User Manual

Digital NTP PoE Clock

LUMEX5, LUMEX7, LUMEX12

Index

General

LUMEX5,LUMEX7 and LUMEX12 are Digital Clocks for indoor use, displaying time in hours and minutes. The time can be displayed in either 12- or 24-hour format. The clock can also be configured to show the time, date and temperature alternately. Light intensity of the digits is adjustable by an automatic dimmer control.
The clock is prepared for time synchronization by Network Time Protocol (NTP) from an NTP server. If the connection to the NTP server is lost the clock will continue to run on the built-in time base. Configuration of network settings, light intensity and other parameters is done via a WEB-browser.

The factory default setting for the IP address assignment is DHCP with foldback IP address 192.168.3.10. Please note, if default settings are used no configuration is needed.

Power-Over-Ethernet

Power-over-Ethernet (PoE) is a network standard based on IEEE 802.3af that provides a means of delivering power to devices connected to the LAN. This technology eliminates AC electrical wiring, wall transformers, allows centralised UPS backup, and is fully compatible with both powered and non-powered Ethernet devices.
In addition to providing time synchronisation and control over Ethernet, PoE enabled Ethernet cable provides power to the clock. System installers need run only a single Ethernet cable that carries both power and data to each clock. This allows greater flexibility placing clocks and, in most cases, significantly decreases installation costs. Westerstrand clocks are fully compliant with the IEEE 802.3af standard for providing power over Ethernet.

Functional description

Start up

When the network cable is connected to the electronics, the clock will display the time from the internal timekeeper. If no correct time, the display will show lines.
After some seconds, the clock tries to receive a correct time message from an NTP server and then display correct time.
In case the NTP would disappear, the clock will run on built-in quartz crystal.

Installation

Wall installation of single-sided clocks

- Unscrew 4 screws, 2 above and 2 below. Remove the back plate from the casing and mount it on the wall.
- Connect the LAN cable to the RJ45 connector, input PoE splitter.
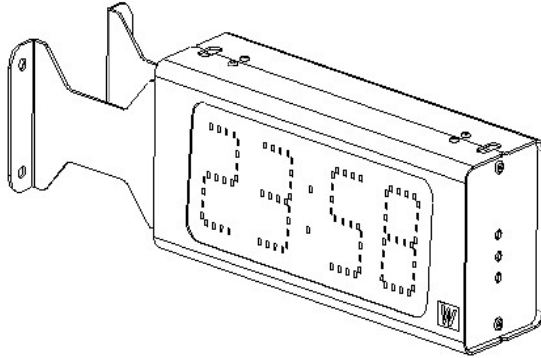- Mount the front on the back plate and fasten the 4 screws.
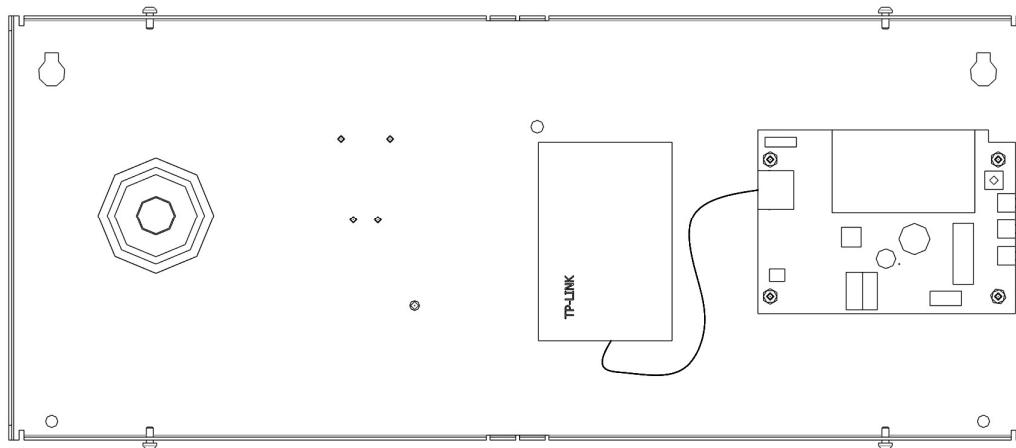
Ceiling mounted installation
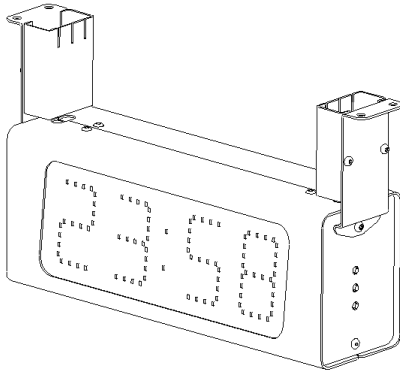
- Unscrew 2 screws under the service front (the front when you have R,F,P buttons to the right). Remove the front.
- Mount the 2 holders at the digital clock and mount it on the wall.
- Connect the LAN cable to the RJ45 connector, input PoE splitter.
- Assemble the front and the cover for the holder.

Wall installation double-sided clock

- Unscrew 2 screws under the service front (the front when you have R,F,P buttons to the right). Remove the front.
- Mount the 2 holders at the digital clock and mount it on the wall.
- Connect the LAN cable to the RJ45 connector, input PoE splitter.
- Assemble the front.

Temperature sensor (Option)

If a temperature sensor is used, connect it to the CPU board according to the pictures below.
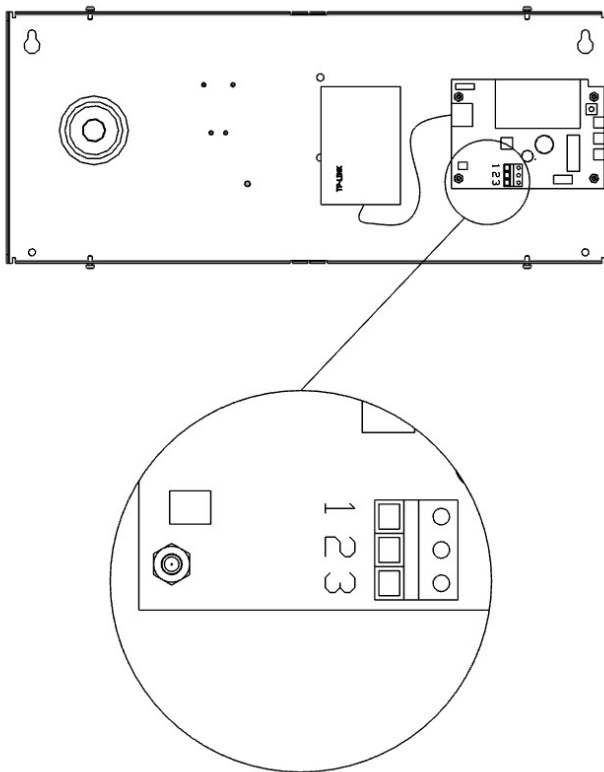
1. Red

2. Black

3. Shield

Synchronisation

NTP

The clock is prepared for time synchronization by Network Time Protocol (NTP) from an NTP server.
When a correct time message is received the clock will display correct time automatically.
The colon between hours and minutes will flash when the clock is in sync and the time message is accepted.

Standalone

If the clock does not have an external synchronisation, it operates standalone.

Configuration using R F P buttons

General

Configuration of network settings, light intensity and other parameters is done via a WEB-browser. Some of the parameters can also be set using three buttons located at one side of the clock. Please note, if default settings are used no configuration is needed.

The programming is made with push buttons placed on the side of the clock (see below).

R
F
P
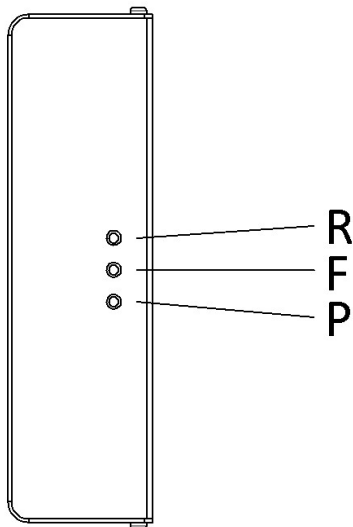
Button
[R] Return   Enter base mode (display time)
[F] Function   Next function / Accept displayed value
[P] Program   Enter the displayed function / Increase displayed value. Hold button for rapid count.

Programming time

1. Push [F] until display shows

    `ti nE`

2. Push [P] and display shows

    `yy 13`   (year)

3. Push [P] until desired year (00-99) and accept with [F]

4. Display shows

    `nn 1`   (month)

5. Push [P] until desired month (1-12) and accept with [F]

6. Display shows

    `dd 1`   (day)

7. Push [P] until desired date (1-31) and accept with [F]

8. Display shows

    `hh 12`   (hour)

9. Push [P] until desired hour (0-23) and accept with [F]

10. Display shows

    `nn 07`   (minutes)

11. Push [P] until desired minute (00-59), accept with [F] and clock starts

12. Display shows

ti nE

13. Push [R]. Program finished
14. Display shows the set time

Setting light intensity

The light intensity for the digits can be adjusted in 8 levels. An automatic dimmer function regulates the light intensity within each level.

1. Push [F] until display shows

di SP
(display)

2. Push [P] to select

3. Display shows

di 1
(display intensity)

4. Push [P] until desired intensity (1 – low, 8 - high) and accept with [F]
5. Push [R]. Program finished

View / configure IP address

The Clocks IP address can be either static or dynamic (DHCP). Configuration of IP addressing work mode is done using a web-browser. The default setting is DHCP.
Using the R F & P buttons it is possible to view or change the current IP-address. It is also possible to see if the Clock is using static or dynamic IP address.
If the work mode is DHCP it is not possible to change the IP address manually.

To view the current IP address:
In this example we demonstrate IP address 192.168.2.51

1. Push [F] until display shows

IP d
(IP mode)

IP mode d = dynamic (DHCP), s = static IP

2. Push [P] to select

3. Display shows

A1 92
(first part)

4. Push [P] to select

5. Display shows

b1 68
(second part)

6. Push [P] to select

7. Display shows

C 2
(third part)

8. Push [P] to select

9. Display shows

d 51
(fourth part)

10. Push [R]. Return to base mode

Configuration using a WEB browser

Login

It is possible to login as administrator or guest. The administrator has the rights to read and to write/change configuration. A guest can read only.

Username

admin or *guest.*

Password

Enter a password. Default password is *password*.
After the login a function menu will be shown.

Status

Name	Symbolic name. The name is set in function *General*
UTC/LT	Current time
Timezone	Offset to UTC during normal time (=winter time).
IP	The Clocks IP address
Netmask	Shows the netmask setting
Gateway	Shows the IP address of the gateway
DNS	Shows the IP address of the DNS server
MAC	A MAC address has format 00-07-09-xx-xx-xx

Alarms	Shows if the Clocks has any alarms. The following alarm texts can be displayed.
	No Alarms = Clock OK.
	Not synchronised = The Clock is not synchronised.
	5-minute limit = The received time message is more than 5 minutes wrong compared to internal time. The message is not accepted.
	Authentication = The MD5 authentication has failed.
	Temp is out of bounds = Temperature reading is currently out of bounds.
NTP	Synchronised = The clock has been synchronised from an NTP server with name/IP ntp.se
	s = Stratum, time quality. A low value is better.
	n = Number of time settings from this NTP server.
	TO = Timeout in minutes before NTP alarm.
Sensor	Dimmer=4/5: Current dimmer value / Set dimmer level. Maximum value 8.
	Sensor=8784: Current light sensor data. Possible values 0-65535.
	Temp=21° C: Current temperature reading.
Uptime	Time in operation since last power failure.
Firmware	Present firmware version.

Network

Enter general network parameters.

DHCP

Off – Static IP address according to static IP below.
On – DHCP IP address with fallback according to IP fallback below.
Fallback: If DHCP is activated this will be the DHCP fallback address.

Static IP

To be checked if static IP address is used.

Address: Enter the static IP-address.

Subnetmask: Enter the subnetmask.

Gateway: Gateway IP address.

DNS: IP address of DNS server. Two different addresses can be entered, DNS1 and DNS 2.

Utilities

Syslog: Syslog server IP address. Send syslog messages if checked.

Identity access: Identify access is used in combination with application software Wunser. Wunser is a PC program that is used for finding and doing light configuration on Westerstrand Ethernet products. Firmware updates are also handled by Wunser.
Wunser uses UDP port 9999 when communicating with other Westerstrand products and UDP port 69 when downloading new firmware. These ports can be open, closed or prepared for encrypted communication.

Identify access = Normal   ; port 9999 and port 69 is open.

Identify access = Password   ; port 9999 and port 69 are using AES encryption. The password used is the same as the administrator login password.

Identify access = Disabled   ; port 9999 and port 69 is closed.

Telnet: Use of Telnet protocol allowed if checked.

Web server: Use of HTTP protocol (web-browser) allowed if checked.

HTTPS: Use of secure communication protocol HTTPS (web-browser) if checked.

SNMP

This function is used to activate the SNMP, enter the address of one or more SNMP servers and to define the SNMP community. The IP address can be specified as an IP address or as a full domain name. Up to three SNMP server addresses can be entered.

Trap type: This function is used to choose SNMP trap version.
Trap type v1 = Trap according to SNMPv1
Trap type v2 = Trap according to SNMPv2

NTP
NTP settings

General Description
Westerstrand NTP Clients has several features to achieve a reliable and accurate time. The configuration of the different facilities is flexible, and the features can be selected or deselected depending on each customer's individual needs.

As an NTP Client the unit has three different ways to determine the most accurate and reliable candidates to synchronize the system clock. Which model that is used depends on the specific installation and the customer requirements. The NTP client has also a server list where up to 5 different time servers can be entered.

The three different ways are:

1. FIRST Always use the first server in the list if available. If not available, take the next one.

This suits installations where it is more important to know exactly from where the clients get time than to have the most accurate time. The other NTP servers in the list will then be more of backup servers.

2. STRATUM Use the NTP server with best stratum. The software sends a request to all servers in the list and uses the time from the one with best stratum. If same stratum it will use the one that is first in the server list.

This suits installations where it is important that the time is coming from a time server high up in the pyramid.

3. MEDIAN Send a request to all servers in the list and use the median value (the NTP server that is in the middle). This will filter out all misleading time messages.

In addition to these rules there are some more features such as synchronization limits and a clock discipline algorithm is also included. This algorithm measures the oscillators drift over a longer period and makes compensations for the drift.

DHCP option 042
Ask for time using the server IP addresses received from the DHCP server (DHCP option 0042).
Maximum 2 NTP servers are set automatically by option 0042.

Broadcast
Accept broadcast/multicast time messages. Broadcast address: 255.255.255.255

Multicast
Accept multicast time messages. Multicast address: 224.0.1.1

NTP server

Select NTP servers, e.g. *192.168.1.237* or as an URL *ntp.se*. Also see **NTP mode**=DHCP above
Up to five different NTP servers can be entered. If the first one fails it will automatically go to the
next one and so on.

Set local Time

Used for manual time setting.

Interval

Interval in seconds between NTP requests.

Remove time at alarm

This function is used to define how the clock should behave during a NTP synchronization alarm. See
Alarm timeout below. If the checkbox is checked the clock will show --:-- in case of synchronization
alarm. If the box is not checked, the clock continues to show time and uses its own built-in quartz
oscillator as time reference.

Alarm timeout

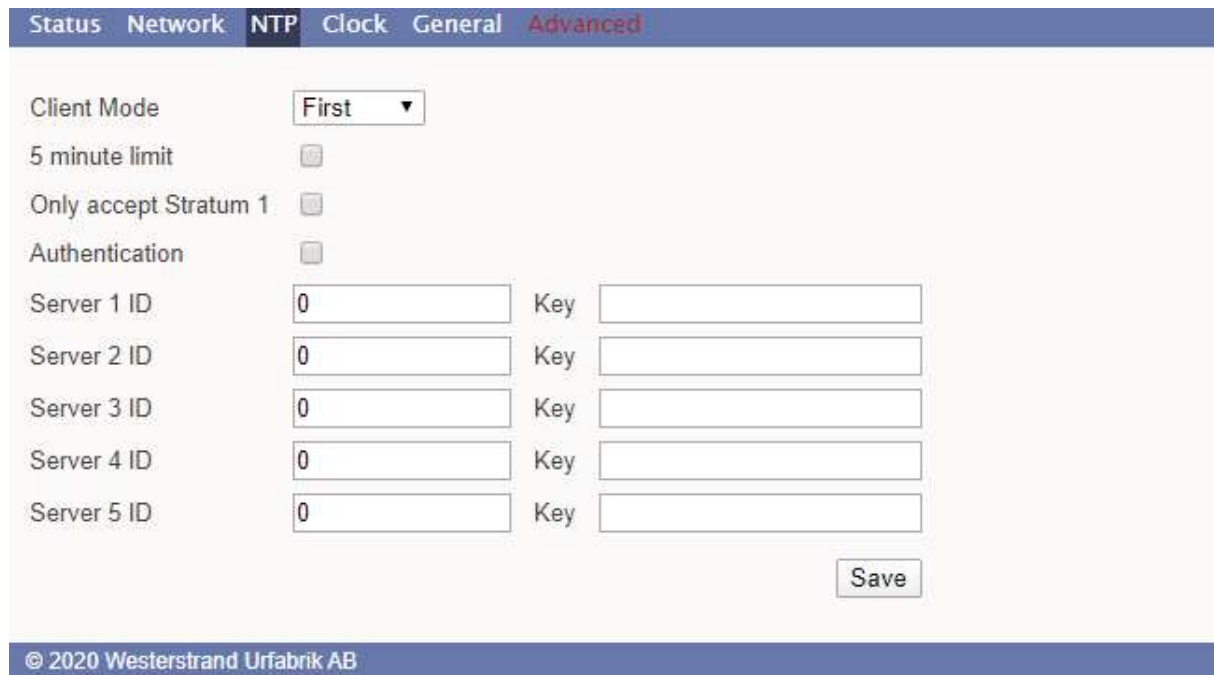Time in minutes before the NTP synchronization alarm is activated.

Timezone

Select country/time zone. A NTP server sends UTC time. The clock will correct this to local time. If
Daylight Saving Time (see below) is checked it will also and adjust for DST (Daylight Saving Time)
automatically.

Daylight Saving Time

If checked then this timezone uses DST (Daylight Saving Time).

NTP advanced

Advanced NTP settings

Client mode

FIRST. Always use the first server in the list if available. If not available take next one.

This suits installations where it is more important to know exactly from where the clients get time than to have the most accurate time. The other NTP servers in the list will then be more of backup servers.

STRATUM. Use the NTP server with best stratum. The software sends a request to all servers in the list and uses the time from the one with best stratum. If same stratum it will use the one that is first in the server list.

This suits installations where it is important that the time is coming from a time server high up in the pyramid.

MEDIAN. Send a request to all servers in the list and use the median value (the NTP server that is in the middle). This will filter out all misleading time messages.

Only accept Stratum 1

This function makes it possible to synchronise to Stratum 1 time servers only.
Check box = Off ; synchronise to time server independent of stratum level.
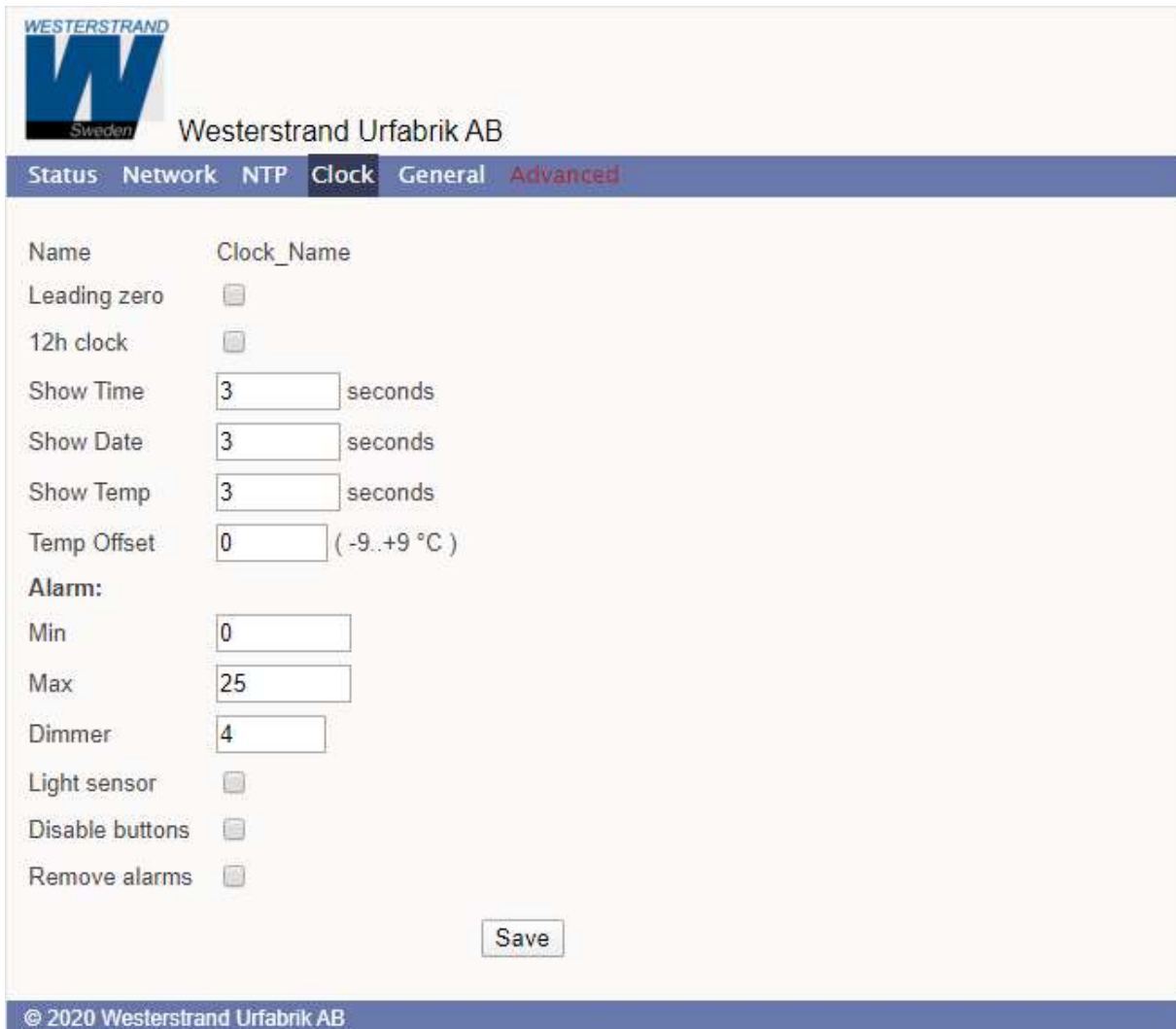Check box = On ; synchronise only if time server is operating on Stratum 1 level.

Authentication

If authentication is activated: Use MD5 authentication.
Server ID/Key: Authentication data for the external NTP servers configured in the NTP server list.

Clock

Used to configure general clock parameters.

Leading zero

Time: not checked; " 8:29",checked; "08:29".
Date: not checked; " 7.9 ", checked "07.9 " (Sep 7).

12h clock

Show e.g. " 2:49" (12h clock) instead of "14.29" (24h clock).

Show Time

Loop-time in seconds for time.

Show Date

Loop-time in seconds for date.

Show Temp

Loop-time in seconds for temperature.

Temp Offset

Adjust the temperature reading (-9 to +9 °C).

Alarm

Set temperature bounds. The temperature alarm "Temp is out of bounds" will be active when the temperature reading is below the min value, or above the max value.

Dimmer

Enter the dimmer value (1-8).

Light sensor

Allow for input from light sensor.

Disable buttons

Disable buttons on the clock. When the buttons are locked the only thing that can be done using the buttons is to read the IP-address.

General

Used to configure general parameters.

Name

Symbolic name, maximum 64 characters. This name is shown in the status menu and is also included in SNMP and Syslog messages. Example: Digital Clock, reception.

Contact

Contact person. This information is included in SNMP messages.

Location

The place where the clocks is located. Example: "Building 3 Room 214". This information is included in SNMP messages.

Password

Login password.
Admin = Adminstrator password. The administrator has the rights to read and to write/change configuration. Default password = *password*.
To switch off the password functionality enter password = *nopassword*
Guest = Guest password. A guest can read only. The button [Save] is deactivated for guest users. Default password = *password*.

Firmware Download

Function to enable firmware download. See also section *Firmware Download*.

Restart

Restart the Clock.

Backup/Restore

Backup

Save the clock configuration to a file. The clock suggests the Name field as filename (here *MyLanur229.txt*).
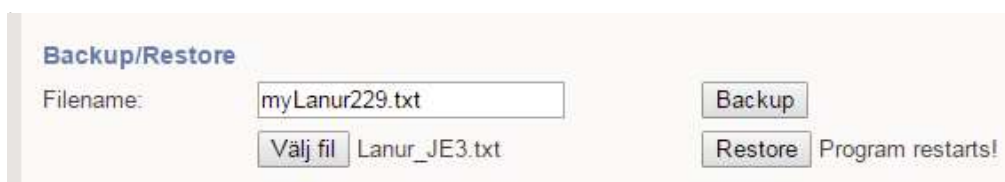Click [Backup].
Passwords are not saved.

Restore

Select file ([Välj fil]). Here file *myLanur229.txt* was selected.

Click [Restore].

The clock restarts. Refresh the page.

The MAC- and IP-address never are restored.

Advanced

Functionality to configure hardware settings for the clock, and to do a factory reset of the clock. Changing the hardware settings may cause the clock to function improperly.

Display type
Set type of display.

With Second
Set whether the clock has second digits.

Factory Reset
Reset the clock to factory settings.

Firmware Download / Wunser

General

The Clock has support for firmware upgrade via the network. The utility program Wunser is used for firmware upgrade. Wunser can be downloaded using the following link:
http://www.westerstrand.com/archives/download.htm

If checkbox Firmware Download is clicked, then the application jumps to a boot-loader. If no firmware upgrade take place within 60 seconds, then the old application is restarted again with the current firmware. *When the clock is in boot-loader mode, then the green LED on the RJ45-connector is flashing*.
When the program is in boot-loader mode, then the clock will answer on PING only.

For details of the download procedure, see Wunser manual, 4296.

Also other programs, e.g. windows built in client tftp, can be used:
c:\ARM\Lisa>tftp 192.168.2.61 put LISA-Q132.MOT
Successful transfer: 1234092 byte 15 sec., 82272 byte/s

Find IP-address

At delivery, the clock is set to DHCP, with fallback address 192.168.3.10. If this has been changed and is unknown, the clock can be found using Wunser, see manual 4296. The clock is identified in the product list by its MAC-address. Each product is labelled with the individual MAC-address.

Reset Button

At a normal start (Reset Button is not pressed) then the green LED is flashing about 2 seconds. Then the green LED is turned off. When the clock is synchronized the green LED is turned on.

Action when the Reset Button is pressed:

Power up	The application stays in boot-loader mode for ever and waits for firmware upgrade.
Application 3-9 seconds	Soft reset. The application restarts immediately.
Application >=10 seconds	Cold reset. The application restarts immediately in DHCP mode. If no DHCP server exist, the clock will take default address 192.168.3.10 after 60 seconds. All parameters except the MAC address will take default values.
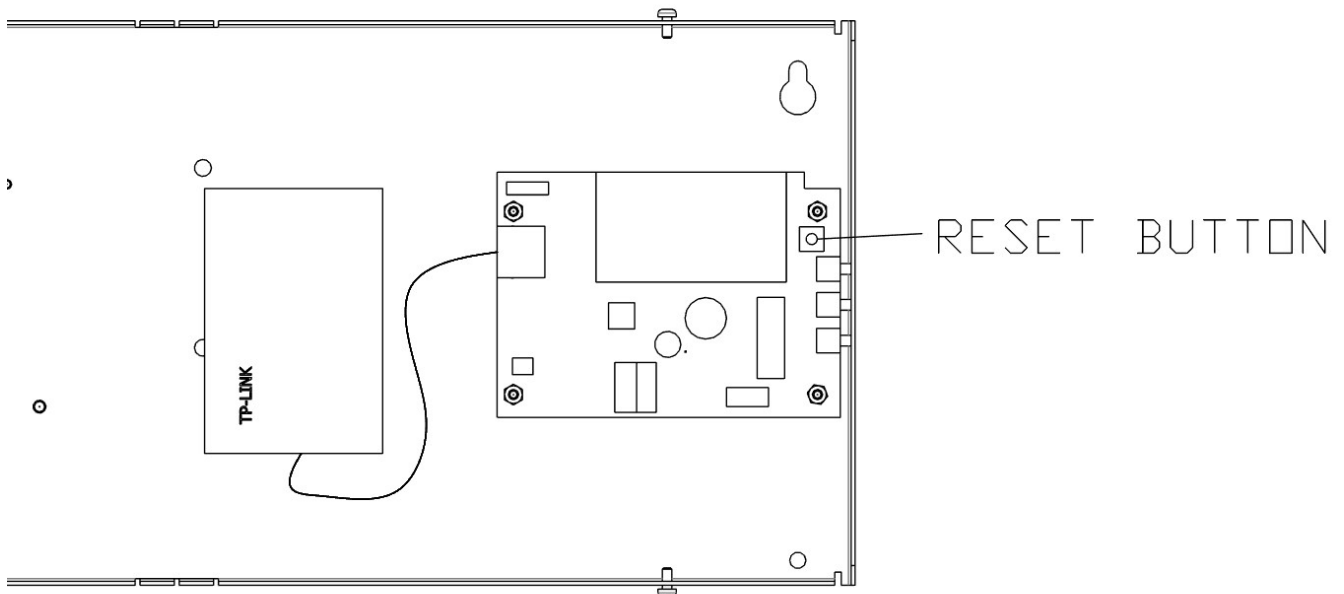
Technical specification

General

Art. no.:	LUMEX 5, LUMEX 7, LUMEX 12 - series
Mounting/Installation:	Single-, double sided. Wall or ceiling mounted.
Digits:	Single line red LED. Indicating time in HH:MM or HH:MM:SS
Digit height:	50 mm, 70 mm or 120 mm
Synchronisation:	NTP
Accuracy	0,1 sec/24 h at 22° C (free-running mode)
Internal time keeping during power failure:	48 hours (display is turned off)
Time format:	12- or 24-hour format selectable. Alternatively showing date: day and month.

Network

Protocols supported:	SNTPv4, RFC 4330, SNMP v2c, MIB II (RFC 1213), RFC2863, HTTP, HTTPS, Telnet, FTP
NTP protocol modes:	Unicast client mode (point to point), support for DHCP option 042, Broadcast/Multicast mode (point to multipoint). Multicast group address 224.0.1.1
Transport protocol:	TCP/IP
IP address assignment:	Static IP address or Dynamic (DHCP)
Compatibility:	Ethernet version 2/IEEE 802.3
Ethernet:	Supports 10/100BASE-T (RJ45) connections
Ethernet cable type:	Shielded
Device Management:	Web-Based (requires web browser) or via Telnet
Additional info.:	Support for DNS

Power supply

Supply voltage:	IEEE 802.3af

Environmental

Temperature range:	0°C to +40°C.
IP class:	IP 30

Housing

Housing:	Aluminium

Abbreviations

DST	Daylight Saving Time
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System. The Internet's system for converting alphabetic names into numeric IP addresses.
LED	Light Emitting Diode
LT	Local time
MAC	Physical address (Media Access Control)
NTP	Network Time Protocol
PING	Packet Internet Grouper
SNMP	Simple Network Management Protocol
UTC	Coordinated Universal Time