

s e r v i c e

Ethernet Manual

How to set up an Ethernet network

ALSTOM

Power Service

Preface

This document

The **Ethernet Manual** is the same for all **ALSTOM Power Service** controllers equipped with Ethernet. Therefore reference to specific controller names such as EPIC or EFFIC will not be used from this point, instead the general term “**controller**” will be used.

This **Ethernet Manual** contains information for the Designing Engineers on the pre-commissioning of the Ethernet network. It also contains information for Shift Operators on the **PC-MTU** software, which is a software used for setting up, operating and monitoring an installation of several controllers in the network.

The **PC-MTU** software is linked together with the web pages on the controllers built-in web server. These web pages are the interface used to configure each individual controller. For more information, see **Operator’s & Installation Manual**.

Related documents

The following documents are related to the **Ethernet Manual**:

- **Ethernet Manual**- (this document).
- **EPIC/EFFIC Operator’s & Installation Manual** - contains information for all groups of users from the installation and commissioning to daily operation and tuning of the cleaning process.
 - Shift Supervisor
Advanced operation and taking action on all alarms that may occur.
 - Process Engineer
From small to medium scale diversions from factory settings in order to optimize the cleaning process.
 - Commissioning Engineer
All stages of the commissioning.
 - Installation personnel (mechanical and electrical)
Mechanical, electrical and communication installation.

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1. Ethernet standard

Ethernet is a network standard of communication. The most widely used for LAN communication, Ethernet typically runs at 100 megabytes per second. All new controllers developed by **ALSTOM Power Service** use the Ethernet standard for communication. The following chapter describes what type of equipment is needed to successfully set up a Ethernet network that functions well together with **Alstom Power Service** products.

1.1. General information on Ethernet

For general information on Ethernet there is a lot of information available both on the Internet and in published books. A good place to start is one of the following websites:

- **Cisco Internetworking Technology Overview for Ethernet**
http://www.cisco.com/univercd/cc/td/doc/cisintwk/ito_doc/ethernet.htm
- **Howstuffworks**
<http://computer.howstuffworks.com/ethernet.htm>

For specific information on Industrial Ethernet standards the ***Industrial Ethernet Planning and Installation Guide*** is recommended, can be downloaded from the following website:

- **Iaona**
www.iaona.org

1.2. Typical Ethernet network

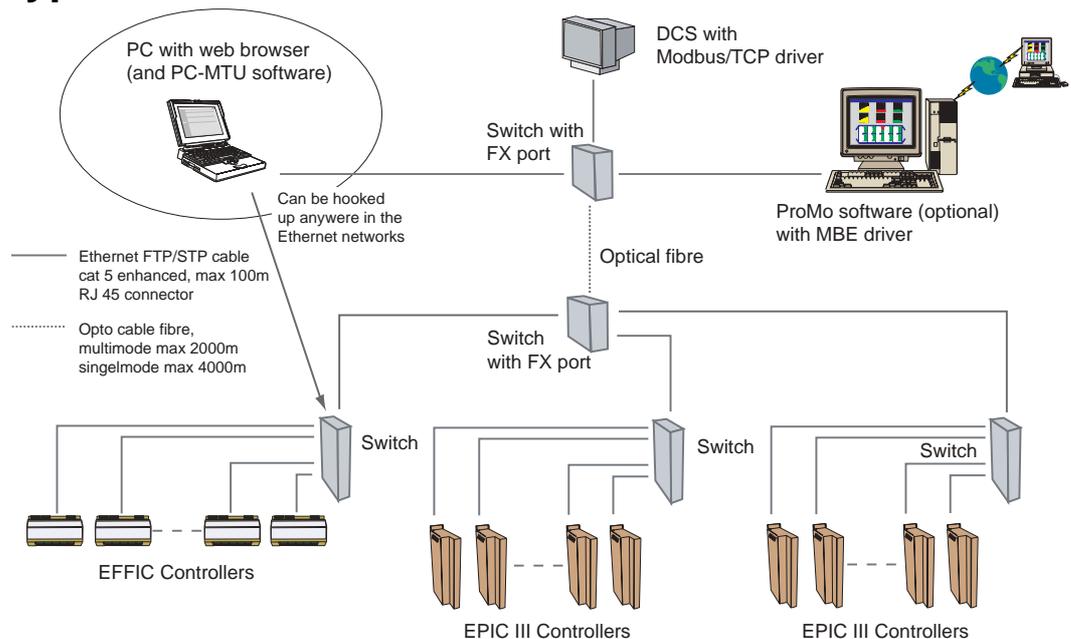


Figure 1. Typical Ethernet network

1.3. Ethernet switch

The Ethernet switch shall meet the following standards:

- EMC immunity for industry EN 50082-2 or EN 61000-6-2

Alstom Power Service has successfully used the switches from HMS Industrial Networks, Sweden and different types of switches from Hirschman Electronics.

1.4. Ethernet hub

Ethernet hub should not be used in a new installation, because it will decrease the performance of the network. With a hub in the network it is also more difficult to calculate the allowed cable lengths.

1.5. Connection to controller

The Ethernet board connection on the controller is of the following type:

- RJ45 10/100M/bit auto negotiation

1.6. Cables

Cat 5E FTP cables with RJ45 connectors are recommended for the Ethernet network.

1.7. Ethernet ports and protocols

The following Ethernet ports are used:

- Port 20, 21 for FTP
- Port 80 for HTTP
- Port 502 for Modbus/TCP data
- Port 3 250 for PC-MTU - IP config
- Port 49 200, 49 201 for the master functionality and PC-MTU.

1.8. Ethernet routers

Routers should not be installed in the EPIC III Ethernet network. The PC-MTU and master functionality will not function properly through it.

2. Setup Ethernet network

The following chapter describes how to install the software and how to setup your Ethernet network. The installation procedure is the same for all ALSTOM Power Service controllers equipped with Ethernet. Therefore reference to specific controller names such as EPIC or EFFIC will not be used from this point, instead the general term “**controller**” will be used.

2.1. Software installation

1. Insert the PC-MTU software CD into your CD-ROM drive.
2. Follow the installation instructions.

2.2. System requirements

- PC with 300 megahertz or higher processor clock speed recommended.
- Intel Pentium/Celeron family, or AMD K6/Athlon/Duron family, or compatible processor recommended.
- 128 megabytes (MB) of RAM or higher recommended.
- Super VGA (1024 x 768) or higher-resolution video adapter and monitor.
- CD-ROM or DVD drive.
- Keyboard and Microsoft Mouse or compatible pointing device.
- Microsoft Windows[®] 2000 or Microsoft Windows XP[®]
- Microsoft Internet Explorer[®] 6.0 or higher.

2.3. Assigning IP address

The IP address is used to identify each controller on the Ethernet network. Therefore, each controller on the network must have a unique IP address.

2.3.1. The Ethernet board location

To manually assign an IP address to a controller its Ethernet boards dip switches are used. The location of the Ethernet board differs depending on product, see figure 2 below.

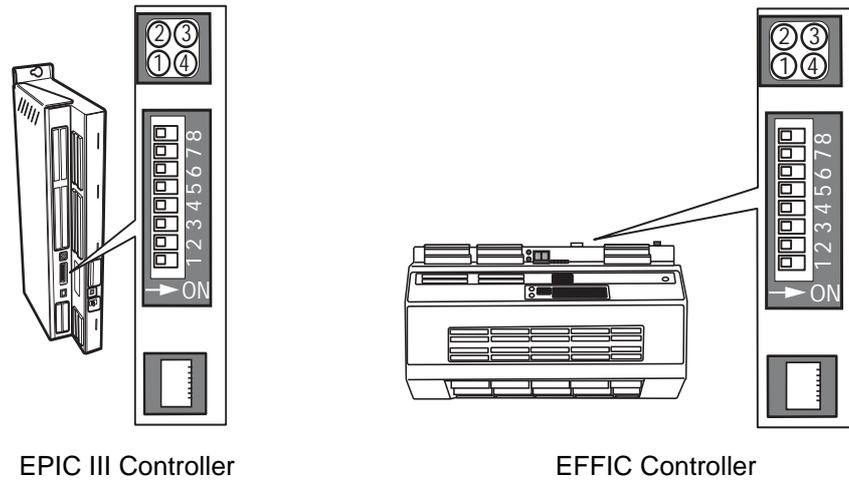


Figure 2. The Ethernet board location

2.3.2. Ethernet LEDs

The Ethernet board has four LEDs carrying the following information:

LED	Colour	LED status	Legend
1	Green	Cont.	The module has a link
1	Green	Not lit	The module does not sense a link
2	Green	1 Hz	IP address not set by using the DIP-switch
2	Red	1 Hz	Invalid MAC address (internal error)
2	Red	2 Hz	Failed to load Ethernet configuration from FLASH memory
2	Red	4 Hz	Internal error
2	Red	Cont.	Duplicate IP addresses detected
3	Green	Blinking	N/A
4	Green	Blinking	Blinks each time a package is received or transmitted.

2.3.3. Assigning the IP address to the controller

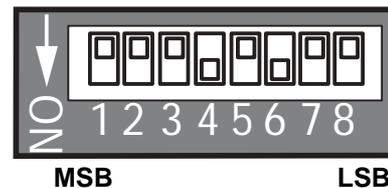
There are many different ways to assign ip addresses, in this manual the **three** most common will be described in the three following sections.

The Ethernet board has a default IP address setting of:
IP address:192.168.0.**X**

The **X** in the IP address can be set from 1 to 255 by the configuration switch on the ethernet board. The switch represents the binary value of the **X** value in the IP address.

Example:

The switches are set to
00010100 (**20** decimal).
The IP address will be set
to 192.168.0.**20**



2.3.4. Using configuration switch

1. Make sure that the controller is switched Off.
2. Use the configuration switch to assign a unique ip number to the controller, a number not used by any other nodes in the network.
3. Switch **On** the controller.
4. Repeat step 1-3 with all the controllers in the network.
5. Now the IP address of the PC has to be set (the PC that is used for running the PC MTU software and browsing the web pages).

Note, Assigning IP address to the computer may differ depending on operating system.

6. On the PC - click the **START button** and select **Control Panel**.
7. In Control Panel select **Network and Dial-up connections** and then **Local Area Connection**.
8. Select **Properties** and highlight **Internet Protocol (TCP/IP)** and select **Properties**.
9. Click the radio button **Specify an IP Address**.
10. In the **IP address field** assign a unique ip number not used by any other nodes in the network to the PC e.g. 192.168.0.100. **The Subnet mask** will normally be automatically filled in (255.255.255.0). Click **OK** and close all windows.
11. To complete the setup start the PC-MTU program.
12. From the menu Choose **Advanced > Ip config**.

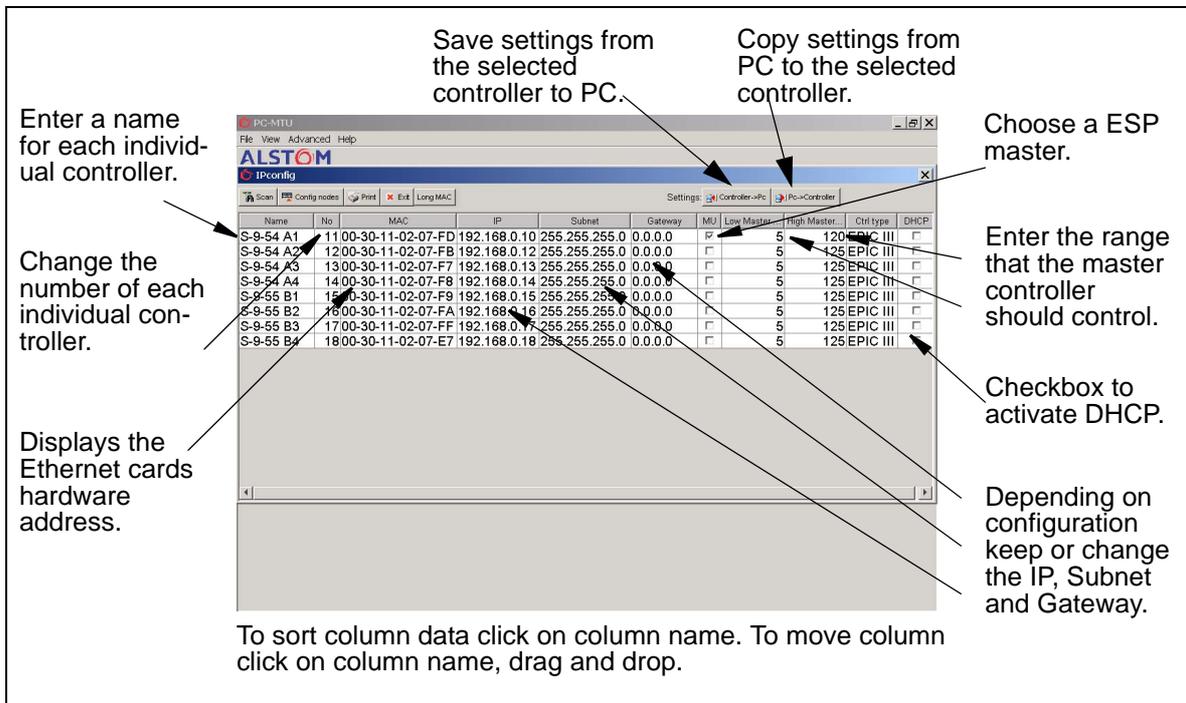


Figure 3. IP config window

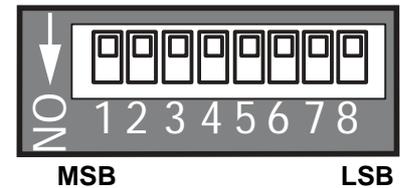
13. Enter password (default 0470)
14. Click the **Scan** button to view all the controllers on the network. Different colours indicates the status off the individual controllers.
 - Red indicates, node has been declared and is **not** present on the net.
 - Blue indicates, node has **not** been declared but is present on the net.
 - White indicates, node has been declared and is present on the network.
15. Double-click to change the **name** of each individual controller. It is recommended to choose a name system that makes it easy to identify each controller. If DNS server is used the **name** also function as the host name and must be unique. Press **ENTER** to verify the assigned name.
16. Double-click to change the **Number** of each individual controller. It is important that addresses are selected systematically and that there are no controllers with the same node address in the network. Also choose values consistent with the **Master range**. Press **ENTER** to verify the assigned number.
17. Choose **Master** controller and the range that it should control.

Note, The Master supervise all the controllers in its range. If range is set to 5-10 and the Master is switched Off from the master window. The controllers with number 5-10 will also switch Off.
18. Click the **Exit button** to exit the Ip config window.

19. To configure each individual controller double-click on the **Name** to visit that specific controllers web page. After setting up one controller it is possible to use the **copy settings** command in the **Ip config window** to save the specific settings to the computer and then copy them to the rest of the controllers in the network.

2.3.5. Using specific IP numbers

1. To setup the controllers execute step 1-17 *in section Using configuration switch* on page 7.
2. Assign the specific **IP number** to each individual controller.
3. Assign the specific **Subnet** to each individual controller.
4. Assign the specific **Gateway** to each individual controller.
5. To save the information on the controller flashdisc click on **Config nodes**.
6. Switch **Off** all controllers.
7. **Reset** the configuration switch on all controllers, see figure to the right.
8. Switch **On** all controllers to start using the values stored in the memory.
9. Execute step 18-19 *in section Using configuration switch* on page 7.



2.3.6. Using DHCP

1. To setup the controllers execute step 1-17 *in section Using configuration switch* on page 7.
2. Mark the checkbox **DHCP** on all the controllers

Note, When DHCP is used together with DNS the name assigned to the controller also function as the **hostname**. Because the **hostname** is used to access the controllers individual, it has to be unique.

3. To save the information on the controller flashdisc click on **Config nodes**.
4. Switch **Off** all controllers.
5. Reset the configuration switch on all controllers
6. Switch **On** all controllers to start using the values stored in the memory.
7. Execute step 18-19 *in section Using configuration switch* on page 7.

3. Operation

The following chapter describes how to monitor and operate the controllers in the network.

3.1. Main window

The main window in the PC MTU displays all the controllers in the network.

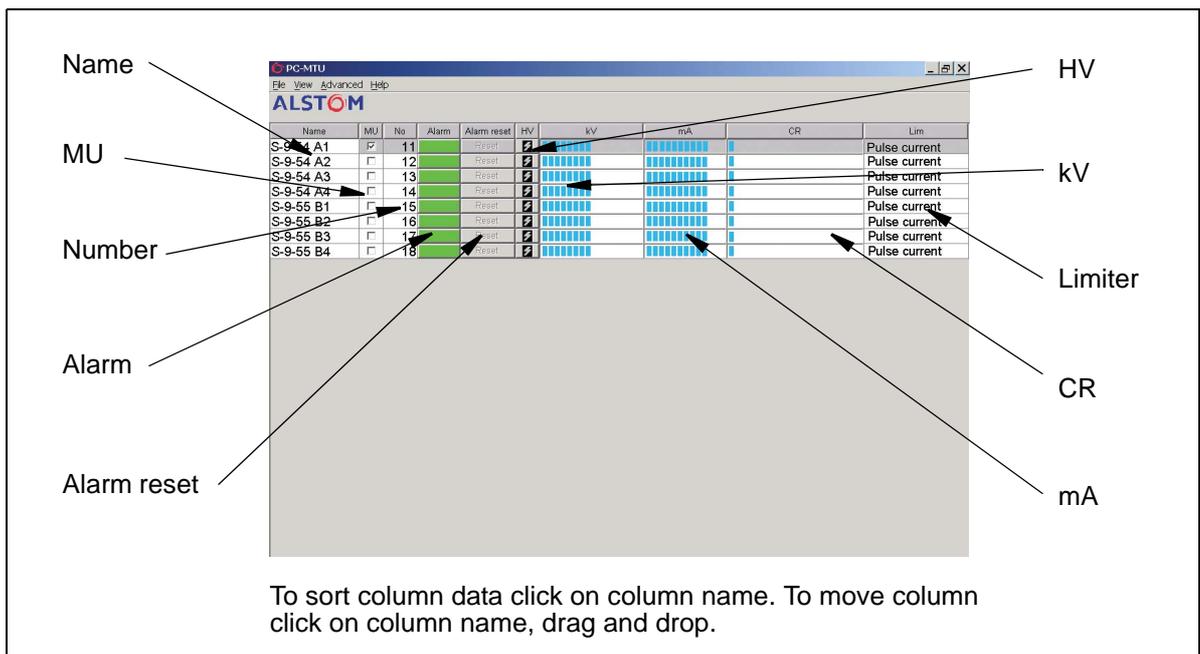


Figure 4. PC-MTU Main window

Name	Function
Name	Displays the Name assigned to each specific controller and works as a link to the web server. Double-click on the name to visit that specific controller. For more information, see Operator's & Installation Manual .
MU	Indicates which controller that is the Master.
Number	Displays the Number assigned to each specific controller.
Alarms	Turns red or yellow to indicate trip or warning alarms (default settings). Trip alarm turns the controller Off and warning indicates that something is wrong. Double-click to visit that specific controllers alarm page. For more information, see Operator's & Installation Manual .

Alarm reset	Click to reset alarm.
HV	Click to switch controller On/Off.
kV	Displays voltage in kV.
Mpa	Displays pressure in kV.
Limiter	Displays Limiter.
CR	Displays Charging Ratio.
mA	Displays current in mA.

3.2. Menu description

Menu name	Sub menus	Function
File	Exit	Exit PC-MTU software.
	Print	Print
View	Save Layout	Save current layout.
	Load Layout	Load a pre-defined layout.
	Adjust Height	Increase/decrease text size.
	Lock layout	Password protect the current layout.
	Colour Edit	Edit the colour preference.
	Enable Sound	Enable/disable alarm sound indicator.
Advanced	IP config	Configure/set up the controller network.
	Change Password	Change password.
	Change Directory	Change working directory.
Help	About	About PC MTU software.

4. Wordlist

DHCP	Dynamic Host Configuration Protocol. DHCP is a network protocol that enables a DHCP server to automatically assign IP addresses.
DHCP-Server	The server that handles the DHCP protocol.
DNS	Domain Name Server. DNS is a service that translates host names into IP addresses.
DNS-Server	The server that handles the DNS protocol.
EFFIC	Control and monitoring system for fabric filters.
EPIC	Control system for conventional T/R units produced by Alstom Power - Environmental Service.
ESP	Electrostatic Precipitator.
Ethernet	Ethernet is the most widely installed local area network (LAN) technology.
Ethernet Switch	A device used to direct a message from a transmitter to a receiver.
Firmware	Software stored in ROM.
Fläktbus	Field bus with token passing concept.
Gateway (general)	A gateway is a network point that acts as an entrance to another network.
Gateway II (product)	Communication protocol translator from Fläktbus to Modbus RS232/RS485.
IP Address	A unique address used to identify each node on a TCP/IP network.
Master	The master controls a group controllers (via the master function).
Modbus/TCP	MODBUS/TCP is a variant of the MODBUS family of simple, vendor-neutral communication protocols intended for supervision and control of automation equipment. Specifically, it covers the use of MODBUS messaging in an 'Intranet' or 'Internet' environment using the TCP/IP protocols.
N/A	Not Available.

Network node address lists	A list of all nodes with name and addresses made by ALSTOM Power Service.
Node	A node (unit) is a single addressable entity on a TCP/IP network.
PC-MTU	Software used to set-up and monitor an installation of several EPICs.
ProMo	A colour graphic software package for process control.
ROM	Read Only Memory.
Router	An active network component that connects one network to another network.
RTU	Remote Terminal Unit gives operators an alpha numerical and graphical interface to ESP parameters.
Subnet	The IP address is divided into three parts to separate them from each other a Subnet mask is used.
SCR	Silicon Controlled Rectifier.
TCP/IP	Transmission Control Protocol/Internet Protocol. TCP/IP is a collection of protocols that control the way data travels from one node to another across a network.
TP	Twisted Pair (type of cable used e.g. in Ethernet).
T/R	Transformer/rectifier.
T/R On/Off	High voltage On/Off.
Web browser	A software used to browse or show web (Internet) pages e.g. Microsoft Internet Explorer.
Webserver	A computer (software and hardware) used to supply client workstations with Web pages.



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