCP/UDP port and Outgoing TCP/UDP source port. Port 0 is used when you want the outgoing source port to change with each connection.

If the port number is set to 0, the initial value of 50000 will be used to actively establish a connection. Each subsequent connection will increment the number by 1. When the port number reaches 59999, it will wrap back to 50000.

The automatic port increment feature must only be used when this device is the one initiating a connection using TCP. The port must be set to a non-zero value when this is a passive device or when UDP is being used instead of TCP.

## 5.4.2 Connect Mode

Connect Mode defines how the unit makes a connection, and how it reacts to incoming connections over the network. Enter Connect Mode options in hexadecimal notation.

*Note: If you do not want to convert the binary numbers to hexadecimals yourself, look up the values in the Tech Notes guide.*

**Table 13 - Connect Mode Options**

| Connect Mode Option   | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| <b>Incoming Connection</b>                                  |   |   |   |   |   |   |   |   |
| Never accept incoming                                       | 0 | 0 | 0 |   |   |   |   |   |
| Accept with DTR Active                                      | 0 | 1 | 0 |   |   |   |   |   |
| Always Accept   | 1 | 1 | 0 |   |   |   |   |   |
| <b>Response</b>   |   |   |   |   |   |   |   |   |
| Nothing (quiet)   |   |   |   | 0 |   |   |   |   |
| Character response (C=connect, D=disconnect, N=unreachable) |   |   |   | 1 |   |   |   |   |
| <b>Active Startup</b>                                       |   |   |   |   |   |   |   |   |
| No active startup   |   |   |   |   | 0 | 0 | 0 | 0 |
| With any character  |   |   |   |   | 0 | 0 | 0 | 1 |
| With DTR Active   |   |   |   |   | 0 | 0 | 1 | 0 |
| With a specific start character                             |   |   |   |   | 0 | 0 | 1 | 1 |
| Manual connection   |   |   |   |   | 0 | 1 | 0 | 0 |
| Autostart   |   |   |   |   | 0 | 1 | 0 | 1 |
| Hostlist  | 0 | 0 | 1 | 0 |   |   |   |   |
| <b>Datagram Type</b>  |   |   |   |   |   |   |   |   |
| Directed UDP  |   |   |   |   | 1 | 1 | 0 | 0 |
| <b>Modem Mode</b>   |   |   |   |   |   |   |   |   |
| No Echo   |   |   | 0 | 0 |   | 1 | 1 |   |
| Data Echo and Modem Response (Numeric)                      |   |   | 0 | 1 |   | 1 | 1 | 1 |
| Data Echo and Modem Response (Verbose)                      |   |   | 0 | 1 |   | 1 | 1 | 0 |
| Modem Response Only (Numeric)                               |   |   | 0 | 0 | 1 | 1 | 1 | 1 |
| Modem Response Only (Verbose)                               |   |   | 0 | 0 | 1 | 1 | 1 | 0 |

**INCOMING CONNECTION:**

**Never Accept Incoming:**  
**Accept with DTR Active:**

Rejects all external connection attempts.

Accept external connection requests only when the DTR input is asserted.  
Cannot be used with Modem Mode.

**Always Accept:**

Accept any incoming connection when a connection is not already established. This is the default setting.

**RESPONSE:**

**Character Response:**

A single character is transmitted to the serial port when there is a change in connection state: C = connected, D = disconnected, N = host unreachable. This option is overridden when the Active Start Modem Mode or Active Start Host List is in effect. Default setting is Nothing (quiet).

**ACTIVE STARTUP:**

**No Active Startup:**

No attempt to initiate a connection under any circumstance. This is the default setting.

**With Any Character:**

Attempts to connect when any character is received from the serial port.

**With DTR Active:**

Attempts to connect when the DTR input changes from not asserted to asserted.

**With a Specific Start Char:**

Attempts to connect when it receives a specific start character from the serial port. The default start character is carriage return.

**Manual Connection:**

Attempts to connect when directed by a command string received from the serial port. The first character of the command string must be a C (ASCII 0x43), and the last character must be either a carriage return (ASCII 0x0D) or a line feed (0x0A). No blanks or space characters in the command string. Between the first and last command string characters must be a full or partial destination IP address and may be a destination port number.

The IP address must be presented in standard dot-decimal notation and may be a partial address, representing the least significant 1, 2 or 3 bytes of the remote IP address. The period is required between each pair of IP address numbers.

If present, the port number must follow the IP address, must be presented as a decimal number in the range 1-65535 and must be preceded by a forward slash (ASCII 0x2F). The slash separates the IP address and the port number. If the port number is omitted from a command string, the internally stored remote port number is used to start a connection.

For Active Start options requiring internally stored destination IP address and port number, the unit will not attempt a connection if this information is not configured (all zeros).

If a partial IP address is presented in a command string, it will be interpreted to be the least significant bytes of the IP address and will use the internally stored remote IP address to provide the most significant bytes of the IP address.

For example, if the remote IP address already configured in the unit is 129.1.2.3, then an example command string would be C3/7. (This would connect to 129.1.2.3 and port 7.) You may also use a different ending for the connection string. For example, C50.1/23 would connect you to 129.1.50.1 and port 23.

If an IP address does not follow the first command string character (which is "C"), the subsequent character string is interpreted as the host name and domain to be used in DNS lookup. This character string can include a destination port number as well. The port number can be preceded by either a forward slash (/) or a colon (:).

**Table 14 - Manual Connection Address Example**

| Command String | Result if remote IP is 129.1.2.3 and remote port is 1234             |
|----------------|--|
| C121.2.4.5/1   | Complete override; connection is started with host 121.2.4.5, port 1 |
| C5             | Connect to 129.1.2.5, port 1234                                      |
| C28.10/12      | Connect to 129.1.28.10, port 12                                      |
| C0.0.0.0/0     | Enter Monitor Mode   |

**Autostart (Automatic Connection):**

If **Autostart** is enabled, the unit automatically connects to the remote IP address and remote port specified when the firmware starts.

**Hostlist:**

If you enable this option, the unit scrolls through the hostlist until it connects to a device listed in the hostlist table. Once it connects, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until it is able to connect to another IP in the hostlist.

Hostlist supports a minimum of 1 and a maximum of 12 entries. Each entry contains the IP address and the port number. The host list will be disabled for Manual Mode and for Modem Mode. The unit will not accept a data connection from a remote device when the host list option is enabled.

```
Port No (10001)
ConnectMode (21)
Send '+++ ' in Modem Mode (Y) ?
Auto increment source port (N) ?

Hostlist :
01. IP : 010.010.010.001 Port : 00023
02. IP : 010.010.010.002 Port : 00023
03. IP : 010.010.010.003 Port : 00023

Change Hostlist ? (N)
Hostlist Retrycounter (3)
Hostlist Retrytimeout (250)
DisConnMode (00)
DisConnTime (00:00) :
```

**Figure 2 - Hostlist Option**

To use the Hostlist option, follow these steps:

1. Enter a **Connect Mode** of 0x20 (**2X**). The menu shows you a list of current entries already defined in the product.
2. To delete, modify, or add an entry, select **Yes**. If you enter an IP address of 0.0.0.0, that entry and all others after it are deleted.
3. After completing the hostlist, repeat the previous step if necessary to edit the hostlist again.
4. For **Retrycounter**, enter the number of times the unit should try to make a good network connection to a hostlist entry that it has successfully ARPed. The range is 1-15, with the default set to 3.
5. For **Retrytimeout**, enter the number of seconds the unit should wait before failing an attempted connection. The time is stored as units of milliseconds in the range of 1-65535. The default value is 250.

### **DATAGRAM TYPE:**

#### **Directed UDP:**

When selecting this option, you will be prompted for the Datagram type. Enter **01** for directed or broadcast UDP.

When the UDP option is in effect, the unit will never attempt to initiate a TCP connection because it will use UDP datagrams to send and receive data.

### **MODEM MODE:**

In Modem (Emulation) Mode, the unit presents a modem interface to the attached serial device. It accepts **AT**-style modem commands and handles the modem signals correctly.

Normally there is a modem connected to a local PC and a modem connected to a remote machine. A user must dial from the local PC to the remote machine, accumulating phone charges for each connection.

Modem Mode allows you to replace modems with NET232s, and to use an Ethernet connection instead of a phone call, without having to change communications applications and make potentially expensive phone calls.

To select Modem Mode, set the Connect Mode to **06** (no echo), **16** (echo with full verbose), or **17** (echo with 1-character response).

*Note: If the unit is in Modem Mode and the serial port is idle, the unit can still accept network TCP connections to the serial port if Connect Mode is set to 06 (no echo), 16 (echo with full verbose), or 17 (echo with 1-character response).*

|                                       |  |
|---------------------------------------|--|
| <b>Without Echo:</b>                  | In Modem Mode, echo refers to the echo of all of the characters entered in command mode; it does not mean to echo data that is transferred. Quiet Mode (without echo) refers to the modem not sending an answer to the commands received (or displaying what was typed). |
| <b>Data Echo &amp; Modem Response</b> | <b>Full Verbose:</b> The unit echoes modem commands and responds to a command with a message string shown in the table below.<br><b>Numeric Response:</b> The unit echoes modem commands and responds to a command with a numeric response.                              |
| <b>Modem Responses Only</b>           | <b>Full Verbose:</b> The unit does not echo modem commands and responds to a command with a message string shown in the table below.<br><b>Numeric Response:</b> The unit does not echo modem commands and responds to a command with a numeric response.                |

| Message       | Meaning   |
|---------------|---|
| OK            | Command was executed without error.                                       |
| CONNECT       | A network connection has been established.                                |
| DISCONNECT    | A network connection has been closed.                                     |
| RING n.n.n.n. | A remote device, having IP address n.n.n.n, is connecting to this device. |

| Message      | Meaning   |
|--------------|---|
| OK           | Command was executed without error.                                       |
| CONNECT      | A network connection has been established                                 |
| NO CARRIER   | A network connection has been closed.                                     |
| RING n.n.n.n | A remote device, having IP address n.n.n.n, is connecting to this device. |
| 0            | OK  |
| 1            | Connected   |
| 2            | Ring  |
| 3            | No Carrier  |
| 4            | Error   |

Received commands must begin with the two-character sequence **AT** and must be terminated with a carriage return character.

Any character sequence received not starting with **AT** will be ignored. The unit will only recognize and process single **AT**-style commands. Compound **AT** commands will be treated as unrecognized commands.

If the **Full Verbose** option is in effect, an unrecognized command string that is otherwise formatted correctly (begins with **AT** and ends with carriage return) will be responded to with the **OK** message and no further action is taken.

If the Numeric Response option is in effect, unrecognized command strings that are otherwise formatted correctly will be responded to with **OK** and no further action is taken.

When an active connection is in effect, the unit will be transferring data and will not process commands received from the serial interface.

When a connection is terminated or lost, the unit will revert to command mode.

When an active connection is in effect, the unit will terminate the connection if the following sequence is received from the attached serial device:

1. No serial data is received for one second.
2. The character sequence +++ is received, with no more than one second between each two characters.

3. No serial data is received for one second after the last + character. At this time the unit will respond affirmatively per the selected echo/response mode.
4. The character string **ATH** is received, terminated with a carriage return. The unit will respond affirmatively per the selected echo/response mode and drop the network connection. The serial interface will revert to accepting command strings.

If the above sequence is not followed, the unit will remain in data transfer mode.

**Table 15 - Modem Mode Commands**

| Modem Mode Command                   | Function   |
|--------------------------------------|--|
| ATDTx.x.x.x,pppp or ATDTx.x.x.x/pppp | Makes a connection to an IP address (x.x.x.x) and a remote port number (pppp).   |
| ATDTx.x.x.x                          | Makes a connection to an IP address (x.x.x.x) and the remote port number defined within the unit.  |
| ATD0.0.0.0                           | Forces the unit into Monitor Mode if a remote IP address and port number are defined within the unit.  |
| ATD                                  | Forces the unit into Monitor Mode if a remote IP address and port number are not defined within the unit.  |
| ATDx.x.x.x                           | Makes a connection to an IP address (x.x.x.x) and the remote port number defined within the unit.  |
| ATH                                  | Hangs up the connection (Entered as +++ATH ).  |
| ATS0=n                               | Enables or disables connections from the network going to the serial port.<br>n=0 disables the ability to make a connection from the network to the serial port.<br>n=1-9 enables the ability to make a connection from the network to the serial port.<br>n>1-9 is invalid. |
| ATEn                                 | Enables or disables character echo and responses.<br>n=0 disables character echo and responses.<br>n=1 enables character echo and responses.   |
| ATVn                                 | Enables 1-character response or full verbose.<br>n=0 enables 1-character response.<br>n=1 enables full verbose.  |

*Note: These AT commands are only recognized as single commands like ATE0 or ATV1; compound commands such as ATE0V1 are not recognized. All other AT commands with Modem Mode set to full verbose acknowledge with an OK, but no action is taken.*

### 5.4.3 Send the Escape Sequence (+++) in Modem Mode

Disable or enable the ability to send the escape sequence. The default is **Y** (Yes) (send the escape sequence).

### 5.4.4 Show IP addr after 'RING'

Disable or enable the xPico's ability to show the IP address after RING in Modem Mode. The default is **Y** (Yes), to show the IP address.



### 5.4.5 Auto Increment Source Port

Y (Yes) auto increment the source port. The NET232+ increments the port number used with each new connection

### 5.4.6 Remote Host

This is the destination IP address used with an outgoing connection.

*Note: This option does not display when Hostlist is enabled from the **ConnectMode** prompt.*

### 5.4.7 Remote Port

The remote TCP port number must be set for the unit to make outgoing connections. This parameter defines the port number on the target host to which a connection is attempted.

To connect an ASCII terminal to a host using the unit for login purposes, use the remote port number 23 (Internet standard port number for Telnet services).

*Note: This option does not display when Hostlist is enabled from the **ConnectMode** prompt.*

### 5.4.8 DisConnMode

This setting determines the conditions under which the unit will cause a network connection to terminate.

*Note: In DisConnMode (Disconnect Mode), DTR drop either drops the connection or is ignored.*

*Note: The Status LED is the State LED on the NET232+.*

**Table 16 - Disconnect Mode Options**

| Disconnect Mode Option                             | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|--|---|---|---|---|---|---|---|---|
| Disconnect with DTR drop <sup>(6)</sup>            | 1 |   |   |   |   |   |   |   |
| Ignore DTR   | 0 |   |   |   |   |   |   |   |
| Telnet mode and terminal type setup <sup>(1)</sup> |   | 1 |   |   |   |   |   |   |
| Channel (port) password <sup>(2)</sup>             |   |   |   | 1 |   |   |   |   |
| Hard disconnect <sup>(3)</sup>                     |   |   |   |   | 0 |   |   |   |
| Disable hard disconnect                            |   |   |   |   | 1 |   |   |   |
| State LED off with connection <sup>(4)</sup>       |   |   |   |   |   |   |   | 1 |
| Disconnect with EOT (^D) <sup>(5)</sup>            |   |   | 1 |   |   |   |   |   |

1. The NET232+ will send the "Terminal Type" upon an outgoing connection.

2. A password is required for a connection to the serial port from the network.

3. The TCP connection will close even if the remote site does not acknowledge the disconnection.

**4. When there is a network connection to or from the serial port, the state LED will turn off instead of blink.**

5. When Ctrl+D or Hex 04 is detected, the connection is dropped. Both Telnet mode and Disconnect with EOT must be enabled for Disconnect with EOT to function properly. Ctrl+D will only be detected going from the serial port to the network.

6. When DTR transitions from a high state to a low state, then the network connection to or from the serial port will drop.

### 5.4.9 DisConnTime (Inactivity Timeout)

Use this parameter to set an inactivity timeout. The connection is dropped if there is no activity on the serial line before the set time expires. Enter time in the following format: **mm:ss**, where **m** is the number of minutes and **s** is the number of seconds. To disable the inactivity timeout, enter **00:00**. Range is 0 (disabled) to 5999 seconds (99 minutes, 59 seconds). Default setting is 0.

#### 5.4.10 Telnet Terminal Type

This parameter appears only if the terminal type option is enabled in Disconnect Mode (see [DisConnMode](#) on page 5-21 above). If this option is enabled, you can use the terminal name for the Telnet terminal type. Enter only one name.

If the terminal type option is enabled, the unit also reacts to the EOR (end of record) and binary options, which can be used for applications like terminal emulation to IBM hosts.

#### 5.4.11 Channel (Port) Password

This parameter appears only if the channel (port) password option is enabled in Disconnect Mode (see [DisConnMode](#) on page 5-21). If the option is enabled, you can set a password on the serial port.

---

### 5.5 Connection 3/4

Connection 3 and 4 are for Accept Mode only. For Port Number and ConnectMode options, see the previous section.

```
Port No (10003)
ConnectMode (00)
```

---

## 5.6 E-Mail Settings

```
Mail server ?
SMTP user ?
Change SMTP password (N) ?

Unit name () ?
Domain name () ?
Recipient 1 () ?
Recipient 2 () ?

- Modem Dial Trigger
Enable modem dial (ATDT) trigger (N) ?

- Trigger 1
Enable serial trigger input (N) ?
Trigger input1 [A/I/X] (X) ?
Trigger input2 [A/I/X] (X) ?
Trigger input3 [A/I/X] (X) ?
Message () ?
Priority (L) ?
Min. notification interval (1 s) ?
Re-notification interval (0 s) ?

- Trigger 2
Enable serial trigger input (N) ?
Trigger input1 [A/I/X] (X) ?
Trigger input2 [A/I/X] (X) ?
Trigger input3 [A/I/X] (X) ?
Message () ?
Priority (L) ?
Min. notification interval (1 s) ?
Re-notification interval (0 s) ?

- Trigger 3
Enable serial trigger input (N) ?
Trigger input1 [A/I/X] (X) ?
Trigger input2 [A/I/X] (X) ?
Trigger input3 [A/I/X] (X) ?
Message () ?
Priority (L) ?
Min. notification interval (1 s) ?
Re-notification interval (0 s) ?
```

### 5.6.1 E-mail Setup

E-mail setup requires you to set up the e-mail server location as follows:

|                             |   |
|-----------------------------|---|
| <b>Mail server:</b>         | The IP address in decimal-dot notation.                   |
| <b>SMTP user:</b>           | Authentication user name                                  |
| <b>Change SMTP password</b> | <b>Change authentication password</b>                     |
| <b>Unit:</b>                | The user name used by the NET232+ to send e-mail messages |
| <b>Domain:</b>              | The Domain name of your e-mail server                     |
| <b>Recipient 1:</b>         | Full e-mail address of the recipient.                     |
| <b>Recipient 2:</b>         | Full e-mail address of the second recipient.              |

## 5.6.2 Trigger Setup

### Conditions

|                                    |  |
|------------------------------------|--|
| <b>Enable Serial Trigger Input</b> | Enabling this option causes specified serial communications to count as a trigger input. |
| <b>Trigger Input</b>               | (A) Active, (I) Inactive or (X) None. Default set to (X)                                 |

*Note: All of the conditions must match for the NET232+ to send an email notification.*

### Message Properties

|                                 |  |
|---------------------------------|--|
| <b>Message</b>                  | The subject line of the trigger event email to the specified recipient(s).   |
| <b>Priority</b>                 | The priority level for the email.  |
| <b>Notification Interval</b>    | The minimum time allowed between individual triggers. If a trigger event occurs within the minimum interval since the last trigger, it is ignored. |
| <b>Re-notification Interval</b> | Indicates the time interval in which a new email message is sent to the recipient(s) when a single trigger event remains active.                   |

Email serial triggers expanded to support up to a 6-byte match sequence.

A trigger event can occur by receiving up to 6 bytes of a specified sequence on the serial port. If the serial sequence is set to **00,00** then it is disabled. At the **Serial Sequence** prompt, enter the ASCII Hex value. Example: A two byte sequence of 12 would be 0x31, 0x32.

**Message:** Enter the subject line of the e-mail.  
**Priority:** L is for normal priority, H is for High Priority.  
**Min. notification interval:** The minimum time allowed between individual triggers. If a trigger event occurs faster than the minimum interval, the trigger will be ignored.  
**Re-notification interval:** If a single trigger event stays asserted, then an e-mail message will be sent at this time interval.

Each trigger is independent from the others. Each condition within an individual trigger must be met before the e-mail will be sent.

---

## 5.7 Expert Settings

These parameters should only be changed if you are an expert and definitely know the consequences the changes might have.

```
TCP Keepalive time in s (1s - 65s; 0s=disable): (45)
ARP Cache timeout in s (1s - 600s) : (600) ?
CPU Performance (0=Regular, 1=Low, 2=High): (0) ?
Disable Monitor Mode @ bootup (N) ?
HTTP Port Number : (80) ?
SMTP Port Number : (25) ?
MTU Size (512 - 1400): (1400) ?
TCP Re-transmission Timeout (500 - 4000) (ms): (500) ?
Enable alternate MAC (N) ?
Ethernet connection type: (0) ?
```

### 5.7.1 TCP Keepalive time in seconds

This option allows you to change how many seconds the unit will wait during a silent connection before attempting to see if the currently connected network device is still on the network. If the unit then gets no response, it will drop that connection.

### 5.7.2 ARP Cache timeout in seconds

Whenever the unit communicates with another device on the network, it will add an entry into its ARP table. The ARP Cache timeout option allows you to define how many seconds (1-600) the unit will wait before timing out this table.

### 5.7.3 Enable High Performance

This option applies to XPort-03 and greater units only. It allows you to increase the CPU performance and utilize the higher baud rates on the serial interface (i.e. 460Kbps and 920Kbps). Increasing CPU performance requires more power and lowers the unit's operating temperature. The standard CPU performance mode supports up to 230400 baud.

*Note: If baud rates of 460Kbps or 920Kbps is set and the high performance mode disabled, the operation of the serial channel would be out of the specified error tolerance thereby leading to inconsistent speed settings on the two ends of the serial channel.*

### 5.7.4 Disable Monitor Mode at Bootup

This option allows you to disable the Monitor Mode only during the startup sequence. This prevents all entries into Monitor Mode except thru 'xxx' followed by 'M'. All other Monitor Mode entry sequences, e.g. 'zzz' and 'yyy', are blocked during startup.

### 5.7.5 HTTP Port Number

This option allows changing the HTTP port number. The valid range is from 1 - 65535. The default value is 80.

### 5.7.6 SMTP Port Number

This option allows changing the SMTP port number. The valid range is from 1 - 65535. The default value is 25.

### 5.7.7 MTU Size

The Maximum Transmission Unit (MTU) is the largest physical packet size a network can transmit for TCP and UDP. Enter between 512 and 1400 bytes. The default is 1400 bytes.

### 5.7.8 TCP Re-transmission

The TCP Re-Transmission Timeout is the interval to wait for acknowledgement of transmitted TCP segments before re-transmitting them. Enter between 500 and 4000 ms. The default is 500 ms.

### 5.7.9 Enable Alternate MAC

If necessary, enable the alternate MAC address (if specified in the OEM setup record).

### 5.7.10 Ethernet Connection Type

The NET232+ allows for the Ethernet speed and duplex to be manually configured. Enter 0 for auto-negotiation (default). To select the speed and duplex, enter one of the following: 2 (10Mbit/half duplex), 3 (10Mbit/full duplex), 4 (100Mbit/half duplex), or 5 (100Mbit/full duplex).

---

## 5.8 Security Settings

*Note: You can change these settings via Telnet or serial connections only, not on the Web-Manager. We recommend that you set security over the dedicated network or over the serial setup. If you set parameters over the network (Telnet 9999), someone else could capture these settings.*

**Caution:** Disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network. Disabling Port 77FE also disables the Web from configuring the device.

```
Disable SNMP (N)
SNMP Community Name (public):
Disable Telnet Setup (N)
Disable TFTP Firmware Update (N)
Disable Port 77FEh (N)
Disable Web Server (N)
Disable Web Setup (N)
Disable ECHO ports (Y)
Enable Encryption (N)
Enable Enhanced Password (N)
```

### 5.8.1 Disable SNMP

This setting allows you to disable the SNMP protocol on the unit for security reasons.

### 5.8.2 SNMP Community Name

This option allows you to change the SNMP Community Name on the unit. This allows for ease of management, and possibly some security. If someone tries to violate security but doesn't know what community to connect to, that person will be unable to get the SNMP community information from the unit. The name is a string of 1 to 13 characters plus a null-terminator (14 bytes total). The default setting is **public**.

### 5.8.3 Disable Telnet Setup

*Note: If you choose to disable this option, keep in mind that disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network.*

This setting defaults to the N (No) option. The Y (Yes) option disables access to this Configuration Menu by Telnet (port 9999). It only allows access locally via the Web pages and the serial port of the unit.

### 5.8.4 Disable TFTP Firmware Upgrade

This setting defaults to the N (No) option. The Y (Yes) option disables the use of TFTP to perform network firmware upgrades. With this option, firmware upgrades can be downloaded over the serial port using Device Installer's Recover Firmware procedure.

### 5.8.5 Disable Port 77FE (Hex)

*Note: If you choose to disable this option, keep in mind that disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network.*

Port 77FE is a setting that allows Device Installer, Web-manager, and custom programs to configure the unit remotely. You may want to disable this capability for security purposes.

The default setting is the N (No) option, which enables remote configuration. You can configure the unit by using Device Installer, web pages, Telnet, or serial configuration.

The Y (Yes) option disables remote configuration and web sites.

**Note:** The Y (Yes) option disables many of the GUI tools for configuring the unit, including the embedded Web-Manager tool.

### 5.8.6 Disable Web Server

This setting defaults to the N (option). The Y (Yes) option disables web server.

### 5.8.7 Disable Web Setup

The Y (Yes) option disables configuration using the Web-Manager. This setting defaults to the N (option).

### 5.8.8 Disable ECHO Ports

Controls whether the serial port will echo characters it receives.

### 5.8.9 Enable Encryption

Rijndael is the block cipher algorithm chosen by the National Institute of Science and Technology (NIST) as the Advanced Encryption Standard (AES) to be used by the US government. The NET232+ supports 128-, 192-, and 256-bit encryption key lengths.

**Note:** *Configuring encryption should be done through a local connection to the serial port of the NET232+, or via a secured network connection. Initial configuration information, including the encryption key, is sent in clear text over the network.*

To configure AES encryption on the NET232+:

1. When prompted to enable encryption, select Y.
2. When prompted, enter the encryption key length. The NET232+ supports 128-, 192-, and 256-bit encryption key lengths.
3. When prompted to change keys, select Y.
4. At the Enter Keys prompt, enter your encryption key. The encryption keys are entered in hexadecimal. The hexadecimal values are echoed as asterisks to prevent onlookers from seeing the key. Hexadecimal values are 0-9 and A-F.
  - For a 128-bit key length, enter 32 hexadecimal characters.
  - For a 192-bit key length, enter 48 hexadecimal characters.
  - For a 256-bit key length, enter 64 hexadecimal characters
5. Continue pressing Enter until you return to the Change Setup menu.
6. From the Change Setup menu, select option 9 to save and exit.

Encryption only applies to the port selected for data tunneling (default 10001), regardless of whether you are using TCP or UDP.

Generally, one of two situations applies:

- Encrypted NET232+-to-NET232+ communication. Be sure to configure both NET232+ devices with the same encryption key.
- Third-party application to NET232+-encrypted communication: NET232+ uses standard AES encryption protocols. To communicate successfully, products and applications on the peer side must use the same protocols and the same encryption key as the NET232+.
- Lantronix Secure Com Port Redirector provides an encrypted connection from Windows-based applications to the NET232+. Information about SCPR is at <http://www.lantronix.com/device-networking/utilities-tools/scpr.html>

### 5.8.10 Enable Enhanced Password

This setting defaults to the N (option), which allows you to set a 4-character password that protects the Configuration Menu via Telnet and Web pages. The Y (Yes) option allows you to set an extended security password of 16-characters for protecting Telnet and web page access.

---

## 5.9 Defaults

Select 7 to reset the unit's Channel 1 configuration, E-mail settings, and Expert settings to the default settings. The server configurations (IP address information) remain unchanged. The configurable pins' settings also remain unchanged. The specific settings that this option changes are listed below:

### Channel 1 Configuration Defaults

|                   |  |
|-------------------|--|
| <b>Baudrate</b>   | 9600                                       |
| <b>I/F Mode</b>   | 4C (1 stop bit, no parity, 8 bit, RS-232C) |
| <b>Flow</b>       | 00   |
| <b>Flush Mode</b> | 00   |
| <b>SendChar 1</b> | 00   |
| <b>SendChar 2</b> | 00   |

### Connection 1 Defaults

|                                   |  |
|-----------------------------------|--|
| <b>Port number</b>                | 10001  |
| <b>Connect Mode</b>               | C0 (always accept incoming connection; no active connection startup) |
| <b>Send '+++' in Modem Mode</b>   | Enabled  |
| <b>Show IP addr after 'RING'</b>  | Enabled  |
| <b>Auto increment source port</b> | Disable  |
| <b>Remote Host</b>                |  |
| <b>Remote Port</b>                | 0  |
| <b>DisConnMode</b>                | 00   |
| <b>DisConnTime</b>                | 00:00  |

### Connection 2 Defaults

|                                   |  |
|-----------------------------------|--|
| <b>Port number</b>                | 10002  |
| <b>Connect Mode</b>               | C0 (always accept incoming connection; no active connection startup) |
| <b>Send '+++' in Modem Mode</b>   | Enabled  |
| <b>Show IP addr after 'RING'</b>  | Enabled  |
| <b>Auto increment source port</b> | Disable  |
| <b>Remote Host</b>                |  |
| <b>Remote Port</b>                | 0  |
| <b>DisConnMode</b>                | 00   |
| <b>DisConnTime</b>                | 00:00  |

### Expert Settings Defaults

|                                      |   |
|--------------------------------------|---|
| <b>TCP Keepalive time in s</b>       | 45  |
| <b>ARP Cache timeout in s</b>        | 600   |
| <b>CPU Performance</b>               | 0 (Regular)                                   |
| <b>Disable Monitor Mode @ bootup</b> | No  |
| <b>RS485 tx enable</b>               | active low                                    |
| <b>HTTP Port Number (1-65535)</b>    | 80  |
| <b>SMTP Port Number (1-65535)</b>    | 25  |
| <b>MTU Size (512 – 1400)</b>         | 0 (resulting in an operational value of 1400) |
| <b>Alternate MAC</b>                 | Disabled ( for OEM use only)                  |
| <b>Ethernet Connection Type</b>      | 0 (auto-negotiate)                            |

### Security Settings Defaults

|                                     |        |
|-------------------------------------|--------|
| <b>Disable SNMP</b>                 | No     |
| <b>SNMP community name</b>          | public |
| <b>Disable Telnet setup</b>         | No     |
| <b>Disable TFTP Firmware Update</b> | No     |
| <b>Disable Port 77FEh</b>           | No     |



|                          |     |
|--------------------------|-----|
| Disable Web Server       | No  |
| Disable Web Setup        | No  |
| Disable ECHO ports       | Yes |
| Enable Encryption        | No  |
| Enable Enhanced Password | No  |

---

## 5.10 Exit Configuration Mode

- Select **8** to exit the configuration mode without saving any changes or rebooting.
- Select **9** to save all changes and reboot the device. All values are stored in nonvolatile memory.



## 6. UDP Datagram Types

The UDP datagram type dictates the serial data format and interface with the EDS when transporting serial data using UDP.

---

### 6.1 UDP Datagram Type 0 (and Type 4)

The Datagram Type 0 serial message format allows the IP address and exact data contents of the UDP packet to be communicated. The format of the serial message for Datagram Type 0 is as follows:

<STX><IP1><IP2><IP3><IP4><Len Hi><Len Lo><Data>...<Data>

This format applies to serial data sent to and received from the device server. The message format is the same in both directions. The serial message sent by the unit when receiving a UDP packet will contain the Source IP address, data length and data bytes. The serial message expected by the unit will contain the Destination IP address, data length and data bytes for the UDP packet that is to be transmitted.

If the first byte received from the serial port is not an STX then the device server firmware flushes all serial input for 100ms. If bytes are not received within 100ms of each other then the message times out and the firmware starts looking for a new message with STX. If there are other errors such as an invalid length (len = 0 or len > Maximum MTU Size, default 1400) then the message is ignored and the firmware starts looking for a new message with STX.

The following rules apply in the serial -> UDP path:

1. the destination IP address always comes from the serial stream header
2. if the IP address in the header is all 0's, the UDP packet is broadcast
3. the destination and source port number in the UDP packet is always set to the configured local port in setup
4. the header is stripped off and only the <Data> bytes are sent in the UDP packet's data

Datagram Type 4 is similar to Type 0 with some application specific data added. Using Datagram Type 4 is the same as 0 except that when receiving a UDP packet the last three bytes of the sender's MAC address are added to the UDP packet data so that the transmitted serial data will appear like the following:

<STX><IP1><IP2><IP3><IP4><Len Hi><Len Lo><Mac4><Mac5><Mac6><Data>...<Data>

---

### 6.2 UDP Datagram Type 1 (and Type 5)

This datagram type transparently sends data between the serial port and network UDP packets so there is no special serial format. Receiving a maximum number of bytes for a UDP packet (MTU Size, default 1400) or a time gap in the serial input stream of 3, 15 (default), 50 or 250 ms, dependent on Pack Control setting, causes the collected serial data to be wrapped in a UDP packet and sent on the network. Setting Pack Control for Matching Send characters can also be used to trigger sending the serial data over UDP.

The following rules apply in the serial -> UDP path:

1. the destination IP address and port number of the outgoing UDP packet are set to the Remote IP address and port number in setup
2. if the Remote IP address is set to the broadcast IP address for the subnet or in newer firmware versions if the broadcast option is selected then the UDP packet will be broadcast on the network
3. if the Remote IP address and port number in setup are 0 then the destination IP address and port number, respectively, of the outgoing UDP packet are set to the source IP address and port number of the last received UDP packet

4. if the destination IP address or port number are still 0 after trying to apply rules 1 to 3, then the UDP packet is not sent

Rule 3 above makes it possible to dynamically send a serial response to the network device that sent the last received UDP packet.

Datagram type 1 also provides a method for accessing configuration settings via the serial interface. If you send the following string, "\$#CsEtUp", to the device server serial port in UDP mode, Datagram Type 1, then the device server will reply with 240 characters representing each byte of setup record 0 in hex format (plus a trailing <CR>). You can also immediately follow the "\$#CsEtUp" string with 240 characters to write to setup record 0. The device server will reset itself after the write is performed.

Datagram Type 5 is similar to Type 1 with some customer specific data added except that it can only be used for sending data. Using Datagram Type 5 is the same as 1 except that the last three bytes of the sender's MAC address are added to the UDP packet data like Datagram Type 4. Datagram Type 5 does not allow UDP data to be received.

---

## 6.3 UDP Datagram Type 2

The Datagram Type 2 serial message format allows the IP address, port number and exact data contents of the UDP packet to be communicated. The format of the serial message for Datagram Type 2 is as follows:

<STX><IP1><IP2><IP3><IP4><PH><PL><LRC1><LH><LL><D1><D2>...<Dn><LRC2>

- \* STX : = 02
- \* IP1...IP4 : send to ip-addr. 4Bytes
- \* PH/PL: send to port number Hi/LoByte
- \* LRC1 : LRC over ip-addr. and port number
- \* LH/LL : length of data Hi/LoByte
- \* D1...Dn : databytes (501 bytes max)
- \* LRC2 : LRC over length and databytes

Each serial message must be received in this format or it will be ignored. The message format is the same in both directions. The serial message sent by the unit when receiving a UDP packet will contain the Source IP address, Source Port number, data length and data bytes. The serial message expected by the unit will contain the Destination IP address, Destination Port number, data length and data bytes for the UDP packet that is to be transmitted. If the destination IP address is all 0's (0.0.0.0) then the UDP packet will be broadcast to the subnet.

The LRC calculation is done at the byte level. The LRC is a byte with an initial value of 0 and is calculated by XORing it with all the applicable bytes of the header or data. LRC1 is an XOR of IP1-4, PH and PL. LRC2 is an XOR of LH, LL and D1-n.

If the first byte received from the serial port is not an STX then the firmware flushes all serial input for 100ms. If bytes are not received within 100ms of each other then the message times out and the firmware starts looking for a new message with STX. If there are other errors such as a bad LRC or too many data bytes then the message is ignored and the firmware starts looking for a new message with STX.

---

## 6.4 UDP Datagram Type 12

Datagram Type 12 is similar to Type 2 (above) except that the destination for transmitted UDP data is specified using a domain name instead of an IP address. The format of the serial message for Datagram Type 12 is as follows:

<STX><N1>...<Nn><Null><PH><PL><LRC1><LH><LL><D1><D2>...<Dn><LRC2>

- \* STX : = 02
- \* N1...Nn : send to domain name via DNS lookup. nChars
- \* <Null>: = 00

- \* PH/PL: send to port number Hi/LoByte
- \* LRC1 : LRC over port number **only** (Note difference from Type 2)
- \* LH/LL : length of data Hi/LoByte
- \* D1...Dn : databytes (501 bytes max)
- \* LRC2 : LRC over length and databytes

Incoming UDP packets are communicated using the Datagram Type 2 serial message format.



## 7. Updating Firmware

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### 7.1 Obtaining Firmware

Your unit was tested and shipped with the latest version of firmware.

*Note: Do not upgrade firmware unless directed by Technical Support.*


#### 7.1.1 Reloading Firmware

Reloading the firmware of a device will destroy all settings and configurations.

Firmware files are not freely distributed since changing the firmware of a device will change its operational features. This should only be done under the direction of technical support.

#### 7.1.2 Via Device Installer

After copying the firmware to your computer, use Device Installer to install it.

1. Store the firmware in a subfolder on your computer.
2. Start Device Installer and search the network for the device you want to upgrade.
3. Select the desired unit and click the **Upgrade** icon  or select **Upgrade** from the Device menu. The Device Upgrade Wizard appears. Follow the instructions on the wizard screens.

The unit performs a power reset after the firmware has been loaded and stored.





## 8. Troubleshooting

This chapter discusses how you can diagnose and fix errors quickly without having to contact tech support.

It helps to connect a terminal to the serial port while diagnosing an error to view summary messages that may be displayed. When troubleshooting, always ensure that the physical connections (power cable, network cable, and serial cable) are secure.

*Note: Some unexplained errors might be caused by duplicate IP addresses on the network. Make sure that your unit's IP address is unique.*

When troubleshooting the following problems, make sure that the NET232+ is powered up. Confirm that you are using a good network connection. See [Table 3 - NET232+ LED Functions](#) on page 3-8 for a description of the LEDs.

*Note: For more information about the ARP commands, see the Technical Notes manual, GC-800239.*

**Table 17 - Problems and Error Messages**

| Problem/Message  | Reason   | Solution   |
|--|--|--|
| When you issue the <b>ARP -S</b> command in Windows, "The ARP entry addition failed: 5" message displays.  | Your currently logged-in user does not have the correct rights to use this command on this PC.   | Have someone from your IT department log you in with sufficient rights.  |
| When you attempted to assign an IP address to the unit via the ARP method, the "Press Enter to go into Setup Mode" error (described below) displayed. Now when you Telnet to the Server, the connection fails. | When you Telnet into port 1 on the server, you are only assigning a temporary IP address. When you Telnet into port 9999 and do not press <b>Enter</b> quickly, the server will reboot, causing it to lose the IP address. | Telnet back into Port 1. Wait for it to fail, then Telnet to port 9999 again. Make sure you press <b>Enter</b> quickly.  |
| When you Telnet to port 9999, the message "Press Enter to go into Setup Mode" displays. However, nothing happens when you press Enter, or your connection is closed.   | You did not press Enter quickly enough. You only have 5 seconds to press Enter before the connection is closed.  | Telnet to port 9999 again, but press Enter as soon as you see the message "Press Enter to go into Setup Mode."   |
| When you Telnet to port 1 to assign an IP address to the device server, the Telnet window does not respond for a long time.  | You may have entered the Ethernet address incorrectly with the ARP command.  | Confirm that the Ethernet address that you entered with the ARP command is correct. The Ethernet address may only include numbers 0-9 and letters A-F. In Windows and usually in Unix, the segments of the Ethernet address are separated by dashes. In some forms of Unix, the Ethernet address is segmented with colons. |
|  | The IP address you are trying to assign is not on your logical subnet.   | Confirm that your PC has an IP address and that it is in the same logical subnet that you are trying to assign to the server.  |
|  | The server may not be plugged into the network properly.   | Make sure that the Link LED is lit. If the Link LED is not lit, then the server is not properly plugged into the network.  |

| Problem/Message   | Reason  | Solution  |
|---|---|---|
| When you try to assign an IP with Device Installer, you get the following message:<br><br>"No response from device! Verify the IP, Hardware address and Network Class. Please try again." | The cause is most likely one of the following:<br>The Hardware address you specified is incorrect.<br>The IP address you are trying to assign is not a valid IP for your logical subnet.<br>You did not choose the correct subnet mask. | Double-check the parameters that you specified. Tip: You cannot assign an IP address to a server through a router.  |
| No LEDs are lit.  | The unit or its power supply is damaged.  | Change power supplies.  |
| The server is not communicating with the serial device it is attached to.   | The most likely reason is the wrong serial settings were chosen.  | The serial settings for the serial device and the server must match. The default serial settings for the server are RS232, 9600 Baud, 8 Character Bits, No Parity, 1 Stop Bit, No Flow Control.   |
| When you try to enter the setup mode on the server via the serial port, you get no response.  | The issue will most likely be something covered in the previous problem, or possibly you have Caps Lock on.   | Double-check everything in the problem above. Confirm that Caps Lock is not on.   |
| You can ping the server, but not Telnet to the server on port 9999.   | There may be an IP address conflict on your network<br><br>You are not Telneting to port 9999.<br><br>The Telnet configuration port (9999) is disabled within the server security settings.   | Turn the server off and then issue the following commands at the DOS prompt of your computer:<br>ARP -D X.X.X.X (X.X.X.X is the IP of the server)<br>PING X.X.X.X (X.X.X.X is the IP of the server).<br><br>If you get a response, then there is a duplicate IP address on the network (the LEDs on the server should flash a sequence that tells you this). If you do not get a response, use the serial port to verify that Telnet is not disabled. |
| When connecting to the Web-Manager within the server, the message "No Connection With The server" displays.   | Your computer is not able to connect to port 30718 (77FEh) on the server.   | Make sure that port 30718 (77FEh) is not blocked with any router that you are using on the network. Also make sure that port 77FEh is not disabled within the Security settings of the server.  |

## 8.1 Technical Support

If you are experiencing a problem, please read the user manual and other technical document supplied on the product CD. If you are unable to solve the problem, please contact technical support.

Grid Connect technical support: (630) 245-1445.

Our phone lines are open from 8:00AM - 4:30 PM Central Time Monday through Friday excluding holidays.

## 9. Monitor Mode

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### 9.1 Monitor Mode

Monitor Mode is a command-line interface used for diagnostic purposes (see [Table 18 - Monitor Mode Commands](#) on page 9-2). There are two ways to enter Monitor Mode: locally through the serial port or remotely through the network.

*Note:* Some firmware versions may not support Monitor Mode.

#### 9.1.1 Entering Monitor Mode Using the Serial Port

*Note:* NET232+ Only

To enter Monitor Mode locally:

1. Follow the same principles used in setting the serial configuration parameters.
2. Instead of typing three “x” keys, however:
  - Type zzz (or xx1) to enter Monitor Mode with network connections.
  - Type yyy (or yy1) to enter Monitor Mode without network connections.
  - A 0> prompt indicates that you have successfully entered Monitor Mode.

#### 9.1.2 Entering Monitor Mode Using the Network Port

To enter Monitor Mode using a Telnet connection:

1. Establish a Telnet session to the configuration port (9999). The following message appears:

```
MAC address 0080A3934000
Software version V6.8.0.3 (120921) XPICO  (Yours may be different)
AES library version 1.8.2.1
Press Enter to go into Setup Mode
```
2. Type M (upper case).
  - A 0> prompt indicates that you have successfully entered Monitor Mode.

#### 9.1.3 Monitor Mode Commands

The following commands are available in Monitor Mode. Some commands have an IP address as an optional (opt) parameter (xxx.xxx.xxx.xxx). If the IP address is given, the command is applied to another Device Server with that IP address. If no IP address is given, the command is executed locally.

*Note:* All commands must be given in capital letters.

**Table 18 - Monitor Mode Commands**

| Command           | Command Name   | Function  |
|-------------------|--|---|
| VS x.x.x.x        | Version  | Query software header record (16 bytes) of unit with (opt) IP address x.x.x.x   |
| GC x.x.x.x        | Get Configuration                                    | Get configuration of unit with (opt) IP address x.x.x.x as hex records (120 bytes)  |
| SC x.x.x.x        | Send Configuration (CAUTION)                         | Set configuration of unit with (opt) IP address x.x.x.x from hex records  |
| PI x.x.x.x        | Ping   | Pings unit with IP address x.x.x.x to check device status   |
| AT                | ARP Table  | Show the unit's ARP table entries   |
| TT                | TCP Connection Table                                 | Shows all incoming and outgoing TCP connections   |
| NC                | Network Connection                                   | Shows the unit's IP configuration   |
| RS                | Reset  | Resets the unit's power   |
| QU                | Quit   | Exit diagnostics mode   |
| G0, G1,...,Ge, Gf | Get configuration from memory page                   | Gets a memory page of configuration information from the device.  |
| S0, S1,...,Se, Sf | Set configuration to memory page                     | Sets a memory page of configuration information on the device.  |
| GM                | Get MAC address                                      | Shows the unit's 6-byte MAC address.  |
| SS                | Set Security record                                  | Sets the Security record without the encryption key and length parameters. The entire record must still be written, but the encryption-specific bytes do not need to be provided (they can be null since they are not overwritten).   |
| SA                | Scan   | Initiates a wireless scan if the wireless interface is enabled. Reports any stations found, including BSSID, SSID, and RSSI. If SA is followed by a string, the string is used to filter SSIDs before reporting. If the BSS does not broadcast its SSID, only the BSSID and RSSI are returned.  |
| NS                | Network Status                                       | Reports the network interfaces' statuses. Includes potentially negotiated parameters like speed/duplex for Ethernet or BSSID, encryption, authentication for wireless interfaces.   |
| co                | Set IP address, hostbits, gateway, and DNS server IP | Example:<br>co 192.168.0.10 8 192.168.0.1 10001 192.168.1.10<br>with<br>192.168.0.10 = IP address of the xPico<br>8 = number of hostbits<br>192.168.0.1 = gateway IP address<br>10001 = port number of the xPico<br>192.168.1.10 = IP address of the DNS Server<br>The xPico stores the setup and performs a reset. It sends an X before the reset if the command was OK.   |
| DB                | Debug Mode   | The tunnel debug trace will display the serial and network data received by the NET232+. The direction of the serial data, the elapsed time in ms and the data will be displayed in both hex and ASCII. Trace messages will also be generated when TCP connections are open or closed and when other noteworthy events happen.<br>Sending any character back on the Telnet connection will exit debug and return the user to the Monitor Mode prompt. |

Responses to some of the commands are given in Intel Hex format.

**Note:** Entering any of the commands listed above will generate one of the following command response codes:

**Table 19 -Command Response Codes**

| <b>Response</b> | <b>Meaning</b>                          |
|-----------------|---|
| 0>              | OK; no error                            |
| 1>              | No answer from remote device            |
| 2>              | Cannot reach remote device or no answer |
| 8>              | Wrong parameter(s)                      |
| 9>              | Invalid command                         |



# 10. Compliance Information

Grid Connect is committed to protecting people and the environment and we are working on identifying any materials used in our processes that could pose a potential hazard to our employees, customers or the environment.

In 2005, Grid Connect began the process of converting all of its products to be built without any of the banned materials. The qualification of RoHS-compliant components supplied by our vendors and the implementation of new manufacturing processes related to this Directive are fully implemented.

Grid Connect will attempt to distribute only those products that comply with the RoHS2 Directive, The Waste Electrical and Electronic Equipment Directive (WEEE), The Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) directive, and the Conflict Minerals directive.

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## 10.1 Overview

The new RoHS Directive, RoHS 2, introduces new CE marking and declaration of conformity requirements. Compliance with the RoHS directive is required before you can place the CE mark on a product. The RoHS2 Directive refers to a secondary document describing the procedures for assessing the conformity of Electrical and Electronic Equipment (EEE), which is Decision no. 768/2008/EC. Hazardous and restricted substances in the RoHS2 directive are outlined in Annex II with maximum concentration values.

Compliance for a manufacturer includes:

1. Ensure that the product has been designed and manufactured in accordance with published standards.
  2. Draw up the required technical documentation (technical file) and carry out the internal production control procedure in accordance with Module A of Annex II in Decision 768/2008/EEC.
  3. Ensure that procedures are in place for production to remain in conformity.
  4. Keep a register of non-conforming products and product recalls, and keep distributors informed thereof.
  5. Ensure that their product(s) bears a type, batch or serial number.
  6. Follow specific labeling requirements.
  7. Take corrective measures to bring their products into conformity, withdraw it from the market or recall it if they have a reason to believe that it is not in compliance with the RoHS2 Directive AND inform the Competent Authorities in all Member States where the product is available.
  8. Provide all information and documentation to demonstrate conformity.
-

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## 10.2 RoHS2

The RoHS Directive, officially known as Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast), was published in the Official Journal of the European Union on July 1, 2011 and entered into force on July 21, 2011.

The restricted substances are:

1. Lead (0.1%)
2. Mercury (0.1%)
3. Cadmium (0.01%)
4. Hexavalent chromium (0.1%)
5. Polybrominated biphenyls (0.1%)
6. Polybrominated diphenyl ethers (PBDE) (0.1%)

The new RoHS Directive, also known as RoHS 2, introduces new CE marking and declaration of conformity requirements. Before placing a product on the market, a manufacturer / importer / distributor must ensure that the appropriate conformity assessment procedure is in line with module A of Annex II to [Decision No 768/2008/EC](#) has been carried out and affix the [CE marking](#) on the finished product. After January 2013, electronic products bearing the CE Mark must meet the requirements of this new directive.

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## 10.3 DECISION No 768/2008/EC

Decision No 768/2008/EC is a common framework for the marketing of products, and repealing Council Decision 93/465/EEC.

This common framework for the marketing of products sets out:

- common definitions;
- common conformity assessment procedures;
- obligations for economic operators (manufacturers, importers and distributors);
- rules for the use of the EC marking, thereby making it possible to increase trust in the products marketed in the EU;
- notification criteria for the conformity assessment bodies;
- safeguard procedures.

### 10.3.1 Obligations of manufacturers, importers and distributors

In order to be placed on the market, a product must comply with certain essential requirements. The manufacturer must ensure that his products comply with the applicable requirements by carrying out or commissioning a product conformity assessment procedure. If the product complies with the essential requirements, the manufacturer affixes the [CE marking](#) on the product and draws



up an [EC declaration of conformity](#). The manufacturer indicates his name, registered trade name or registered trade mark, as well as his address on the product. They shall ensure that series production remains in conformity. The product must be accompanied by [instructions and safety information](#) in a language which can be easily understood. In the case where an external conformity assessment body intervenes, the manufacturer shall affix the body's identification number.

The importer and the distributor must ensure that the manufacturer has fulfilled his obligations, i.e. check that the product has a conformity marking and that the required documents have been supplied.

Manufacturers (or their authorised representative), distributors and importers must provide the competent authorities with all necessary information on the product concerned in order to ensure product traceability.

### 10.3.2 Product conformity

This Decision sets a clearer framework for conformity assessment. It establishes a number of conformity assessment procedures (specified in the Annex), from which the legislator can choose the most appropriate.

Furthermore, it lays down the rules and conditions for affixing the "CE" marking, which is subject to the general principles defined by Regulation No [765/2008](#). Member States shall ensure correct application of the regime governing the "CE" marking and provide sanctions for infringements.

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### 10.3.3 Technical Documentation

Module A of Annex II of Decision 768/2008/EC requires the Manufacturer to establish technical documentation which shall make it possible to assess the product's conformity to the RoHS substance restrictions, and shall include an adequate analysis and assessment of the risks. The technical documentation shall specify the RoHS substance restrictions and cover the design and manufacture of the product. Module A specifies that the technical documentation shall contain, wherever applicable,

- A general description of the product
- Conceptual design and manufacturing drawings and schemes of components, sub-assemblies, circuits etc
- Descriptions and explanations necessary for the understanding of those drawings and schemes
- A list of the harmonised standards and/or other relevant technical specifications the references of which have been published in the Official Journal of the European Union, applied in full or in part, and descriptions of the solutions adopted to comply with aspects of the RoHS substance restrictions which are not covered by these standards or where the standards have only been implemented in part.
- Results of design calculations made, examinations carried out, etc, and
- Test reports

### 10.3.4 European Standard EN 50581:2012

In October 2011 the European Commission issued a Mandate to CENELEC to develop a European Standard that Manufacturers can choose to follow to comply with the RoHS2 technical documentation requirements. European Standard EN 50581:2012 “Technical documentation for the evaluation of electrical and electronic products with respect to restriction of hazardous substances” was approved on 11 June 2012 by all CENELEC National Committees and, as per the Mandate, will be published in the Official Journal of the European Union as a RoHS2 Harmonised Standard. Under Article 16 (2) of the RoHS2 Directive, a Manufacturer who demonstrates compliance with EN 50581:2012 will automatically be deemed to be compliant to the RoHS2 technical documentation requirements.

### 10.3.5 Internal Production Control

Article 7(e) of the RoHS2 Directive 2011/65/EU requires the Manufacturer to ensure that procedures are in place for series production to remain in conformity. The Manufacturer shall take into account changes in product design and changes in the harmonised standards or in technical specifications which the Manufacturer has applied in full or in part.

In addition, Module A of Annex II of Decision 768/2008/EC states that the Manufacturer shall take all measures necessary so that the manufacturing process and its monitoring ensure compliance of the manufactured products with the technical documentation and with the requirements of the RoHS2 Directive.

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## 10.4 CE Marking

The CE marking (an acronym for the French "Conformite Europeenne") certifies that a product has met EU health, safety, and environmental requirements, which ensure consumer safety. Manufacturers in the European Union (EU) and abroad must meet CE marking requirements where applicable in order to market their products in Europe. A manufacturer who has gone through the conformity assessment process, may affix the CE marking to the product. With the CE marking, the product may be marketed throughout the EU.

Some products require conformance to more than one directive. For example, the Safety of Machinery directive, the Electromagnetic Compatibility (EMC) directive, and the Low Voltage Equipment directive may all apply to one product.

Grid Connect employs the services of a testing laboratory that is affiliated with a "European Notified Body" to test and certify our products for the CE marking.

Once the manufacturer has conformed to the requirements laid out in the applicable directive(s), whether through self-certification or approval by a notified body, and has obtained a certificate/report from a lab to prove conformance, the manufacturer needs to affix the CE marking to its product. The manufacturer must also include a "declaration of conformity" with each shipment stating which CE marking directive(s) has been met and include a signature of a company official indicating the company's responsibility for its CE marking compliance claim.

The exporter must maintain a file called a "technical file" containing the paperwork that proves conformity to the CE marking directive(s) covering its product. The exporter or authorized representative must be able to provide the supporting paperwork to prove CE marking conformity at any time, if requested by the appropriate member state authorities.

Finally, it is the manufacturer/exporter's responsibility to regularly check for and comply with any standards changes that might affect its product. Therefore, it is important to periodically visit the EU website that lists the CE marking directives and their standards.

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## 10.5 Declaration of Conformity

Module A of Annex II of Decision 768/2008/EC states that the Manufacturer shall draw up a written EU Declaration of Conformity for each product model and keep this together with the technical documentation for 10 years after the product has been placed on the market. The EU Declaration of Conformity shall identify the product for which it has been drawn up. Article 13 (2) states that it shall be translated into the language or languages required by the Member State on the market of which the product is placed or made available.

Article 13(2) of the RoHS2 Directive states that the EU Declaration of Conformity shall contain the following elements and shall be updated

1. Model number or other means of uniquely identifying the product.
2. Name and address of the manufacturer or his authorized representative.
3. Statement that the EU Declaration of Conformity is issued under the sole responsibility of the manufacturer.
4. Object of the declaration (identification of the product allowing traceability. It may include a photograph, where appropriate)
5. Statement that the object of the declaration described above is in conformity with the RoHS substance restrictions.
6. Where applicable, references to the relevant harmonized standards used or references to the technical specifications in relation to which conformity is declared.
7. Signature on behalf of the producer (name, function) and date of issue.

Article 7(g) of the RoHS2 Directive requires the Manufacturer to ensure that the product bears a type, batch or serial number or other element allowing its identification, or, where the size or nature of the product does not allow it, that the required information is provided on the packaging or in a document accompanying the product.

### 10.5.1 Sample Declaration of Conformity:

Manufacturer: Grid Connect  
1630 W. Diehl Rd.  
Naperville, IL 60563  
Telephone No. (630) 245-1445

Product: NET232Plus Serial to Ethernet Adapter  
Model No. **NET232Plus**

The undersigned hereby declares, on behalf of Grid Connect, Inc., of Naperville, Illinois, that the above-referenced product, to which this declaration relates, is in conformity with the provisions of:

CISPR 24:2010 "Information technology equipment – Immunity characteristics – Limits and methods of measurement"

IEC 61000-6-3:2011 "Electromagnetic Compatibility (EMC) - Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial Environments"

IEC 61000-4-2:2008 "Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Section 2: Electrostatic Discharge Test"

IEC 61000-4-3:2010 "Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement Techniques, Section 3: Radiated, Radio-Frequency, Electromagnetic Fields"

IEC 61000-4-4:2011 "Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement Techniques, Section 4: Electrical Fast Transient/Burst Immunity"

IEC 61000-4-6:2008 "Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Section 6: Immunity to conducted disturbances, induced by radiofrequency fields"

CISPR 22: 2008 Edition 6.0 "Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement"

The Technical Construction File required by this Directive is maintained at the corporate headquarters of Grid Connect, Inc., 1630 W. Diehl Rd., Naperville, IL.

The object described above is in conformity with the RoHS substance restrictions.

The electromagnetic compatibility tests were performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. Engineering Test Report No. 1402865-01.

Glenn Rodgers  
Vice President Production  
Date: 10-14-2014

### 10.5.2 FCC Notices

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The **NET232Plus** has been tested and found to comply with the radiated and conducted emission limits for a Class B digital device. The Class B limits are designed to provide reasonable protection against harmful interference in a residential installation.

The equipment listed generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:



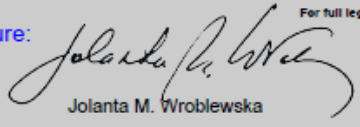

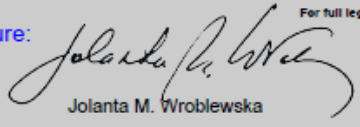

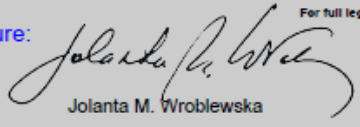
- Move the unit to a new location
- Connect the equipment to a different circuit

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## 10.6 UL Marking

The following Reference Certificate has been issued for several products bearing the UL mark.

UL is the world's largest, not-for-profit product safety testing and certification organization with global name recognition and acceptance. Founded in 1894 in the US, it permits the use of its listing mark (the UL mark) as its stamp of approval on goods and materials after standardized and stringent testing. Thereafter its inspectors regularly visit the producer to audit compliance with its certification requirements. UL has some 46 laboratories and 200 inspection centers in over 70 countries and applies its 750 standards to more than 18 thousand types of products manufactured by about 60 thousand firms. UL mark, however, guarantees only the safety of the item in use, not its performance or quality.

|  |   |  |   |
|--|---|--|---|
|   | <b>Ref. Certif. No.</b><br><br><b>US-20442-A3-UL</b>  |  |   |
| <b>IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME</b>   |   |  |   |
| <b>SYSTEME CEI D'ACCEPTATION MUTUELLE DE CERTIFICATS D'ESSAIS DES EQUIPEMENTS ELECTRIQUES (IECEE) METHODE OC</b>   |   |  |   |
| <table style="width: 100%;"> <tr> <td style="width: 35%; vertical-align: top;"> <b>CB TEST CERTIFICATE</b><br/><br/> <b>Product</b><br/>Produit<br/><br/> <b>Name and address of the applicant</b><br/>Nom et adresse du demandeur<br/><br/> <b>Name and address of the manufacturer</b><br/>Nom et adresse du fabricant<br/><br/> <b>Name and address of the factory</b><br/>Nom et adresse de l'usine<br/><br/> <small>Note: When more than one factory, please report on page 2</small><br/> <small>Note: Lorsque il y a plus d'une usine, veuillez utiliser la 2<sup>ème</sup> page</small><br/> <b>Ratings and principal characteristics</b><br/>Valeurs nominales et caractéristiques principales<br/><br/> <b>Trademark (if any)</b><br/>Marque de fabrique (si elle existe)<br/> <b>Type of Manufacturer's Testing Laboratories used</b><br/>Type de programme du laboratoire d'essais constructeur<br/><br/> <b>Model / Type Ref.</b><br/>Ref. De type<br/><br/> <b>Additional information (if necessary may also be reported on page 2)</b><br/> Les informations complémentaires (si nécessaire, peuvent être indiqués sur la 2<sup>ème</sup> page<br/><br/> <b>A sample of the product was tested and found to be in conformity with</b><br/> Un échantillon de ce produit a été essayé et a été considéré conforme à la<br/><br/> <b>As shown in the Test Report Ref. No. which forms part of this Certificate</b><br/> Comme indiqué dans le Rapport d'essais numéro de référence qui constitue partie de ce Certificat </td> <td style="width: 65%; vertical-align: top; background-color: #f0f0f0; padding: 10px;"> <b>SERIAL TO ETHERNET ADAPTER</b><br/><br/> GRID CONNECT INC<br/> 1630 W DIEHL RD<br/> NAPERVILLE IL 60563-1142, USA<br/><br/> GRID CONNECT INC<br/> 1630 W DIEHL RD<br/> NAPERVILLE IL 60563-1142, USA<br/><br/> GRID CONNECT INC<br/> 1630 W DIEHL RD NAPERVILLE IL 60563-1142<br/> UNITED STATES<br/> <input type="checkbox"/> Additional Information on page 2<br/> (Optional)<br/> NET232, NET232-GDC4S, NET232+: 5-24 Vdc, 2 W<br/> NET485: 8-24Vdc, 2.5 W<br/><br/> None<br/><br/> NET232, NET232-GDC4S, NET485, NET232+<br/><br/> Additionally evaluated to EN 60950-1:2006/ A11:2009 / A1:2010 / A12:2011; National Differences specified in the CB Test Report.<br/> <input checked="" type="checkbox"/> Additional Information on page 2<br/><br/> IEC 60950-1(ed.2), IEC 60950-1(ed.2);am1<br/><br/> E357346-A1-CB-2 issued on 2014-08-29, E357346-A1-CB-2 issued on 2014-09-03 </td> </tr> </table> <p style="margin-top: 10px;"> This CB Test Certificate is issued by the National Certification Body<br/> Ce Certificat d'essai OC est établi par l'Organisme National de Certification </p> |   | <b>CB TEST CERTIFICATE</b><br><br><b>Product</b><br>Produit<br><br><b>Name and address of the applicant</b><br>Nom et adresse du demandeur<br><br><b>Name and address of the manufacturer</b><br>Nom et adresse du fabricant<br><br><b>Name and address of the factory</b><br>Nom et adresse de l'usine<br><br><small>Note: When more than one factory, please report on page 2</small><br><small>Note: Lorsque il y a plus d'une usine, veuillez utiliser la 2<sup>ème</sup> page</small><br><b>Ratings and principal characteristics</b><br>Valeurs nominales et caractéristiques principales<br><br><b>Trademark (if any)</b><br>Marque de fabrique (si elle existe)<br><b>Type of Manufacturer's Testing Laboratories used</b><br>Type de programme du laboratoire d'essais constructeur<br><br><b>Model / Type Ref.</b><br>Ref. De type<br><br><b>Additional information (if necessary may also be reported on page 2)</b><br>Les informations complémentaires (si nécessaire, peuvent être indiqués sur la 2 <sup>ème</sup> page<br><br><b>A sample of the product was tested and found to be in conformity with</b><br>Un échantillon de ce produit a été essayé et a été considéré conforme à la<br><br><b>As shown in the Test Report Ref. No. which forms part of this Certificate</b><br>Comme indiqué dans le Rapport d'essais numéro de référence qui constitue partie de ce Certificat | <b>SERIAL TO ETHERNET ADAPTER</b><br><br>GRID CONNECT INC<br>1630 W DIEHL RD<br>NAPERVILLE IL 60563-1142, USA<br><br>GRID CONNECT INC<br>1630 W DIEHL RD<br>NAPERVILLE IL 60563-1142, USA<br><br>GRID CONNECT INC<br>1630 W DIEHL RD NAPERVILLE IL 60563-1142<br>UNITED STATES<br><input type="checkbox"/> Additional Information on page 2<br>(Optional)<br>NET232, NET232-GDC4S, NET232+: 5-24 Vdc, 2 W<br>NET485: 8-24Vdc, 2.5 W<br><br>None<br><br>NET232, NET232-GDC4S, NET485, NET232+<br><br>Additionally evaluated to EN 60950-1:2006/ A11:2009 / A1:2010 / A12:2011; National Differences specified in the CB Test Report.<br><input checked="" type="checkbox"/> Additional Information on page 2<br><br>IEC 60950-1(ed.2), IEC 60950-1(ed.2);am1<br><br>E357346-A1-CB-2 issued on 2014-08-29, E357346-A1-CB-2 issued on 2014-09-03 |
| <b>CB TEST CERTIFICATE</b><br><br><b>Product</b><br>Produit<br><br><b>Name and address of the applicant</b><br>Nom et adresse du demandeur<br><br><b>Name and address of the manufacturer</b><br>Nom et adresse du fabricant<br><br><b>Name and address of the factory</b><br>Nom et adresse de l'usine<br><br><small>Note: When more than one factory, please report on page 2</small><br><small>Note: Lorsque il y a plus d'une usine, veuillez utiliser la 2<sup>ème</sup> page</small><br><b>Ratings and principal characteristics</b><br>Valeurs nominales et caractéristiques principales<br><br><b>Trademark (if any)</b><br>Marque de fabrique (si elle existe)<br><b>Type of Manufacturer's Testing Laboratories used</b><br>Type de programme du laboratoire d'essais constructeur<br><br><b>Model / Type Ref.</b><br>Ref. De type<br><br><b>Additional information (if necessary may also be reported on page 2)</b><br>Les informations complémentaires (si nécessaire, peuvent être indiqués sur la 2 <sup>ème</sup> page<br><br><b>A sample of the product was tested and found to be in conformity with</b><br>Un échantillon de ce produit a été essayé et a été considéré conforme à la<br><br><b>As shown in the Test Report Ref. No. which forms part of this Certificate</b><br>Comme indiqué dans le Rapport d'essais numéro de référence qui constitue partie de ce Certificat   | <b>SERIAL TO ETHERNET ADAPTER</b><br><br>GRID CONNECT INC<br>1630 W DIEHL RD<br>NAPERVILLE IL 60563-1142, USA<br><br>GRID CONNECT INC<br>1630 W DIEHL RD<br>NAPERVILLE IL 60563-1142, USA<br><br>GRID CONNECT INC<br>1630 W DIEHL RD NAPERVILLE IL 60563-1142<br>UNITED STATES<br><input type="checkbox"/> Additional Information on page 2<br>(Optional)<br>NET232, NET232-GDC4S, NET232+: 5-24 Vdc, 2 W<br>NET485: 8-24Vdc, 2.5 W<br><br>None<br><br>NET232, NET232-GDC4S, NET485, NET232+<br><br>Additionally evaluated to EN 60950-1:2006/ A11:2009 / A1:2010 / A12:2011; National Differences specified in the CB Test Report.<br><input checked="" type="checkbox"/> Additional Information on page 2<br><br>IEC 60950-1(ed.2), IEC 60950-1(ed.2);am1<br><br>E357346-A1-CB-2 issued on 2014-08-29, E357346-A1-CB-2 issued on 2014-09-03 |  |   |
| <table style="width: 100%;"> <tr> <td style="width: 30%; vertical-align: top;"> <br/><br/> <b>Date:</b> 2014-09-03<br/> <b>Original Issue Date:</b> 2012-12-21 </td> <td style="width: 70%; vertical-align: top;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;"> <input checked="" type="checkbox"/><br/><input type="checkbox"/><br/><input type="checkbox"/> </div> <div> UL (US), 333 Pfingsten Rd IL 60062, Northbrook, USA<br/> UL (Denko), Borupvang SA DK-2750 Ballerup, DENMARK<br/> UL (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN<br/> UL (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA </div> </div> <div style="margin-top: 10px;"> <b>Signature:</b> <br/> Jolanta M. Wroblewska </div> </td> </tr> </table> <p style="font-size: small; margin-top: 5px;">For full legal entity names see <a href="http://www.ul.com/hcnames">www.ul.com/hcnames</a></p>  |   | <br><br><b>Date:</b> 2014-09-03<br><b>Original Issue Date:</b> 2012-12-21   | <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;"> <input checked="" type="checkbox"/><br/><input type="checkbox"/><br/><input type="checkbox"/> </div> <div> UL (US), 333 Pfingsten Rd IL 60062, Northbrook, USA<br/> UL (Denko), Borupvang SA DK-2750 Ballerup, DENMARK<br/> UL (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN<br/> UL (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA </div> </div> <div style="margin-top: 10px;"> <b>Signature:</b> <br/> Jolanta M. Wroblewska </div>   |
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### 10.6.1 UL Certificate of Compliance

The UL Certificate of Compliance for the NET232+ (NET232Plus) is shown in the following picture.

**CERTIFICATE OF COMPLIANCE**

Certificate Number 20140908-E357346  
Report Reference E357346-A1-UL  
Issue Date 2013-SEPTEMBER-08

Issued to: GRID CONNECT INC  
1630 W DIEHL RD  
NAPERVILLE IL 60563

This is to certify that representative samples of INFORMATION TECHNOLOGY EQUIPMENT INCLUDING ELECTRICAL BUSINESS EQUIPMENT  
SERIAL TO ETHERNET ADAPTER, NET232, NET232-GDC4S, NET485, NET232+

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 60950-1, Information Technology Equipment - Safety - Part 1: General Requirements  
CSA C22.2 No. 60950-1-07, Information Technology Equipment - Safety - Part 1: General Requirements

Additional Information: See the UL Online Certifications Directory at [www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.  
The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with "C" and "US" identifiers; "UL" the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

*William R. Conroy*  
William R. Conroy, Director, North American Certification Programs  
UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at [info@ul.com](mailto:info@ul.com).

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### 10.7 EMC Directive

The Electromagnetic Compatibility (EMC) Directive (2004/108/EC) became mandatory for products covered by its scope on July 20, 2009.

The EMC Directive states that equipment shall be designed and manufactured, having regard to the state of the art, to ensure that:

- a) the electromagnetic disturbance generated does not exceed the level which radio and telecommunications equipment or other equipment cannot operate as intended;
- b) it has a level of immunity to the electromagnetic disturbance to be expected in its intended use which allows it to operate without unacceptable degradation of its intended use.

The EMC Directive covers “apparatus,” “components and sub-assemblies,” and “mobile installations.” Apparatus means any finished appliance or combination of appliances made commercially available as a single functional unit which can generate electromagnetic disturbance or whose performance is affected by such disturbance. Components or sub-assemblies are intended for incorporation into an apparatus by the end user. They cannot generate emissions and must be immune from incoming emissions to ensure their intended performance. Mobile installations are defined as a combination of apparatus and where applicable, other devices, intended to be moved and operated in a range of locations.

A component made by a supplier for installation into a final product may need CE marking. If the component can be sold commercially and used independently, such as electronic circuit boards, electric motors, or computer disc drives, then CE marking will be required. If the component has no direct function, then it does not need CE marking. Cables and cabling accessories, simple mechanical thermostats, and light-emitting diodes (LED) are examples of components that do not need CE marking.

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## 10.8 Low Voltage Directive

The purpose of the European Union Low Voltage Directive (2006/95/EC) is to ensure the safety of people, domestic animals, and property by protecting them against hazards caused by electrical equipment. Manufacturers must ensure protection against hazards stemming from the electrical equipment by addressing factors such as temperature, arcs and radiation. Insulation must be suitable for the conditions of use. The manufacturer must also offer protection from hazards arising from external influences on the electrical equipment such as mechanical, chemical, fire, electromagnetic frequency (EMF) or thermal risks.

In effect the essential requirements of the Low Voltage Directive state that electrical equipment within the scope of the directive should not endanger persons, domestic animals or property when the equipment is properly installed, maintained and used in applications for which it was made.

All electrical equipment designed for use with a voltage rating between 50 and 1000 volts for alternating current (AC) or between 75 and 1500 volts for direct current (DC) are covered by the Low Voltage Directive. Voltage ratings refer to the voltage of the electrical input or output, not to voltages which may appear inside the equipment.



Generally speaking, products that must comply with the Low Voltage Directive are electrical consumer products or capital goods that are designed to operate within these voltage limits. Examples are:

- electrical appliances and hand-held electrically driven tools;
- lighting equipment including ballasts;
- switch gear and control gear;
- electric wiring;
- appliance couplers and cord sets;
- electrical installation equipment;
- cable management systems

Battery-operated equipment outside the voltage rating is naturally outside the scope of the Low Voltage Directive. However, accompanying battery-chargers, as well as equipment with integrated power supply units within the voltage ranges of the Directive, are within the scope of the LVD. This applies also to battery-operated equipment with a supply voltage rating under 50 V AC and 75 V DC, with accompanying mains power supply units (e.g. notebooks). So when the notebook and power supply unit are distributed together, they both need to meet the CE mark requirements for the Low Voltage Directive, even if the notebook has a battery-powered voltage under the range of the LVD. (The notebook would also have to meet the CE mark requirements for the EMC Directive).

Grid Connect believes that providing the UL Certification on its products complies with, and exceeds the Low Voltage Directive.

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## 10.9 WEEE Directive (2002/96/EC)

The Waste Electrical and Electronic Equipment Directive (WEEE) applies to companies that manufacture, sell, distribute, recycle or treat electrical and electronic equipment and to consumers in the E.U. It covers all large and small household appliances, IT equipment, radio and audio equipment, electrical tools and telecommunications equipment, providing the means to collect and recycle electronics products from consumers at end-of-life.

The Directive aims to reduce the waste arising from electrical and electronic equipment and to improve the environmental performance of all those involved in the life cycle of these products.

The requirement to mark equipment with the WEEE symbol (the crossed-out wheeled bin) went into effect as of August 13, 2005.

All equipment shipped to the EU member states since the date of the directive is marked with the **Wheeled Bin mark**.



Grid Connect has a no-charge “take-back” service that gives customers the option to return used hardware products to be recycled. Products covered by the WEEE directive shipped to EU member states may be returned at no charge. Grid Connect ensures that the products are properly recycled. This service helps reduce the impact on landfills and other disposal sites and provides an environmentally safe end-of-life solution.

To send hardware products to be recycled, customers can contact Grid Connect to obtain an RMA number and we will reply with information on how to ship the product. There is no charge for the disposal but the customer must pay for shipping. After the product is returned, Grid Connect also can provide a Certificate of Custody change upon customer request.

Product “take-back” regulations are constantly evolving. Current regulations do not require Grid Connect to take back its products. However, by launching a WEEE take-back program, Grid Connect demonstrates a commitment to the environment and its customers by helping them dispose of products responsibly.

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## 10.10 REACH

The Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) is a European Community Regulation related to the safe use and identification of chemicals (Regulation (EC) Number 1907/2006). REACH entered into force on June 1, 2007 with the aim of improving the protection of human health and the environment through better and earlier identification of the intrinsic properties of chemical substances. The new legislative framework under REACH shifts responsibility for the control and safety of chemicals from government authorities to industry and created the European Chemicals Agency to act as a central coordinator.

Grid Connect is an importer of articles as defined in the Regulation. However, registration requirements under Article 7 of REACH do not currently apply to articles imported by Grid Connect into the European Union because:

1. Substances are not present in the articles in quantities totaling over one ton per year
2. Substances are not intended to be released under normal or reasonably foreseeable conditions of use.

Grid Connect is not categorized as a downstream user under REACH because it does not use the substances in the course of its professional activities and therefore has no applicable requirements

under Article 37 of REACH. Grid Connect will continue to monitor REACH developments and will comply with any applicable requirements.

As Substances of Very High Concern (SVHCs) are added to Annex XIV of the Regulation (Authorization List), Grid Connect will assess whether both of the following conditions are met:

1. The substance is present in the articles in quantities over one (1) ton per year
2. The substances are present in Grid Connect devices above a concentration level of 0.1% w/w

Grid Connect shall comply with the requirements of Article 7(2) and Article 33 of the Regulation, as necessary. For informational purposes, Grid Connect has contacted its material and manufacturing vendors to verify that Grid Connect devices do not contain SVHCs.

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## 10.11 Conflict Minerals

The US Securities and Exchange Commission (SEC) issued their long awaited conflict minerals rule as required per Section 1502 of the Dodd Frank Financial Dodd-Frank Wall-Street (Financial) Reform and Consumer Protection Act. The aim of the rule is to stop companies from sourcing minerals from regions in the world where armed conflict and human rights abuses are occurring, and armed rebel groups perpetuating the conflict/abuses are profiting from it. The region specifically targeted in the rule is the Democratic Republic of Congo (DRC) and surrounding region.

The new rule requires **SEC registered companies** to annually determine if any tin, tantalum, tungsten, or gold (and their derivatives) was added to/used in their products. If so, they must conduct a reasonable country of origin inquiry (RCOI) to determine whether the mineral(s) used came from a conflict-free source (i.e. from outside the DRC region or from a conflict free smelter located in the DRC region). Affected companies must annually report the results of their RCOI to the SEC. **Grid Connect is not an SEC registered company and is not required to file a report.**

Grid Connect supports the conflict minerals rules and requires all suppliers of any fabricated materials such as Printed Circuit Boards to be monitored.

Grid Connect is committed to sourcing responsibly and considers mining activities that fuel conflict as unacceptable. Grid Connect's efforts related to conflict minerals are aligned to the work of the Electronic Industry Citizenship Coalition® (EICC®) and Global e-Sustainability Initiative (GeSI). The EICC's and GeSI's work includes the Conflict-Free Smelter Program and the Conflict Minerals Reporting Template. The Template provides a common industry approach for the collection of sourcing information related to conflict minerals. The template is available by contacting Grid Connect.

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## 10.12 ISO 9000

ISO 9000 registration (or EN 29000 certification) is used widely in Europe on a voluntary basis as a condition of acceptance of a manufacturer's product or as a way of recognizing the manufacturer's credibility. While a quality system such as ISO 9000 indicates that a company has an efficient organization structure and has low failure costs, it does not always certify conformity with the CE marking directives. However, some directives require use of a quality management system as part of the conformity assessment.

Grid Connect Inc. is committed to providing excellent products and services and creating a pleasant and stimulating working environment for its employees and those with whom it does business.

The company recognizes that the disciplines of quality, health, safety and environmental management are an integral part of its management function. The company views these as a primary responsibility and believes that a key to good business is maintaining the appropriate quality standard, ISO 9001:2008.

In pursuit of our policy we will:

- Comply with all applicable statutory laws, statutory regulations and with the requirements of ISO 9001:2008.
- Follow a concept of continual improvement and make best use of our management resources in all quality matters.
- Communicate our quality objectives and our performance against these objectives throughout the company and to interested parties.
- Take due care to ensure that activities are safe for employees, associates, subcontractors and others who come into contact with our workplace.
- Work closely with our customers and suppliers to establish the highest quality standards and to ensure customer satisfaction.
- Adopt a forward-looking view on future business decisions, which may have quality impacts.
- Train our staff in the needs and responsibilities of quality management.
- Recycle electronics, paper, plastics, metal, and glass through recycling facilities and donation centers.

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## 10.13 Compliance Statements for vendor supplied products.

### 10.13.1 Compliance Statement for the xPico

(According to ISO/IEC Guide 22 and EN 45014)

**Manufacturer's Name & Address:**

Lantronix, Inc. 167 Technology Drive, Irvine, CA 92618 USA

Declares that the following product:

**Product Name Model:** xPico Embedded Device Server

Conforms to the following standards or other normative documents:

**Electromagnetic Emissions/Immunity:**

*Table A-1 Electromagnetic Emissions*

| Test Description   | Specification         | Test Method     | Pass/Fail |
|--------------------|-----------------------|-----------------|-----------|
| Radiated Emissions | EN 55022:2010 Class B | CISPR 22:2008   | PASS      |
| Radiated Emissions | FCC 15.109(g):2012    | ANSI C63.4:2009 | PASS      |

|                     |                       |                 |      |
|---------------------|-----------------------|-----------------|------|
|                     | CISPR 22:1997 Class B |                 |      |
| Conducted Emissions | EN 55022:2010 Class B | CISPR 22:2008   | PASS |
| Conducted Emissions | FCC 15.109(g):2012    | ANSI C63.4:2009 | PASS |
|                     | CISPR 22:1997 Class B |                 |      |

**Table A-2 Electromagnetic Immunity**

| Test Description        | Specification | Test Method                                | Performance Criteria |
|-------------------------|---------------|--|----------------------|
| ESD                     | EN 55024:2010 | IEC 61000-4-2:2008                         | 2                    |
| Radiated Immunity       | EN 55024:2010 | IEC 61000-4-3:2010                         | 1                    |
| EFT                     | EN 55024:2010 | IEC 61000-4-4:2004<br>(Amended by A1:2010) | 1                    |
| Surge                   | EN 55024:2010 | IEC 61000-4-5:2005                         | 1                    |
| Conducted Immunity      | EN 55024:2010 | IEC 61000-4-6:2008                         | 1                    |
| Magnetic Field Immunity | EN 55024:2010 | IEC 61000-4-8:2009                         | 1                    |
| Voltage Interruptions   | EN 55024:2010 | IEC 61000-4-11:2004                        | 3                    |
| Voltage Dips            | EN 55024:2010 | IEC 61000-4-11:2004                        | 1                    |

**Manufacturer's Contact:**

Lantronix, Inc.  
167 Technology Drive  
Irvine, CA 92618 USA  
Tel: (800) 526-8766 Tel: (949) 453-3990 Fax: (949) 450-7249

## 10.13.2 xPico RoHS Notice

All Lantronix products in the following families are China RoHS-compliant and free of the following hazardous substances and elements:

Lead (Pb)  
Mercury (Hg)  
Polybrominated biphenyls (PBB)  
Cadmium (Cd)  
Hexavalent Chromium (Cr (VI))  
Polybrominated diphenyl ethers (PBDE)

| Product Family Name | Toxic or hazardous Substances and Elements |              |              |                               |                                |                                       |
|---------------------|--|--------------|--------------|-------------------------------|--------------------------------|---------------------------------------|
|                     | Lead (Pb)                                  | Mercury (Hg) | Cadmium (Cd) | Hexavalent Chromium (Cr (VI)) | Polybrominated biphenyls (PBB) | Polybrominated diphenyl ethers (PBDE) |
| xPico               | 0  | 0            | 0            | 0                             | 0                              | 0                                     |

The following notices apply, as appropriate, to the NET232+ (NET232Plus) product line.