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OM-ES-020 **Ethernet-to-Serial Device Server**



OMEGAnet® Online Service
omega.com

Internet e-mail
info@omega.com

Servicing North America:

U.S.A.:
ISO 9001 Certified
Omega Engineering Inc., One Omega Drive, P.O.Box 4047
Stamford, CT 06907-0047 USA
Toll-Free: 1-800-826-6342
FAX: (203) 359-7700
TEL: (203) 359-1600
e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec) H7L 5A1, Canada
Toll-Free: 1-800-826-6342
FAX: (514) 856-6886
TEL: (514) 856-6928
e-mail: info@omega.com

For immediate technical or application assistance:

U.S.A. and Canada:
Sales Service: 1-800-826-6342/1-800-TC-OMEGA®
Customer Service: 1-800-622-2378/1-800-622-BEST®
Engineering Service: 1-800-872-9436/1-800-USA-WHEN®

**Mexico/
Latin America:**
TEL: 001 (203) 359-1660
FAX: 001 (203) 359-7700
e-mail: espanol@omega.com

Servicing China:

China:
1698 Yi Shan Road, Unit 102
Min Hang District
Shanghai, China 201103 P.R.C.
Hotline: 800 819 0559/400 619 0559
e-mail: info@cn.omega.com

Servicing Europe:

Benelux:
Toll-Free: 0800 099 3344
FAX: +31 20 643 46 43
TEL: +31 20 347 21 21
e-mail: sales@omegaeng.nl

Czech Republic:
Frystatska 184
733 01 Karviná, Czech Republic
TEL: +420-59-6311899
FAX: +420-59-6311114
e-mail: info@omegashop.cz

France:
Toll-Free: 0805 541 038
FAX: 01 57 32 48 18
TEL: 01 57 32 48 17
e-mail: esales@omega.fr

Germany/Austria:
Daimlerstrasse 26
D-75392 Deckenpfronn, Germany
Toll-Free: 0800 8266342
FAX: +49 (0) 7056 9398-29
TEL: +49 (0) 7056 9398-0
e-mail: info@omega.de

Uniter Kingdom:
ISO 9001 Certified
OMEGA Engineering, Ltd.
One Omega Drive, River Bend Technology Centre, Northbank
Irlam, Manchester M44 5BD United Kingdom
Toll-Free: 0800-488-488
FAX: +44 (0) 161 777-6622
TEL: +44 (0) 161 777-6611
e-mail: sales@omega.co.uk

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The information contained in this document is believed to be correct, but OMEGA 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 human applications.

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1. Introduction

The OM-ES-020 Ethernet to Serial device brings the benefits of fast data access and remote management to asynchronous serial devices by connecting them to the existing local network infrastructure within your organisation. Designed and built on-site with close collaboration between the hardware and software teams to deliver a product that is both user-friendly and has plenty of functionality.

The OM-ES-020 supports the RS-232 serial port standard as well as network communication over raw TCP and Telnet. The supplied Windows drivers allow you to use any existing software that uses COM ports, without modification.



2. Before You Start

Box Contents Check list – OM-ES-020

The following items are included with your product:

- Ethernet to Serial OM-ES-020 device
- Boost.LAN Product CD
- Quick Start Guide

If any of the items are missing from your box or damaged in anyway please contact cservice@omega.com

Requirements

System Requirements

Components: Microsoft .NET Framework 2.0 (installed automatically with Boost.LAN package)

Windows Installer: Windows Installer 3.1 or later (Recommended)

Internet Explorer: If you are running Internet Explorer, then Internet Explorer 6.0 or later is required

Processor: 400 MHz Pentium processor or equivalent (Minimum); 1GHz Pentium processor or equivalent (Recommended)

RAM: 96 MB (Minimum); 256 MB (Recommended)

Hard Disk: Up to 500 MB of available space may be required

CD or DVD Drive: Not required

Display: 800 x 600, 256 colours (Minimum); 1024 x 768 high colours, 32-bit (Recommended)

Network Requirements

Ethernet network connection (wired).

Supported Operating Systems

The OM-ES-020 can be used in the following Microsoft Operating Systems with the supplied Boost.LAN drivers:



Omega Boost.LAN drivers have undergone Microsoft testing with the OM-ES-020. Upon passing these tests, the drivers were signed by Microsoft, as an indication of their quality and stability.

It is also possible to use the OM-ES-020 device with a Linux system. See Section 17 for full details.

3. Hardware Features

OM-ES-020 Hardware



1.	Screw terminal block connection	6.	Reset button (use unfolded paperclip to press)
2.	Wall mount screw hole	7.	Ethernet port connection - 10BaseT / 100BaseTX
3.	Serial Port LED	8.	Status LED
4.	Ethernet LED	9.	DIN Rail kit holes
5.	Power Input 5-30V DC, 0.75-1.06W Typical	10.	Non-conducting polyamide case

LED Information		
Status LED	Green Light on	Device Ready
	Flashing Yellow	Changing Settings
	Flashing between Red & Green	Querying IP
	Flashing between Green & Red/Yellow	IP Problem
	Flashing Green/Red	Performing Hard Reset
	Flashing between Green & Yellow	Problem during initialization (e.g. Firmware Problem)
Serial Port LED	Green light on	Port Open
	Flashing light on	Data RX/TX
Ethernet LED	Green light on	Link established
	Flashing Green	Data RX / TX

Network IP Addressing

The OM-ES-020 device is shipped in DHCP Mode.

- On connecting to the network, the device automatically checks if it is connected to a DHCP Server. If this is the case, the DHCP server will allocate an IP address automatically to the OM-ES-020 device.
- If no DHCP Server is detected (e.g. you have the OM-ES-020 device plugged directly into the PC), the ES device will default to an IP address of 192.168.127.254 within 60 seconds. Please ensure the PC you're using for configuration can communicate with the 192.168.127.xxx IP range by setting the Ethernet port the OM-ES-020 device is plugged into, to an IP address in the same subnet.
- If you are using the default IP address with no DHCP server, you can change to a static IP address to avoid having to wait 60 seconds for the default address of 192.168.127.254

Default Settings

Network Setting	
Device Network Address	DHCP Mode
Web Server Port	80
Port Settings -RS-232 Port	
Baud rate	115200
Data bits	8
Stop bits	N
Parity	1
Flow Control	None
Duplex mode	Full Duplex
Protocol Settings	Telnet + COM port control Mode (Server)

4. Installation steps

PLEASE READ CAREFULLY

The “Setup” program will install the Boost.LAN Manager application.

- Boost.LAN Manager application is the graphical user interface for locating and configuring OM-ES-020' Ethernet to Serial devices in Windows.
- Boost.LAN is the COM ports device driver that you will use in Windows to access your OM-ES-020 ports as standard Windows COM ports. You need Boost.LAN Manager to install the Boost.LAN COM ports driver.
- Neither Boost.LAN Manager or Boost.LAN is required if:
 1. Your application speaks directly to IP addresses (E.g. using telnet or Win sock communication).
 2. You want to remotely change the settings of the OM-ES-020 device via web page access

Follow the instructions below to start the installation process.

If you have any issues with installation, see Section 16

Connecting Your OM-ES-020 Device

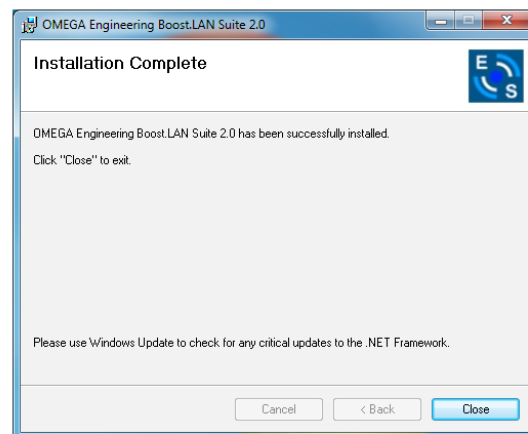
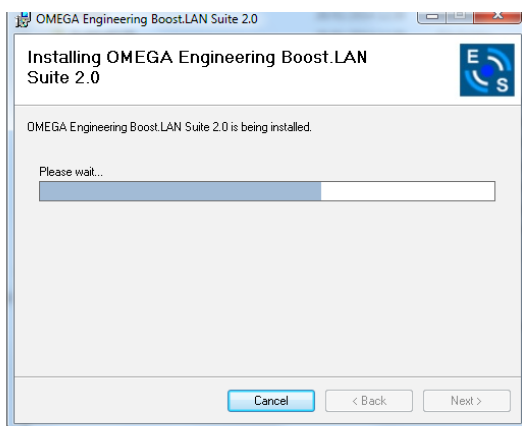
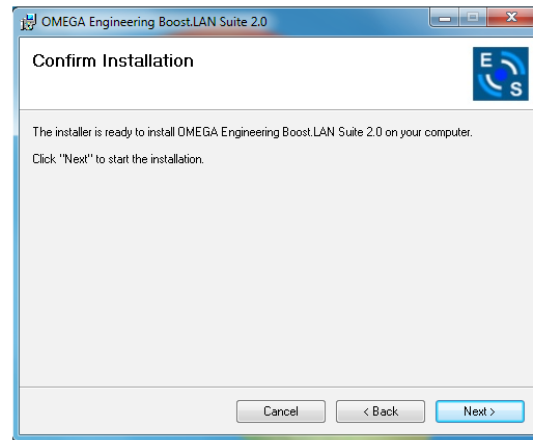
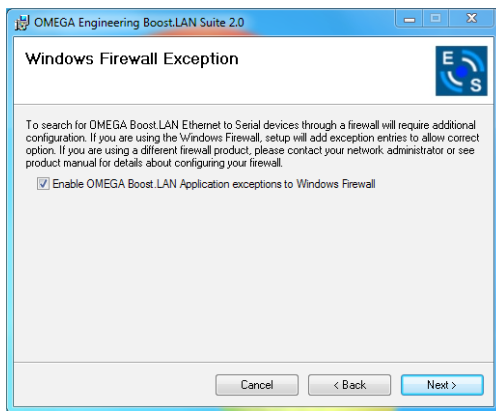
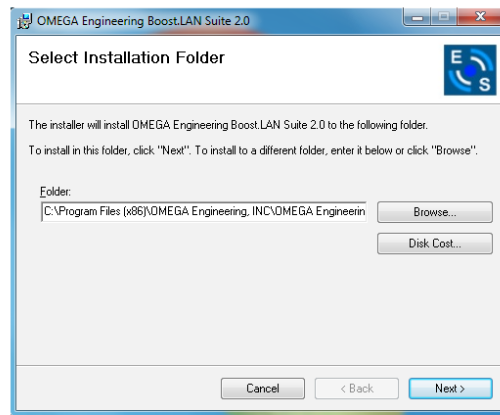
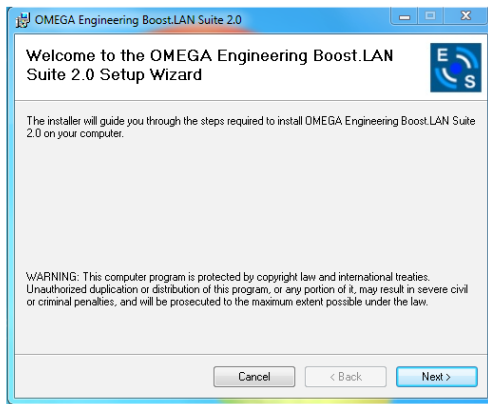
1. Connect the OM-ES-020 device to your local network by using an Ethernet cable and plugging into the Ethernet port connection. The OM-ES-020 Ethernet port will automatically detect the polarity of the Ethernet connection so both a straight through or crossover Ethernet cable can be used.
2. Connect the power adapter or a DC power line (5-30V) to the OM-ES-020 power terminal block.
3. When the Status LED starts shows a solid green light the device is ready to use.
4. Connect the serial cable from your serial device to the port terminal block) on the OM-ES-020 device. See Section 19 for pin outs.

Make a note of device MAC address (on the side of the OM-ES-020 device, XX-XX-XX-XX-XX) as you will need it to identify the device on your network later.

Windows Installation: Boost.LAN Manager Application (Windows 7)

1. With the computer turned on, insert the Boost.LAN Driver CD. This should launch the Navigation Page. **Note:** If the navigation page does not auto load, go to Start » My Computer » Right Click the CD and select Explore. This will open the CD in Windows Explorer for browsing the contents of the CD. Locate the “Setup” program on the CD and double click to launch. Proceed to Step 3.
2. Click “Install” to launch the Boost.LAN Setup.exe program.
3. Follow the on screen instructions to install the Boost.LAN Manager application

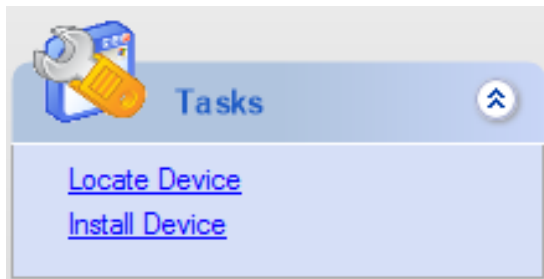
Connecting Your OM-ES-020 Device continued



- When installation is complete, you should see an icon labelled "Boost.LAN Manager" on the desktop.

Windows Installation: Device Driver (Windows 7)

1. Double click the icon labelled “Boost.LAN Manager” on the desktop to open the application.
2. Click on the “File > Find Devices” in the top left hand side of the window. This will find any OM-ES-020 Ethernet to Serial devices connected to your network.
3. You can find your OM-ES-020 by selecting a device and matching it with the corresponding MAC address available in the left hand panel (see below). The MAC address of your device is located on a sticker on the side of the OM-ES-020 device.
4. Once found, select the device and scroll to the “Tasks” section on the left hand panel.



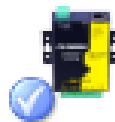
Online - Device Not Installed



OMEGA OM-ES-020 Ethernet
to Serial
OM-ES-020
192.168.127.254

5. Click “Install Device”.
6. During the device installation you will see a timer symbol and the status of the device will be ‘Installing driver...’.
7. Once the device is installed a pop up box will appear saying ‘Your new hardware is installed and ready to use.’
8. In Boost.LAN Manger, the device will display a blue tick symbol showing that it is installed and the status of the device will be ‘Ready’.

Online - Device Installed



OMEGA OM-ES-020 Ethernet
to Serial
OM-ES-020
192.168.127.254

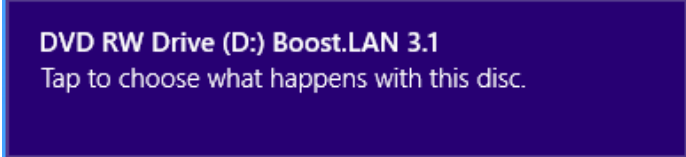
9. You can check the COM Number of the Port, by following the instructions in Section 7 Finding your OM-ES-020 COM port If you need to change the COM port number, see Section 9 Changing Your COM Label).

Windows Installation: Boost.LAN Manager Application (Windows 8)

With the computer turned on, insert the Boost.LAN Driver CD.

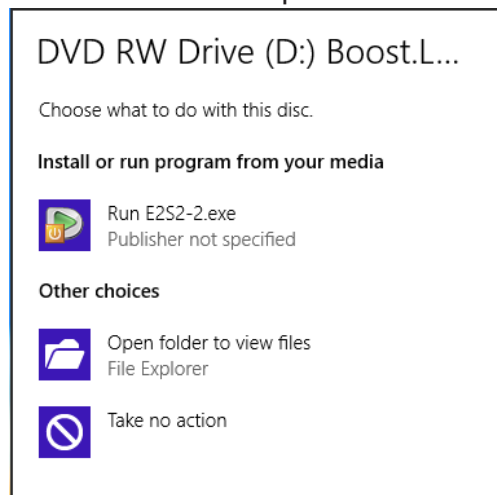
Note: If the navigation page does not auto load, go to Start » My Computer » Right Click the CD and select Explore. This will open the CD in Windows Explorer for browsing the contents of the CD. Locate the “Setup” program on the CD and double click to launch. Proceed to Step 3.

1. You will now see a purple pop up window as shown below. Click on it.

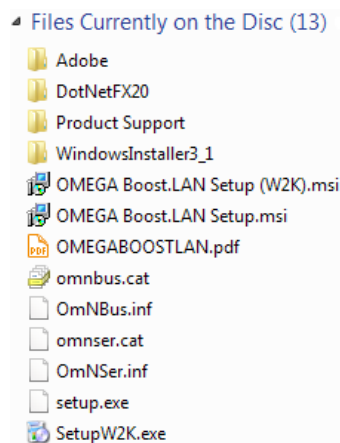


DVD RW Drive (D:) Boost.LAN 3.1
Tap to choose what happens with this disc.

2. This will bring up a new menu. Select the ‘Open folder to view files’ option.

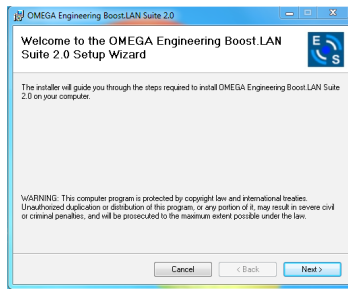


3. Click on the setup.exe file to begin the installation on the Boost.LAN manager application.

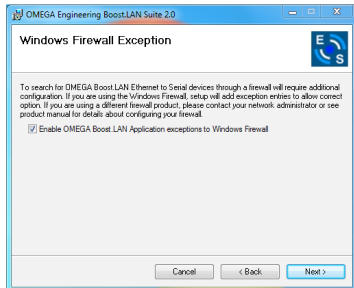


4. When you click on the setup.exe file shown above in step 3, you will then be presented with the below window. Press next.

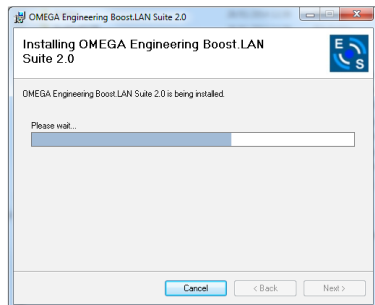
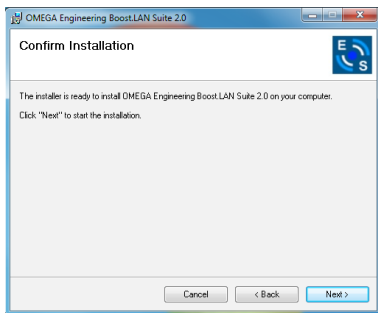
Windows Installation: Boost.LAN Manager Application (Windows 8) continued



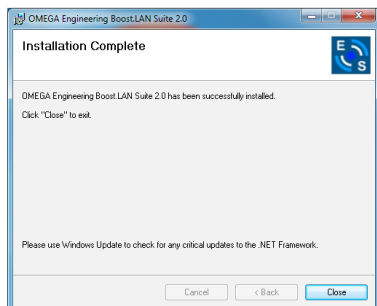
5. After you have clicked next, the setup program will ask you to allow Boost.LAN Ethernet to Serial devices through your firewall. Enable the tick box to continue the installation procedure.



6. You will now be asked to confirm whether or not you wish to carry on installing the software. Click next.



7. The software will now begin to install.

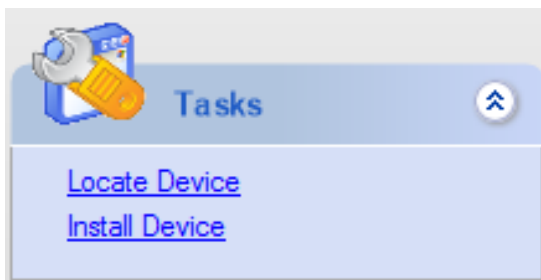


8. After the installation has finished, you will now see the below window. Click close.

Windows Installation: Device Driver (Windows 8)

Double click the icon labelled “Boost.LAN Manager” on the desktop to open the application.

1. Click on the “File > Find Devices” in the top left hand side of the window. This will find any Omega Ethernet to Serial devices connected to your network. You can find your OM-ES-020 device by selecting a device and matching it with the corresponding MAC address available in the left hand panel (see below). The MAC address of your device is located on a sticker on the side of the OM-ES-020 device.
2. Once found, select the device and scroll to the “Tasks” section on the left hand panel. Now click Install Device as shown below. The device will now begin to install. During the device installation you will see a timer symbol and the status of the device will be ‘Installing driver...’



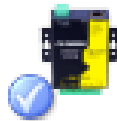
Online - Device Not Installed



OMEGA OM-ES-020 Ethernet
to Serial
OM-ES-020
192.168.127.254

3. In Boost.LAN Manager, the device will display a blue tick symbol showing that it is installed and the status of the device will be ‘Ready’. Shown below.

Online - Device Installed



OMEGA OM-ES-020 Ethernet
to Serial
OM-ES-020
192.168.127.254

4. You can check the COM Number of the Port, by following the instructions in Section 7 Finding your OM-ES-020 COM port. If you need to change the COM port number, see Section 9 Changing Your COM Label).

5. RS-232 Settings

The RS-232 Standard

The RS-232 standard was introduced in 1962, it is now widely established. RS-232 is a slow speed, short distance, single ended transmission system (i.e. only one wire per signal). Typical RS-232 maximum cable length is 50 feet.

In general, you will need to make up a “cross-over” cable to correctly interface the PC to the RS-232 port of another computer or device. Provided you have the pin outs and handshake requirements of both sides of your RS-232 connection, the cross over cable becomes a matter of common sense. The cross-over cable is simply to ensure that the right signals going out of one RS-232 port go into the appropriate lines of the other RS-232 port.

9 Pin D serial port connections to another PC

Suppose we want to connect the OM-ES-020 Serial Port to the serial port of another PC. Connect the earth lines. Line 5 of Serial Port 2, to lines 1 & 7 of the other PC. This gives the two devices a common earth level.

Connect the Transmit and Receive lines together. Line 3, TXD, Port 2 goes to line 3, RXD, of the other PC. Line 2, RXD, Port 2 goes to line 2, TXD, of the other PC. This allows each to receive the data transmitted by the other.

Connect the Port 2 DTR line, pin 4 to the other PC DCD, pin 8 and CTS, pin 5, lines. Also, connect up the other PC DTR line, pin 20 to the Port 2 DCD, pin 1 and CTS, pin 8, lines.

This allows the receiving device to signal when it can no longer accept data. The receiving device sets DTR false when it is unable to receive any more data. The sending device reads DTR on its CTS and DCD pins. It should stop sending when CTS goes false.

Connect the Port 2 RTS line, pin 7, to the other PC DSR line, pin 6. Also, connect the other PC RTS line, pin 4, to the Port 2 DSR line, pin 6. This RTS line is used to let the other device know that it is ready for data exchange.

6. Finding your OM-ES-020 COM port

1. Open Boost.LAN Manager (Found by clicking Start » All Programs » OM-ES-020 » Boost.LAN » Boost.LAN Manager)
2. Click on your OM-ES-020 Device
3. Find the “COM ports” section on the left hand pane.

To change your COM label, see Section 9 - Changing your COM label

Using the OM-ES-020 device with your Equipment

If you are using a COM port based application:

1. Ensure the OM-ES-020 device is powered up.
2. Ensure the OM-ES-020 device is connected to the network (Ethernet LED should be ON)
3. Ensure the OM-ES-020 device is connected to your Equipment via the correct serial port.
4. Ensure the OM-ES-020 device is installed on the PC you wish to control the communications to the equipment with.
5. Open your application on the PC which talks to your equipment.
6. Select the COM port associated with your device.
7. Click “Open” or “OK” to start communications as you would usually when communicating to the equipment using your existing direct serial cable connection.
8. Check the Port LED on the OM-ES-020 device is now ON. This indicates the port is open and is receiving data to and from your equipment.
9. Continue to use your application as normal. If you have problems with your application communicating to the equipment, see troubleshooting guide.

If you are using a socket based application:

1. Ensure the OM-ES-020 device is powered (the power LED should be ON)
2. Ensure the OM-ES-020 device is connected to the network (Ethernet LED should be ON)
3. Ensure the OM-ES-020 device is connected to your Equipment via the correct serial port
4. Determine the IP address and port number for each serial port you’ll be communicating to. Use Boost.LAN Manager to find your OM-ES-020 device by matching the MAC address on the side of the device with the MAC address in Boost.LAN Manager.
5. Open your application and enter the IP address of the OM-ES-020 device and port number for each serial port you’ll be communicating to.
6. Click “Open” or “OK” to start communications as you would usually when communicating to the equipment using your existing direct serial cable connection.
7. Check the Port LED on the OM-ES-020 device is now ON. This indicates the port is open and is receiving data to and from your equipment.
8. Continue to use your application as normal. If you have problems with your application communicating to the equipment, see troubleshooting guide.

7. Testing the OM-ES-020 device

In order to prove that your OM-ES-020 device is functioning correctly, you can perform a loopback test to check the Transmit and Receive lines are working and that you can access the device over the network.

- Perform a loopback: A loopback test will verify that your OM-ES-020 device is able to Transmit and Receive Data. The Transmit and Receive lines will need to be connected so that any data sent out of the OM-ES-020 device is then received back on the same Port. If you are still experiencing problems, see the Troubleshooting Section in this manual.

8. Testing the OM-ES-020 device

In order to prove that your OM-ES-020 device is functioning correctly, you can perform a loopback test to check the Transmit and Receive lines are working and that you can access the device over the network.

- Perform a loopback: A loopback test will verify that your OM-ES-020 device is able to Transmit and Receive Data. The Transmit and Receive lines will need to be connected so that any data sent out of the OM-ES-020 device is then received back on the same Port. If you are still experiencing problems, see the Troubleshooting Section in this manual.

Advanced Configuration

OM-ES-020 devices store the device settings inside the device. When you access the webpage it gets these settings from the device. When you access the driver it gets the settings from the device too. If you have Boost.LAN closed and change a setting on the webpage, the device driver will not know that the settings have been changed on the webpage until Boost.LAN is opened. When Boost.LAN first opens it will update the settings of any installed devices. Therefore you need to open Boost.LAN manager after changing a setting on the webpage in order for the driver to use this new setting.

IP Addressing

- The IP settings can be easily changed by clicking the “Change” link available in the “Device Info” section on the left hand panel of Boost.LAN Manager.
- This will bring up the following dialogue box.
- As mentioned in the “Features” section of this manual, the OM-ES-020 device is shipped in DHCP Mode. On connecting to the network, the device automatically checks if it is connected to a DHCP Server. If this is the case, the DHCP server will allocate an IP address automatically to the OM-ES-020 device.
- If no DHCP Server is detected within 60 seconds (e.g. you are using a direct cable connection to the PC), the OM-ES-020 device will default to the IP address specified in the static IP Settings as shown above. By default, this is 192.168.127.254.

Port Settings

The Port Settings allow you to set Default or Override Settings for the serial communication and how to deal with incoming hardware handshaking events.

- To open 'Port Settings', open Boost.LAN Manager and Double Click on the Omega COM Port Entry.
- Then Click on the 'Port Settings' tab.
- All options can be selected from the Dropdown Menus. In addition, you can enter a non-standard value into the Baud rate

NB – Once the desired settings have been achieved, you must click OK to activate them. At any time click the 'Restore Default' button to return to the original setup.

Default / Override Settings

- The "Default Settings" will be set if an application does not specify the serial settings when it opens the COM Port.
- This is sometimes the case with old Legacy applications and you will need to choose these settings to match the communications that you wish to use.
- The majority of Applications will specify what Serial Settings they wish to use. In this case, it will not matter what the Default settings are, as the Port will be opened with the Application's Settings.
- When the 'Override' box is checked next to the Default Setting, the Port will communicate at this setting whether an application has requested it or not.
- For example, this will enable you to force baud rates that your application does not allow you to select. This can be useful for interfacing to equipment which uses higher baud rates or unusual baud rates, which your application does not support.
- In a case where you want to use hardware handshaking, but your application is not capable, you can select CTS Always True – Hardware state ignored and choose to Override it.

NB with the use of Override Settings, you need to ensure that the equipment you are connecting to be setup to match the communications settings you are forcing.

Changing your COM label

1. If you need to change the COM label, Double click on the Port entry in Boost.LAN Manager
2. Click on the 'Port Settings' tab and click Advanced
3. A new COM Port label can be selected from the dropdown menu. Click OK to set the new COM Label.
4. If the COM Port number is labelled "in use", it is either currently used by a COM Port present on the system, or is reserved for a device which is not currently present. It is possible to select this COM number and force the change, if you are sure it is not required by any other device.

Advanced Settings – TCP/IP Settings

The TCP/IP Settings for the OM-ES-020 COM Port allow you to obtain the OM-ES-020 device's TCP/IP settings without having to go to Boost.LAN Manager or the Webpage interface. Some users may prefer this accessibility.

- To open Advanced Settings, open the Port Settings (as described in section 9) and click the Advanced button.
- Select the 'TCP/IP Settings' tab.
- Device MAC Address: This is assigned when the device is manufactured.
- Remote Device IP Address: If the device is set to DHCP mode the IP address will be automatically assigned by the DHCP server. If it is set to static, this is set by the user either with the Webpage interface or using Boost.LAN Manager. This is useful for finding out the IP address of the ES device to access web page or a COM port.
- Remote TCP Port Number: Number set by user for accessing Port on OM-ES-020 device. This is set to 9001 by default.
- Connection Attempt Timeout: This is set to "0" by default. If "Connection Attempt Timeout" is other than "0", the Telnet connection to the port will be disconnected automatically (i.e. other devices can access this port) after being idle (i.e. no data is being received or sent to and from the port) for a time ranging from 1 – 20 second/s as specified. The LED for the port will go off at this point. If "Connection Attempt Timeout" setting is "0", the port will need to be disconnected manually by the user.

The default settings have been carefully selected and should provide the right settings for the majority of users.

Alternate Access Methods

There are three methods to view and configure your Ethernet Device once it's installed on the target PC. Which method to use depends on personal preference and convenience.

NB: Only certain settings can be configured using the Web Page Interface

- **Boost.LAN Manager:** This is the application that is installed initially to find the device and install the COM port drivers. Configuring from here is the recommended option for ease and convenience, as it centralises all Ethernet to Serial devices.
- **Windows Device Manager:** This is the standard Windows Control Panel that allows users to view and control all hardware attached to a computer. The Ethernet to Serial ports can be configured from here also.
- **Web Page Interface:** This allows the Ethernet to Serial device to be accessed from any PC within your network as it does not require Boost.LAN Manager. Configuration from here is recommended for socket based applications only. See Section 10 for more information about the web page interface.

Proxy Server Settings

If you have a proxy server enabled on your PC this will restrict access to the web page interface. You may need to add the OM-ES-020 device to the Proxy Server's exceptions list. If you need help doing this contact your network administrator.

Device Swapping

In the unlikely event of a device failing, it can be easily replaced by swapping it with a device which has the same IP address. This is particularly useful when using a large number of OM-ES-020 devices together which have already been installed and setup and are already communicating with peripherals. The faulty device can be replaced without having to set up and install a new device. To set the device to the same IP address use the web page interface or Boost.LAN to set the IP address to the static address of the device you are replacing. For more information on IP address configuration see Section 9.

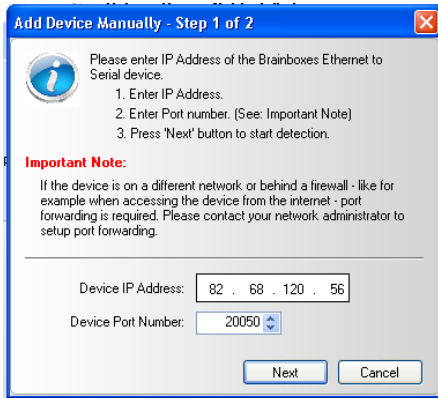
Remote Access

The Remote access feature of the OM-ES-020 devices allows access to the device over the internet or from a different network. The device can be accessed either through the webpage interface, or through Boost.LAN device manager. To access the OM-ES-020 device remotely, you will need the IP address of the router and have port forwarding set up on your router for the device and the ports on your device. If you need assistance setting up port forwarding on your network, contact your network administrator.

Once you have the IP address and port forwarding numbers of the device and the ports, you can either access the device through the webpage or through Boost.LAN.

Adding a remote device using Boost.LAN Manager

1. To access the device through Boost.LAN go to Tools and then click 'Add Device Manually'.
2. Enter the public IP address of your router into the Device IP Address field, and the port forwarding number into the Device Port Number field.
3. Click the 'Next' button.



4. Enter the port forwarding numbers for Port 1 and Port 2 and then click the 'Add' button. The device will then appear in the Boost.LAN manager window. It can then be installed and used as if it were on a local network.
5. Enter the port forwarding numbers for Port 1 and Port 2 and then click the 'Add button

Remote Access Using Web Browser

To access the OM-ES-020 device through the webpage you will need the IP address of your router and the OM-ES-020 device's port forwarding number. Type this address into the navigation bar with a colon then the port forwarding number. For example `http://82.68.120.56:20050/` See the example in the screen shot below.



Serial Tunnelling

OM-ES-020 Ethernet to Serial Devices have a feature called serial tunnelling. Serial tunnelling connects two devices together to create a serial tunnel which extends the serial link over an Ethernet connection. When serial data is sent, it is converted to Ethernet packets by one Ethernet to Serial device, and then transmitted over the network, then unpacked and converted back to serial data by the other Ethernet to Serial device. An example of tunnelling is shown in the diagram below.



To Set up Serial tunnelling

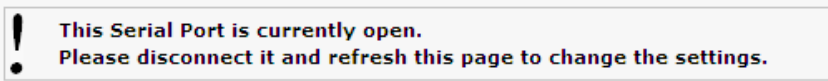
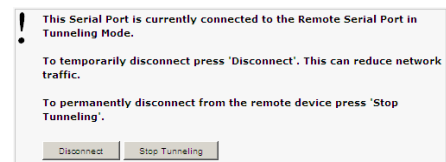
Serial Tunnelling is set up using the webpage interface. In the following instructions there are two devices which are referred to, the local side which is the device that you are connecting from, and the remote side which is the device you are connecting to.

1. Go to the web page interface of the Local OM-ES-020 Device using a web browser.
2. Navigate to the page of the serial port you want to use.
3. At the bottom of this web page is the device tunnelling section.

4. To connect tunnelling tick the enable box and select if you want the device to be master or slave. Enter the Remote IP Address and Remote TCP Port number of the OM-ES-020 device you want to connect to and tick the 'Enable' check box.
5. Click the 'Apply Changes' button and you will be taken to a page which will display a success page. You will be redirected to the port page after the countdown timer has finished.



6. The devices will now be in tunnelling mode.
7. On the Local device port webpage you will see displayed the device tunnelling section with two buttons, 'Disconnect' and 'Stop Tunnelling'. By clicking the 'Stop Tunnelling' button this will disconnect the ports on the remote and local side and put both of the devices into an idle state. If the 'Disconnect' button is clicked the remote side port will be disconnected and go into the idle state, but the local side will remain in tunnelling mode.
8. When the remote port is disconnected the local port webpage shows a 'Connect' button. When this button is pressed the remote device will be connected to the local device and tunnelling will be connected.



9. On the remote device port webpage interface, on the Serial port that is tunnelling it will show that the port is connected.
10. In Boost.LAN Manager, the symbol in the image to the right will be displayed when a device is connected in tunnelling mode.

Firewall Exceptions and Port Numbers

When using the OM-ES-020 devices with a firewall you may need to manually add the exception entries and port numbers to the firewall list. Listed below are the default port numbers and the firewall exceptions:

Program Name	Default port number
Device Web Server	80
Serial Port 1	9001
Serial Port 2	9002
Firmware Upgrade	67 (BOOTP Server)
	68 (BOOTP Client)
	69 (TFTP Port)

Default Windows Firewall Exception entries:

- OM-ES-020 Boost.LAN Suite
- OM-ES-020 Boost.LAN Suite (Device discovery) (except Windows XP 32 & 64 bits)
- UPnP Framework (Windows XP 32 & 64 bits)
- Network Discovery (Windows 7 or later)

UPnP on/off

The screenshot shows a web interface titled "Other Settings". It contains a "Web Server Port" field with the value "80" and a note "(1-65535)". Below this, the "UPnP" setting is shown with two radio buttons: "On" (which is selected) and "Off". At the bottom right, there are two buttons: "Apply Changes" and "Reset".

Turning the UPnP of your device off or on can only be done using the web page interface and will mean that the OM-ES-020 device won't be broadcasting on the network. This means you won't be able to search for the device using Boost.LAN Manager. You can however add the device manually if you know the IP address and port number.

It is recommended when using Boost.LAN Manager that you install the driver before turning off the UPnP. This will ensure that when Boost.LAN is opened, the installed device will be displayed in the Boost.LAN device manager panel.

Transmission Interval

The transmission interval can be set via the web configuration page. The factory default for the Transmission Interval is set to 0. With the transmission interval set to 0 milliseconds, the incoming data is transmitted straight away, in small bytes which cause a lot of network traffic and high CPU usage on the PC receiving the data.

When there is a transmission interval set, there is a delay on sending the data. The first byte of data that comes in is sent immediately but after this no further data is sent until the transmission interval time has passed. The OM-ES-020 device then accumulates any further bytes of data and then sends them all together in one large chunk after the transmission interval, reducing network traffic and CPU usage.

Transmission Interval : milliseconds
(0-10)

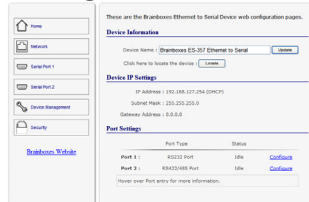
Note: *Transmission interval will not be used if set to '0'. In this case data is sent immediately at the cost of higher network traffic.*

9. Web Page Interface

The OM-ES-020 device can be accessed from any PC within your network as it does not require Boost.LAN Manager.

To access the OM-ES-020 device web page:

1. Obtain the IP Address of the OM-ES-020 device via the Boost.LAN Manager
2. Type the IP address in your internet browser and hit Enter
3. The OM-ES-020 device webpage interface should appear allowing you to view and configure the OM-ES-020 device settings.



NB: Please bear in mind, if you are using the Windows driver to create a COM port then port settings detailed on the web page are overridden in the driver. The settings available through the web page only apply to socket based applications.

The webpage provides:

- Summary of current IP and Serial Port Settings (available on Home Page)
- Separate pages to configure each serial port.
- Serial Port Settings:
 - Baudrate (Maximum 1M baud)
 - Databits (8, 7, 6, 5)
 - Stopbits (1, 2)
 - Parity (None, Even, Odd, Mark, Space)
- Networking Protocol settings for each Serial Port:
 - NB: If you are using the Windows driver to create a COM port then the driver will use Telnet + COM port Control Mode (Server) regardless of the protocol setting set on the webpage.
 - RAW TCP: Data sent over the network is the same as the data sent over the serial link. Any configuration of the serial port settings will need to be set via the web page.
 - Telnet + COM port Control Mode (Server): This is based on the RFC2217 standard which lets the serial ports settings be configured dynamically. Data is then encapsulated over serial link
- Telnet
- IP Settings
- Device Tunnelling Setup
- Device Management to:
 - Restart OM-ES-020 device
 - Restore factory settings
- Security settings:
 - Enable Administrator account
 - MAC Address restriction
 - Enable user account

10. Security

Anyone with access to the network can access the webpage of your OM-ES-020 device and change its settings. To prevent this from occurring, there are security features available on the device that can restrict access to certain web pages to account holders only.

Administrator Access Settings

Creating an Administrator account restricts access to the Security Page to the Administrator account holder. All other pages are still accessible to other users.

- To create an Administrator account:
 1. Open the device's Webpage by typing the device's IP address into a browser
 2. On the left hand menu, click Security. This will open the device's Security Settings page.
 3. Enter a username and password in the "Administrator Access Settings" section
 4. Click "Apply Changes" at the bottom of the page.
 5. To access the security page of the device via the webpage again, you will be prompted with a log in prompt. Only the administrator will have access to this page.

User Access Settings

Creating a User Access account restricts complete access to the web page interface of your device to a User Account or Administrator account holder. No configuration page can be accessed without logging in using the user or administrator log on credentials.

- A User account may be created without an Administrator account.
- Both an Administrator and User Account can be set up on the same device. If both are setup, the Security Page will be restricted to the Administrator account holder only. If just a User is setup, then the User has access to all areas.
- To create a User account:
 1. Open the device's Webpage by typing the device's IP address into a browser (see Section 10 for further details).
 2. On the left hand panel, click Security. This will open the device's Security Settings page.
 3. Enter a username and password in the "User Access Settings" section
 4. Click "Apply Changes" at the bottom of the page.
 5. To access the web interface of the device again, you will be prompted with a log in prompt. Only an administrator or user will be able to log in.

MAC Address restriction

In addition to Administrator and User accounts to restrict access to users with the correct log on credentials, there is a feature called “MAC address restriction”

- MAC address restriction is available under both Administrator and User settings.

The screenshot displays two sections of a web interface for configuring MAC address restrictions. The top section, titled "Administrator Access Settings", includes fields for "User Name" and "Password", followed by a section for "Administrator MAC Address Restriction" with an "Enable" checkbox and a "MAC Address" field containing six boxes, each with "00". The bottom section, titled "User Access Settings", includes fields for "User Name" and "Password", followed by a section for "User MAC Address Restriction" with an "Enable" checkbox and a "MAC Address List" field containing a link to "Modify MAC Address List".

Administrator Access Settings

User Name :

Password :

Administrator MAC Address Restriction :

Enable : ☐

MAC Address: : : : : :

User Access Settings

User Name :

Password :

User MAC Address Restriction :

Enable : ☐

MAC Address List : [Modify MAC Address List](#)

- Enabling MAC address restriction means access to the device will be limited to Administrators or Users with the MAC addresses specified in the MAC Address list. For example
 - The Administrator/User is expected to always log in from the same MAC address. Even if the correct username and password are entered, access will be refused if the MAC address is different.
- WinSock and UPnP communications are also restricted to specified MAC addresses.
- Administrators are automatically Users, so there is no need to add the Administrator MAC address to the User MAC address list.
- With MAC address restriction enabled, the device will only appear visible on specified MAC addresses.

Restricting “Reset/Restore Default”

Once an Administrator account is set up, access to the “Device Management” page to “Reset or Restore Default settings” is still available to all users. Alternatively, if both an Administrator and User are set up, both the Administrator and User can access the page.

To avoid any unauthorised “Resetting or Restoring to Default”, the following features are available:

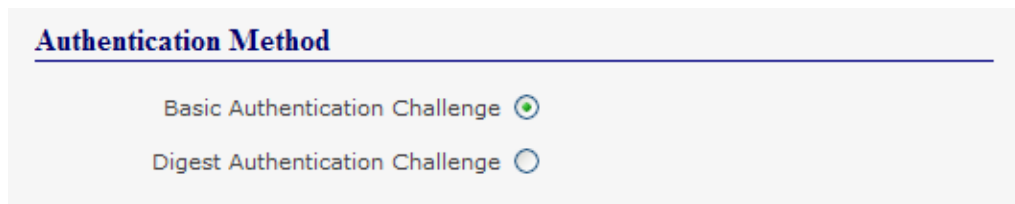
- Everybody: This will restrict the ability to reset or restore to those with an administrator or user account
- Admin only: This will restrict the ability to reset or restore to the administrator only.



- NB: You must set up an Administrator account or a User account (or both depending on requirements) for “Reset/Restore Defaults Protection” to take effect.

Authentication Method

There are two authentication methods:



- Basic Authentication Challenge: Log on credentials are passed as plaintext over the network.
- Digest Authentication Challenge: Log on credentials are encrypted when sending over the network and as such, more secure than Basic Authentication Challenge.

11. Exporting & Importing Device Settings

It is possible to export the devices current settings to a file, and then import these settings at a later date. This feature is available in the Boost.LAN Manager. At the time of going to print, the export feature exported the following settings:

- Firmware Network Settings.
- Firmware Serial Port Settings.
- NB: This feature does not currently back up driver port settings. This is because the driver serial port settings and firmware serial port settings are not linked.

Exporting Device Settings

1. Open Boost.LAN Manager
2. Find and select your installed OM-ES-020 Device.
3. On the left hand panel of the window, scroll down to the “Other Tasks” section.



4. Select “Export Settings”
5. Browse to a location where you wish to save the settings file to.
6. Enter a file name in the “File name” box. E.g. “Device Model, Firmware Version XX“ etc)
7. Press Save.

Importing Device Settings

1. Open Boost.LAN Manager
2. Find and select your installed OM-ES-020 Device
3. On the left hand panel of the window, scroll down to the “Other Tasks” section
4. Select “Import Settings”
5. Browse to the location where you saved the settings file.
6. Select the file and press Open
7. The device will then import the settings.

12. Rebooting Device

We strongly recommend that you check that the device is NOT in operation before doing this to prevent data loss.

Rebooting in Boost.LAN Manager

If for any reason you wish to reboot your device, whilst still retaining the existing settings:

1. Open Boost.LAN Manager
2. Find and select the OM-ES-020 device you wish to reboot.
3. On the left hand panel of the window, scroll down to the “Other Tasks” section
4. Select “Reboot Device”
5. Any connections you may have had to the COM port may need to be reopened.

Manual Reboot (power cycle)

1. Press the reset button once and after 5 seconds the device will reboot.
2. The device will restart and any connections you have had to the COM ports will need to be re-established.

13. Restoring to Factory Default

Restoring back to Factory Default Settings

We strongly recommend that you check that the device is NOT in operation before doing this to prevent data loss.

If for any reason you wish to restore the OM-ES-020 device back to factory default settings:

1. Open Boost.LAN Manager
2. Find and select the OM-ES-020 device.
3. On the left hand side of the window, scroll down to the “Other Tasks” section
4. Select “Restore Factory Settings”

See Section 3 for factory default settings.

Manual Hard Restore

1. Press and hold the reset button on the OM-ES-020 device for 15 seconds.
2. The device will then be restored to factory settings.

14. Firmware Upgrade

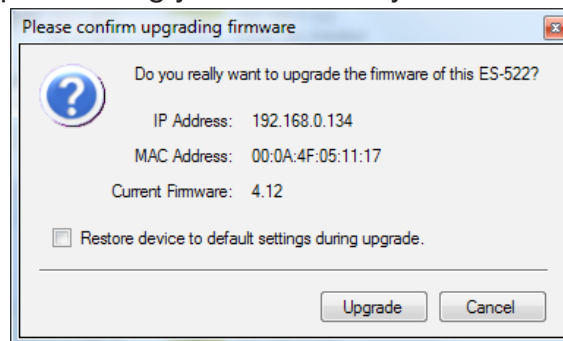
To upgrade your firmware to the latest release follow the instructions below:

NB: If you have firmware 3.12 or older we recommend running the firmware upgrade with the OM-ES-020 device connected directly into the PC using an Ethernet cable.

1. Open Boost.LAN Manager
2. Select your device from the Boost.LAN window.
3. Make a note of the current firmware version on the left hand panel.
4. Close Boost.LAN Manager.
5. Visit Omega's website, www.omega.com and locate the latest firmware version for your device. Alternatively, contact Omega Technical Support via das@omega.com and request the latest firmware version be sent to you.
6. If the firmware online or received by Omega Technical Support is a later version, download and save the file to a location you will remember
 - the firmware is NOT a later version, do not proceed with the upgrade.
7. Open the Boost.LAN Manager
8. Select your device
9. Go to the left hand panel and select "Firmware Upgrade"



10. A message box will appear asking you to confirm you wish to upgrade the firmware.



11. Press OK
12. Browse to the directory where you saved the latest firmware.
13. Select the firmware (the file extension will be .efw)
14. Press Open
15. Do not disconnect the OM-ES-020 Device from the network or power during the upgrade process.
16. Once the upgrade process is complete, select the device and check the firmware version shown in the left hand panel is now the later version.

15. Uninstallation

It is possible to uninstall individual OM-ES-020 devices from your computer or remove the complete Boost.LAN Suite.

Complete Boost.LAN Suite Uninstallation

This will remove all Boost.LAN related software, including the Boost.LAN Manager and device driver.

This can be done at any time, with or without the device connected.

1. Open Control Panel, and then open “Add or Remove Programs”
2. Click on the “Boost.LAN Device Driver Suite” and then click Remove
3. The Boost.LAN Suite will then be uninstalled.

Individual Device Uninstallation

This can be done at any time, with or without the device connected

1. Open the Boost.LAN Manager
2. Find and select your OM-ES-020 device
3. Click “Remove Device” on the left hand panel
4. Once the device is removed, it will be listed in the “Online – Driver not installed” section.

When finished, you may disconnect your OM-ES-020 device. To reinstall, simply follow the installation instructions as in Section 4.

15. Troubleshooting and Testing

The most common problems and frequently asked questions for the ES range of devices are listed in the table below along with descriptions and suggestions for corrective actions.

Question	Description	Solution
Problems installing Boost.LAN Device Manager	Boost.LAN installation wizard has not completed or shows an error	Restart the PC and try installing Boost.LAN again. Check if there is an updated driver package online at http://www.omega.com
Can't find OM-ES-020 device in Boost.LAN Device Manager	When the 'Find Devices' button is clicked the device isn't displayed in Boost.LAN manager.	Check that the device is correctly powered up and plugged into the network. Check the Ethernet and status LED behaviour (see Section 3 Hardware Features) Ensure Boost.LAN Suite is set as an exception in Windows Firewall if it is enabled, and any other custom firewall that you have installed. If you have a proxy server installed check Boost.LAN is on the exceptions list. If you are connecting through a router check that port forwarding is enabled on the router.
Problems installing Boost.LAN COM port driver	Can't install the OM-ES-020 device COM ports.	If device manager shows error messages for the Ethernet to serial device and ports (errors are indicated by a yellow exclamation mark), it is recommended to uninstall and re-install. If the problem is still present after trying the above, try another computer to narrow down the problem.
Code 10 Error in Device Manager	Device Manager reports "This device cannot start. (Code 10)"	In the device Properties dialog box, click the Driver tab, and then click Update Driver to start the Hardware Update Wizard. Follow the instructions to update the driver. Install the latest drivers found on our website. Try installing the COM port on a different PC.

Troubleshooting and Testing continued

<p>Cannot open COM port</p>	<p>There is an error when trying to open the COM port</p>	<p>Check the Ethernet cable is plugged in to the device.</p> <p>Check the OM-ES-020 device is correctly installed, and the ports appear in Device Manager without any errors (Errors are indicated by a yellow exclamation mark.)</p> <p>Make sure that the port you are trying to open is not being blocked by a firewall that may be installed.</p> <p>If you are using a hub/switch or another device between the network server and OM-ES-020 device, check that it's powered and working correctly.</p> <p>If you are using the OM-ES-020 device in Static IP mode, check that its IP address is in the same sub-net as the server.</p> <p>Check that there are no IP address conflicts on the network.</p> <p>Check if there is an updated firmware or software driver package for your OM-ES-020 device by contacting Omega</p> <p>Technical Support with your existing software version.</p> <p>Check the status LED behaviour. (See Section 3. Hardware Features)</p> <p>If the status LED is showing a problem perform a power cycle, and if there is still a problem restore the factory settings. (See Section 13)</p> <p>Make sure that you have access to the device which you are trying to open the COM port of.</p> <p>If the problem is still present after trying the above, try a different network card if possible.</p>
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Communication Problems	Problems transmitting or receiving data through the port.	<p>Check the status LED behaviour. (See Section 3. Hardware Features)</p> <p>If the status LED is showing a problem perform a power cycle, and if there is still a problem restore the factory settings. (See Section 13)</p> <p>Perform a loopback: The loopback test will verify that your OM-ES-020 device is able to Transmit and Receive data. The transmit and receive lines are connected together so any data sent is received on the same port.</p>
Can't access OM-ES-020 configuration webpage	When you try to access the webpage by typing the IP address into the address bar of your web browser, the page cannot be displayed.	<p>Check the status and Ethernet lights on the device show that the device is connected to the network and ready. (See section 3 Hardware Features)</p> <p>Check that the IP address is the correct one. If you are on a private network the default IP address is 192.168.127.254.</p> <p>If you have a proxy server installed check IP address of the device is on the exceptions list.</p>
Error page loads when trying to load web Configuration page	When loading the web configuration page, the OM-ES-020 web page loads with an error.	<p>Check that you have user or admin access to the device that you are trying to load. If the security settings are on you will need your MAC address added to the access list.</p> <p>To clear the security settings you will need to hard reset the device by holding the reset button on the device for 10 seconds. You will then have access to all the web configuration pages.</p>
Problem Upgrading Firmware	The upgrade process does not start or continues to restart without completing successfully	<p>We recommend using a direct Ethernet to PC connection when upgrading the firmware of your OM-ES-020 device. Using this private network means the upgrade will run smoother and quicker because there is no other traffic on the network.</p>

Old hardware / equipment	Users often have old hardware or equipment which they think may not work with the OM-ES-020.	OM-ES-020 use 16C950+ UART which can meet the most stringent demands. It has very tight timing characteristics implemented in the hardware. It supports between 60 baud and 1,000,000 baud (1Mb). Also supports any custom baud rate as standard. It has a 2 kilobyte FIFO on Rx and Tx.
Grounding	Grounding the device for a return path for induced common mode noise and receiver current.	OM-ES-020s have a Signal Ground connection on each serial Port. Connect the Ground wire to this; optionally add a 120 Ω 1Watt resistor in series at one end of the Bus.

Should the problem still persist with your OM-ES-020 device please contact das@omega.com with:

- Your Loopback test result
- IP address
- Static or DHCP setting
- COM Setting required (baud rate, data bits, parity, stop bits and handshaking)
- Firmware and Driver version.

16. Linux support for OM-ES-020 devices

The OM-ES-020 can work in Linux but the drivers are not compatible, which means you cannot use Boost.LAN. To use the device, you would have to open the port using the IP address. You can configure the settings etc. using the device webpage (by entering its IP address into your search bar).

It is possible to communicate with the OM-ES-020 devices from Linux for both configuration and communicating with attached devices using standard serial port applications. This is achieved by using the Cyclades Serial Client application.

NB the Cyclades Serial Client application is open source software, which is not owned or distributed by Omega. Omega cannot be held responsible for any loss or damage incurred from using this software.

Configuring the OM-ES-020 device from Linux

To configure the device, you will need to know the device's IP address. You should be able to get this information from your network administrator. If this is not possible, you can search for the ES device from a Linux machine using `upnp_search.pl`. This can be found on the CD in the directory Product Support/Utilities/Linux Tools and requires Perl to be installed along with the Net::UPnP Perl module.

- Configuration of all the options on the device can be done using the Web page interface. This can be done from any OS, using any modern browser (e.g Mozilla Firefox, Konqueror, Opera, etc) See Section 10.
- Note: The Cyclades Serial Client will not be able to track changes in the IP address of an ES product on the network. It is for this reason that we recommend setting the device to a static IP address on the OM-ES-020 device when used with Linux.

Using Cyclades Serial Client to communicate with OM-ES-020 device ports

- The Cyclades serial client can be downloaded as an rpm, or can be installed from the standard package repositories of many popular flavours of Linux, including Debian and Ubuntu.
- After installation, the correct details for the OM-ES-020 ports will need to be added to the `/etc/cyclades-devices` file. You will require one configuration line for each port, which contains the following details in a colon separated format;
 - `devname` » the device node in `/dev`, e.g. `/dev/ttyS0`
 - `rastype` » this is just set to `Omega`
 - `rasname` » the IP address of the OM-ES-020 device on your network
 - `physport` » port number on the device
 - `type` » communications protocol. Set to `rfc2217`
 - `options` » further device specific options `-p 9000 -d 0`

Example lines for and OM-ES-020 device are given below;

```
/dev/ttyS8:Omega:192.168.0.223:1:rfc2217:-p 9000 -d 0
```

```
/dev/ttyS9:Omega:192.168.0.223:2:rfc2217:-p 9000 -d 0
```

See `man cyclades-devices` and also text within `/etc/cyclades-devices` for more information.

- After the OM-ES-020 product port information has been added to the `/etc/cyclades-devices` file, the cyclades device server should be started and stopped using the commands (as root);
 - `cyclades-serial-client start`
 - `cyclades-serial-client stop`
 -

These should be integrated into your `rc.d` scripts so that the OM-ES-020 devices are initiated and stopped on your system start up and halt.

17. Lifetime Warranty and Support

Technical Support is free. As long as you have an OM-ES-020 Product we will be happy to help, even if it's discontinued or out of warranty. Excellent Customer Service, just as it should be.

For the quickest solution to your issue, if you email us, please include as much detail of your setup and the fault you are experiencing.

Email:

Technical Support: das@omega.com

Sales Enquiries: sales@omega.com

Telephone:

You can speak to Omega's Support or Sales teams direct, Monday – Friday, 8:30am – 6:00pm (EST)

Tel: 1-800-USA-WHEN
1-800-872-9436

18. Technical Specifications

Device specification

Network connection

10Base-T or 100Base-TX Ethernet connection
Standard 8P8C ("RJ45") socket connector
TCP/IP protocol stack
DHCP or static IP address
Automatic transmit/receive crossover detection
1500V isolation

RS-232 Serial Port

Baud rates up to 1M Baud
5, 6, 7 or 8 data bits
1 or 2 stop bits
Odd, even, mark, space or no parity bit
Line-break generation and detection
RTS/CTS, XON/XOFF flow control option
ESD protection to 15kV human body model
Can be connected to as a Windows COM port, as a raw TCP socket, or using the RFC2217 standard
Serial cable length: 3m maximum (EU only)

Power

Wide-range 5-30V DC power input (1.0W typical, 1.8W maximum)
Reverse voltage protected
ESD and surge protected
Earthing connection point

!! Caution - Do not attempt to operate this product with any other power supply/rating than that specified.

LED indicators

Indicators for the network and serial ports show when a connection is open and when data is being transferred.
Three-colour status LED provides additional information on the status of the device.
For more information see LED information in Section 3. Hardware

Physical

Plastic enclosure

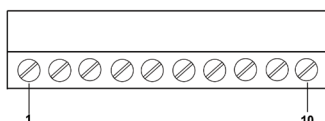
Mounting flanges for wall-mounting or attachment of optional DIN-rail mounting kit

Once your wiring is setup, you will also need to set the device to FULL or HALF Duplex mode in the software. For further details, see Section 6

Terminal Block Connector Pin out

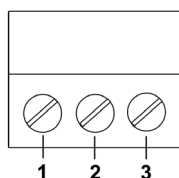
OM-ES-020 devices terminal block connectors have the signals detailed below.

1. RS-232 1 Port



Pin 1	TxD
Pin 2	RxD
Pin 3	RTS
Pin 4	CTS
Pin 5	GND
Pin 6	DTR
Pin 7	DSR
Pin 8	DCD
Pin 9	RI
Pin 10	GND

2. Power Terminal Block



Pin 1	V+ Power Supply
Pin 2	V- Power Supply
Pin 3	Earth/Chassis Ground

Storage and Operating Environment Guidelines

Storage

Temperature: -10oC to +70oC

Humidity: 8% to 95% non-condensing

Operational

Temperature: 0oC to +50oC

Humidity: 20% to 75% non-condensing

19. Regulatory Approvals / Compliance

For up to date details of global certifications, please check the product datasheet on the Omega website.

Europe – EU Declaration of Conformity

The OM-ES-020 Ethernet to serial devices conform to the protection requirements of European Council Directive 2004/108/EC.

The products are designed to meet the standards detailed below. The Declaration of Conformity and supporting Technical Construction File is available by request from Omega.

EN 55022:1998 A2:2003

Class A Information technology equipment — Radio disturbance characteristics — Limits and methods of measurement

EN 55024:1998 A2:2003

Class A Information technology equipment — Immunity characteristics — Limits and methods of measurement

This product is a Low Voltage Device, designed and manufactured to EN60950 safety standard. On no account should the power supply be opened or modified in any way; if damaged, the power supply must be disposed of, observing local arrangements for recycling.

The OM-ES-020 range has been made to comply with the latest EMC standards.

WEEE Directive (Waste Electrical and Electronic Equipment)

The WEEE Directive 2004/96/EC came into force, in the UK, at the beginning of 2007.

Customer Responsibilities

At the end of life, this product must be disposed of in accordance with WEEE regulations. This can be done through your local civic amenities site, an approved treatment facility or alternatively through a relevant compliance scheme.

RoHS Compliance

All OM-ES-020 products are fully RoHS compliant.



What is the RoHS Directive?

The RoHS directive (2002/95/EC the Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment) prohibits the sale of electrical and electronic equipment containing hazardous substances. A list of these hazardous substances includes lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenylethers. RoHS affects each and every electronics manufacturer, directly or indirectly, regardless of geographical location or the equipment they produce.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC., warrants this unit to be free of defects in materials and workmanship for a period of 61 months from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal five (5) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

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 in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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 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 RETURNS, 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 the product and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords customers the latest technology and engineering.

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PRESSURE, STRAIN AND FORCE

Transducers & Strain Gages
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Instrumentation & Accessories

FLOW/LEVEL

Rotameters Gas Mass Flowmeters & Flow Computers
Air Velocity Indicators
Turbine/Paddlewheel Systems
Totalizers & Batch Controllers

PH/CONDUCTIVITY

pH Electrodes Testers & Accessories
Benchtop/Laboratory Meters
Controllers, Calibrators, Simulators & Pumps
Industrial pH & Conductivity Equipment

DATA ACQUISITION

Data Acquisition & Engineering Software
Communications-Based Acquisition Systems
Plug-in Cards for Apple, IBM, & Compatibles
Data Logging Systems
Recorders, Printers, & Plotters

HEATERS

Heating Cable
Cartridge & Strip Heaters
Immersion & Band Heaters
Flexible Heaters
Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

Metering & Control Instrumentation
Refractometers
Pumps & Tubing
Air, Soil & Water Monitors
Industrial Water & Wastewater Treatment
pH Conductivity & Dissolved Oxygen Instruments