



iServer MicroServer™



User's Guide

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It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.



This device is marked with the international caution symbol. It is important to read the Setup Guide before installing or commissioning this device as the guide contains important information relating to safety and EMC.

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NOTES, WARNINGS and CAUTIONS

Information that is especially important to note is identified by the following labels:

- **NOTE**
- **WARNING or CAUTION**
- **IMPORTANT**
- **TIP**

Note E3[®]

NOTE: Provides you with information that is important to successfully setup and use the iServer.



CAUTION or WARNING: Tells you about the risk of electrical shock.



CAUTION, WARNING or IMPORTANT: Tells you of circumstances or practices that can effect the instrument's functionality and must refer to accompanying documents.

Tip E3[®]

TIP: Provides you helpful hints.

FEATURES

- **Temperature**
- **Relative Humidity**
- **Dew Point**
- **Web Server**
- **Accurate Readings**
- **Password Protection**
- **Email Alarms**
- **Data Logging**
- **Virtual Chart Recorder**

PART 1

INTRODUCTION

1.1 Safety and EMC Considerations

The instrument is a Class III device (10 to 32 Vdc).

Always use a power supply, which complies with EN 60950 safety standard.

EMC Considerations

- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use twisted-pair wires for signal connections.
- Install Ferrite Bead(s) on signal wires close to the instrument if EMC problems persist.

Failure to follow all instructions and warnings may result in injury!

1.2 Before You Begin

Inspecting Your Shipment: Remove the packing slip and verify that you have received everything listed. Inspect the container and equipment for signs of damage as soon as you receive the shipment. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent. The carrier will not honor damage claims unless all shipping material is saved for inspection. After examining and removing the contents, save the packing material and carton in the event reshipment is necessary.

Customer Service: If you need assistance, please contact the Customer Service Department nearest you.

Manuals, Software: The latest Operation Manual as well as free iSeries configuration software and iServer Mail Notifier are available at **the website listed on the cover page of this manual or on the CD-ROM enclosed with your shipment.**

1.3 Description

View Temperature + Humidity with a Web Browser. The iTHX let's you monitor and record Temperature, Relative Humidity and Dew Point over an Ethernet network or the Internet with no special software except a Web browser. The iTHX serves Active Web Pages to display real time readings, display charts of temperature and humidity, or log data in standard data formats for use in a spreadsheet or data acquisition program such as Excel or Visual Basic.

Adjustable Charts. The Java™ Applet chart scales are fully adjustable on the fly. For example, the chart can display one minute, one hour, one day, one week, one month or one year. Users can select channel 1, channel 2 or the difference of the two channels. Temperature and humidity can be charted across the full span (-40 to 124°C, and 0-100% RH) or within any narrow range (such as 20-30°C).

Display and Chart Two Channels. The iTHX transmitters come complete with a humidity and temperature probe for measurement of a single location. With the addition of a second probe, the transmitter can measure and display humidity + temperature and dewpoint in a second location up to twenty feet away. The transmitter can display and chart absolute measurement in both locations, or a differential measurement between the two locations. The second probe requires no change to the basic iTHX transmitter hardware, firmware or software. A second probe can be added at the time of purchase or in the future. There is a choice of industrial probes in 2 inch (51mm) probe with 3 foot (0.9m) cable and 5 inch (137mm) probe with 20 foot (6m) cable.

Award-winning Technology

The iTHX is simple to install and use, and features award winning iServer technology that requires no special software except a Web browser. The iTHX connects to an Ethernet Network with a standard RJ45 connector and sends data in standard TCP/IP packets. It is easily configured with a simple menu using a Web browser and can be password protected. From within an Ethernet LAN or over the Internet, the user simply types its IP address or an easy to remember name such as "Cleanroom 5" or "Midwest Server Room" in any Web Browser, and the iTHX serves a Web Page with the current readings.

Alarms and Email

If temperature or humidity exceeded a set limit, the iTHX can trigger an alarm that could be sent by email to an Internet enabled pager or cell phone.

Note

This device can be purchased as a stand alone DIN Rail mounted unit (iTHX-2), as a bench/wall mount unit (iTHX-W), or as a bench/wall mount unit with an LED display, Flash Memory Card and Back-up Battery (iTHX-M).

The following example illustrates how you can hookup the devices with serial interface on the network using the iServer:

A standard web browser can be used to monitor temperature, humidity, and dew point, and chart temperature and humidity. The browser can also be used to configure the device's IP address, passwords for access control, and Terminal Server/Remote Access parameters for serial tunneling. An iLD Big Display can be used with an iTHX .

The following example illustrates how you can hookup an iTHX and iLD to your network:

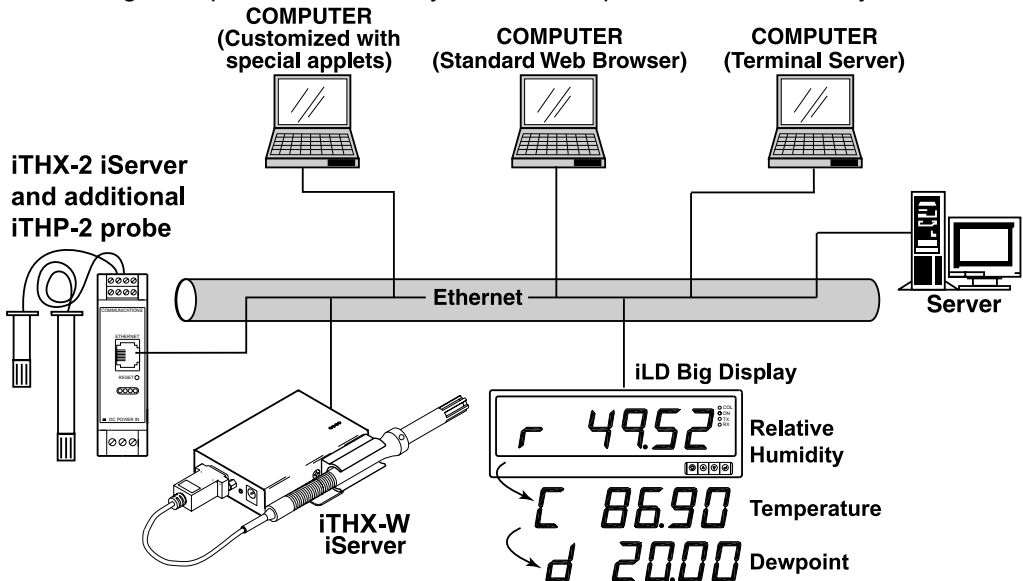


Figure 1.1 iServer with Probe on the Ethernet Network

PART 2 HARDWARE

2.1a Mounting on a DIN Rail

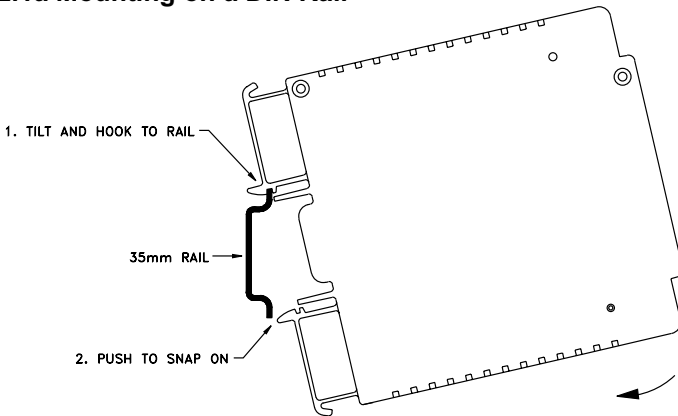


Figure 2.1a Mounting

To install unit onto DIN Rail:

- Tilt unit, position mounting slot onto DIN Rail, as shown.
- Push unit towards DIN Rail and it will snap into place.

2.1b Removal from a DIN Rail

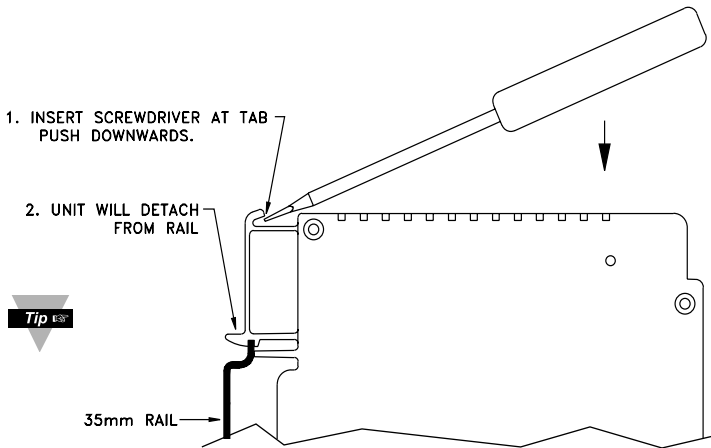


Figure 2.1b Removal

- Insert flat screw-driver into tab and push downwards.
- Unit will detach from DIN Rail.

2.2 DIP Switches

The iServer is shipped with all DIP switches in "OFF" position.

DIP Switch Usage

- N/C - not used
- To change to default factory settings
- To enable/disable DHCP
- N/C - not used

To return the device to default settings: move DIP Switch #2 to the "ON" position, turn power off and on, then move DIP Switch back to "OFF" position.

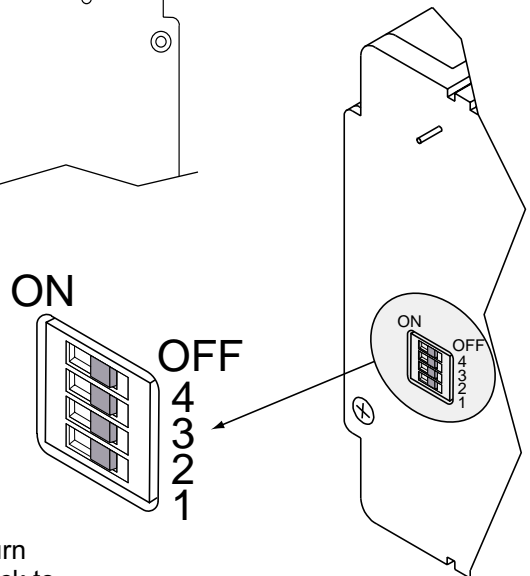
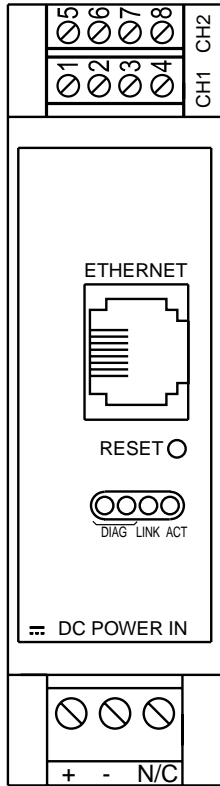


Figure 2.2 DIP Switches

2.3 Parts of the iServer Unit



Communication Connector		
Pin #	CHANNEL 1	
1	3.3V	RED
2	GND	BLACK
3	DATA	WHITE
4	SCK	GREEN
Pin #	CHANNEL 2	
5	3.3V	RED
6	GND	BLACK
7	SCK	GREEN
8	DATA	WHITE

Figure 2.3 Parts of the iServer Unit

Table 2.1 Parts of iServer Unit

CH1 & CH2	Screw Terminal Block Connections
ETHERNET	RJ45 interface for 10BASE-T connection.
RESET	Button: Used for power resetting the iServer.
ACTIVITY	LED (Red) Blinking: Indicates network activities (receiving or sending packets).
NET LINK	LED (Green) Solid: Indicates good network link.
DIAG	LED (Yellow) Blinking: For diagnostics, indicates DHCP when first connected.
DIAG	LED (Green) Blinking: For diagnostics, indicates DHCP when first connected.
DC Power Supply Section:	
+	Plus Power Supply Wire connection (inside the plug).
-	Minus Power Supply Wire connection (outside the plug).

PART 3 NETWORK CONFIGURATION

3.1 Network Protocols

The iServer can be connected to the network using standard TCP/IP protocols. It also supports ARP, HTTP (WEB server), DHCP, DNS and Telnet protocols.

3.2 Ethernet (MAC) Address

MAC (Media Access Control) address is your computer's unique hardware number. When you're connected to the LAN from your computer, a correspondence table relates your IP address to your computer's physical (MAC) address. The MAC address can be found on the label of your device and contains 6 bytes (12 characters) of hexadecimal numbers XX:XX:XX:XX:XX:XX hex

For example: 0A:0C:3D:0B:0A:0B

Note There is room on the label to put your IP address. See **Figure 3.1**.

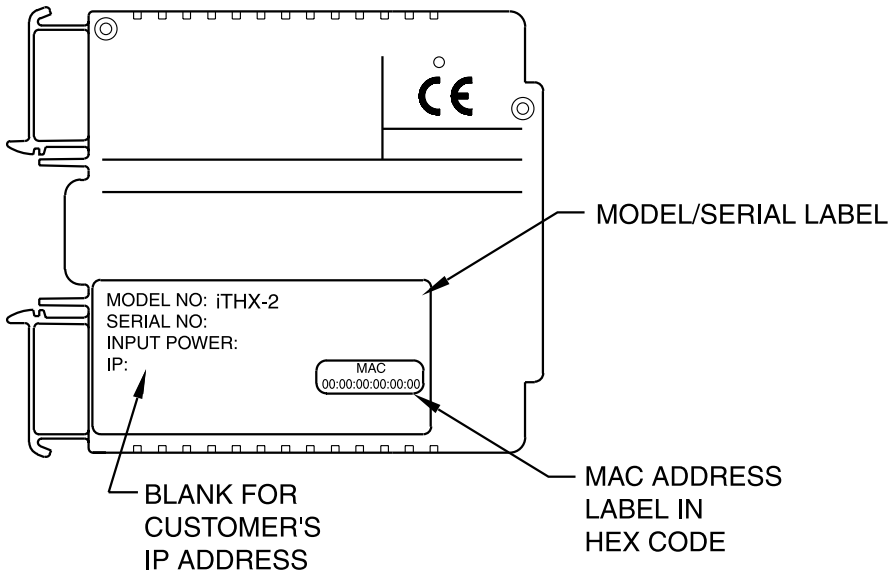


Figure 3.1 Labeling

3.3 DHCP

DHCP, Dynamic Host Configuration Protocol enables individual computers or devices to extract their IP configurations from a server (DHCP server). If the DHCP is enabled on your iServer, as soon as the iServer is connected to the network, there is an exchange of information between DHCP server and the iServer. During this process the IP address, the Gateway address, and the Subnet Mask will be assigned to the iServer by the DHCP server. Note that the DHCP server must be configured correctly to do such assignment.

If fixed or static IP address is desired, the DHCP must be disabled. The iServer is shipped with DHCP disabled (factory default). The DHCP can be enabled by setting the DIP switch # 3 to the “ON” position (refer to **Figure 3.2**).



DIP switch # 3 shown in “ON” position

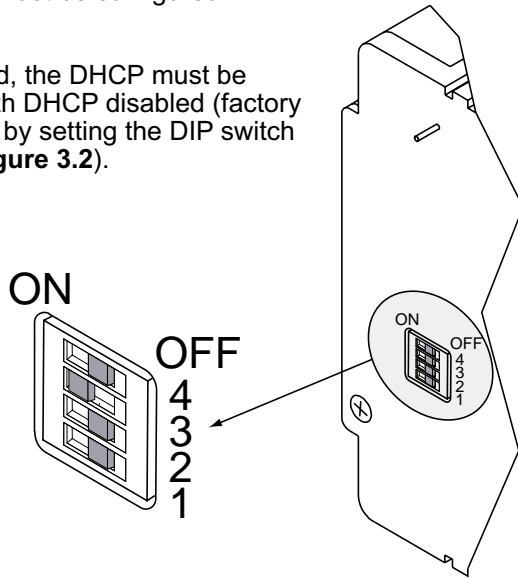


Figure 3.2 DIP Switch on the Bottom Side of iServer

3.4 DNS

DNS, Domain Name System enables individual computers and devices to be recognized over a network based on a specific name instead of an IP address. For example, instead of having to use **http://128.100.101.254** (IP address), you would use only **http://eis03ec** or any eight character name stored as Host Name under Access Control menu in the iServer Home Page. The default DNS name for an iServer is "eis" followed by the last four digits of the MAC address of that particular iServer.

1. It is very important to communicate with the network administrator in order to understand the DHCP and its existing configurations on the host server, before enabling the DHCP on the iServer.
2. The iServers are shipped with a default static IP address of **128.100.101.254** and Subnet Mask of **255.255.0.0**.
3. On Novell networks or Windows 2000 where the DCHP is an updated function of DNS this feature may be beneficial since a particular name can be assigned eliminating the need for the IP address, as described in **Section 3.4**.

3.5 IP Address

Every active device connected to the TCP/IP network must have a unique IP address. This IP address is used to build a connection to the iServer's serial port. Every computer using TCP/IP should have a unique 32-bit address. It is divided into two portions, the network ID and the host ID. For instance, every computer on the same network uses the same network ID. At the same time, all of them have a different host ID. For more details about the IP address see **Appendix B**.

3.5.1 Default IP Address

The iServer is shipped with a default IP address set to **128.100.101.254** and Subnet Mask of **255.255.0.0**. If you are going to use a Web browser or Telnet program to access the iServer using its default IP address, make sure that the PC from which you're establishing the connection has an IP address that is in the same range as the iServer's IP address (**128.100.x.x**, where **x** can be any number from 1 to 254. Note that your PC's IP address cannot be the same as the iServer's IP address). You also need to make sure that your PC's Subnet Mask is **255.255.0.0**. This is a good way to access the iServer over the network and make any configuration changes needed. If the factory default address is already in use on your network, use an Ethernet crossover cable between your computer and the iServer and modify the IP address or any other settings within the iServer.

3.6 Port Number

All TCP connections are defined by the IP address and a port number. A port number is an internal address that provides an interface between an application running on your computer and the network through the TCP/IP protocol.

There are three default TCP socket port numbers assigned to the iServer:

1. Port (socket) number 1000 when using HTTPGET program.
2. Port (socket) number 2000 when trying to access your serial device connected to the serial port of the iServer.
3. Port (socket) number 2002 when trying to access the iServer itself for reading or changing the settings. This can be done using Telnet application.

Example: C:\>Telnet 128.100.101.254 2002

PART 4 OPERATIONS

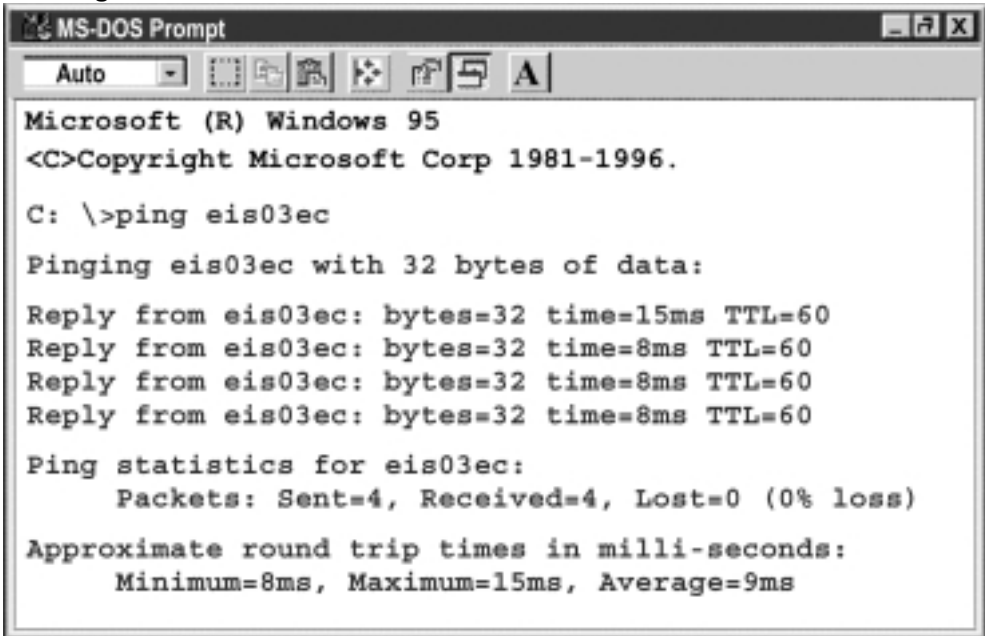
This iServer can be used and configured in several ways, depending on user's preference and network setup. It can be configured using a Web browser, like Netscape or Internet Explorer. It can also be used in Telnet simulation mode where it emulates serial communication operation over a network cable.

If DHCP and DNS servers are used, the connection is very simple, you do not need to worry about IP address, MAC address, or network conflicts, all of these issues are solved for you by your network DHCP and DNS server. All that is left for you to do, is to use a straight/normal network cable to connect the device to a hub and power it up.

Tip Instead of connecting the iServer directly to your network, you can configure your PC's network connection with an IP address that is in the same range as the iServer's IP address (128.100.x.x) and connect to the iServer using a cross-over network cable.

Go to your computer that is connected over the same network and from the MS-DOS Prompt window type "**ping 128.100.101.254**" and press Enter. If DHCP and DNS servers are used type "**ping eisxxx**", where xxx are the last four digits from the MAC address, located on the back of the device. You should get a reply as shown in **Figure 4.1**.

4.0 Testing the Connection



```
MS-DOS Prompt
Auto
Microsoft (R) Windows 95
<C>Copyright Microsoft Corp 1981-1996.
C: \>ping eis03ec
Pinging eis03ec with 32 bytes of data:
Reply from eis03ec: bytes=32 time=15ms TTL=60
Reply from eis03ec: bytes=32 time=8ms TTL=60
Reply from eis03ec: bytes=32 time=8ms TTL=60
Reply from eis03ec: bytes=32 time=8ms TTL=60
Ping statistics for eis03ec:
    Packets: Sent=4, Received=4, Lost=0 (0% loss)
    Approximate round trip times in milli-seconds:
        Minimum=8ms, Maximum=15ms, Average=9ms
```

Figure 4.1 Pinging eis03ec MS-DOS Prompt

This proves that the connection is proper and you can get into configuration or run mode using the Telnet or Web browser.

4.1 iCONNECT Software

The iServer may also be assigned an IP Address by using the iCONNECT software.

- a) Download the iCONNECT software from the website listed in this manual.
- b) Install iCONNECT software on a networked PC. This software is compatible with Windows 95, 98, NT, 2000, and XP.
- c) Use iCONNECT to assign an IP address to the iServer and access its web pages for configuration. You can also use any standard web browser to access the iServer's web pages. Consult with your IT department for obtaining an IP address.

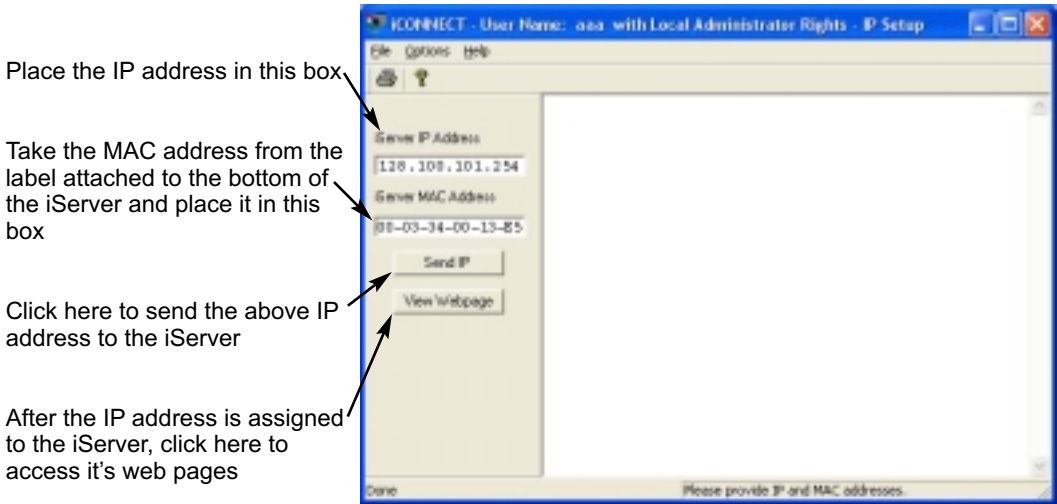


Figure 4.2 Assigning an IP Address using iCONNECT

To access the iServer for Configuration.

- a) By clicking on the "View Webpage" button, you will access the iServer's main web page.
- b) For information configuring the iServer, refer to **Section 4.3**.



Figure 4.3 Accessing the iServer for Configuration

4.2 Setting a New IP Address over the Network

Besides using the iCONNECT software, you may use the iServer's default IP address to access it and assign a new IP address to it.

The iServer is shipped with a default IP address of **128.100.101.254** and Subnet Mask of **255.255.0.0**. You can configure your PC's Network connection with an IP address that is in the same range as the iServer's IP address (**128.100.x.x**) and connect to the iServer using a crossover network cable between your PC and the iServer.

With this completed, you can go to the DOS-Prompt and ping 128.100.101.254. If you receive responses back (**Figure 4.1**), you can go to the Web browser and type in **http://128.100.101.254** and it will take you to the Device Type page and then to the Home Page.

Select Access Control button, you'll be asked for the password. First default Login password is "**12345678**" and the Admin password is "**00000000**", then you should be on the administrator setup page where you can simply type in the desired Static IP address, and click Save.



The screenshot shows a web browser window titled "Access Control" with the address bar containing "http://128.100.101.254". The main content area displays the "ACCESS CONTROL" menu with the following fields and values:

Login Password:	12345678
Admin Password:	00000000
Host Name:	eis0e0f
MAC Address:	0A:0B:0C:0D:0E:0F
IP Address:	128.100.101.254
Gateway Address:	0.0.0.0
Subnet Mask:	255.255.0.0

At the bottom of the form are two buttons: "Save" and "Reset". Below the buttons is a link labeled "Main Menu".

Figure 4.4 Access Control Menu

For the IP address to take effect the iServer needs to be turned OFF/ON or press the Reset button.

Once all of this is done, you can connect the iServer to an Ethernet hub using a straight through cable, power it up, and follow the ping routine mentioned in the previous section.

4.3 Setup and Operation Using the iServer Web Page

- Start your web browser.
- From the browser you type ***http://eisxxxx*** using the last four-digits from the MAC address label located on the device if DHCP and DNS are used. If a static IP address is used, then simply type ***http://x.x.x.x***, where ***x.x.x.x*** is the iServer's IP address.
- The Home Page, shown in **Figure 4.5**, will be displayed.

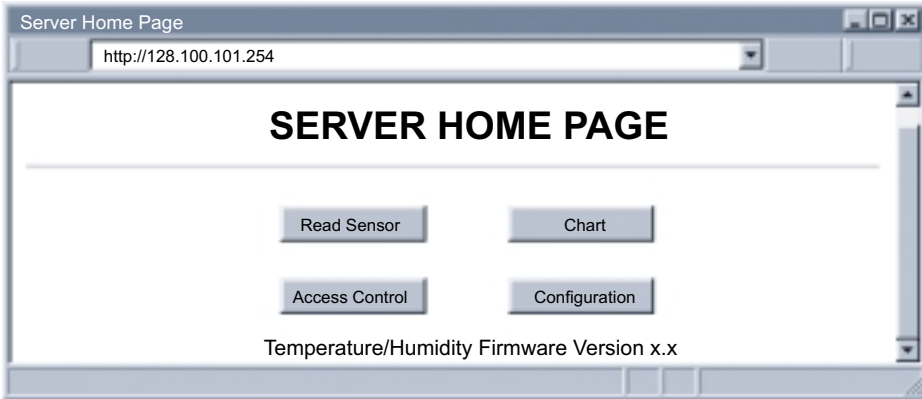


Figure 4.5 iServer Home Page Menu

Note

In order to access certain menu items of the Home Page, users may be prompted for a password, as shown in **Figure 4.6**.



Figure 4.6 Login Password

There are 2 different access levels:

1. Admin Password (administrator) allows certain groups and individual users to access and modify "All" iServer menu items without any restrictions. The default password is **00000000**. This password can be up to 16 alphanumeric case-sensitive characters.
2. Login Password (operator) allows certain groups and individual users to access and modify "Read Devices" and "Device Setpoints" menus only. The default password is **12345678**. This password can be up to 16 alphanumeric case-sensitive characters.

Note

If no passwords are needed, simply leave the password fields blank and save your screen.

4.3.1 Read Sensor

- Click on **Read Sensor**. In a few moments, about 20 seconds or so, the following page will appear with all default values of 100.00. Then the actual readings of Temperature, Humidity and Dewpoint will display.
- This page automatically updates the Temperature, Humidity, and Dew Point.
- You may select to display Channel 1, Channel 2, both (as Shown in **Figure 4.7**) or a difference between the two channels.
- Click on Main Menu to return to Home Page.

Note If a blank screen appears without any “java application running” or image of a “Java logo”, please verify you have the latest Java Runtime Environment installed and setup according to instructions, listed below.

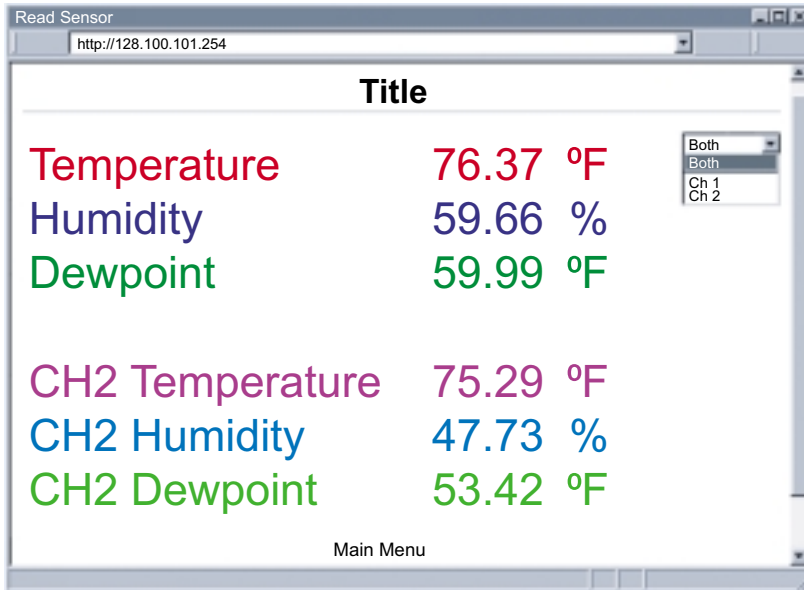


Figure 4.7 Read Sensor Menu

4.3.1.1 Java Runtime Environment 1.4 Setup instructions

Go to your computer's Control Panel

Open the Java Plug-in

1. Select the "Cache" Tab
 - Un-check the "Enable Caching" box
2. Select the "Proxy" Tab
 - Un-check the "Use Browser" box

If you still have problems viewing the page and you are on a Proxy Server or are behind a Firewall, please contact your MIS administrator to verify that you have the latest Proxy Client Software, version 2.0 or higher.

Java and the Java Coffee Cup Logo are trademarks or registered trademarks of Sun Microsystems, Inc. in the U.S. and other countries."

4.3.2 Configuration

- Click on **Configuration** . The following page should appear.
- Clicking on the No. **1, 2, 3, 4, 5, or 6** allows you to modify the Sensor Parameters.

No.	Device Name	Reading	Display Units	Display Format	Remote Format	Remote End Char (HEX)	Offset
1	Temperature	SRTF	°F	decimal	TA00.00F	0D	000.00
2	Humidity	SRH	%	decimal	HA00.00%	0D	000.00
3	Dewpoint	SRDF	°F	decimal	DA00.00F	0D	000.00
4	Ch2 Temperature	SRTF2	°F	decimal	TB00.00F	0D	000.00
5	Ch2 Humidity	SRH2	%	decimal	HB00.00%	0D	000.00
6	Ch2 Dewpoint	SRDF2	°F	decimal	DB00.00F	0D	000.00

Figure 4.8 Configuration Menu

Below are some definitions of terms used in the Configuration Menu.

Title: editable box which will show on the Read Sensor page.

Terminal Server

TCP/UDP:* selectable for data transmit mode.

Server Type: Continue mode send the temperature, humidity and dewpoint to Ethernet, continually, every one second. Command mode needs a command to query the iTHX to get the response back to querying device.

Number of Sockets: 0 disable the Terminal server. 1-5 (TCP mode) can allow the number of querying device to receive the response from the iTHX.

Port: (default 2000) is the queried port for TCP and UDP connection.

Remote Access

Remote IP Address: iTHX can establish a connection to a remote device with this IP.

Remote Port: (default 2000) the remote port number for the connection.

Remote Access:** Remote Access can be enabled and disabled.

Note

*TCP/UDP: when UDP mode is selected, Remote Access should be disabled and Remote IP and Port are the UDP remote listening IP and Port. If the Remote IP is set to 255.255.255.255. The UDP package become a broadcasting package which will allow any device listening the Remote port to receive the package.

**If Remote Access is enabled, Terminal Server is automatically disabled.

4.3.3 Sensor Parameter

- In the first column of Configuration's Device Setup page, click on **1** to view and modify sensor parameters. See **Figure 4.9**.

Note You may type any ASCII characters in the first three boxes, but you must delete the leading spaces.

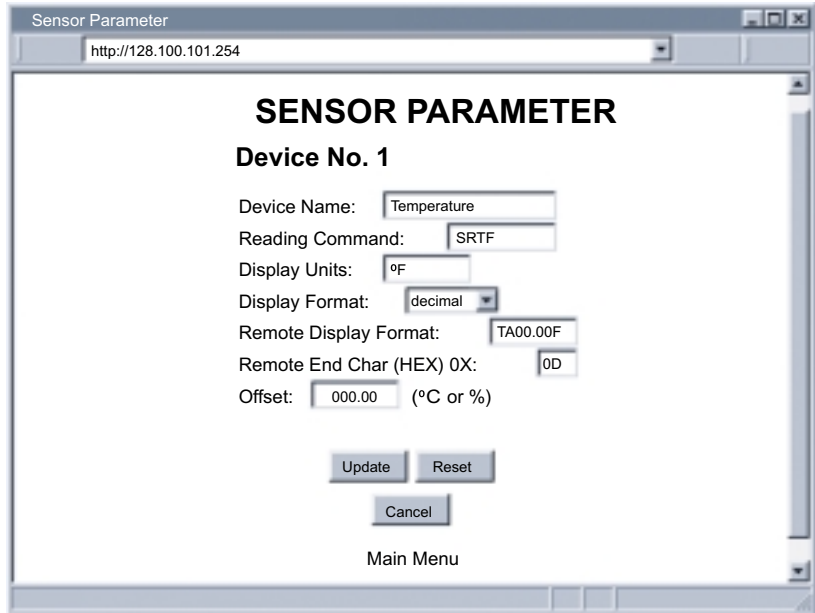


Figure 4.9 Sensor Parameter Menu

Below are some definitions of terms used in the Sensor Parameter Menu.

Device Name: shows on the Read Sensor page.

Reading Command: Can be set as the following command.

Channel 1 Commands

- SRTC Read the temperature in °C.
- SRTF Read the temperature in °F.
- SRH Read humidity.
- SRDC Read dewpoint in °C.
- SRDF Read dewpoint in °F.

Channel 2 Commands

- SRTC2 Read the temperature in °C.
- SRTF2 Read the temperature in °F.
- SRH2 Read humidity.
- SRDC2 Read dewpoint in °C.
- SRDF2 Read dewpoint in °F.

Display Units: shows on the Read Sensor page.

Display Format: raw—the leading zero is there. Decimal—the leading zero is eliminated in reading page.

Remote Display Format: Remote display format is for Terminal Server continuous mode. For example, **HA00.00%** in humidity setting, means **H** will sent as themselves, **A** is for Channel 1, **00.00%** is the humidity value display.

Example: if the humidity is 30.00, the HA30.00% will be seen in the remote. If no format is specified (blank), there is no reading sent out. If temperature is 76.25 and 00.0F is used in temperature setting, the remote site will show 76.2F. This format setup is originally based on iLD remote display, which has four and six LEDs. For six LEDs, TA00.00F can be set, and for four LEDs, 00.0F can be used.

4.3.3 Sensor Parameter (continued)

Remote End Char: Remote End char is the terminal server in continue mode. After the message 25.1F, the end character is followed. The sending message will send as:

```
TA76.50F
HA30.00%
DA26.10F
TB76.50F
HB30.00%
DB26.10F
```

If end character is (0x20—space), the message will be sent as:

```
TA76.50F HA30.00% DA26.10F
```

iLD Remote Display will update as soon as receive the return character (Hex format 0x0d). User can change it if they use different vendor's remote display.

Offset: This is the offset which will be applied to the reading. In temperature mode, it must be Degree C.

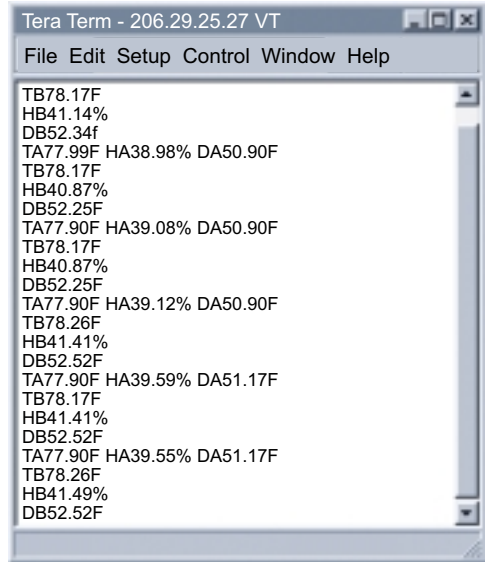


Figure 4.10 Remote End Char

4.3.4 Adjustable Chart

- Click on **Chart**. The following page should appear. The graph displays Temperature and Humidity and can be charted across the full span (0-70°C, and 10-90% RH) or within any narrow range (such as 20-30°C). The time-base can display one minute, one hour, one day, one week, one month or one year. Users can select channel 1, channel 2 or the difference of the two channels.

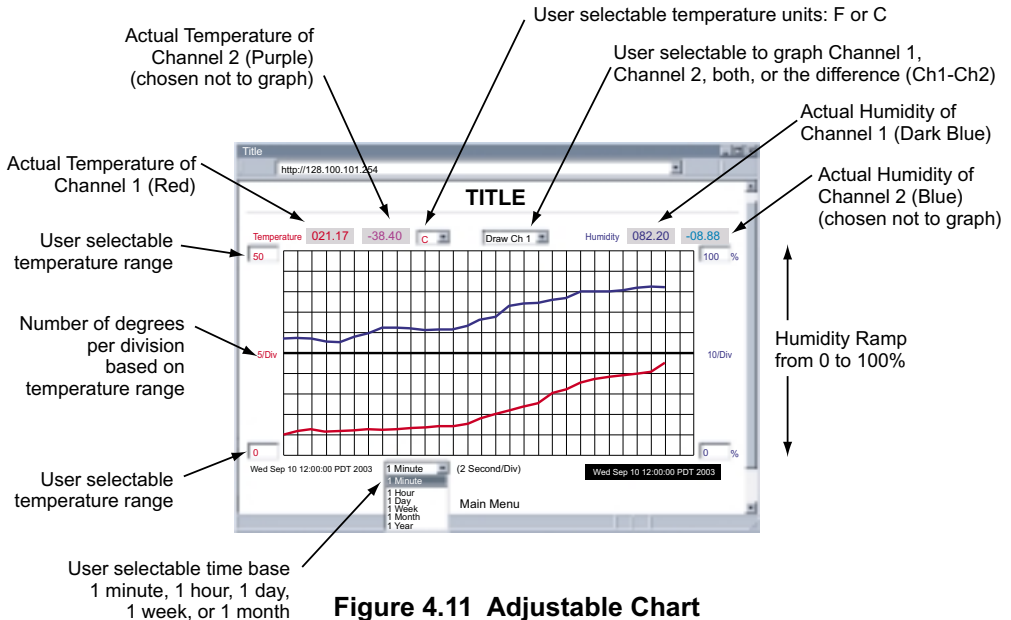


Figure 4.11 Adjustable Chart

4.3.5 Access Control

Allows the network user to set a different access level to the iServer parameters for different groups or individual users, as well as setting the TCP/IP parameters of the iServer.

- Click on **Access Control**. The following page should appear. This page allows the user to change several parameters including IP address, subnet mask, and passwords.

For the new IP address to take effect press **Reset** or cycle power.



Figure 4.12 Access Control Menu

4.4 Telnet Setup

Set the socket number to 1-5 other than 0, using telnet simulation program connect to iTHX. In continue mode, the telnet terminal will receive continue message from the iTHX. In command mode, the command can be sent to query the iTHX and get response back. Refer to **Figure 4.13**.

Send remote reset: Telnet port 2002 will bring a terminal for admin password. After typing the password and following with the end character, the message Admin. Login Successful will be showed on the terminal. Now type "reset" following with return character will reset the iTHX. If no character is receive within 20 second, the terminal will be closed automatically.

Telnet stands for Telecommunications Network, is a protocol that provides a way for users (or clients) to connect to computers (or servers) on a network, whether in the next building or across the other side of the world.

You can open a Telnet session using Tera Term Pro (can be download from <http://download.cnet.com/downloads/0-10062-100-890547.html>.) Windows Operating Systems include Telnet program as well.

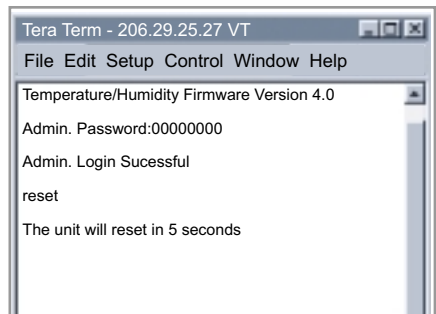


Figure 4.13 Tera Term Telnet Connection Screen

4.5 HTTPGET Program

4.5.1 HTTPGET using Port 1000

You can setup and read the information from the iServer by using the HTTPGET program. The following program can be used to read data from the embedded server firmware by using TCP port **1000**. The command string sends to this TCP port, then it reads back the response from the same port. Whatever you write to the port goes to the serial port unmodified. Any response from the serial port can be read back from the same socket.

The Httpget.exe file is used to setup and read information from the iServer. This file will be automatically installed when you run any iServer related software available on our website and CD.

Example to use the "Httpget" program:

1. Create a directory **C:\iServer\Httpget**.
2. Copy httpget.exe and readme_features.doc files to this directory.
3. Make sure that you are in this directory and then enter the following test program:

C:\iServer\Httpget\httpget -r -S "SRTF" 128.100.101.254:1000**

where:

"-r -S" are switches before the command string

"01" is device address (in hex format) for RS485 communication interface (skip for RS232)

"**SRTF" is the command (of Channel 1) as the following:

Channel 1 Commands

SRTC Read the temperature in °C.
SRTF Read the temperature in °F.
SRH Read humidity.
SRDC Read dewpoint in °C.
SRDF Read dewpoint in °F.

Channel 2 Commands

SRTC2 Read the temperature in °C.
SRTF2 Read the temperature in °F.
SRH2 Read humidity.
SRDC2 Read dewpoint in °C.
SRDF2 Read dewpoint in °F.

"128.100.101.254" is an IP address

"1000" is a socket port number

Response:

076.62 (in Deg.F format)

4.5.2 HTTPGET and ARP to setup Device IP Address

Use ARP first to assign the mac address to a static IP address in computer arp table by this command:

```
arp -s 128.100.101.254 00-03-34-00-00-06-b6
```

Then use the following command to assign new IP to the device:

```
C:\iServer\Httpget\Httpget -r -S "00000000" 128.100.101.254:1
```

00000000 is admin. Password. If the password is wrong, the unit will ignore the new IP. If the new IP is taken, you will get the message "New IP is Assigned" after the httpget command. The device will reset automatically. (TX and RX led is on for 2 second).

4.6 ARP Protocol

ARP is the Internet layer protocol responsible for determining the MAC (hardware) address that corresponds to a particular IP address. The ARP command allows the user to view the current contents of the ARP cache of the local computer (residing on the same network) or remote computer (residing on the different network) through a router. Microsoft includes the ARP.EXE utility for viewing and modifying the ARP cache with its Windows products. The following ARP commands can be used to view cache entries:

- **arp -a** → Use this command to view all ARP cache entries.
- **arp -a** plus **IP address** → Use this command to view ARP cache entries associated with one particular interface on a network with multiple adapters.
- **arp -g** → Same as arp -a.
- **arp -N** → Use this command to display ARP entries for specific network interface.
- **arp -s** plus **IP address** plus **Physical address** → Use this command to manually add a permanent static entry to the ARP cache.
- **arp -d** → Use this command to manually delete a static entry.

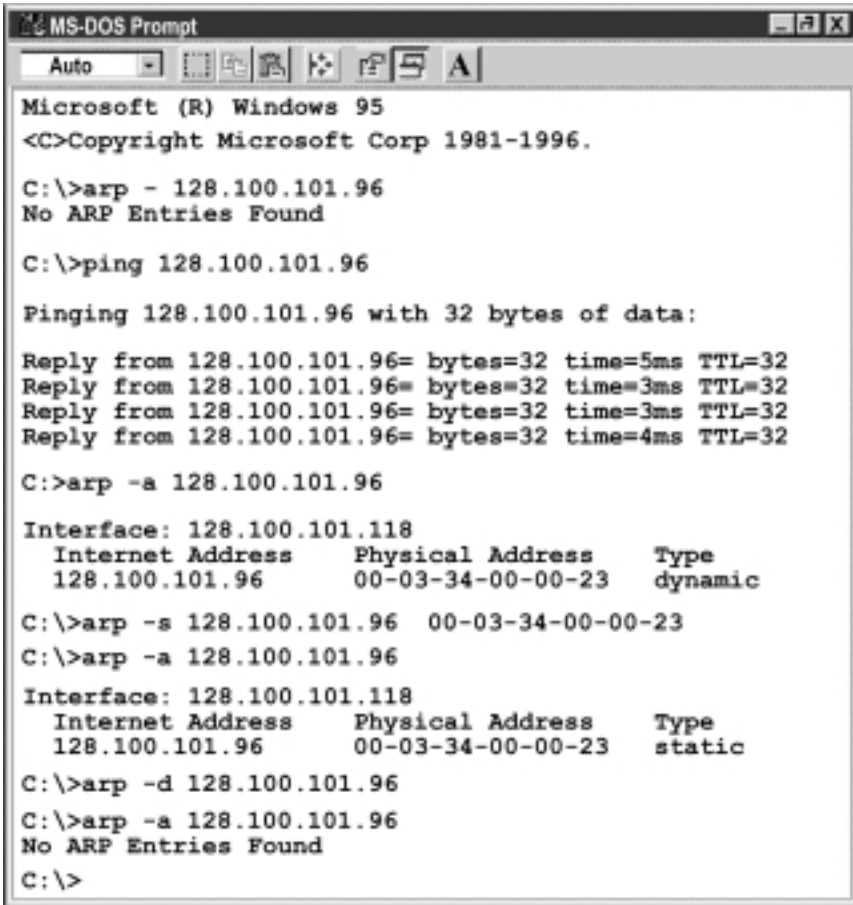
Note

Ping the destination computer using IP address first before using the arp -a command.

4.6 ARP Protocol (continued)

The following window shows examples of arp commands and responses.

- Your computer has an IP address of **128.100.101.118**
- The destination computer has an IP address of **128.100.101.96**



```
MS-DOS Prompt
Auto
Microsoft (R) Windows 95
<C>Copyright Microsoft Corp 1981-1996.

C:\>arp - 128.100.101.96
No ARP Entries Found

C:\>ping 128.100.101.96

Pinging 128.100.101.96 with 32 bytes of data:

Reply from 128.100.101.96= bytes=32 time=5ms TTL=32
Reply from 128.100.101.96= bytes=32 time=3ms TTL=32
Reply from 128.100.101.96= bytes=32 time=3ms TTL=32
Reply from 128.100.101.96= bytes=32 time=4ms TTL=32

C:\>arp -a 128.100.101.96

Interface: 128.100.101.118
  Internet Address      Physical Address      Type
  128.100.101.96       00-03-34-00-00-23    dynamic

C:\>arp -s 128.100.101.96 00-03-34-00-00-23
C:\>arp -a 128.100.101.96

Interface: 128.100.101.118
  Internet Address      Physical Address      Type
  128.100.101.96       00-03-34-00-00-23    static

C:\>arp -d 128.100.101.96
C:\>arp -a 128.100.101.96
No ARP Entries Found
C:\>
```

Figure 4.14 ARP Commands and Responses

4.7 Remote Access (Tunneling)

To "tunnel", in this context, is to transmit data between two points through a private conduit on a shared or public network. The network could be an Ethernet LAN, a WAN, or the Internet. The iServer allows for a connection between a serial device and a PC, or between two serial devices, using an existing network rather than dedicated wiring.

The connected serial devices to iServer's can communicate with each other back and forth over the networks. This characteristic is called Tunneling and it's illustrated in **Figures 4.15** and **4.16**.

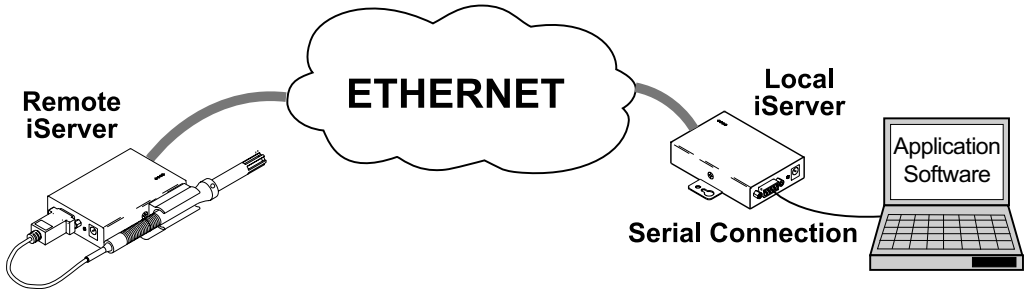


Figure 4.15 PC-to-Device Communication

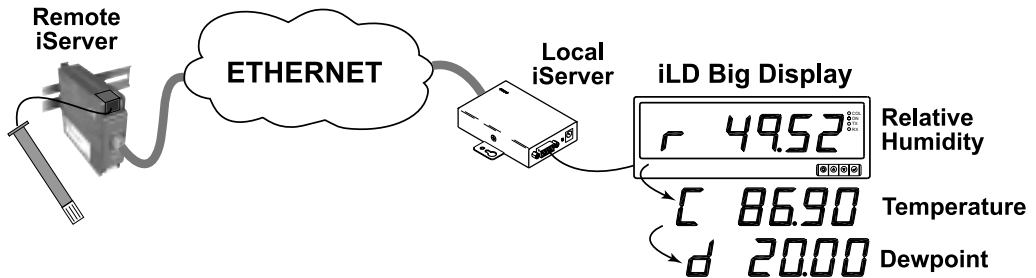


Figure 4.16 Device-to-Device Communication

In order to use this Tunneling feature, some settings are required within the local and remote iServer's.

4.7.1 Local iServer

1. An IP address should be assigned to the iServer either statically or using a DHCP server.
2. Use a browser to access iServer's WEB server. Simply type the iServer's IP address at the browser's URL location (i.e. <http://128.100.101.254>).
3. Click on Update button.
4. Click on Configuration button and enter the password (the default password is 12345678).
5. Click on Configuration button once again and now you're on the configuration page.
6. Under Terminal Server section, set the Number of Sockets to "5".
7. Click on Save button for the changes to take place.
8. Make sure that the serial connection between the local iServer and the serial device is valid and the serial settings like baud rate, stop bit, parity, etc. are configured correctly.

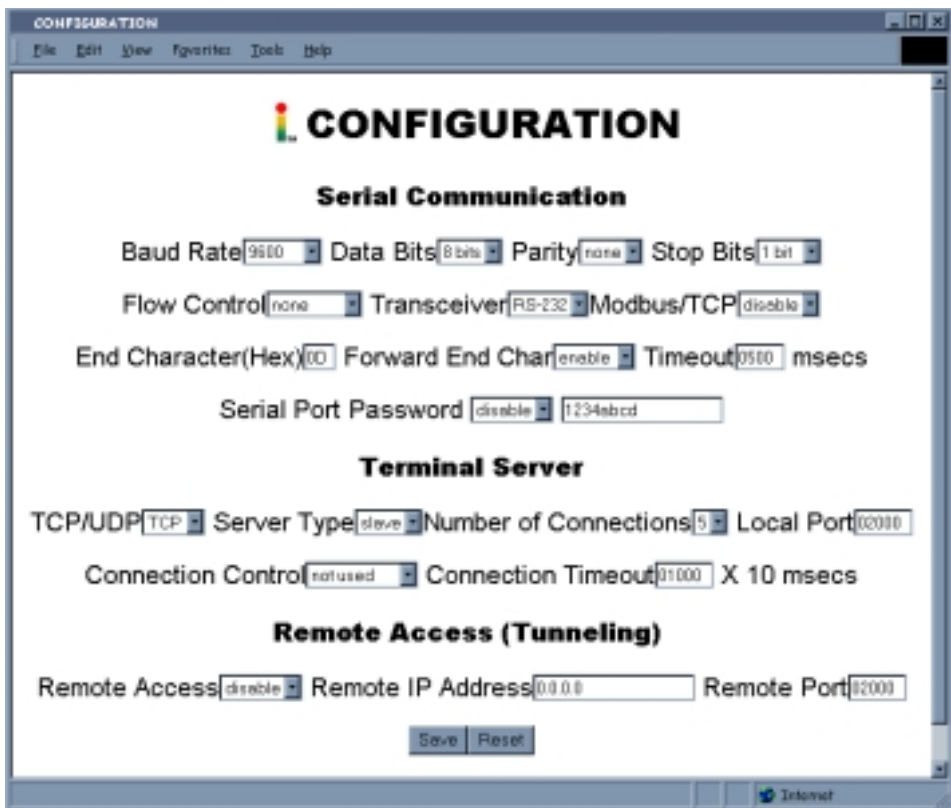


Figure 4.17 Local iServer Configuration Menu Terminal Server/Remote Access (Tunneling)

4.7.2 Remote iServer

1. An IP address should be assigned to the iServer either statically or using a DHCP server.
2. Use a browser to access iServer's WEB server. Simply type the iServer's IP address at the browser's URL location (i.e. <http://128.100.101.84>).
3. Click on Update button.
4. Click on Configuration button and enter the password (the default password is 12345678).
5. Click on Configuration button once again and now you're on the configuration page.
6. Under Terminal Server section, set the Number of Sockets to "1" and Server Type to "Continue".
7. Under Remote Access section,
 - a. Enter the IP address of the remote iServer (i.e. **128.100.101.254**).
 - b. Use the default Remote Port **2000**.
 - c. Set the Remote Access to "enable".
8. Click on Update button for the changes to take place.

At this point, reset the power, first on the remote and then the local iServer and initialize the local serial device to send or request data.

The screenshot shows a web browser window titled "Device Setup" with the URL "http://128.100.101.254". The main content area is titled "DEVICE SETUP" and contains a table with 8 columns: No., Device Name, Reading, Display Units, Display Format, Remote Format, Remote End Char (HEX), and Offset. Below the table are sections for "Terminal Server" and "Remote Access (Tunneling)" with various input fields and buttons.

No.	Device Name	Reading	Display Units	Display Format	Remote Format	Remote End Char (HEX)	Offset
1	Temperature	SRTF	°F	decimal	TA00.00F	0D	000.00
2	Humidity	SRH	%	decimal	HA00.00%	0D	000.00
3	Dewpoint	SRDF	°F	decimal	DA00.00F	0D	000.00
4	Ch2 Temperature	SRTF2	°F	decimal	TB00.00F	0D	000.00
5	Ch2 Humidity	SRH2	%	decimal	HB00.00%	0D	000.00
6	Ch2 Dewpoint	SRDF2	°F	decimal	DB00.00F	0D	000.00

Title:

Terminal Server

TCP/UDP: Server Type: Number of Sockets: Port:

Remote Access (Tunneling)

Remote IP Address: Remote Port: Remote Access:

Click on device no. on left to modify device parameters.

[Main Menu](#)

**Figure 4.18 Remote iServer Configuration Menu
Terminal Server/Remote Access (Tunneling)**

4.8 Mail Notifier Software

For complete information of how to use the Mail Notifier software, click on the Help menu of the main window.

The Mail Notifier software utilizes E-Mail notifications of alarm conditions of the devices having either embedded iServer board or connected via the stand alone iServer units, which reformats RS232/485 bus traffic into Ethernet packets. Hence users/operators can be notified automatically of alarm conditions monitored via internet connections throughout the world. By use of the E-Mail forwarding of alarm conditions, alarm conditions can be monitored on a network isolated from the internet and forwarded to connections on the Internet.

The Mail Notifier utility operates under Windows 95, 98, NT 4.0, and NT 2000 in conjunction with existing E-Mail that supports the MAPI messaging interface. If MS Outlook has been loaded, the MAPI support should be available.

4.8.1 Installation

The Mail Notifier must be loaded on a computer running Microsoft Windows (versions specified earlier) and with a MAPI client software. Network access must be available between this computer and the iServer. Network access must also be available from this computer to the appropriate E-Mail server and from the E-Mail server to the recipient's E-Mail server.

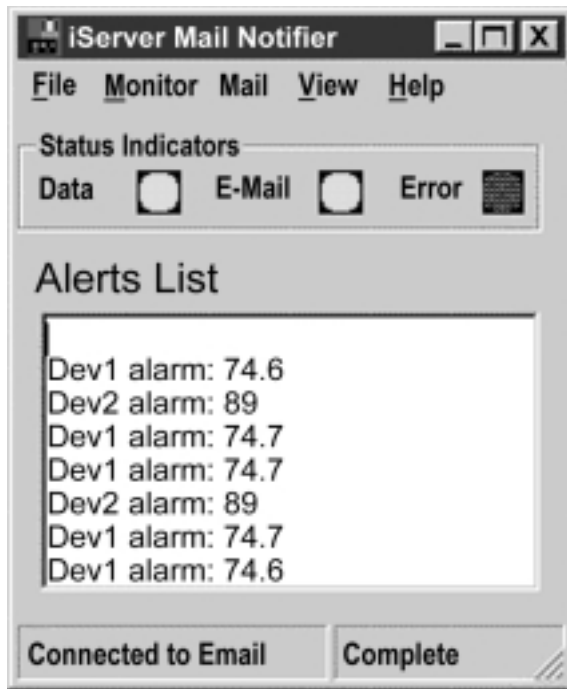


Figure 4.19 iServer Mail Notifier Main Window

4.8.2 Program Options Setup and Configuration

Note

Complete program setup requires:

- Entering a recipient for the E-Mail
- Specifying connection details to MAPI services.
- Defining alarms for devices, and selecting how and when the E-Mail will be active.

The screenshot shows the 'Alarm Editor' dialog box. It is divided into two main sections: 'device info (2 of 2)' and 'Alarm Configuration'.
In the 'device info' section, the following fields are visible:
- Server IP Address: 128.100.101.254
- Socket Number: 1000
- RS485 Unit #: 1
- Description: ITHX
- Src ID: Dev 2
- Reading Cmd: SRTF
To the right of these fields are buttons for 'OK', 'Cancel', 'Help', 'Add', and 'Del'.
The 'Alarm Configuration' section contains:
- Alarm Type: A dropdown menu set to 'Alarm Low'.
- Info Message: A text box containing 'Alarm triggered'.
- Alarm High: A text box containing '70'.
- Pause Interval: A text box containing '60'.
- Alarm Low: A text box containing '100'.
- Monitor Interval: A text box containing '5'.

Figure 4.20 iServer Mail Notifier Profile Setup

The E-Mail User tab provides fields to define the name/profile for the Mail Notifier to utilize when E-Mail is sent.

Follow the steps below to set profile in Microsoft Exchange (5.0.1458.47)

1. Start Microsoft Exchange.
2. From Menu bar select tools, options.
3. It will open to the General tab.
4. On the General tab there is the "When starting Microsoft Exchange" options.
5. The profile name is specified under the "Always use this profile" option button.
6. On the Mail Notifier, go to View, Options.
7. From the options dialog, go to the E-mail User tab.
8. Set the Name/Profile to the profile name obtained in Step 5
9. Make sure that the E-Mail Access option is set to MS Outlook. (This is used to prevent input of a password -- which isn't going to be used with Microsoft Exchange)

The Send To tab contains a field to specify an E-mail address to which alarm notifications will be sent. Only one entry is permitted, but with some E-Mail packages, the entry can represent a group of users with different E-Mail addresses.

4.8.3 Device Setting and Configuration

Device setup requires:

- Entering the IP address for iServer device (for example 128.100.101.98).
- Specifying Socket number (1000 for iServer).
- Defining RS485 Unit # serial interface address (1 to 199). Enter "0" for RS232 interface.
- Entering Reading command. Normally set to X01 to obtain reading from the devices.
- Defining the Alarm setup (High/Low, High value, or Low value).
- Specifying Pause Interval. It determines how many seconds each subsequent alarm notification will be sent.
- Determining Monitor interval. It establishes the interval or time resolution in seconds for which readings will be obtained from the device.

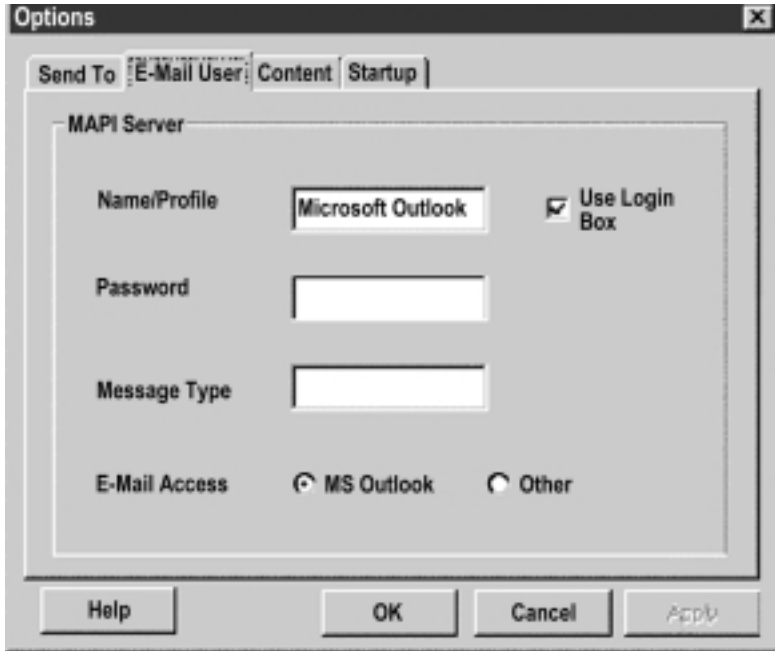


Figure 4.21 iServer Mail Notifier Device Setting

4.9 RH-Temp Excel Software

The RH-Temp Excel logging software is a simple to use mechanism that enables you to use Microsoft Excel 97 for logging, graphing, and storing data from the iServer.

For complete information of how to use the RH-Temp software, click on the Help menu of the main window.

Note

The terminal server setting is noted in the Help file under Options. It must be configured for the iServer within the server type field on the device set up page.

Select Command mode if you want to use the software for logging.

Select Continuous mode if you are using the browser for viewing the data.

PART 5 SPECIFICATIONS

SENSOR SPECIFICATIONS

Relative Humidity (RH)

Accuracy/Range: $\pm 2\%$ for 10 to 90%

$\pm 3\%$ for 0 to 10% and 90 to 100%

Non-linearity: $\pm 3\%$

Response Time: 4 sec (63% slowly moving air)

Repeatability: $\pm 0.1\%$

Resolution: 0.03%, 12bit

Temperature (T)

Accuracy/Range @ 25°C:

$\pm 0.5^\circ\text{C}$ for 0 to 80°C

($\pm 1^\circ\text{F}$ for 32 to 176°F)

$\pm 1^\circ\text{C}$ for -40 to 0°C and 80 to 124°C

($\pm 2^\circ\text{F}$ for -40 to 32°F and 176 to 254°F)

Response Time: 5 sec (63% slowly moving air)

Repeatability: $\pm 0.1^\circ\text{C}$

Resolution: 0.01°C , 14 bit

Physical Dimensions:

Industrial Probe:

137mm Length x 16mm Diameter (5" x 0.63") with 6.1m (20 foot) long cable.

Note: cable lengths can be made shorter but not longer.

Single Probe (standard) for Channel 1,

Dual Probe for 2 Channels (optional).

iSERVER SPECIFICATIONS

Interfaces

Ethernet: 10Base-T (RJ45)

Sensor: Digital 4-wire (screw-terminals)

Supported Protocols

TCP/IP, UDP/IP, ARP, ICMP, DHCP, DNS, HTTP, and Telnet

Indicators (LED's)

Network Activity, Network Link, and Diagnostics

Processor

Enhanced 8051, 22 MHz

Memory

512 Kbytes Flash, 16 Kbytes SRAM

Management

Device configuration and monitoring through embedded WEB server

Embedded WEB Server

Serves WEB pages containing real-time data and live updated charts within definable time intervals.

POWER

Power Input:

10-32 Vdc

Consumption:

2 W max.

ENVIRONMENTAL

Operating Temperature:

0 to 70°C (32 to 158°F)

Storage Temperature:

-40 to 125°C (-40 to 257°F)

PACKAGING

Material: Polycarbonate case with DIN Rail mount

Dimensions: 90.2H x 25.1W x 115.0D mm (3.54 x 0.99 x 4.53 in)

Weight: 0.113 kg (0.25 lbs.)

GENERAL

Agency Approvals

FCC-B, CE (see CE Approvals page)

Software

Field firmware upgradeable.

Including an Excel program for automatic data logging within definable time intervals, compatible with all Windows operating systems.

**PART 6
FACTORY PRESET VALUES**

PRESET PARAMETERS	FACTORY DEFAULTS
Network Interface:	
IP Address	128.100.101.254
Gateway Address	0.0.0.0
Subnet Mask	255.255.0.0
Device Host Name	eis and Last 4 digits from the MAC address
Login Password	12345678
Admin Password	00000000
DHCP	Disabled
Flow Control	None
End Character	0D (Hex) (Carridge Return)
Terminal Server:	
Server Type	Continue
Number of Sockets	0
Port #	2000
Server Mode	Disable
Remote Access (Tunneling):	
Remote Access	Disable
Remote Port	2000
Remote IP Address	0.0.0.0
Jumpers:	
3.3V	S1-A installed
For factory only, not used	S2 storage position

User of this manual should be familiar with following definitions:

ARP (Address Resolution Protocol) is a protocol for mapping an Internet Protocol address (IP address) to a physical machine address that is recognized in the local network. For example, the IP address in use today is an address that is 32-bits long. In an Ethernet local area network, however, addresses for attached devices are 48-bits long. (The physical machine address is also known as a Media Access Control or MAC address.) A table, usually called the ARP cache, is used to maintain a correlation between each MAC address and its corresponding IP address. ARP provides the protocol rules for making this correlation and providing address conversion in both directions.

Ethernet is a network protocol defined by the IEEE 802.3 standard. Ethernet-based networks use MAC Address rather than IP Address to exchange data between computers. By using ARP and adding TCP/IP support, Ethernet devices may be connected as part of the Internet. An Ethernet LAN typically uses coaxial cable or special grades of twisted pair wires. The most commonly installed Ethernet systems are called 10BASE-T and provide transmission speeds up to 10 Mbps. Devices are connected to the cable and compete for access using a Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol.

IP (Internet Protocol) is the method or protocol by which data is sent from one computer to another on the Internet.

IP address (Internet Protocol address) is a 32-bit number that identifies each sender or receiver of information that is sent in packets across the Internet.

IP Netmask is a 32-bit pattern of bits used to determine which part of the IP address is the network portion and which part is the host portion.

MAC (Media Access Control) Address is your computer's unique hardware number. When you're connected to the Internet from your computer, a correspondence table relates your IP address to your computer's physical (MAC) address on the LAN.

Ping is a utility that tests the network connectivity. It is used to determine if the host is capable of exchanging information with another host.

Port number/Socket number is a way to identify a specific process to which an Internet or other network message is to be forwarded when it arrives at a server. It is a predefined address that serves as a route from the application to the Transport layer or from the Transport layer to the application of the TCP/IP system.

Sockets are a method for communication between a client program and a server program in a network and defined as "the endpoint in a connection." Information transferred across the Internet primarily occurs between sockets.

TCP/IP (Transmission Control Protocol/Internet Protocol) is the basic communication language or protocol of the Internet. When you are set up with direct access to the Internet, your computer is provided with a copy of the TCP/IP program just as every other computer that you may send messages to or get information from also has a copy of TCP/IP. TCP/IP often is used as a general term to indicate generic access to the Internet.

Appendix B

IP Address

An IP address is a unique 32-bit address assigned to a computer and includes:

- A network ID number identifying a network.
- A host ID number identifying a computer on the network.

All IP addresses have been divided into three smaller groups (classes) A, B and C

- **Class A** addresses have 8-bits of network ID and 24-bits of host ID. They can support a large number of hosts, approximately $2^{24} = 16,777,216$ computers per network.

The IP addresses range in binary from 00000001.xxxxxxxx.xxxxxxxx.xxxxxxxx
to 01111111.xxxxxxxx.xxxxxxxx.xxxxxxxx

The IP addresses range in decimal from 1.x.x.x to 127.x.x.x

Class A network ID's support a very large number of hosts.

- **Class B** addresses have 16-bits of network ID and 16-bits of host ID. They can support approximately $2^{16} = 65,536$ computers per network.

The IP addresses range in binary from 10000000 00000000.xxxxxxxx.xxxxxxxx
to 10111111 11111111.xxxxxxxx.xxxxxxxx

The IP addresses range in decimal from 128.0.x.x TO 191.255.xxx.xxx


Class B network ID's support a medium number of hosts.

- **Class C** addresses have 24-bits of network ID and 8-bits of host ID. They can support approximately $2^8 = 256$ computers per network.

The IP addresses range in binary from 11000000.00000000.00000000.xxxxxxxx
to 11011111.11111111.11111111.xxxxxxxx

The IP addresses range in decimal from 192.0.0.xxx to 223.255.255.xxx

Class C network ID's support a small number of hosts.

 The rest of the addresses are divided into two classes, D and E.
Class D networks are not assigned to the host. They are used for multicasting.
The address range from 224.x.x.x to 239.x.x.x

Class E networks are experimental or reserved addresses.
The address range from 240.x.x.x to 247.x.x.x

Appendix C

IP Netmask

IP Netmask or Subnet Mask is a 32-bit pattern of ones and zeros used to determine network portion of an IP address from the host portion of the IP address. Subnet mask is a network ID that is created by borrowing bits from host portion of IP address and using them as part of a network ID. The table below shows a default subnet mask for address Classes A, B, and C. Each bit that is set to "1" in the subnet mask corresponds to the bit in the IP address that is to be used as the network ID. Each bit that is set to "0" in the subnet mask corresponds to a bit in the IP address that is to be used as the host ID.

Address Class	Mask Binary Value	Mask Decimal Value or Dotted Notation
Class A	11111111 00000000 00000000 00000000	255.0.0.0
Class B	11111111 11111111 00000000 00000000	255.255.0.0
Class C	11111111 11111111 11111111 00000000	255.255.255.0

If your network requires more network ID's, you can extend the default subnet mask to include additional bits from the host ID. This allows for additional network ID's within the network. The table below shows some examples of subnet masks and bits moved from the hosts ID to create a new subnet.

Mask Dotted Notation	Mask Binary	Mask Bits
Class A		
255.0.0.0 (Default)	11111111 00000000 00000000 00000000	0
255.192.0.0	11111111 11000000 00000000 00000000	2
255.224.0.0	11111111 11100000 00000000 00000000	3
255.240.0.0	11111111 11110000 00000000 00000000	4
255.248.0.0	11111111 11111000 00000000 00000000	5
255.252.0.0	11111111 11111100 00000000 00000000	6
255.254.0.0	11111111 11111110 00000000 00000000	7
255.255.0.0	11111111 11111111 00000000 00000000	8
255.255.128.0	11111111 11111111 10000000 00000000	9
255.255.192.0.0	11111111 11111111 11000000 00000000	10
.....
255.255.255.252	11111111 11111111 11111111 11111100	22
Class B		
255.255.0.0 (Default)	11111111 11111111 00000000 00000000	0
255.255.192.0	11111111 11111111 11000000 00000000	2
.....
255.255.255.252	11111111 11111111 11111111 11111100	14
Class C		
255.255.255.0 (Default)	11111111 11111111 11111111 00000000	0
255.255.255.192	11111111 11111111 11111111 11000000	2
.....
255.255.255.254	11111111 11111111 11111111 11111100	6

To determine the number of valid hosts ID's remaining after subnetting, use the following equation: $2^n - 2$, where n is the number of octet digits left after the subnet mask.

Appendix D

ASCII Chart

ASCII Char	Dec	Hex	Binary No Parity	ASCII Char	Dec	Hex	Binary No parity
NUL	00	00	00000000	@	64	40	01000000
SOH	01	01	00000001	A	65	41	01000000
STX	02	02	00000010	B	66	42	01000010
ETX	03	03	00000011	C	67	43	01000011
EOT	04	04	00000100	D	68	44	01000100
ENQ	05	05	00000101	E	69	45	01000101
ACK	06	06	00000110	F	70	46	01000110
BEL	07	07	00000111	G	71	47	01000111
BS	08	08	00001000	H	72	48	01001000
HT	09	09	00001001	I	73	49	01001001
LF	10	0A	00001010	J	74	4A	01001010
VT	11	0B	00001011	K	75	4B	01001011
FF	12	0C	00001100	L	76	4C	01001100
CR	13	0D	00001101	M	77	4D	01001101
SO	14	0E	00001110	N	78	4E	01001110
SI	15	0F	00001111	O	79	4F	01001111
DLE	16	10	00010000	P	80	50	01010000
DC1	17	11	00010001	Q	81	51	01010001
DC2	18	12	00010010	R	82	52	01010010
DC3	19	13	00010011	S	83	53	01010011
DC4	20	14	00010100	T	84	54	01010100
NAK	21	15	00010101	U	85	55	01010101
SYN	22	16	00010110	V	86	56	01010110
ETB	23	17	00010111	W	87	57	01010111
CAN	24	18	00011000	X	88	58	01011000
EM	25	19	00011001	Y	89	59	01011001
SUB	26	1A	00011010	Z	90	5A	01011010
ESC	27	1B	00011011	[	91	5B	01011011
FS	28	1C	00011100	\	92	5C	01011100
GS	29	1D	00011101	]	93	5D	01011101
RS	30	1E	00011110	^	94	5E	01011110
US	31	1F	00011111	_	95	5F	01011111
SP	32	20	00100000	`	96	60	01100000
!	33	21	00100001	a	97	61	01100001
"	34	22	00100010	b	98	62	01100010
#	35	23	00100011	c	99	63	01100011
\$	36	24	00100100	d	100	64	01100100
%	37	25	00100101	e	101	65	01100101
&	38	26	00100110	f	102	66	01100110
'	39	27	00100111	g	103	67	01100111
(	40	28	00101000	h	104	68	01101000
)	41	29	00101001	i	105	69	01101001
*	42	2A	00101010	j	106	6A	01101010
+	43	2B	00101011	k	107	6B	01101011
,	44	2C	00101100	l	108	6C	01101100
-	45	2D	00101101	m	109	6D	01101101
.	46	2E	00101110	n	110	6E	01101110

Appendix D

ASCII Chart Continuation

/	47	2F	00101111	o	111	6F	01101111
0	48	30	00110000	p	112	70	01110000
1	49	31	00110001	q	113	71	01110001
2	50	32	00110010	r	114	72	01110010
3	51	33	00110011	s	115	73	01110011
4	52	34	00110100	t	116	74	01110100
5	53	35	00110101	u	117	75	01110101
6	54	36	00110110	v	118	76	01110110
7	55	37	00110111	w	119	77	01110111
8	56	38	00111000	x	120	78	01111000
9	57	39	00111001	y	121	79	01111001
:	58	3A	00111010	z	122	7A	01111010
;	59	3B	00111011	{	123	7B	01111011
<	60	3C	00111100	|	124	7C	01111100
=	61	3D	00111101	}	125	7D	01111101
>	62	3E	00111110	~	126	7E	01111110
?	63	3F	00111111	DEL	127	7F	01111111

ASCII Control Codes

ASCII Char	Dec	Hex	Ctrl Key Equiv.	Definition	ASCII Char	Dec	Hex	Ctrl Key Equiv.	Definition
NUL	00	00	Ctrl @	Null Character	DC1	17	11	Ctrl Q	Data Control 1 - XON
SOH	01	01	Ctrl A	Start of Header	DC2	18	12	Ctrl R	Data Control 2
STX	02	02	Ctrl B	Start of Text	DC3	19	13	Ctrl S	Data Control 3 - XOFF
ETX	03	03	Ctrl C	End of Text	DC4	20	14	Ctrl T	Data Control 4
EOT	04	04	Ctrl D	End of Transmission	NAK	21	15	Ctrl U	Negative Acknowledge
ENQ	05	05	Ctrl E	Inquiry	SYN	22	16	Ctrl V	Synchronous Idle
ACK	06	06	Ctrl F	Acknowledge	ETB	23	17	Ctrl W	End of Trans Block
BEL	07	07	Ctrl G	Bell	CAN	24	18	Ctrl X	Cancel
BS	08	08	Ctrl H	Back Space	EM	25	19	Ctrl Y	End of Medium
HT	09	09	Ctrl I	Horizontal Tabulation	SUB	26	1A	Ctrl Z	Substitute
LF	10	0A	Ctrl J	Line Feed	ESC	27	1B	Ctrl [	Escape
VT	11	0B	Ctrl K	Vertical Tabulation	FS	28	1C	Ctrl \	File Separator
FF	12	0C	Ctrl L	Form Feed	GS	29	1D	Ctrl]	Group Separator
CR	13	0D	Ctrl M	Carriage Return	RS	30	1E	Ctrl |	Record Separator
SO	14	0E	Ctrl N	Shift Out	US	31	1F	Ctrl _	Unit Separator
SI	15	0F	Ctrl O	Shift In	SP	32	20		Space
DLE	16	10	Ctrl P	Data Link Escape					

**PART 7
APPROVALS INFORMATION**

7.1 Electrical Compatibility (EMC)

This device conforms with requirements of EMC Directive 89/336/EEC, amended by 93/68/EEC. This instrument complies with the following EMC Immunity Standards as tested per EN 50082-2, 1995 (Industrial environment)

Phenomena	Test Specification	Basic Standard
Electrostatic Discharge	+/- 4 kV contact discharge +/- 8 kV air discharge	IEC 1000-4-2 Performance Criteria B
Radio Frequency electromagnetic field.	27 - 1000 MHz 10 V/m 80% AM (1 KHz)	IEC 1000-4-3 Performance Criteria A
Radio Frequency electromagnetic field. Pulse modulated.	900 MHz 10 V/m 50% Duty cycle @ 200 Hz	IEC 1000-4-3 Performance Criteria A
Fast Transients	+/- 2 kV (ac mains) +/- 1 kV (dc, signal I/O) 5/50 ns Tr/Th, 5 KHz rep. freq.	IEC 1000-4-4 Performance Criteria B
Radio Frequency conducted	0.15 - 80 MHz 10 V/m 80% AM (1 KHz)	IEC 1000-4-6 Performance Criteria A

This instrument complies with the following EMC Emission Standards as tested per EN 50081-1, 1992 (Residential, Commercial and Light Industrial)

Phenomena	Frequency Range	Limits	Basic Standard
Radiated Emission	30-230 MHz 230-1000 MHz	30 dB_V/m at 10 m 37 dB_V/m at 10 m quasi peak	CISPR 22 Class B
Conducted Emission	0.15-0.5 MHz 0.5-5 MHz 5-30 MHz	66-56 dB_V quasi peak 56 dB_V quasi peak 60 dB_V quasi peak	CISPR 22 Class B

Safety

This device conforms with Low Voltage Directive 73/23/EEC, amended by 93/68/EEC. The following LVD requirements have been met to comply with EN 61010-1, 1993 (Electrical equipment for measurement, control and laboratory use)

1. Pollution Degree 2
2. Installation Category II
3. Double Insulation
4. Class III Equipment (10-32 Vdc Low Power Option)

7.2 FCC

This device complies with Part 15, Subpart B, Class B of the FCC rules



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **one (1) year** from the date of purchase. In addition to OMEGA's standard warranty period, OMEGA Engineering will extend the warranty period for **one (1) additional year** if the warranty card enclosed with each instrument is returned to OMEGA.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

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