INTEGRA
METERING

User manual
AMBUS CMe3000

AMBUS_CMe3000_9-981-IG-EN-01

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1 Document notes

All information in this manual, including product data, diagrams, charts, etc. represents information on products at the time of publication, and is subject to change without prior notice due to product improvements or other reasons. It is therefore recommended that customers contact Elvaco AB for the latest product information before purchasing a CMe3000 product.

The documentation and product are provided on an “as is” basis only and may contain deficiencies or inadequacies. Elvaco AB takes no responsibility for damages, liabilities or other losses by using this product.

1.1 Copyright and Trademark

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CMe3000 is a trademark of Elvaco AB, Sweden.

1.2 Contacts

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2 Using this manual

2.1 Purpose and Audience

This manual provides information needed to mount, configure and use the CMe3000 product. It is intended for field engineers and developers.

2.2 Models

This manual covers CMe Series model CMe3000.

2.3 Additional and updated information

Latest documentation version is available on Elvaco web site at http://www.elvaco.com.

3 Introduction

This chapter summarizes the CMe3000 features and outlines the basic information needed to get started.

3.1 Product configuration

Use the table below to find out the capabilities of your CMe Series.

Product name	Comments
CMe3000	TCP/IP M-Bus master with M-Bus 2-wire interface

Table 1 Product configuration

3.2 Capabilities

The CMe3000 is a stand-alone, DIN-mounted TCP/IP equipment with M-Bus protocol, intended to read values from any kind of meter supporting the M-Bus protocol.

The CMe3000 has the following key capabilities.

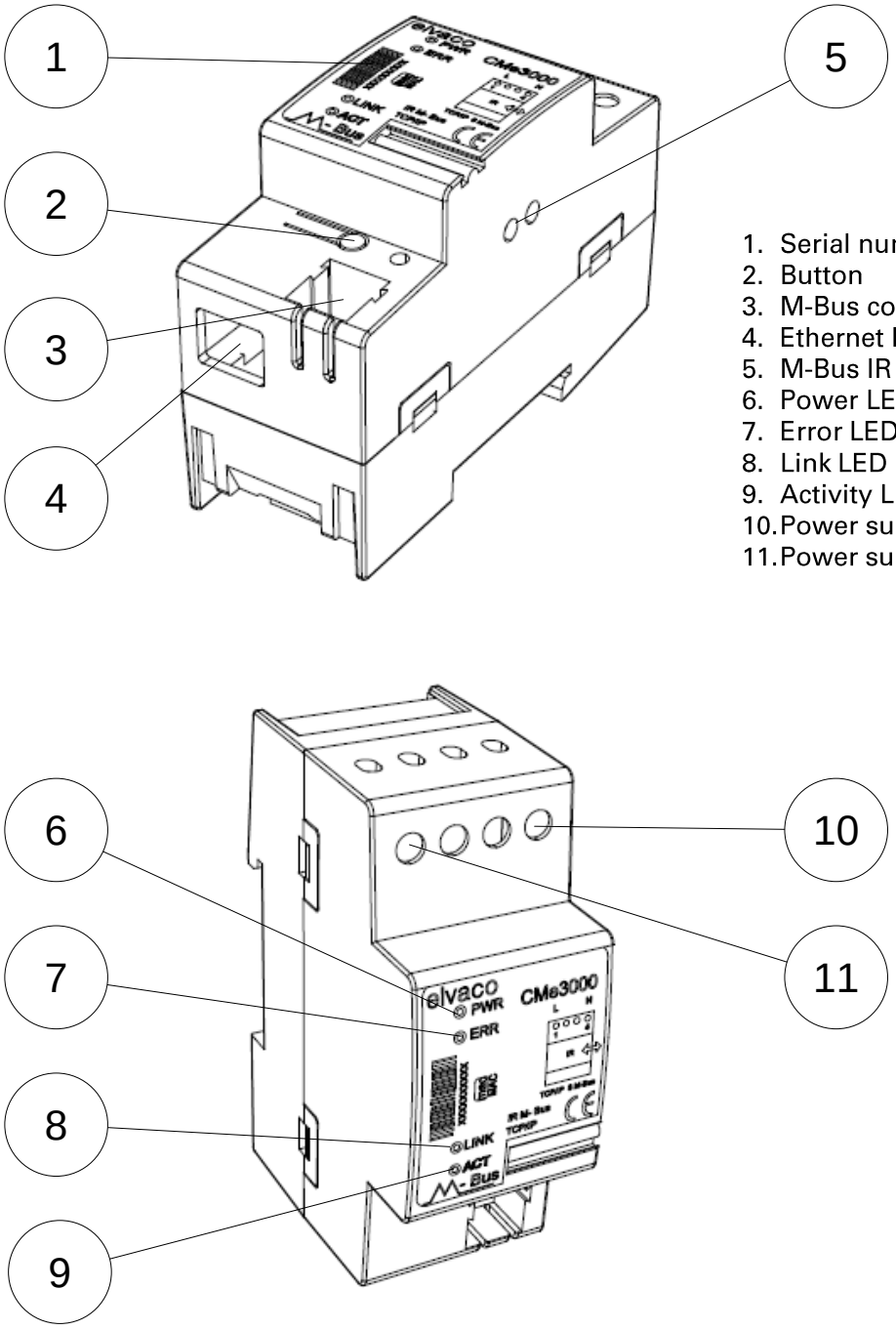
- Transparent TCP/IP communication to read meter values from any ABB electricity meter with IR interface
- Transparent TCP/IP communication to read meter values from any meter following the standard M-Bus protocol
- Connect up to 8 M-Bus slave devices
    - Expansion module series CMeX enables extra connected M-Bus slave devices using IR interface
- Remotely updatable application using internal web interface

3.3 Applications

The CMe3000 fits into almost any kind of meter collection system. For example:

- Remote reading of an M-Bus compatible electricity meter
- Remote reading of a combination of meter types on a single bus-system, such as M-Bus compatible water meters, electricity meters and heat meters

3.4 Overview



1. Serial number
2. Button
3. M-Bus connector
4. Ethernet RJ45 connector
5. M-Bus IR interface
6. Power LED (Green)
7. Error LED (Red)
8. Link LED (Yellow)
9. Activity LED (Yellow)
10. Power supply N
11. Power supply L

Figure 1 CMe3000 Front View

4 Physical installation

This chapter covers the physical installation of the CMe3000.

4.1 Mounting

The CMe3000 should be mounted on a DIN-rail. The metallic clip on the bottom is used to mount and demount the unit from the DIN-rail. For safety reasons, a DIN-rail enclosure must cover the terminals.

4.1.1 Ethernet connection

Connect the TP-cable to the RJ45 connector (4). On successful connection to switch/hub, the yellow Link LED (8) should be permanently on.

4.1.2 M-Bus 2-wire bus

M-Bus is a multi-drop 2-wire bus, with no polarity. A cable of telephone type (i.e. EKKX 2x2x0.5 mm) or standard mains type (1.5 mm^2) should be used. Connect the wiring to the connector (3). Do not exceed the maximum cable length of 1000 meters.

⚠ **IMPORTANT**

Please take the following in consideration:

- The internal M-Bus interface can handle up to 8 M-Bus slave devices. Overloading the bus will cause communication problems with the connected slaves.
- All connected M-Bus slave devices must have unique primary or secondary M-Bus addresses depending on addressing mode used

4.1.3 IR Interface with ABB electricity meters or CMeX Series modules

When the IR interface is used beside an ABB electricity meter or CMeX module, the IR shield (5) should be removed. The CMe3000 should be mounted on the left side of the ABB electricity meter or CMeX module. There shall be no space between the CMe3000 and the ABB electricity meter or CMeX module. (Do not remove the shield if not used beside an ABB electricity meter or CMeX module.)

4.1.4 Power supply

The installation should be performed by a qualified electrician or an installer with the required knowledge. The power supply must be protected with a 10 A circuit breaker of characteristic C or slow blow fuse. The power supply should be connected via a clearly marked, easily accessible and nearby switch so the unit can be switched off during service work.

The main supply should be connected to screw terminal (10) and screw terminal (11). Main supply voltage should be in the range of 100-240 VAC, 50/60 Hz. The CMe3000 will be running factory default settings when first powered up.

5 Application description

This chapter covers general application description of the product.

5.1.1 Purpose

The product is intended to be used for communication with M-Bus meters using transparent TCP/IP communication.

5.2 Operation

The product has different operation states depending on the current application task.

5.2.1 Watchdog restart

The product has an intelligent Watchdog functionality to enable stable operation. When any application error is discovered, the product will automatically reset and reinitialize again.

5.2.2 Power on

When powered on, the product has an internal boot time of approximately 10 seconds. During the boot time, the product will execute the following tasks:

- Initialize all settings
- Start necessary tasks for operation
- Start M-Bus transparent servers

5.2.3 Normal operation

During normal operation, the following tasks are executed:

- Listening for incoming requests on transparent TCP server
- Status indication (LED)
- User interaction (push-button)

5.3 Indications

The product is equipped with four LEDs. The red LED indicates M-Bus error or collision, the green LED shows mains connection and the yellow LEDs indicate current TCP/IP activity and status.

ERR Red LED	Product state	Visual
Permanently on	Short circuit on M-Bus 2-wire bus	

PWR Green LED	Product state	Visual
Off	No power supply	
Permanently on	Normal operation	

LINK Yellow LED	Product state	Visual
Off	The product is not connected to an active network	
Permanently on	The product is connected to a network	

ACT Gul LED	Product state	Visual
Off	No communication in progress	
Flashing	Communication in progress in the network	

5.4 Reset to factory default

There are two alternatives when resetting the product to factory default;

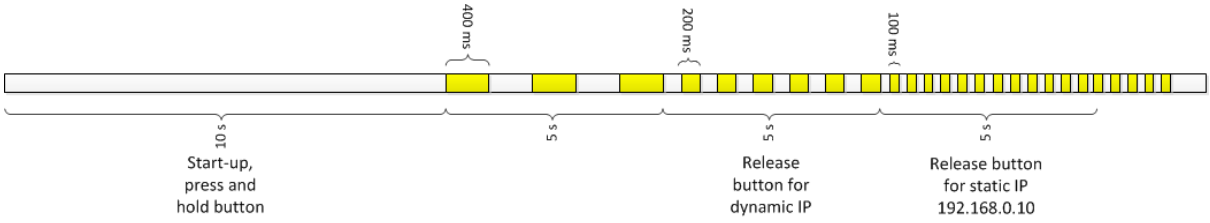
1) Reset to use dynamic IP addressing

   a. Press and hold the button during power-up and hold it for at least 15 seconds. The ACT LED will go from slow to fast flashing after 15 seconds. Release the button and the product will be reset to factory defaults and restart. After restart, the product will be given an IP address from available DHCP server.

2) Reset to use static IP

   a. Press and hold the button during power-up and hold it for at least 20 seconds. The ACT LED will go from slow to fast flashing after 15 seconds. After 20 seconds, the ACT LED will flash even faster. Release the button and the product will be reset to factory defaults and restart. After restart, the product will be set to static IP address according to: IP: 192.168.0.10, MASK: 255.255.255.0, GATEWAY: 192.168.0.1

The product can also be reset using the internal web interface, please see section 8.2.



6 Administration of the product

This section covers how to configure the product using the internal web interface.

6.1 Login

Use a web browser (i.e. Internet Explorer, Firefox, Chrome) and type the IP address of the product in the address field. Login with username **admin** and password **admin**. Review product and status information of the product using this page, see Figure 2.

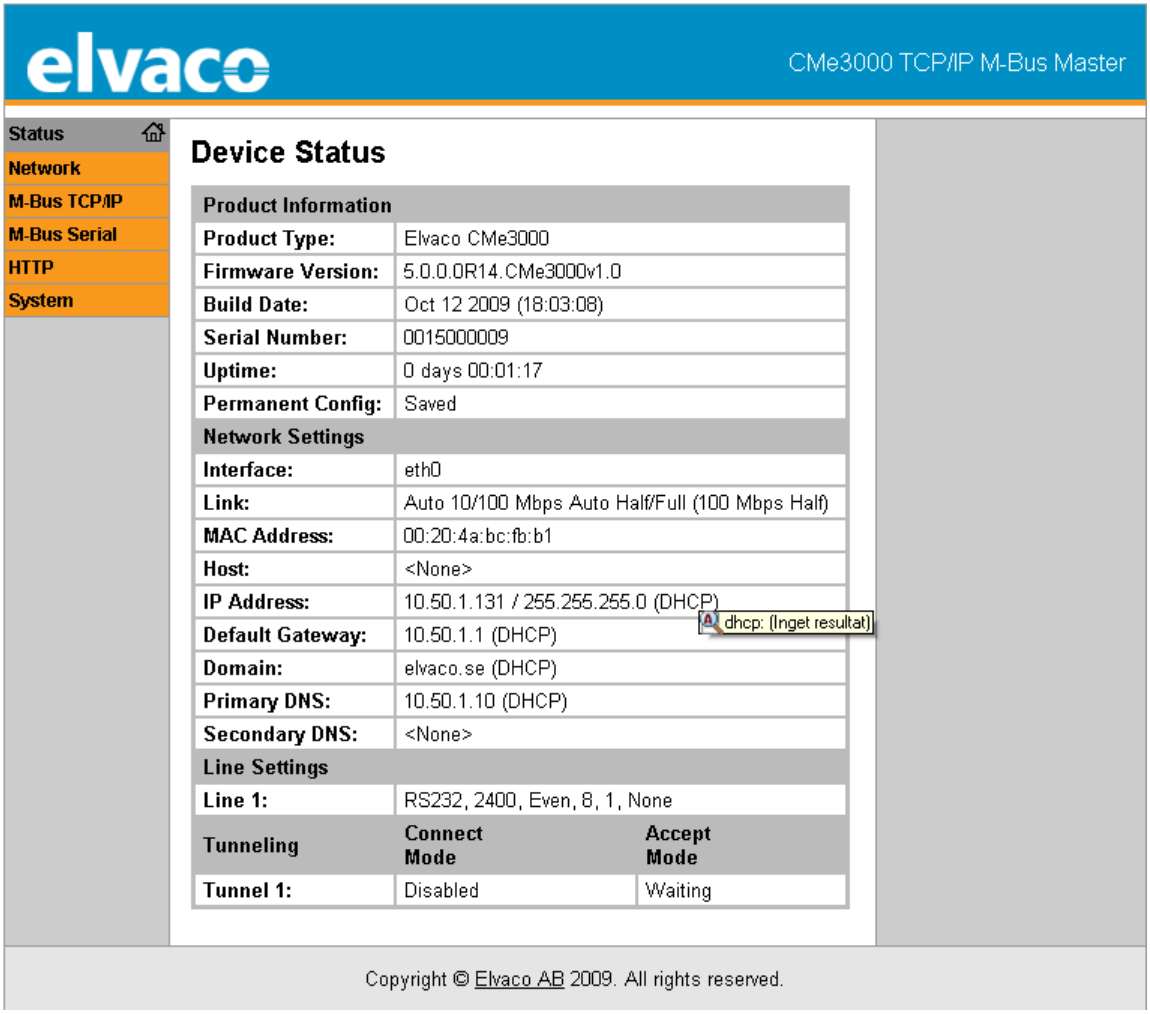


Figure 2 Internal web interface - Home

6.2 Change IP settings

The product supports both DCHP and static IP settings. To change settings, navigate to “Network” page. Current IP settings are shown as in Figure 3.

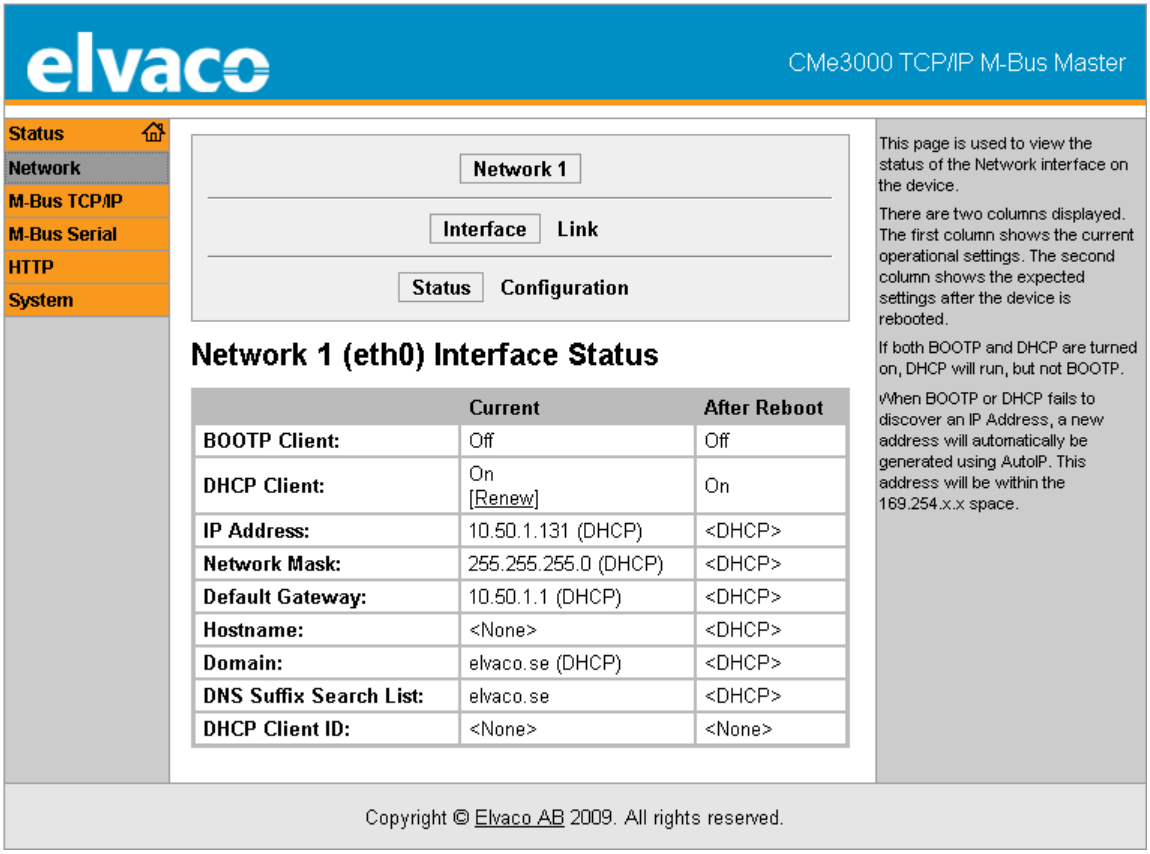


Figure 3 Internal web interface - Network interface status

Click on "Configuration" to change current IP settings. Depending on settings changed, the product may need a reboot. Please see Figure 4 for available configuration.

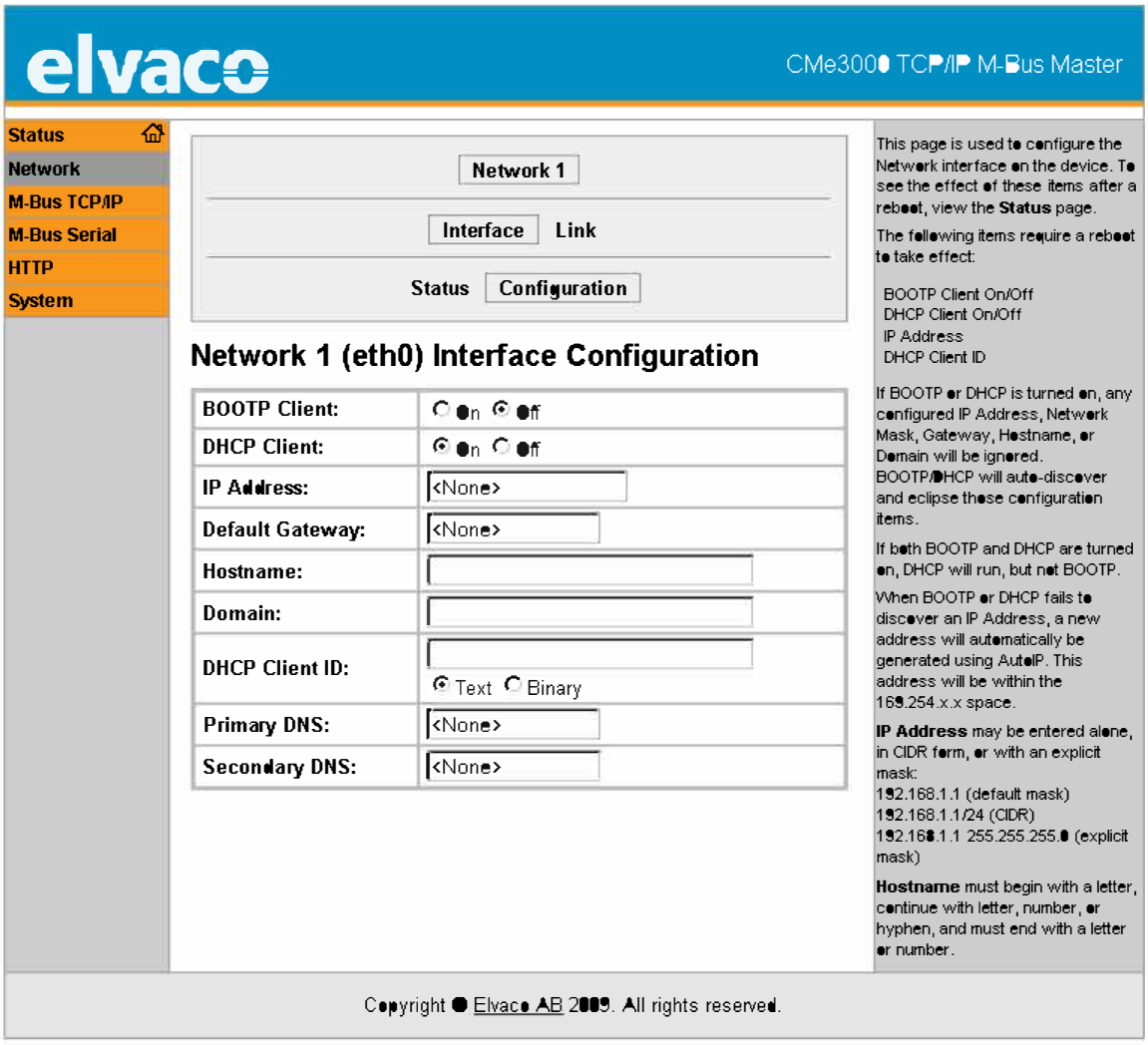


Figure 4 Internal web interface - Network interface configuration

The product will use auto speed and auto duplex from factory defaults. Change settings by clicking “Link”. See Figure 5.

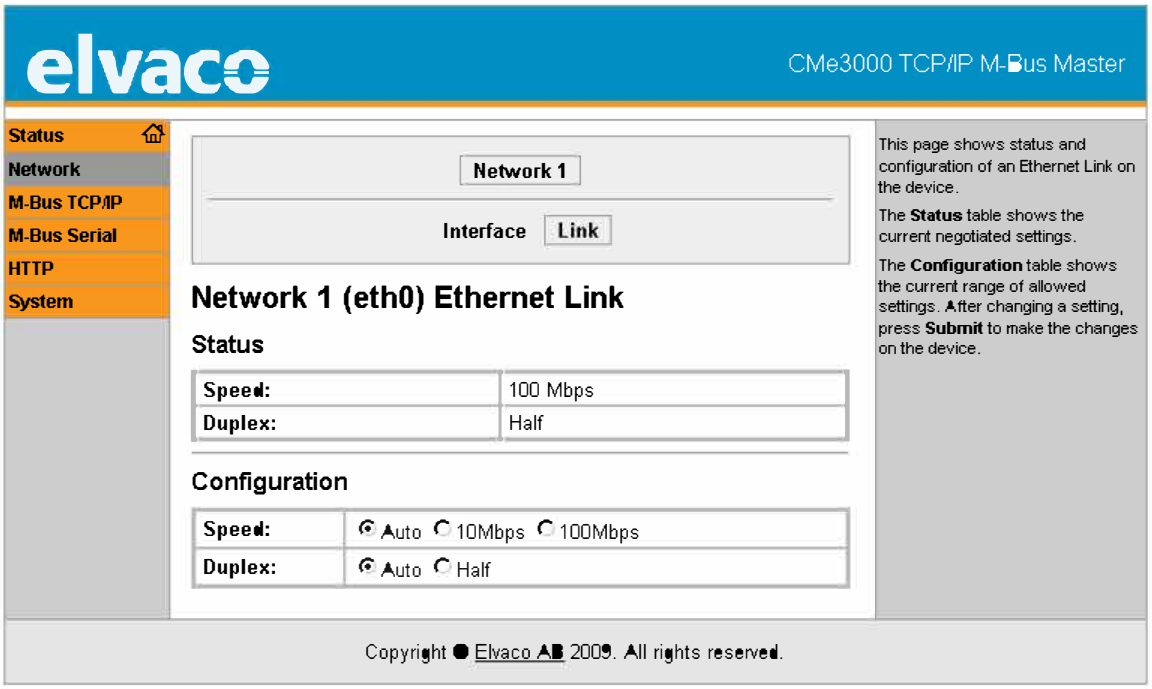


Figure 5 Internal web interface - Network link configuration

6.3 Configure M-Bus Transparent server settings

The product handles incoming TCP/IP connections and establishes a transparent link to the M-Bus interface. Use the M-Bus TCP/IP settings page to configure the TCP/IP server settings, see Figure 6.

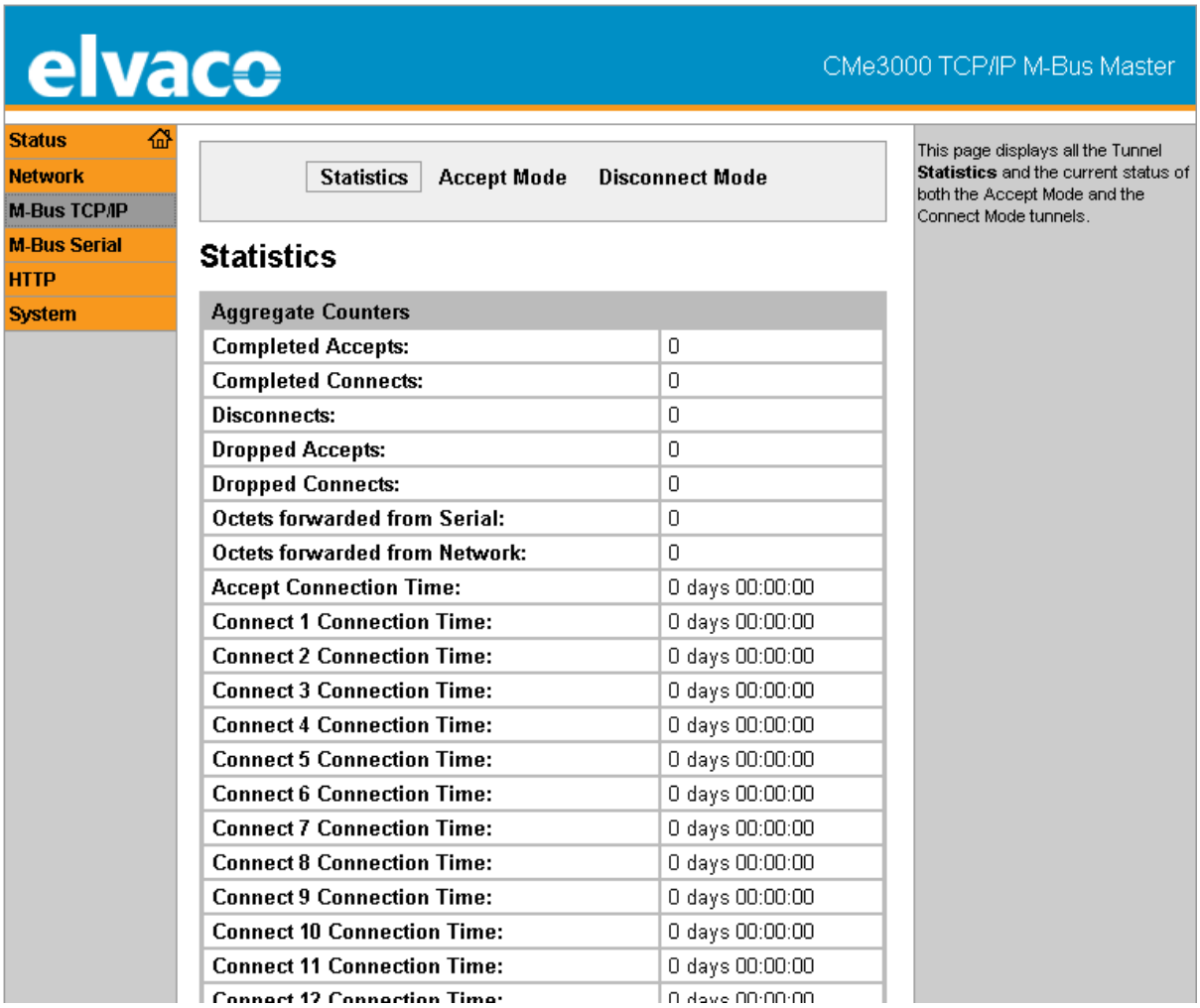


Figure 6 Internal web interface - M-Bus TCP/IP statistics

Click “Accept Mode” to change TCP server listening port and keep-alive settings, see Figure 7.

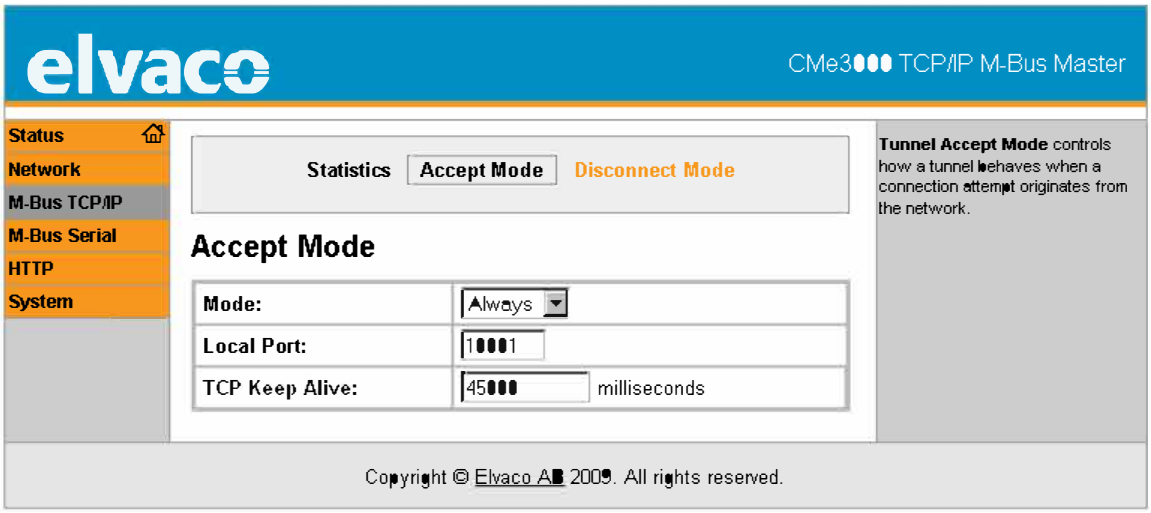


Figure 7 Internal web interface - M-Bus TCP/IP accept mode

Click “Disconnect Mode” to change disconnect timeout, see Figure 8.

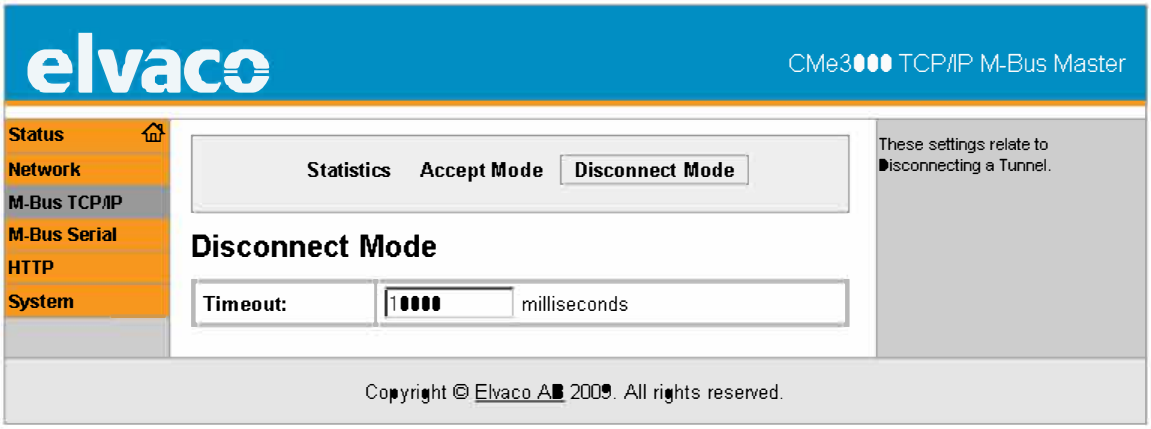


Figure 8 Internal web interface - M-Bus TCP/IP disconnect mode

6.4 Configure M-Bus Transparent local baud rate

Click “M-Bus Serial” to view M-Bus local serial line statistics, see Figure 9.

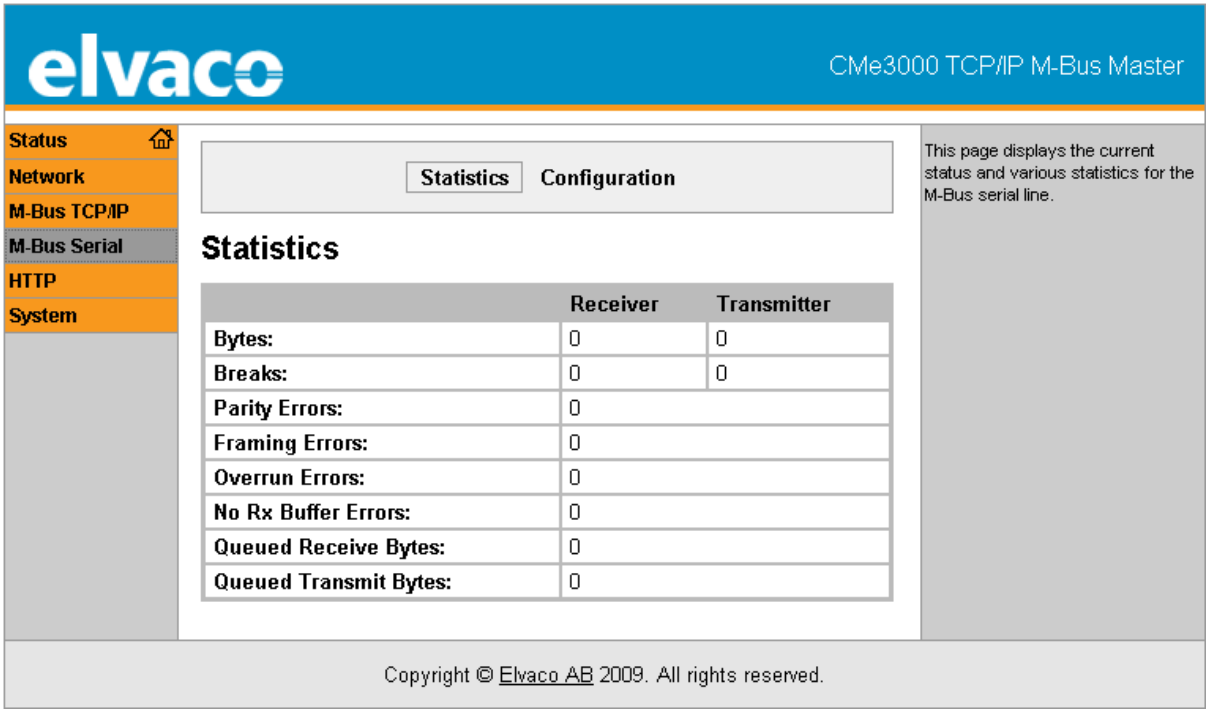


Figure 9 Internal web interface - M-Bus Serial statistics

Click “Configuration” to change local M-Bus baud rate, see Figure 10.

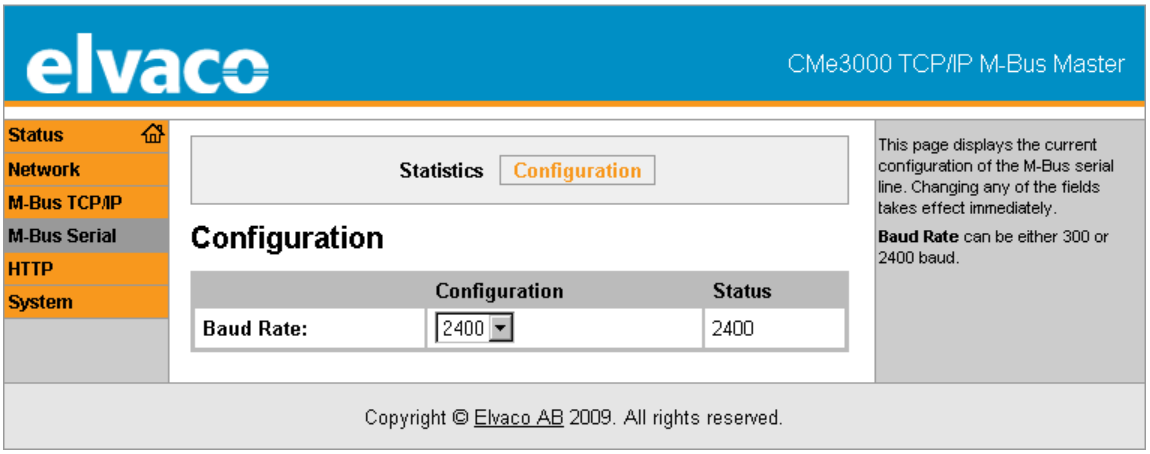


Figure 10 Internal web interface - M-Bus Serial configuration

6.5 Configure internal web interface settings

Click “HTTP” to view internal web interface statistics. The internal web interface can handle different users and HTTPS when required, see Figure 11.

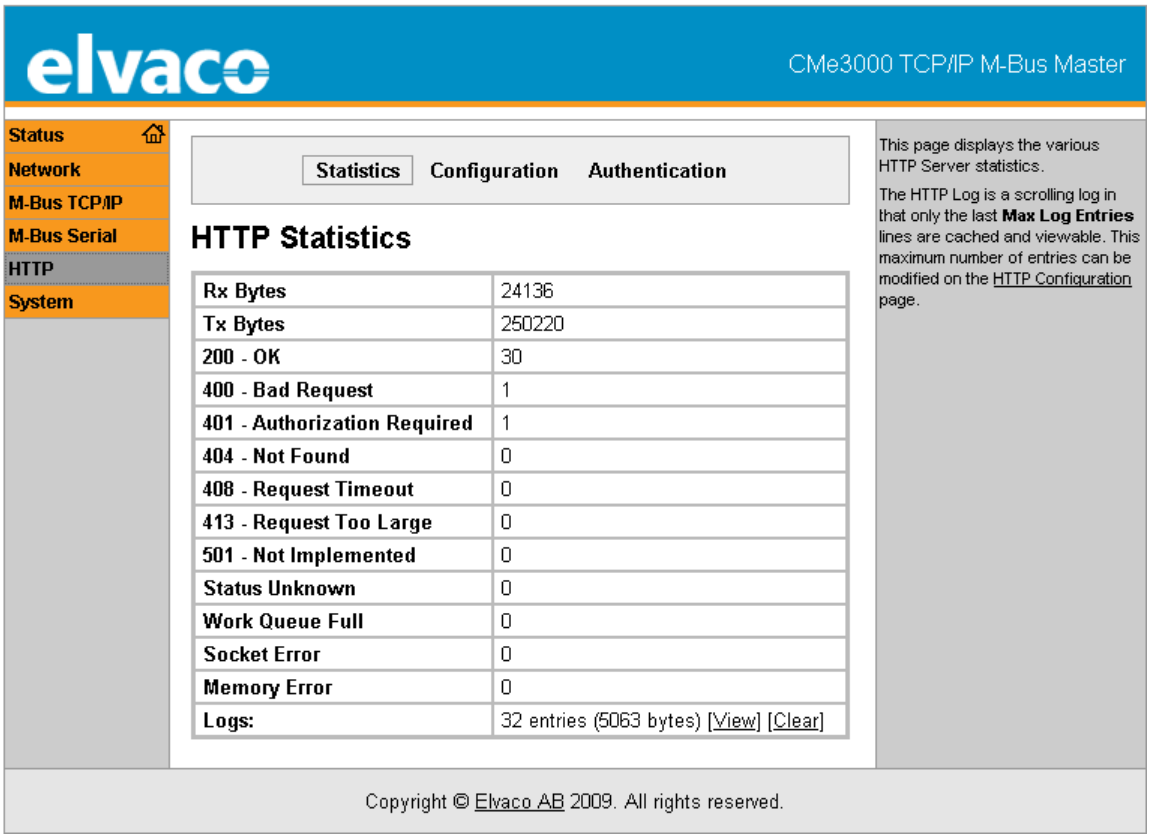


Figure 11 Internal web interface - HTTP statistics

Click “Configuration” to change internal web interface server settings, see Figure 12.

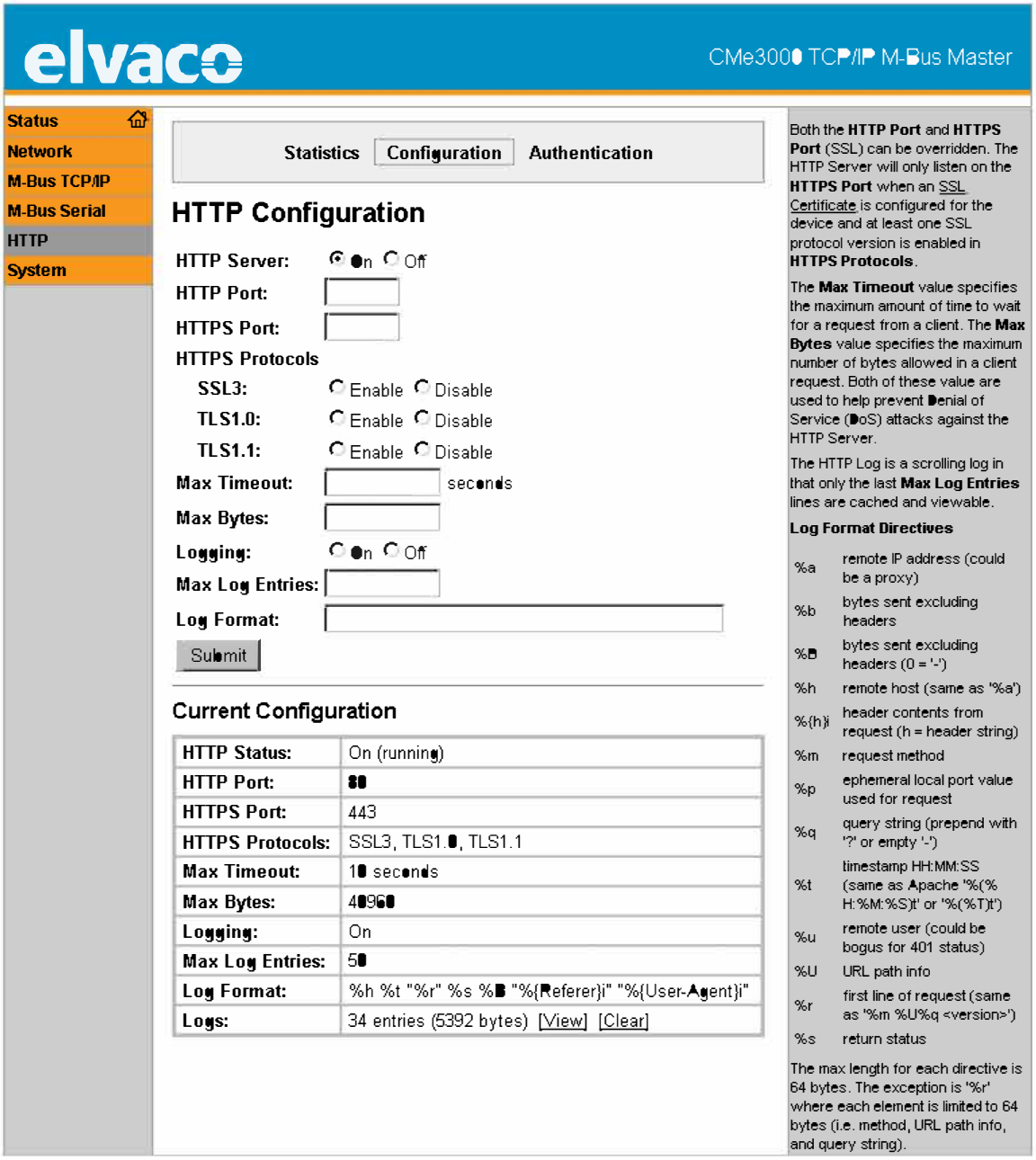


Figure 12 Internal web interface - HTTP configuration

Click “Authentication” to change security settings, see Figure 13.

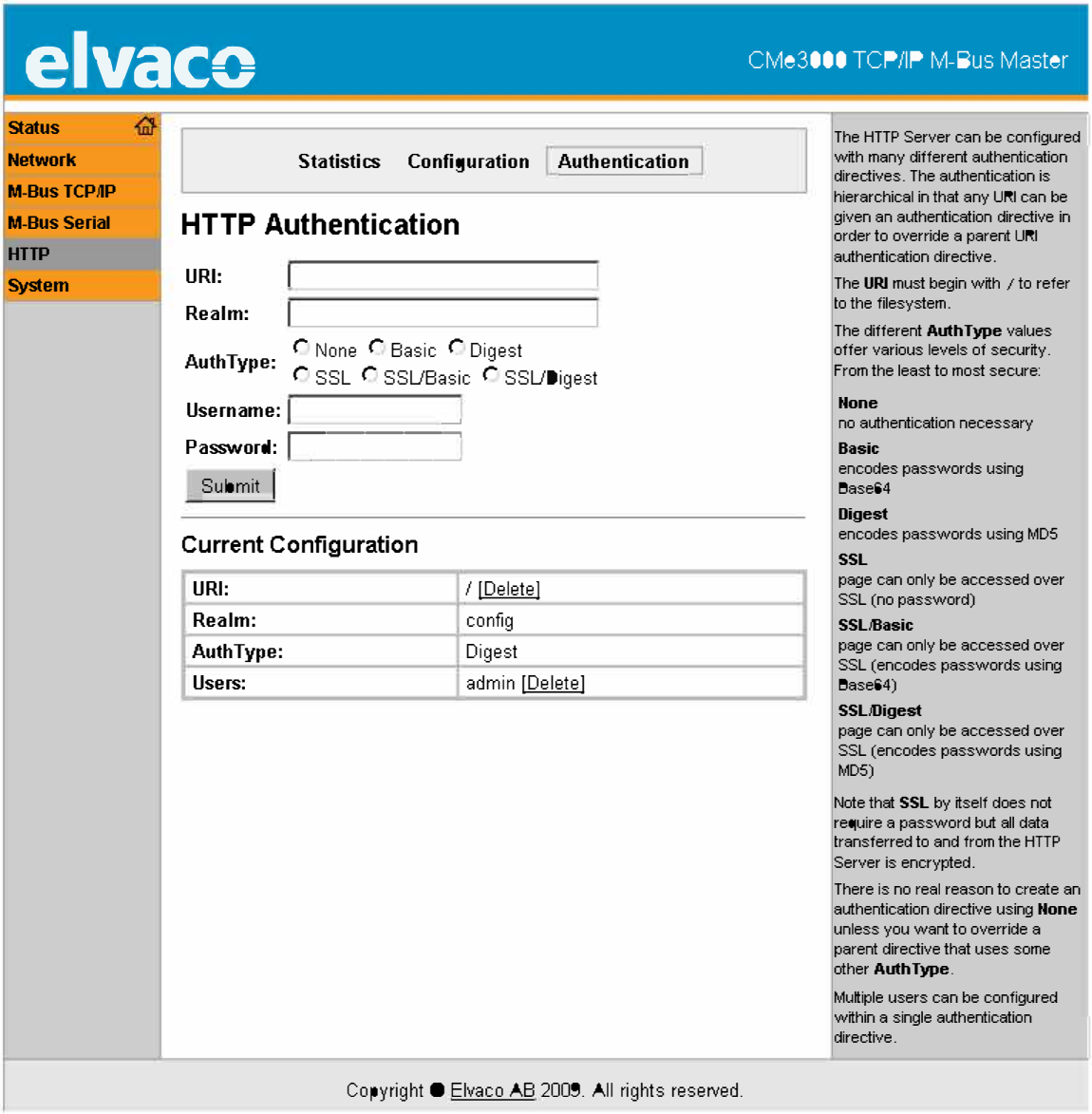


Figure 13 Internal web interface - HTTP authentication

6.6 System

On the System page, the product can be rebooted, reset to factory defaults and the firmware can be upgraded. Click “System” to enter the System page, see Figure 14.

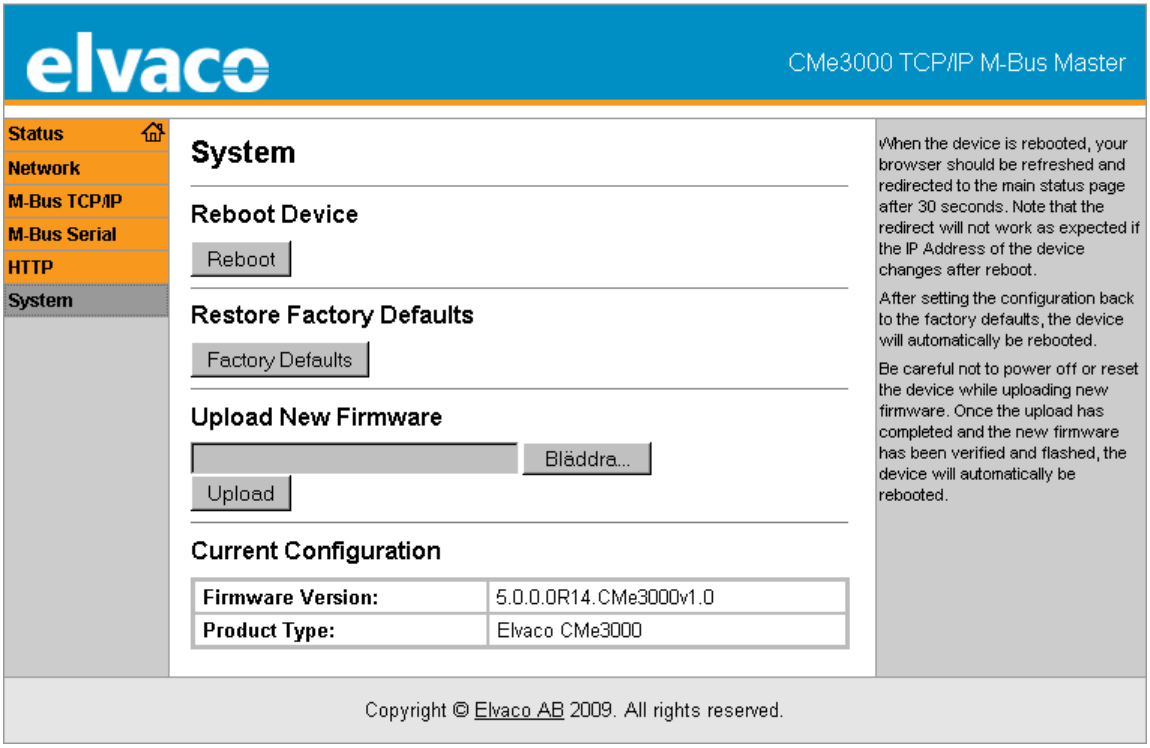


Figure 14 Internal web interface - System

6.6.1 Reboot

Click the “Reboot” button to reboot the device. Boot time is approximately 10 seconds.

6.7 Factory defaults

Reset to factory defaults by clicking the button “Factory defaults”. See Table 3 for default settings. The product can also be reset to factory defaults by pressing the button on power up for 5 seconds, see section 5.4.

6.8 Firmware update

The product can be remotely updated by uploading new firmware in the internal web interface. Use the button “Browse” to select the firmware file and click “Upload” to start firmware update process. The latest firmware file can be found on Elvaco web site, http://www.elvaco.com.

Firmware file name should be named cme3000.romz.

7 Troubleshooting

7.1 All LEDs are permanently off

There is a problem with the supply voltage. Please verify 100-240 VAC. If the problem persists, the product may be malfunctioning. Please contact Elvaco support.

7.2 Red LED is permanently on

This indicates an error on the M-Bus 2-wire bus.

Please verify no short-circuit of the M-Bus bus. The voltage of the bus should be between 24 VDC and 30 VDC.

7.3 Cannot connect to the product using TCP/IP

Please verify TCP/IP settings in the internal web interface:

- TCP port used for communication
- IP address
- Ethernet link settings

7.4 Cannot read connected M-Bus slaves

Please verify M-Bus status:

- Voltage over M-Bus slave device should be between 24 VDC and 30 VDC
- All M-Bus slave devices must have unique secondary or primary M-Bus addresses depending on addressing mode
- M-Bus slave device baud rates

If you still have problems getting your CMe Series running, please contact Elvaco support, see contact information section 1.2.

8 Technical specifications

8.1 Characteristics

Type	Value	Unit	Comments
Mechanics			
Casing material	Polyamide	-	
Protection class	IP20	-	
Dimensions (w x h x d)	35 x 90 x 65	mm	2 DIN modules
Weight	100	g	
Mounting	DIN rail	-	Mounted on DIN rail (DIN 50022) 35 mm
Electrical connections			
Supply voltage	Screw terminal	-	Cable 0.75-2.5 mm^2, 0.5 Nm tightening torque.
M-Bus master port	Pin terminal	-	Solid wire 0.6-0.8 Ø mm
Network	RJ45	-	Ethernet
Electrical characteristics			
Nominal voltage	100-240	VAC	+/- 10%
Frequency	50/60	Hz	
Power consumption (max)	<2.5	W	
Power consumption (nom)	<1	W	
Installation category	CAT 3	-	
Environmental specifications			
Operating temperature	-20 to +55	°C	
Operating humidity max	80 % RH at temperatures up to 31 °C, decreasing linearly to 50 % RH at 40 °C	-	
Operating altitude	0-2000	m	
Pollution degree	Degree 2	-	
Usage environment	Indoors, can be extended with IP67 enclosure for outdoor use	-	
Storage temperature	-40 to +85	°C	
User interface			
Green LED	Power	-	
Red LED	Error	-	
Yellow LEDs	Status Ethernet	-	

Push button	Factory reset	-	
Configuration	Web interface (HTTP)	-	
M-Bus			
Interfaces	IR, integrated M-Bus Master	-	
Maximum number of M-Bus devices (software limit)	256	-	
Transparent M-Bus	TCP/IP	-	Software limit does not apply to Transparent M-Bus mode
Integrated M-Bus Master			
M-Bus standard	EN 13757	-	
M-Bus baud rate	300 and 2400	bit/s	
Nominal voltage	28	VDC	
Maximum unit loads	8/12	T/mA	Can be extended using CMeX10-13S Series
M-Bus search modes	Primary, secondary	-	
Maximum cable length	1000	M	100 nF/km, maximum 90 Ω
General			
Software/firmware update	Web interface	-	
Fixed network (Ethernet)			
Speed and duplex	Auto 10/100	Mbit	Half/Full duplex
Communication protocols			
TCP Transparent M-Bus @ 300 and 2400 baud TCP Console for configuration HTTP internal web server for configuration			

Table 2 Technical specifications

8.2 Factory defaults

Name	Value	Unit	Comments
BOOTP Client	Off	-	
DHCP Client	On	-	IP address, default gateway, hostname, domain, DNS from DHCP
Ethernet Speed	Auto	-	
Ethernet Duplex	Auto	-	
M-Bus TCP/IP Server	Enabled	-	
M-Bus TCP/IP Port	10001	-	
M-Bus TCP/IP Server Keep Alive	45	s	
M-Bus TCP/IP Server disconnect timeout	10	s	
M-Bus Serial local baud rate	2400	Bit/s	
Internal web interface username	admin	-	
Internal web interface password	admin	-	

Table 3 Factory defaults

9 Type approvals

CMe Series is designed to comply with the directives and standards listed below.

Approval	Description
EMC	EN 61000-6-2, EN 61000-6-3
Safety	EN 61010-1, CAT 3

Table 4 Type approvals

10 Safety and environment

10.1 Safety precautions

The following safety precautions must be observed during all phases of the operation, usage, service or repair of any CMe Series product. Users of the product are advised to convey the following safety information to users and operating personnel and to incorporate these guidelines into all manuals supplied with the product. Failure to comply with these precautions violates safety standards of design, manufacture and intended use of the product. Elvaco AB assumes no liability for customer's failure to comply with these precautions.

All instructions must be carefully read before CMe3000 is installed and used. They contain important information about how the product is used properly.

The installation of CMe3000 should not be started before the technical specifications are fully understood. The work must be performed in the order listed in this manual, and only by qualified personnel. The work must also be done in accordance with national electrical specifications and applicable local regulations.

In order to avoid the product being damaged by static electricity, an ESD wristband should be worn when handling the product.

To prevent hazardous power levels, the M-Bus 2-wire cable should be disconnected from the M-Bus slave or other installations.

The product is intended for permanent connection to the M-Bus slaves through the M-Bus 2-wire cable. The M-Bus master's 2-wire cable must be properly dimensioned, and if necessary, it must be possible to disconnect the M-Bus slaves from the 2-wire cable.

The labelling of the product may not be changed, removed or made unrecognizable.

11 Document History

Version	Date	Description	Author
1.0	2010-01-21	First draft	David Vonasek
1.1	2010-07-01	Added information of reset possibilities for static IP settings.	David Vonasek
2.0	2011-03-17	Minor changes	Ericha Bloom
	2014-05-22	Added LED images	Ericha Bloom
	2016-08-16	Added text in section 4.1.4	Ericha Bloom

11.1 Document software and hardware appliance

Type	Version	Date	Comments
Hardware	>R1A	2010-01	Released
Software	>=1.5.0	2010-12	Released

12 References

12.1 References

[1] EN-13757-1, EN-13757-2, EN-13757-3
Communication System for meters and remote reading of meters – Part1, Part2 and Part3

12.2 Terms and Abbreviations

Abbreviation	Description
AMR	Automatic Meter Reading
Product	In this document CMe3000
OTAP	Over The Air Provisioning
DIB	Data Information Block (M-Bus data block)
DIF	Data Information Field (M-Bus data block information)
VIF	Value Information Field (M-Bus value block information)
Device	In this document; M-Bus slave or other metering slave

12.2.1 Number representation

Decimal numbers are represented as normal number, i.e. 10 (ten).

Hexadecimal numbers are represented with prefix 0x, i.e. 0x0A (ten)

Binary numbers are represented with prefix 0b, i.e. 0b00001010 (ten)