User's Manual

AXIS 2490 Serial Server

Network Access to Serial Devices

AXIS® COMMUNICATIONS

About This Document

This document is intended for administrators and users of the AXIS 2490 Serial Server, and is applicable for software release 2.0. Although many of the operational aspects of the product are described in the on-line help, this manual does contain information for configuring, managing and using the unit in your networking environment, as well as a general overview of the product functionality.

Readers are recommended to use this manual as a supplement to the Wizards and other online information available via the Web-based interface. Later versions of this manual will be posted to the Axis Website, as required.

Safety Notices

Please observe all safety markings when using this product.
Caution! - Potential hazard that can damage the product.

Important! - Potential hazard that can seriously impair operation.
Do not proceed beyond any of the above notices until you have fully understood the implications.

Electromagnetic Compatibility (EMC)

USA – This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user will be required, at his/her own expense, to take whatever measures may be necessary to correct the interference. Shielded cables should be used with this unit to ensure compliance with the Class A limits.

Europe CE – This digital equipment fulfills the requirements for radiated emission according to limit B of EN55022/1994, and the requirements for immunity according to EN55024/1998 residential, commercial, and light industry.

Liability

Every care has been taken in preparing this manual. If you find any inaccuracies or omissions, please inform your local Axis office. Addresses and telephone numbers can be found on the AXIS website at www.axis.com.

Axis Communications AB cannot be held responsible for any technical or typographical errors and reserves the right to make changes to the product and manuals without prior notice. Axis Communications AB makes no warranty of any kind with regard to the material contained within this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Axis Communications AB shall not be liable nor responsible for incidental or consequential damages in connection with the furnishing, performance or use of this material.

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Warranty

This product is supplied with a 1-year warranty. Please register your product at http://warranty.axis.com

Support Services

Should you require any technical assistance, please contact your local dealer. If your questions cannot be answered immediately, your dealer will forward your queries through the appropriate channels to ensure you a rapid response. If you are connected to the Internet, you can obtain on-line manuals, technical support, software updates, application software and general corporate information from www.axis.com

AXIS 2490 User's Manual
Revision 1.1
Part No:
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Overview

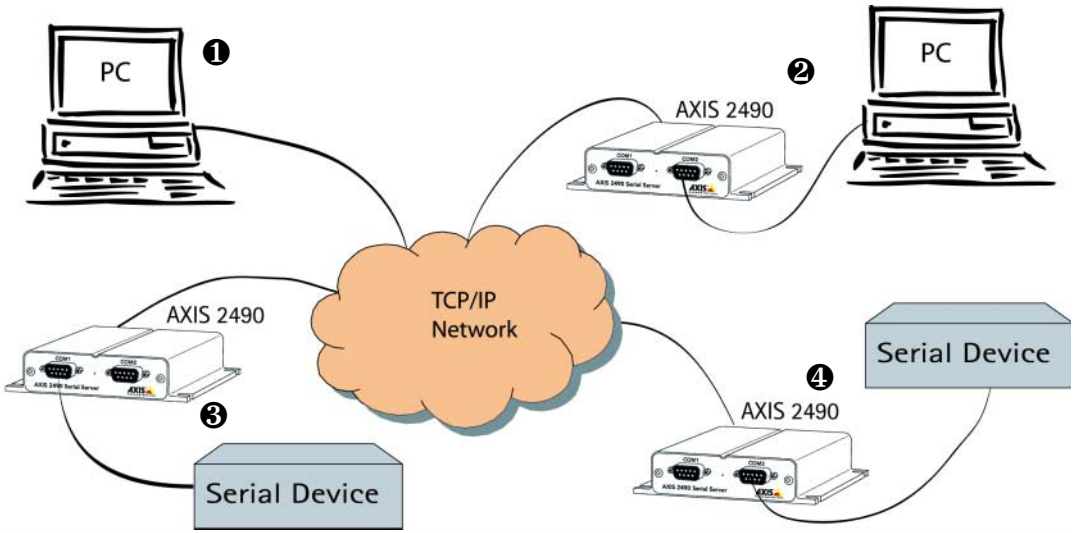
The old way of installing serial devices was by connecting them to PCs, either directly with serial cables or by using modems. This often required a lot of PCs, long cables, etc.

The AXIS 2490 Serial Server makes it possible to connect serial devices directly to a network without using a PC, thus providing applications with convenient remote access to these resources via HTTP and TCP/IP. The illustration below shows the following physical setups:

❶ to ❸ The PC application uses a network socket or a COM-Port redirector to communicate.

❷ to ❹ PC to Serial Server to network. This can be used if you have an old application that uses the serial port and when you can't use a COM-port redirector.

❸ to ❹ Two serial devices connected to each other via a "virtual extension cable".



For more information, please refer to *The AXIS 2490 in Your Application,* on page 9.

With its own built-in Web server, the AXIS 2490 allows direct access from any browser on the network and provides full Web-based control of the management and configuration functions.

The AXIS 2490 Serial Server supports high data rates and high throughput. It enables 10 Mbit and 100 Mbit Ethernet network access to serial devices using TCP/IP or HTTP as the transport protocol.

One or two serial servers replace long cables and one PC, allowing dramatic reductions in installation costs. The network solution also makes it possible to contact the application/device remotely. As there are no physical confinements, the device can be managed from anywhere within the network and controlled centrally, which is useful if many people need access. Service engineers especially, will find it much more convenient to troubleshoot devices remotely. System uptime will also be increased, as many moving parts, i.e. the hard drives in the PC's, are eliminated.

Features and Benefits

Easy to Use – The AXIS 2490 is completely independent of any other server and requires no special hardware or software. All you need is Netscape Navigator 4.x or above, or Microsoft Internet Explorer 4.x or above. The AXIS 2490 has complete plug-and-use functionality - all you need do is assign a valid IP address.

Simple Installation – The AXIS 2490 connects directly to Ethernet or Fast Ethernet networks, Its Web-based interface greatly simplifes the installation process, and allows a seamless integration into your networking and application environments.

Open Standards Environment – Supporting TCP/IP, HTTP and other protocols, the AXIS 2490 can be used in mixed environments, such as Windows, UNIX, Macintosh and OS/2. Integrates easily into other WWW/Intranet applications and CGI scripts.

Simple Administration – Configuration and management via the product's own Web-based Administration Tools. Adjust the settings for; serial ports, security, the network etc, directly from your browser.

Security – Data protection is normally implemented by your Network Administrator using the unit's security settings in combination with an organization's Internet firewall. The Administrator can decide whether individuals, groups, the whole company or the whole world may access your Serial Server. The AXIS 2490 supports multi-user password protection. Furthermore, when using the serial ports in TCP/IP mode, it is also possible to specify **Allowed Users** and **Allowed IP-addresses**.

AXIS Technolgy – Axis' renowned chipset technology is built on an open architechture that is streamlined to provide device connectivity independent of any file server.

The AXIS 2490 is driven by a powerful AXIS ETRAX 32-bit RISC processor.

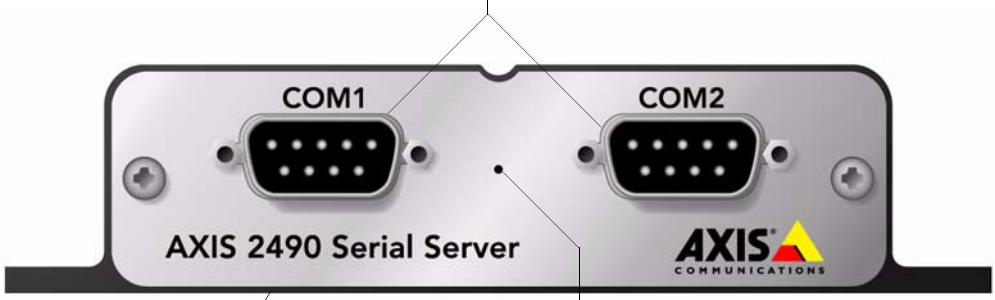
Linux Operating System – Including a Boa Web server, the Linux operating system provides a stable platform for open-source development in future releases of the product. In accordance with the *GNU General Public License*, Axis have published the kernel for this product at http://developer.axis.com/. Axis would like to thank Paul Phillips, who wrote Boa; and Larry Doolittle, who is now enhancing and maintaining this free software - published at www.boa.org.

Complimentary Software – AXIS IP Installer - for quick installation of multiple units.

Product Description

Read the following information to familiarize yourself with the AXIS 2490, making particular note of where the connectors and indicators are located.

Front Panel



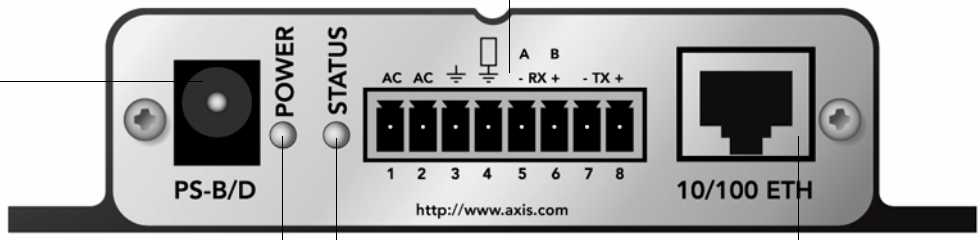
Two RS-232 serial ports, 9-pin male D-SUB. Both ports support: RX, TX, RTS, CTS, DSR, DTR, RI and CD.

Serial Number
Located on the underside label of the AXIS 2490, the serial number is identical to the Ethernet address of the unit.

Control Button
Used to reset the unit and to reinstate the factory settings.

Rear Panel

Screw Connector Block
One RS-485/RS-422 serial port on screw terminal block. The block connector also provides an auxiliary connection point for AC or DC power to the unit.



Power Supply Connector
A single Jack socket (PS-B) for connection of AXIS 2490 power supply.

Status Indicator

Power Indicator

Network Connector
The AXIS 2490 is designed for 10 Mbps Ethernet and 100 Mbps Fast Ethernet networks and connects to the network via a twisted pair category 5 cable (10baseT and 100baseTX) terminated using a standard RJ-45 connector. Supporting NWAY, the AXIS 2490 detects the speed of the local network segment and varies the speed of data communication accordingly, between 10 Mbps and 100 Mbps.

Assembling Your Unit

The information provided in this section will help you unpack and assemble your product; you are then ready to proceed with the installation and configuration of the product into your application environment, as described in the following sections of this document.

Checking the Hardware Inventory

Unpack and check all the items against the itemized list below. You should contact your dealer immediately if you find anything is missing or damaged.

Item	Model Variants	Part Numbers
Serial Server	AXIS 2490	0108-001-01
Power Supply (PS-B)	Europe	13267
	UK	13268
	Australia	13269
	USA	13270
	Japan	13936
4 x Rubber Feet		13933
4 x Screws	ST4.2X25 RXS-Z FZB	17645
4 x Plugs	30X3.5-4MM	17644
Printed Materials	Getting Started Guide AXIS 2490 R1.0 (or later)	17298

The AXIS 2490 in Your Application

The AXIS 2490 can be used in a wide variety of applications. Installing directly onto an Ethernet network, the product is completely independent and requires no additional software, unless you plan on using a COM-port Redirector (see below).

This section will help you prepare for the installation and configuration of the unit. Not to be regarded as a comprehensive catalog of possible applications, the section describes several typical general applications. For more examples of applications, see *Examples,* on page 35.

Networking Applications

Traditionally, serial devices have always been connected to PCs, either directly by cables or via modems. Now, however, you can use an existing Ethernet network (LAN/WAN) to connect to your serial device. Using the AXIS 2490 Serial Server as the link between the serial device and the network, simply connect the device to the AXIS 2490, which in turn plugs into the LAN/WAN. Lastly, set the IP address for the Serial Server and you're ready to start using your serial devices over the network.

Port Modes

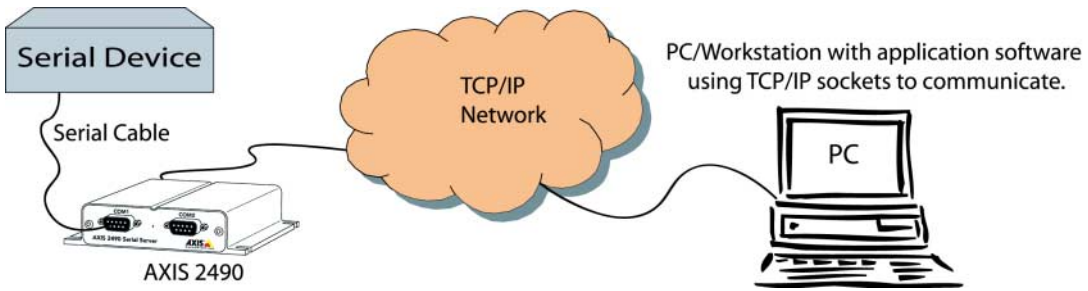
The Serial Server has two operational modes: Generic TCP/IP and Generic HTTP. The mode can be set independently for each serial port: (two RS-232 ports and one RS-422/485 port).

Generic TCP/IP

This mode is as a data connection for transparent communication, where the AXIS 2490 can act both as a server and a client. The mode can be used for the following configurations:

Remote access using an application with network support

The AXIS 2490 supports the Telnet option for COM port control according to RFC2217. This is one example of how the setup shown below can be used. Please see *Protocols,* on page 27 for a complete list of the protocols supported.

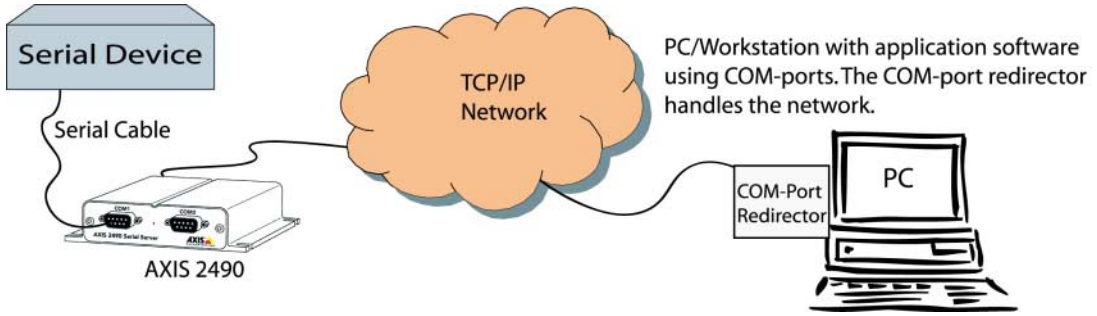


Telnet RFC2217 Options

COM port control according to RFC2217 uses telnet options in the data stream to encapsulate status and control information. It can be used to control the state of the control outputs (RTS and DTR) and to monitor the state of inputs (CD, DSR, CTS and RI). It can also be used to control the COM port settings, such as baudrate, parity settings etc. A COM port redirector that supports RFC2217 will configure the baud rate etc., to the configuration set by the application on the PC.

Remote access using a COM port redirector

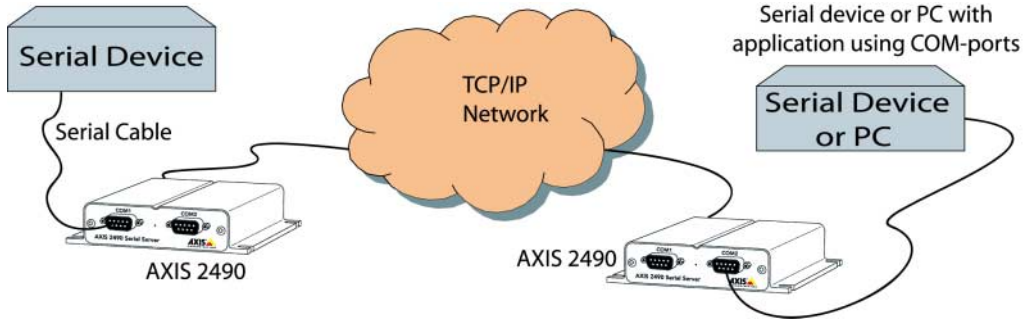
Many applications require local serial ports for their function and will not work with a networked serial port, which is what you'll have when using the AXIS 2490. To make the server's ports appear to the application as if they were local ports, you must install and use additional software - a COM Port Redirector. This software allows programs (especially older ones) that use Windows serial port drivers to be used over a network. The application itself runs as usual, with no modifications.



Note: For more information about COM-port Redirectors, please see the AXIS 2490 product pages on the Axis website att www.axis.com.

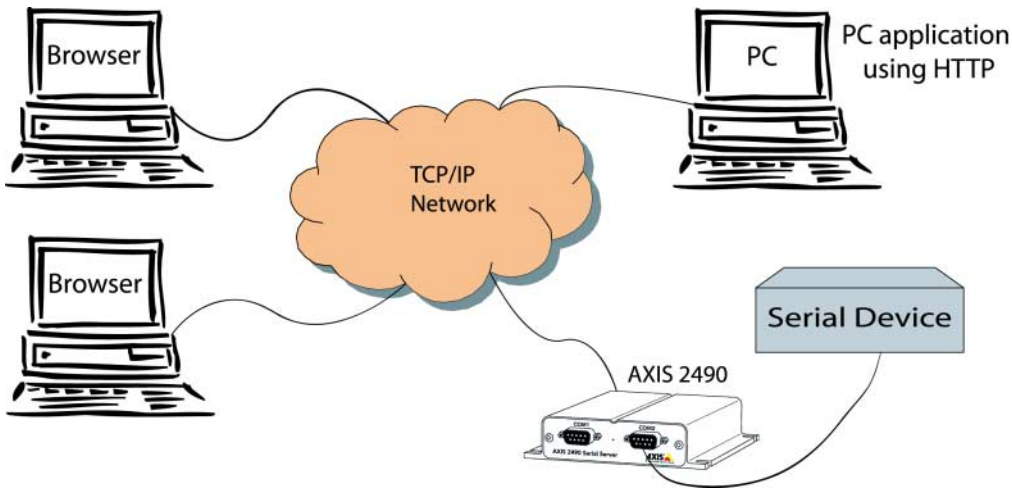
2 Serial Servers used together create a "tunnel" and use the network as a "virtual extension cable"

This alternative can be used to connect two serial devices or a serial device with a PC using an application that uses COM ports. See *Tunnel Communication,* on page 36 for the necessary settings.



Generic HTTP

The Generic HTTP mode gives you the ability to receive status/data and send commands via HTTP. Communication via HTTP can be restricted to defined users or it can be available for annonymous access.



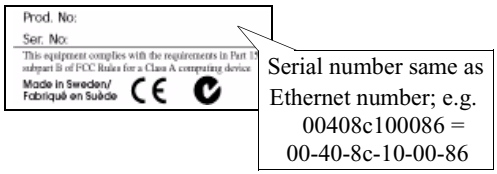
Connecting to a Network

Quick Installation Procedure

Follow the instructions below to quickly connect the AXIS 2490 to an Ethernet network:

❶ Note the Serial number

Note the Serial number on the underside of the unit. You need to know this to set the IP address:



❷ Assigning an IP Address

Important!

- Do not use the default IP address featured in the following examples when installing your AXIS 2490. If in doubt, consult your Network Administrator before assigning an IP address.
- Server Privileges: Although no special privileges are required for Windows 95/98, you do need *Administrator* privileges for Windows NT/2000, and *Root* privileges on UNIX.

Using an appropriate method for your operating system, assign your AXIS 2490 with a unique IP Address from a computer on your network, using the ARP command, as follows:

Windows 95/98 & NT/2000 only - Start a DOS window and type these commands:

Syntax:

```
arp -s <AXISServer IP address> <Ethernet address>
<my PC IP address>
ping -t <AXISServer IP address>
```

Example:

```
arp -s 172.21.1.200 00-40-8c-10-00-86
172.21.1.193
ping -t 172.21.1.200
```

UNIX only - Type these commands in your command line:

Syntax:

```
arp -s <IP address> <Ethernet
address> temp
ping <IP address>
```

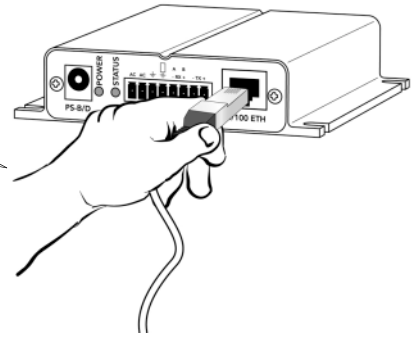
Example:

```
arp -s 172.21.1.200
00:40:8c:10:00:86 temp
ping 172.21.1.200
```

You will now see the message '`Request timed out...`', repeatedly returned in the window.

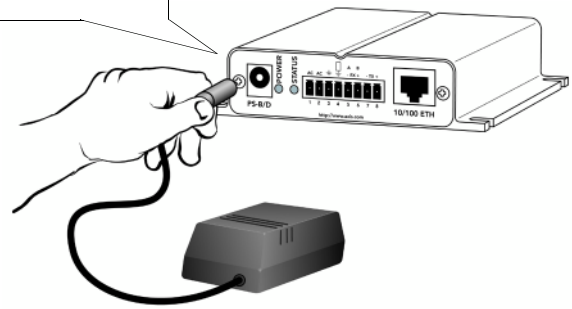
❸ Connect an Ethernet cable

Connect an Ethernet cable to your AXIS 2490 and attach it to the network.



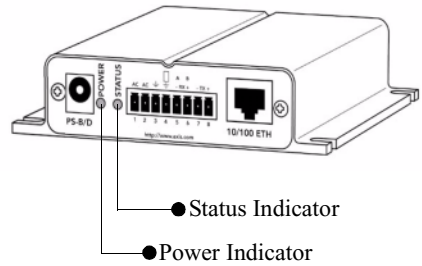
❹ Attach the external Power Supply

Attach the external Power Supply to the unit and connect it to your local mains supply.



❺ Wait for a reply from the unit and check the Status indicator

Approximately 10-15 seconds after connecting the power supply, the message '`Reply from 172.21.1.200...`' - or similar, is returned in the DOS window. Ensure that the Power Indicator is permanently lit and that the Status Indicator flashes intermittently.



❻ Exit PING

The connection is now complete, and you are ready to access the AXIS 2490 from your Web browser, as described in the next section.

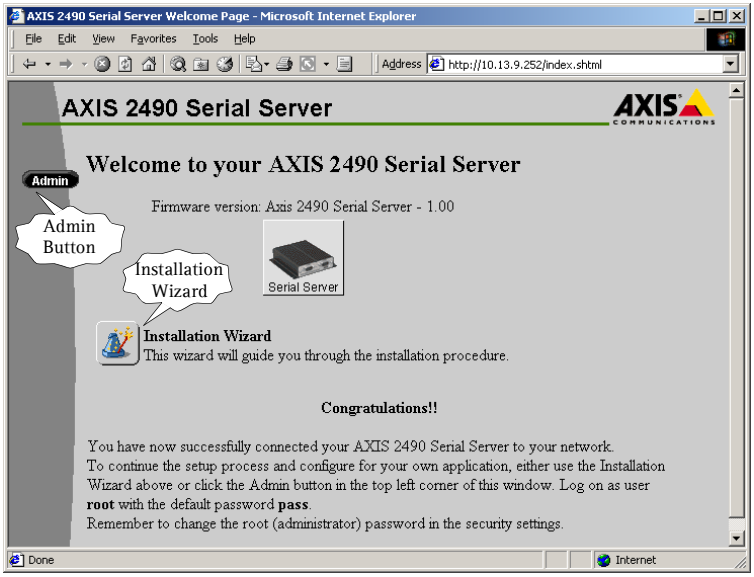
Verifying the Connection From Your Browser...

Having completed the procedure above, you should then verify the connection between the AXIS 2490 and the network, as follows:

1. Start your browser (see note below) and enter the IP address of the AXIS 2490 in the **Location/Address** field:

   http://172.21.1.200/

   The Welcome Page for your AXIS 2490 is now displayed:



2. Continue the setup process and configure your own application using the **Installation Wizard** or click the **Admin** Button and use the **Administration Tools**, as described in *Configuring Your Serial Server,* on page 18.

Important!

The Administration Tools can be used to change your username and password. Log on as an Administrator using the username root and default password pass. It is recommended that you change the root password, since all Axis products are shipped with the same password as default. For further information, refer to *System Security*, on page 22.

Alternative Methods of Assigning the IP Address

In addition to the ARP command (as described earlier in this section), you can set the IP address using an appropriate method for your operating system from the table below:

Important!

- Do not use the default or IP address featured in the following examples when installing your AXIS 2490. Acquire an unused IP address from your Network Administrator.
- Make sure the AXIS 2490 is powered up and attached to the network.
- Ethernet Address: The AXIS 2490 is pre-configured with a unique Ethernet Address based on the serial number printed on the label on the underside of the unit; where the serial number typically follows the format 00-40-8c-xx-yy-zz. You must know the Ethernet address to complete the installation.

Method	Operating Systems	Refer to...
AXIS IP Installer	Windows 95/98 and NT/2000	*Using the AXIS IP Installer*, on page 16.
BOOTP Requiring a BOOTP daemon on your system, this method operates over the entire network. A request to an active daemon initiates a search of the boot table to find an entry matching the unit's Ethernet address. The daemon downloads the IP address to the device if a match is found.	UNIX	*Using BOOTP in UNIX*, on page 17.

Using the AXIS IP Installer

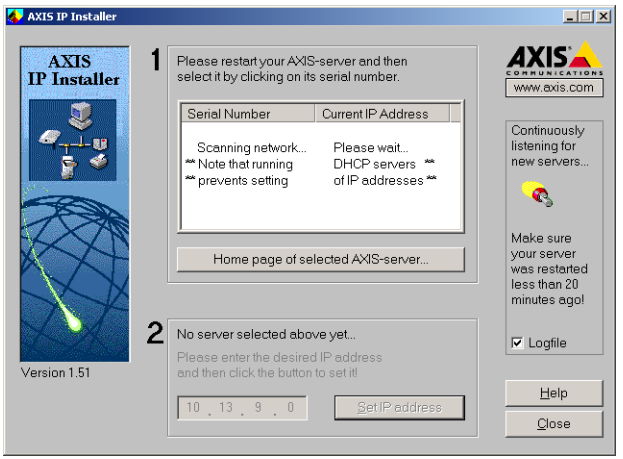
The AXIS IP Installer is a Windows 95/98 & NT/2000 program that is ideal for setting the IP addresses for *multiple* Axis' networking products on your network. Also allowing you to access the home page of any Axis ThinServer device connected to your network, this freely distributed software is available for download from the Axis' Website at www.axis.com.

Installing the AXIS IP Installer:

1. Download the latest AXIS IP Installer software onto your desktop and run the `Setup_IPInstaller.exe` program to start the installation.
2. The **AXIS IP Installer - Setup** dialog is displayed on the screen.
3. Follow the instructions as they appear on the screen.
4. Click **Finish** to complete the installation.

Setting the IP Address with the AXIS IP Installer:

1. Run the **AXIS IP Installer** from the **Start** menu. The **AXIS IP Installer** dialog is displayed on the screen.



2. Restart your AXIS 2490.
3. Select the serial number of your AXIS 2490 from the list. The serial number is identical to the unit's Ethernet address.
4. Enter the desired IP address. Click **Set IP address**. The IP address will now be set.
5. To access the home page of the AXIS 2490, click **Home page of selected Axis-server...** You can now configure the AXIS 2490 according to your requirements.
6. Click **OK** to exit the program.

For more help during the installation of the IP address, click **Help** or **F1**.

Using BOOTP in UNIX

Follow these steps to use the BOOTP method:

1. Append the following entry to your boot table. This is typically done using the file `/etc/bootptab`:

```
<host name>:ht=<hardware type>:vm=<vendor magic>:\
:ha=<hardware address>:ip=<IP address>:\
:sm=<subnet mask>:gw=<gateway field>
```

   where:

   ht = ether
   vm = rfc1048
   ha = The Ethernet address of the AXIS 2490
   ip = The IP address of the AXIS 2490
   sm = The subnet mask
   gw = The default router address

Example!

```
myserver:ht=ether:vm=rfc1048:\
:ha=00408c100086:ip=172.21.1.200:\
:sm=255.255.255.0:gw=172.21.1.1
```

2. If necessary, update your host table and alias name databases according to the requirements of your system.
3. If it is not already running, start the BOOTP daemon. This is typically done using the command `bootpd`.
4. Restart the AXIS 2490 to download the IP address, default router address, and subnet mask.

Mapping a Host Name to the IP Address

If you are using host names, you can also map a unique host name to the acquired IP address. Refer to your system manuals or Network Administrator for instructions on how to perform the name mapping on your particular system.

Configuring Your Serial Server

The AXIS 2490 is configured and integrated into your application environment using the Web-based *Installation Wizard* or the *Administration Tools*. It is assumed that you have connected your Serial Server prior to commencing with this section. If not, please refer to *Connecting to a Network,* on page 12.

Important!

On-line help is available from most pages within the AXIS 2490 Web interface. Containing comprehensive details on all product parameters; this information is your first point of reference when configuring and managing the unit, and is a particularly useful reference when resolving any administration queries. The help system is stored internally in the AXIS 2490.

When accessing the Administrator Tools for the first time during a session, you are prompted for the username and password. Log on as an Administrator using the username root and default password pass. It is recommended that you change the root password, since all Axis products are shipped with the same password as default. For further information on this, refer to *System Security,* on page 22.

Complete the Basic Installation Using the Installation Wizard

Having connected your AXIS 2490 directly to a local area network, you should now use the *Installation Wizard* to complete the most basic setup. This wizard will help you make settings for the following:

- Administrators, Users and Passwords.
- The host name, IP address, subnet mask and other basic network settings.

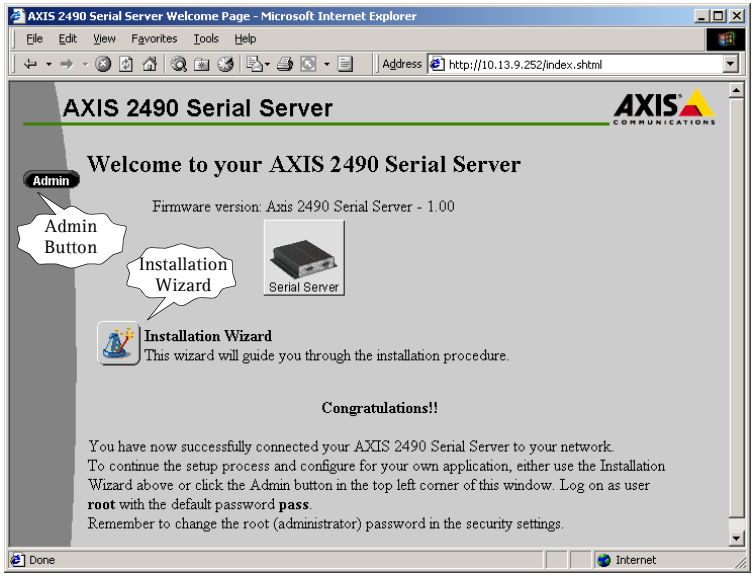
Important!

Prior to accessing the *Installation Wizard* or *Administration Tools* over a network, you must first set the Internet address, as described in *Connecting to a Network,* on page 12.

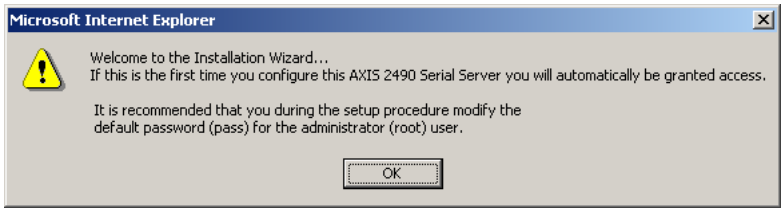
Start the Installation Wizard

Starting the Installation Wizard

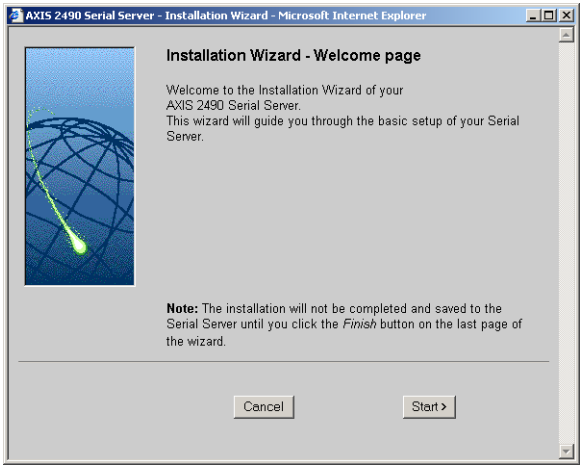
1. Start your browser and go to the AXIS 2490's **Home Page** by entering the IP address you used to connect the Serial Server with in *Quick Installation Procedure*, on page 12. The page contains buttons for the *Installation Wizard* and for the *Admin* tools.



2. Click the button *Installation Wizard*. If this is the first time you are accessing the Serial Server you will see this message. Click **OK** to proceed.



3. The window for the *Installation Wizard* opens, as shown below.



4. Click Start > to proceed.
5. Continue with the pages that follow to make the basic settings as listed on page 18, and on the final page, click **Finish** to save your settings. No changes will be made until you actually click **Finish**.

The individual settings in the configuration can now be changed at any time by using the Administration Tools, as described below.

Using the Administration Tools

The administration tools are accessed from the Welcome Page (see above) by clicking the *Admin* button. The tools found here are used to make settings for the following:

Network - Settings for IP addresses, DNS servers etc.

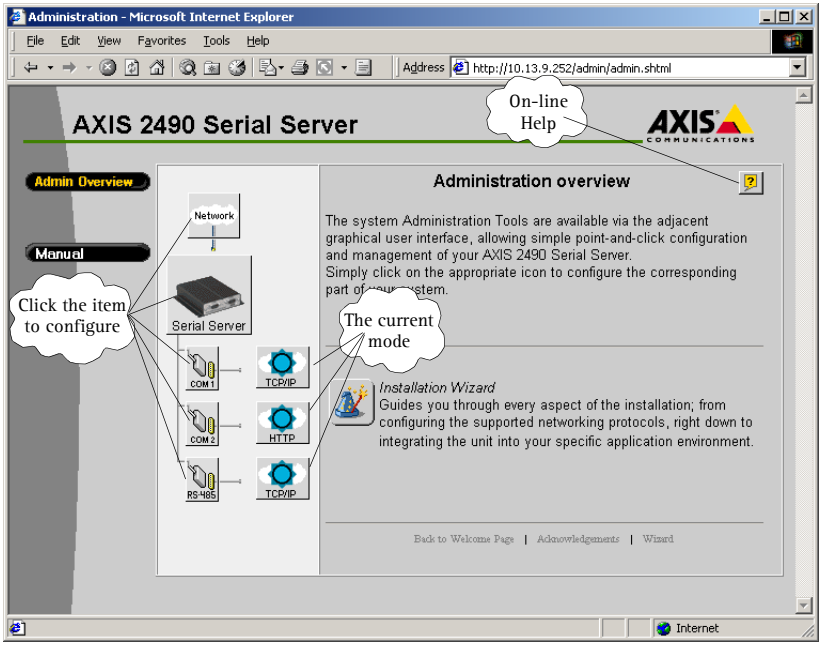
Serial Server - General settings for e.g. date and time, security settings etc. From here you can also restart the Serial Server or reinstate factory settings, should this be necessary.

COM1 - Configure the serial port COM1 for baud rate, mode, protocols, modems etc.

COM2 - As for COM1.

RS485 - Configure the serial port RS485/RS422 for protocols, baud rate, flow control etc.

Note: It is recommended that you change the password for your AXIS 2490 as soon as possible.



Tools Overview

The table below provides a one-stop overview of the **Administration Tools.**

Network	Sub-Button	Description
	 Detailed View	Configure TCP/IP, SMTP, DHCP, BOOTP and DNS network settings.

General	Sub-Button	Description
	 Security	Set the Administrator password and add or delete users and their passwords.
 Serial Server	View Parameter List	See a listing of the configured parameters.
	View Log File	View the log file automatically created by the AXIS 2490.
	View Server Report	Shows various important information about status and settings.
	View Release Notes	View the final notes from the product's release.
	Restart	Restart the AXIS 2490.
	Factory Default	Reset the unit to the factory defaults.

COM1/2	Sub-section	Settings
	Select Mode	Select Generic TCP/IP, Generic HTTP or Off. This selection determines the configurable parameters that appear below this setting.
	→ Settings for selected Mode	Various communication settings such as: baud rate, data bits, stop bits, parity, flow control etc.

RS422/485	Sub-section	Settings
	Select Mode	Select Generic TCP/IP, Generic HTTP or Off. This selection determines the configurable parameters that appear below this setting.
	→ Settings for selected Mode	Various communication settings such as: baud rate, data bits, stop bits, parity, flow control etc.

System Security

To prevent unauthorized use, the AXIS 2490 supports user-level password protection and access is restricted to defined *users* only. System *Administrators* have exclusive access to the server's Administration Tools and can determine the registration and access rights for all *users*.

Note: Although, the default username and password (set to *root* and *pass* respectively) can be used for logging in to the unit for the first time, it is strongly recommended that you change the password for your AXIS 2490 as soon as possible - since all Axis products are shipped with the same password as default.

User Access Rights

As a user with *Administrator* privileges, you can click the **Security** button to add, configure and delete further **usernames** and **passwords**, including ones with Administrator privileges.

Important!

- To restrict open access via HTTP, simply register a single authorized user: this effectively revokes the anonymous user service and restricts access to specified users. If the anonymous user service is satisfactory for your application, simply do not add any users.
- Please change the default password for the Administrator (root) as soon as possible. This will enable the unit's security function.

Reinstating the Factory Default Settings

In certain circumstances, it may be necessary to reinstate the Factory Default settings for your AXIS 2490. This is performed by clicking the appropriate button within the Administration Tools, or by pressing the Control Button. Follow the instructions below to reinstate the product factory default settings using the Control button:

1. Switch off the AXIS 2490 by disconnecting the power cable.
2. Press and hold in the Control Button, and reconnect the power supply cable.
3. With the Control Button pressed, the Status Indicator will now flash briefly and then go out. When the Status Indicator has been out for about 5 seconds, release the Control Button. When the Status Indicator starts to flash again after approximately 5 seconds, the AXIS 2490 will then have been reset to its default setttings.

Notes:
- Reinstating the original default settings will cause all of the unit's parameters to be reset.
- It is also possible to restart the unit with the Restart Button on the the Admin pages.
- Refer to *Alternative Methods of Assigning the IP Address,* on page 15 for information on how to set the IP number in the product.

Appendix A - Troubleshooting

This appendix provides useful information to help you to solve any problem you might have with your AXIS 2490. Fault symptoms, possible causes and remedial actions are provided in a quick reference table.

PINGing Your IP Address

By sending a packet to the specified address and waiting for a reply, the *PING* utility can determine whether a specific IP address is accessible. It also provides a particularly useful method for confirming addressing conflicts with your AXIS 2490 on the network.

Having disconnected your AXIS 2490, follow the instructions below in association with *Symptoms, Possible Causes and Remedial Actions,* on page 25, and run the PING utility to troubleshoot TCP/IP problems on your network:

1. Start a DOS window.
2. Type **`ping x.x.x.x`**, where **`x.x.x.x`** is the IP address of the AXIS 2490.
3. The subsequent replies will provide an explanation as to the cause of the problem. Replies can be interpreted as defined in the table below:

PING Reply	Interpretation and recommendation
bytes = 32 time = 2 ms.....	The IP address is already in use. You must obtain a new IP address.
destination host unreachable	The AXIS 2490 is not accessible within your subnet. You must obtain a new IP address.
request timed out	This IP address is not used by anyone and is available for use with your AXIS 2490.

How to test your setup

Connect a serial port on the 2490 to a serial port on the PC using a null modem cable.

Start a terminal program on the PC that accesses the serial port, e.g. **Hyper Terminal** in Windows or **minicom** or **cua** in Linux.

Start a telnet session to the Serial Server IP address and the corresponding TCP port for the chosen serial port (default 4000, 4001, 4002).

In Windows, select **Run...** from the Start Menu and type: `telnet ipaddress portnr`, for example: `telnet 10.13.7.12 4000`.

Everything you type should appear in the terminal program when you press Enter, and everything you type in the terminal program should appear in the telnet window.

Test a COM Port Redirector

Configure the COM Port Redirector to connect to the host and the port. Enable or disable the use of telnet options (RFC2217), depending on the settings in the AXIS 2490 Serial Server. Start a second instance of the terminal program instead of using telnet. Whatever you type in the terminal programs should appear in the other terminal window.

Symptoms, Possible Causes and Remedial Actions

Symptoms	Possible causes	Remedial actions
The AXIS 2490 cannot be accessed from a browser.	The IP address is already used by another device.	Disconnect your AXIS 2490 from the network, run the PING utility and follow the appropriate recommendations.
	The IP address is located within a different subnet.	Run the PING utility. If the utility returns "no response" or similar, in Windows 95/98 or Windows NT/2000, you should then check that the IP address for your AXIS 2490 is on the same subnet as your workstation. If these subnets are different, the IP address cannot be set from the workstation. Please contact your network administrator.
	In Windows 95, the ARP table was empty when you tried to set the IP address.	If the table is empty, re-install the product ensuring that the IP address for your own PC is also used. Type `arp -a` to view the ARP table.
	Proxy server.	Try disabling the proxy default in your browser.
	Other networking problems.	Try replacing your network cable. Test the network interface of the product by connecting a local computer to the unit, using a standard *Crossover (hub-to-hub) Cable*. If the above actions don't solve the problem, the AXIS 2490 may be faulty. In this case, try to localize the problem by connecting the AXIS 2490 to the serial port of a local computer, using a *Null Modem Cable;* and report your findings to your local distributor.
The Power indicator is not constantly lit.	Faulty power supply.	Verify that you are using an AXIS PS-B power supply.
The Status indicator flashes rapidly.	Hardware failure.	Contact your Axis dealer.
Your AXIS 2490 works locally, but not externally.	Firewall protection.	Check the Internet firewall with your system administrator.
	Default routers required.	Check if you need to configure the default router settings.
"Unable to connect to remote host: Connection refused" or similar error message.	The IP settings in the 2490 are wrong.	Check the IP number, router and netmask settings.

Symptoms	Possible causes	Remedial actions
	The TCP port number is wrong.	Make sure you use the same port number the 2490 is configured for.
	The 2490 is not in Generic TCP/IP mode.	Check the settings in the 2490.
An established connection is closed immediatly.	Someone else is already using the port and has connected to the Axis 2490.	Select "View Log FIle" in the Server settings to see if anyone else has connected. See the example Log File Below. You may want to configure "Allowed IP addresses" and restart the unit.
	You have enabled "Allowed IP addresses" but your IP address is not allowed.	Check the settings in the 2490.

Sample Log File

```
Jan  1 03:56:20 ado-6 sersrvd[19]: Port COM1 server 12 connected from10.13.7.12
Jan  1 03:56:29 ado-6 sersrvd[19]: Port COM1 server 13 connected from 10.13.7.13
Jan  1 03:56:29 ado-6 sersrvd[19]: Port COM1 close(13) - too many connections.
Jan  1 04:27:07 ado-6 sersrvd[19]: Port COM1 net close(12) rx: 2 tx: 0
```

Note: If you still have a problem after reading this information, please contact your reseller or check the FAQ on the Axis Website at www.axis.com.

Appendix B - Technical Specifications

System Requirements
TCP/IP on Windows 95, 98, NT/2000, Linux, UNIX, Mac and several others. Microsoft Internet Explorer 4.x or higher, or Netscape 4.x or higher.

Protocols
ARP, BOOTP, TCP, IP, HTTP, ICMP, FTP, and DNS. The serial server supports telnet options for COM port control according to RFC2217.

Network Management
Configuration and status via standard HTTP browser. Microsoft Internet Explorer 4.0 or Netscape 4.0 or higher. Possible to use FTP to upload/download configuration files.

Network Connection
1 RJ-45 connector (Category 5 shielded or unshielded twisted pair cable) for 10BaseT Ethernet or 100Base TX Fast Ethernet. (Shielded cable recommended for industrial environments).

Additional Software
A COM Port Redirector, which allows existing Windows software to access networked attached serial devices, can also be used with the serial server. For more information about COM-Port Redirectors, please see the AXIS 2490 product pages at www.axis.com.

The Axis IP-installer can be used to assign IP-addresses.

Security
User-level password protection. It is also possible, when using the ports in TCP/IP mode, to specify **Allowed Users** and **Allowed IP addresses**. These settings will disallow all other IP addresses and users.

Software Updates
Flash memory allows central and remote software updates over the network using FTP over TCP/IP. All software upgrades are available free of charge from the product pages for the AXIS 2490 at the Axis Website www.axis.com.

CPU
32 bit RISC processor (ETRAX 100).

Memory
Flash Memory - 2MB.
RAM - 8MB.

Serial Connectors
Two RS-232 serial ports, 9 pin MALE D-SUB. Both support: RX, TX, RTS, CTS, DSR, DTR, RI and CD. Supported speeds of up to 115200 bps.

MALE 9-pin DSUB (RS-232 levels) (X3 and X2)

1	I	/CD Carrier Detect
2	I	RXD Receive Data
3	O	TXD Transmit Data
4	O	/DTR Data Terminal Ready
5	-	GND
6	I	/DSR Data Set Ready
7	O	/RTS Request To Send
8	I	/CTS Clear To Send
9	I	/RI Ring Indicator

1 RS-485/422 serial port on screw terminal block:
Supports speeds of up to 1843200 bps.

1 AC
2 AC
3 GND
4 GND 100 Ohm
5 RX/TX- A
6 RX/TX+ B
7 TX-
8 TX+

Delimitations for RS-485/422
RS-485 and RS-422 are similar, although there are differences in the electrical specification. Most driver circuits are compatible with both, at least for the receiver part. The AXIS 2490 Serial Server is primarily designed to work with RS-485 devices, although it will probably work with most RS-422 devices as well. A terminating 100-120 Ohm termination resistor might be needed between RX+ and RX-.

Operating Temperature
+5 to +50 ° C.

Humidity
8-80% RHG, non-condensing.

Dimensions and weight
Height: 27mm
Width: 112mm
Length: 110mm
Weight: 0.32kg

Power Supply
Power: 9-24 V AC (or DC), 6 VA, via external power supply (PS-B). Typical power consumption is 2,5-3,5 VA.

Mechanical Design
Stable aluminum metal casing, with screwholes for wall mounting.

EMC and Safety approval
The AXIS 2490 Serial Server fulfills both industrial and light industrial/commercial EMC standards for emission and immunity, and Standards for Safety.

Immunity Standards:

EN 55024:1998,
EN 50082-1:1997
EN 6100-6-2:1999

Emission Standards:

EN 55022:1994 (CISPR 22:1993 + A1: 1995 + A2: 1996), Class B + A1: 1995 +A2: 1997.
FCC Part 15, Subpart B, Class A.
FCC Part 15, Subpart B, Class B, demonstrated by compliance with EN55022: 1994, Class B.
AS/NZS3548 (C-Tick). Demonstrated by compliance with CISPR 22:1993.

Safety Standards:

EN 60950, UL, CSA.

Warranty
1 year. Please register your product at http://warranty.axis.com.

AXIS Chipset Technology
The AXIS 2490 Serial Server comprises Axis' own ETRAX 100 32-bit RISC processor and embedded Linux. See http://developer.axis.com for info about our embedded Linux.

All specifications are subject to change without prior notice.

Appendix C - Updating the Software

The AXIS 2490 software is stored in Flash memory. This memory is provided by a silicon chip that, just like any other ROM device, retains data content even after power is removed. Flash memory is unique because it allows its data to be erased and re-written. This means you can install software updates for your AXIS 2490 as they become available - without having to replace any parts. New software can be simply loaded into the AXIS 2490 over the network.

Obtaining Updated Software

The latest version of the AXIS 2490 software is available free of charge from Axis or from your local distributor. You can obtain this software over the Internet from www.axis.com.

Updating the Software

The AXIS 2490 Flash memory is updated over the network using FTP. See the detailed instructions supplied with each new software release.

Important!

- Always read the upgrade instructions available with each new release, prior to upgrading your software.
- Downloading normally takes between 30 seconds and 10 minutes, although it can take longer. After starting the download, you should always wait at least 20 minutes before power-cycling the AXIS 2490 - even if you suspect the download procedure has failed.
- In controlled environments, flash memory upgrades provide a very safe method of updating the software. However, flash products can become damaged if the upgrade operation is not performed correctly. Your dealer reserves the right to charge for any repair attributable to faulty upgrading by the user.

Appendix D - The Unit Connectors

This section provides a detailed overview of the Serial Server's serial port connections: the two **RS-232 Serial Ports**, and the **IO Block Connector,** including the **RS-422/485 Port.**

The Serial Connectors

The two RS-232 serial connectors provide the physical interface for connecting serial devices to the AXIS 2490 and thus to the network.

RS-232 Connections

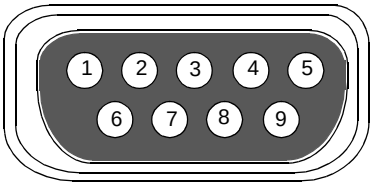
Two 9 pin male D-sub connectors provide the physical connections for the RS-232 serial interface of the AXIS 2490. These connectors are for use with serial devices at speeds of up to 115200 bps. The RS-232 ports (3 outputs and 5 inputs) support all status and control signals.

The male connector is the same as on a PC, i.e. a DTE. The RS-232 driver supports up to 115200 bps. Wiring distances should be limited to about 60 meters (200 feet) for asynchronous data and to about 15 meters (50 feet) on synchronous lines.

COMx D-SUB 9 connector (RS-232 levels)

Pin	Function
1	I CD (Carrier Detect)
2	I RXD (Receive Data)
3	O TXD (Transmit Data)
4	O /DTR (Data Terminal Ready)
5	- GND (Ground)
6	I /DSR (Data Set Ready)
7	O /RTS (Request To Send)
8	I /CTS (Clear To Send)
9	I /RI (Ring Indicator)

The Pinout for the male RS-232 connector on the Serial Server



The IO Connector Block

The AXIS 2490 has an I/O Connector (screw terminal blocks) for connecting RS-485/422, or for use as an alternative power supply.

RS-485

RS-485 is a bi-directional, half-duplex standard for transmitting data over multi-drop communications line. Supporting up to 32 drivers and 32 receivers over a single twisted pair cable, the maximum cable length should not exceed 1220 meters (4000 feet). Typically used for connecting a single master (e.g. a PC) to several addressable devices over the same cable. The master decides which slave speaks and the slaves only speak when spoken to, by raising RTS. The Axis 2490 will act as either a master or a slave, depending on how

communication is initiated. RS-485 is similar to RS-232, but without a signal ground and with double-wired transmit and receive data. The wires are TxD+, TxD-, RxD+ and RxD-. Data detection is done by measuring the voltage difference between the positive and negative line. This eliminates disturbance by interference, because interference appears identically on all lines simultanously. This means greater distances can be covered than with RS-232.

RS-422

RS-422 is similar to RS-485, but uses 2 pairs of wires (4-wire RS-485). This provides a full-duplex communication line that supports cable lengths up to 1220 meters (4000 feet).

RS-422 is a so-called 'differential' interface. This means that the signals are transported over balanced circuits. In practice this means that you will have two dedicated wires for each signal. Data is coded as a voltage difference between the two wires. Each signal has to be transported over one pair. Because these wires have to be a twisted-pair, any noise picked up will influence the voltage level of both wires in the same way and the difference between the wires will not be affected. Thus the information is much less receptive to noise than when using RS-232.

Delimitations for RS-485/422

RS-485 and RS-422 are similar, although there are differences in the electrical specification. Most driver circuits are compatible with both, at least for the receiver part. The AXIS 2490 Serial Server is designed primarily to work with RS-485 devices, although it will probably work with most RS-422 devices as well. A terminating 100-120 Ohm termination resistor might be needed between RX+ and RX-.

Physical Connections on the I/O Connector Block

Screw terminal connector with 8 poles:

- (Phoenix MC 1.5 - 3.81 mm)
- 4 pins for RS-422/485 TX+, TX-, RX+, RX-
- 1 pin for RS-485/422 ground (connected to GND with 100 ohm resistor)
- 1 pin for GND
- 2 pins Alternative power (9-24V AC)

The RS-485/422 port

A 4-wire RS-422/485 port (one TX pair and one combined RX/TX pair).

The RX port can be used for both RX and TX (controlled by RTS) and for half-duplex RS-485.

The port can be used in any of these configurations:

- Full-duplex RS-422 (4-wire) or
- 4-wire RS-485 or
- Half-duplex RS-485 (2 wire)

The port is compliant with EIA-RS-485 up to 1843200 bps.

RS-485/422 Serial Port on screw terminal block

Pin	Function
1	AC
2	AC
3	GND (Standard Ground)
4	GND100 Ohm (Connected to Gnd via 100 Ohm resistor)
5	RX/TX -A
6	RX/TX +B
7	TX -
8	TX +

Appendix E - Examples

Applications

Access Control Devices

Many buildings nowadays do not use door keys for controlling access, but instead use magnetic cards and card readers at each door or access point. Entering a code on a keypad is another alternative. Both the card readers and the keypads are connected to a computer that opens/unlocks the door.

A common way of installing a large number of card readers in a building with several floors has been to use a PC for each card reader and connect them via long serial cables. Every card reader and connected PC must then be provided with the correct information about all the employees who require access. Some people might have access to all doors while others only have admission to a certain floor.

To cancel lost cards and to issue new ones, all the PCs must be given this information. This will be necessary each time someone leaves the company and when new employees are hired.

A much better solution would be to connect the card readers to a network. Even if a network has to be installed, it will still be cheaper than running long serial cables to each card reader.

The network solution has many advantages. From anywhere in the network it is possible to send the right commands to all of the card readers, and it's also easy to update the system. In the case of a stolen card, it can easily be invalidated from a remote location.

It's also possible to connect a camera to each card reader. Every time someone enters the door with a magnetic card a photo is taken and stored. If a stolen card is used, the person using the card will be revealed. It is also possible to connect an alarm system to prevent break-ins.

Remote access to keypads and card readers makes work much easier for everyone concerned. Using the Internet, there are no physical limits anymore. Even repairs can be made from a distance. Service engineers can work from home if they are on call at night or at the weekend.

Surveillance and Alarm Systems in Buildings

In places such as lifts and toilets, there might be a push button to activate a distress signal in case of an emergency. The button would be linked directly to the network via a serial server.

Barcode Readers

Barcodes and barcode readers can be found in many different locations, such as shops and factories. In production plants, different parts could have a barcode which would show where it belongs. In the case of car production, it would be possible to see who has ordered a particular car and what it will look like when finished. Whether the car should be fitted with e.g. airbags, the car's color etc, is all information that could be contained in the barcode.

If the barcode reader is connected to a network via an AXIS 2490 Serial Server, the individual car seller will have access to information about possible delays and delivery dates. The information about a specific car ordered by a customer will be accessible at all stages during production.

Remote Troubleshooting

Suppose a device malfunctions and the manufacturer and/or service technicians are located on the other side of the world. Via the AXIS 2490 Serial Server it would be possible to connect the device's serial port to the Internet, where it will then be available to service engineers, who will be able to find out what is wrong with the device and recommend a course of action.

Tunnel Communication

Any two devices that can connect to each other via a serial cable can also be connected via two Serial Servers over a network. Assuming the two servers have the addresses 1.2.3.1 and 1.2.3.2, the following settings are then needed:

1.2.3.1 uses **Connect To**: 1.2.3.2 and uses the **Allowed IP Address:** 1.2.3.2.

1.2.3.2 in turn uses **Connect To**: 1.2.3.1 and **Allowed IP Address**: 1.2.3.1.

Both devices must use the same **Listener Port** or it must be specified in the **Connect To** parameter, e.g. Connect To: 1.2.3.1:4000.
Telnet Options must have the same value on both units; **Yes** if RFC2217 functions are required.

Climate Control

Monitoring of indoor climates includes heating, ventilating and air conditioning systems. These systems are usually connected to computers via long serial cables. A more convenient solution is if the building's control systems are connected to a network via AXIS 2490 Serial Servers. This enables remote access and monitoring from anywhere in the network. Service engineers can also locate and identify errors. In some cases they'll even be able to solve the problem directly over the network, and even if they can't, they'll know which equipment and spare parts are needed.

Pan/Tilt/Zoom (PTZ) Applications

As a person approaches a building, this is seen on a computer screen. An operator clicks on the image and a camera redirects and zooms in. An enlarged image of the person is displayed on the screen.

This is a realization of a Pan/zoom/tilt device and a camera connected to a network via AXIS 2490 Serial Servers. The camera can be controlled by simply using a browser and clicking on control buttons in the web page. Another alternative is to activate the proper camera positions by using an image map of the area in question, as in the example above. Wherever something interesting happens, you only need to click on the image. The PTZ device will redirect the camera to the chosen spot.

Serial port control

Method: GET/POST

Syntax: Control Serial Port

```
http://<AXISserver>/axis-cgi/com/serial.cgi?<parameter>=<value>[&<parameter>=<value>...]
```

The following parameters and values are available:

<parameter>=<value>	Values	Description
port=<int>	1,2,3	This parameter selects the COM port.
write=<string>	<bytestring>	"<bytestring>": hex coded bytes with values of {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, a, b, c, d, e, f} Writes the specified data string to the selected serial port. Max string length: 128 bytes.
writestring=<string>	<url encoded string>	Writes the url encoded string to the selected serial port. Max string length: 128 bytes.
read=<int>	<n>	Reads n bytes from the selected serial port. The returned data will be hexadecimal coded and placed between #s (e.g. #3A#).
wait=<int>	1 - 9000	Specified in milliseconds. Used together with the "read" parameter. A read is terminated when the specified number of bytes is read or when the wait period has ended.
timeout=<int>	1 - 9	Specified in seconds. Used together with the "read" parameter. A read is terminated when the specified number of bytes is read or when the timeout has expired.
info=<int>	1	Returns a description of this CGI-request.

Open serial port

This CGI makes it possible to open the serial port using the HTTP protocol. Authentication is handled by the Web server. After an initial connect command from the client, the connection is kept alive until the client closes it. A limited number of clients may be connected concurrently to the same serial port.

After the connection has been set up, data sent from the client to the Web server is forwarded to the serial port, and incoming serial data is returned to all the currently connected clients.

Syntax: open serial port

```
http://<servername>/axis-cgi/com/serial.cgi?<parameter>=<value>[&<parameter>=<value>...]
```

The following parameters and values are available:

<parameter>=<value>	Values	Description
port=<int>	1,2,3	Select COM port.
unit=<int>	1,2,3	Selects the source AXIS server. If omitted, and the "port=" command is also ommitted, the default AXIS server is used to determine the serial port to use.
connect=<string>	yes	Makes the AXIS server keep the connection open, and start acting as a link between the client and the serial port.

Simple TCP Client Program Example for a Generic TCP/IP port

This example is for use on Linux and other UNIX variants.

Note: The example provided here is intended only as a guideline for developing your own application and there is NO guarantee that the code will work in your particular application. All of the code shown here is subject to change without prior notice.

```
* This uses blocking sockets without select(),
use select() for more complex applications.
 * Compile with: gcc -Wall tcpclient.c -o
tcpclient

 * Axis Communications AB, Lund Sweden

 */
#include <string.h>
#include <unistd.h>      /* read, write, close */
#include <stdlib.h>
#include <stdio.h>
#include <netinet/in.h>  /* sockaddr_in,
IPPROTO_TCP */
#include <netdb.h>       /* gethostbyname */
#include <errno.h>       /* errno etc. */
#define RXBUFSIZE 1000

/* Create TCP connection to host:portnr, return
filedescriptor > 0 if ok */
int client_connect(const char* host, u_short
portnr)
{
  int s = 0;
  struct sockaddr_in server;
  struct hostent *hp;

  hp = gethostbyname(host);
  if (hp != NULL) {
    bzero((char *) &server, sizeof server);
    bcopy(hp->h_addr, (char *) &server.sin_addr,
hp->h_length);
    server.sin_family = hp->h_addrtype;    /*
Protocol family */
   server.sin_port = htons(portnr);/* Port number
*/
    s = socket(AF_INET, SOCK_STREAM, 0);
    if (s < 0) {
      printf("error in socket\n");
    }
    if (connect(s, (struct sockaddr *) & server,
sizeof server) < 0) {
      printf("connect() error in bind\n");
      s = 0;
    }
  }
  return s;
}
int main(int argc, char **argv)
{
  int fd;
  u_short portnr = 4000;
  const char *host;

  if (argc < 2) {
    printf("Usage: tcpclient host [port]\n");
    printf(" port is default 4000\n");
    exit(1);
  }
  host = argv[1];
  if (argc > 2) {
    portnr = atoi(argv[2]);

}
```

Continued.....

```
  printf("Connecting to %s:%u...\n", host,
portnr);
  fd = client_connect(host, portnr);
  if (fd > 0) {
    int num_sent;
    int num_rec;
    char txstring[]="This is a test string\r\n";
    int txlen = strlen(txstring);
    char rx_buf[RXBUFSIZE];
    int rx_tot = 0;
    printf("Connected ok\n");

    /* We are connected */
    num_sent = write(fd, txstring, txlen);
    if (num_sent != txlen) {
      perror("Failed to write all");
      if (errno == EAGAIN)
      {
        /* We can send remaining bytes */
      }
    }
    printf("Sent %i bytes: '%s'\n", num_sent,
txstring);
    printf("Reading 30 bytes data...\n");

    /* Read data until we got 30 bytes */
    while (fd && rx_tot < 30) {
      num_rec = read(fd, &rx_buf[rx_tot],
30-rx_tot);
      if (num_rec > 0) {
        /* Ok */
        rx_tot += num_rec;
        rx_buf[rx_tot]='\0';
        printf("rx_tot: %i '%s'\n", rx_tot,
rx_buf);
      } else {
        perror("Failed to read\n");
        if (errno != EAGAIN)
        {
          printf("Closing\n");
          close(fd);
          fd = -1;
        }
      }
    }
    if (fd > 0) {
      close(fd);
    }
  } else {
    perror("Failed to connect!\n");
  }
  return 0;
}
```

Index