Manual

Analogue NTP Clock

With Power-Over-Ethernet connection

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General

Westerstrand Analogue NTP Clock with Power over Ethernet (PoE) connection provides the possibility to create a time distribution system with high accuracy and high reliability.
The NTP Clock is equipped with two motors, 3 hands analogue movement. Initial setting function and error correction is automatic. The movement starts automatically after reception of correct time.
The hour hand is sweeping, minute and second hands are stepping.

LAN connection

The NTP clock is equipped with a RJ45 (10/100BASE-T) connector for direct connection to the LAN via a Power-Over-Ethernet switch.
Each clock has a unique IP address. The IP address, gateway, subnetmask etc can be set manually (static IP) using a web browser (or telnet) or it can be set automatically using DHCP (dynamic IP).

The clock normal delivery mode is DHCP (dynamic IP with fallback address 192.168.3.10). Otherwise the IP address is labelled on the clock.

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.

NTP

To distribute correct time to different users in a Local Area Network (LAN) the Network Time Protocol (NTP) can be used. NTP is a part of the protocol family TCP/IP. The unit that sends out the time is called NTP Server and the clock that receives the time is called NTP Client.
There are some different ways (work modes) that can be used for distribution of time according to the NTP standard.
The NTP clock supports three different work modes:

1. Unicast client mode (point to point). A unicast client (the NTP clock) sends a request to a designated NTP server at its unicast address and expects a reply from which it can determine the time, the roundtrip delay and local clock offset relative to the server. The IP address of the NTP server is to be entered manually.

2. Same as work mode 1, but the IP address of the NTP server is received automatically from the DHCP server (option 042). The clock delivery mode is this option.

3. Broadcast/Multicast mode (point to multipoint). A multicast NTP server periodically sends a unsolicited message to a designated local broadcast address or multicast group address (224.0.1.1) and ordinarily expects no requests from clients. A multicast client (the NTP clock) listens on this address and ordinarily sends no requests.

Functional description

After connection of the network cable, the hands are driven to 12:00. When the hands have reached this position, the motors will be stopped and the time code detector is switched on. The hands will not move until the time code has been accepted. After the receiving process has finished the hands are driven to show the correct time and the movement starts normal run. The total start up time is approx. 10 minutes.
A correction is done if necessary (when a difference between received time and displayed time occurs).
If the NTP signal disappears, the clock continues to work by means of the built-in quartz crystal.

Installation

1. When the network cable is coming out from the wall, ensure that cable output is positioned in the shaded area. See fig. 1.
2. The cable inlets can also be used.
3. Measure and assemble an appropriate mounting screw (not included).
4. Connect the network cable to the clock.
5. Mount the clock on the wall.
6. Configure the clock using a normal web browser.

Please note that if the default settings are used no configuration is needed.
If the IP address is unknown, please use the Wunser software to search for the clock.
http://www.westerstrand.com/archives/download.htm

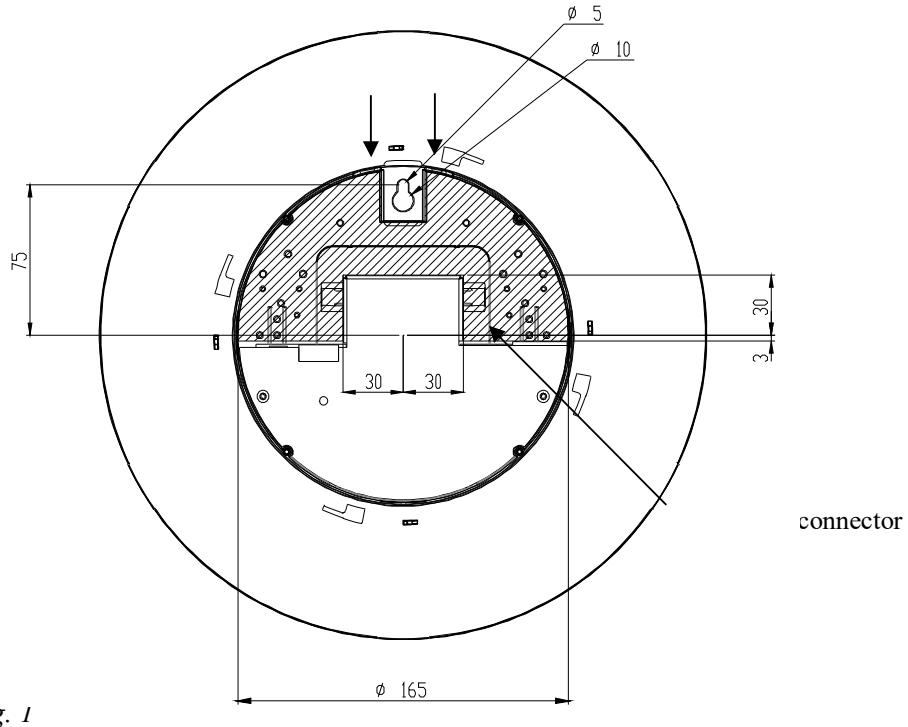
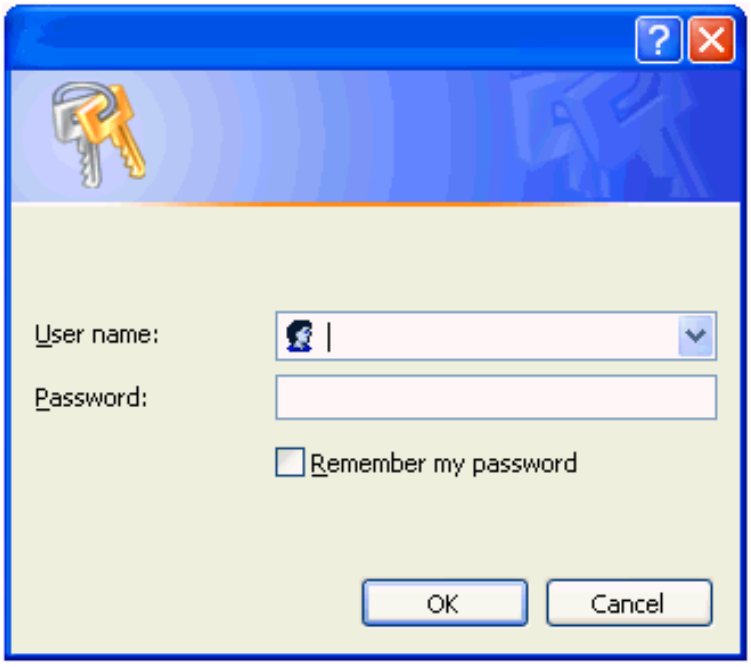


Fig. 1

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.



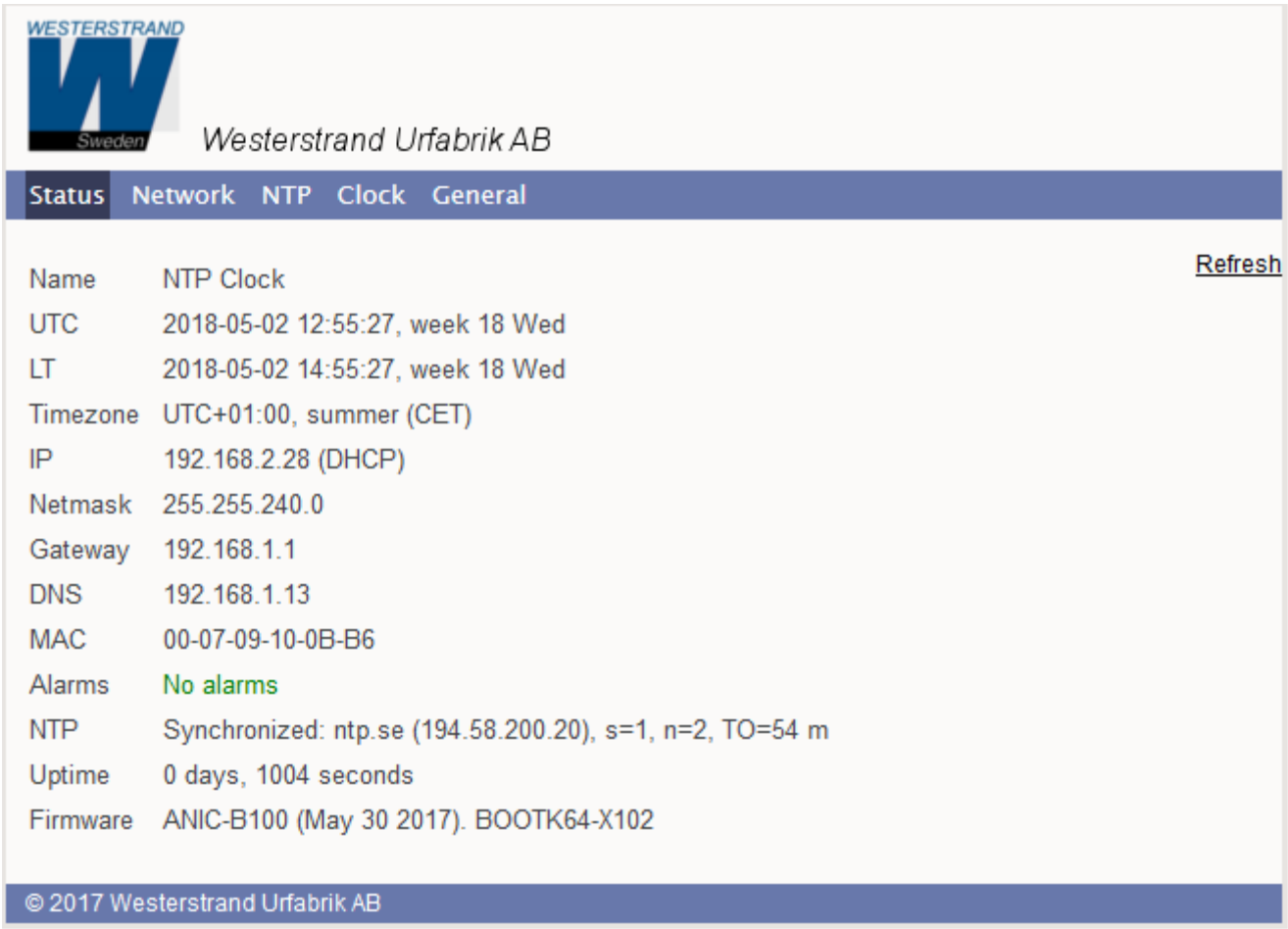
User name

admin or *guest.*

Password

Enter a password. Default password is *password.*
After login a function menu is displayed:

Status

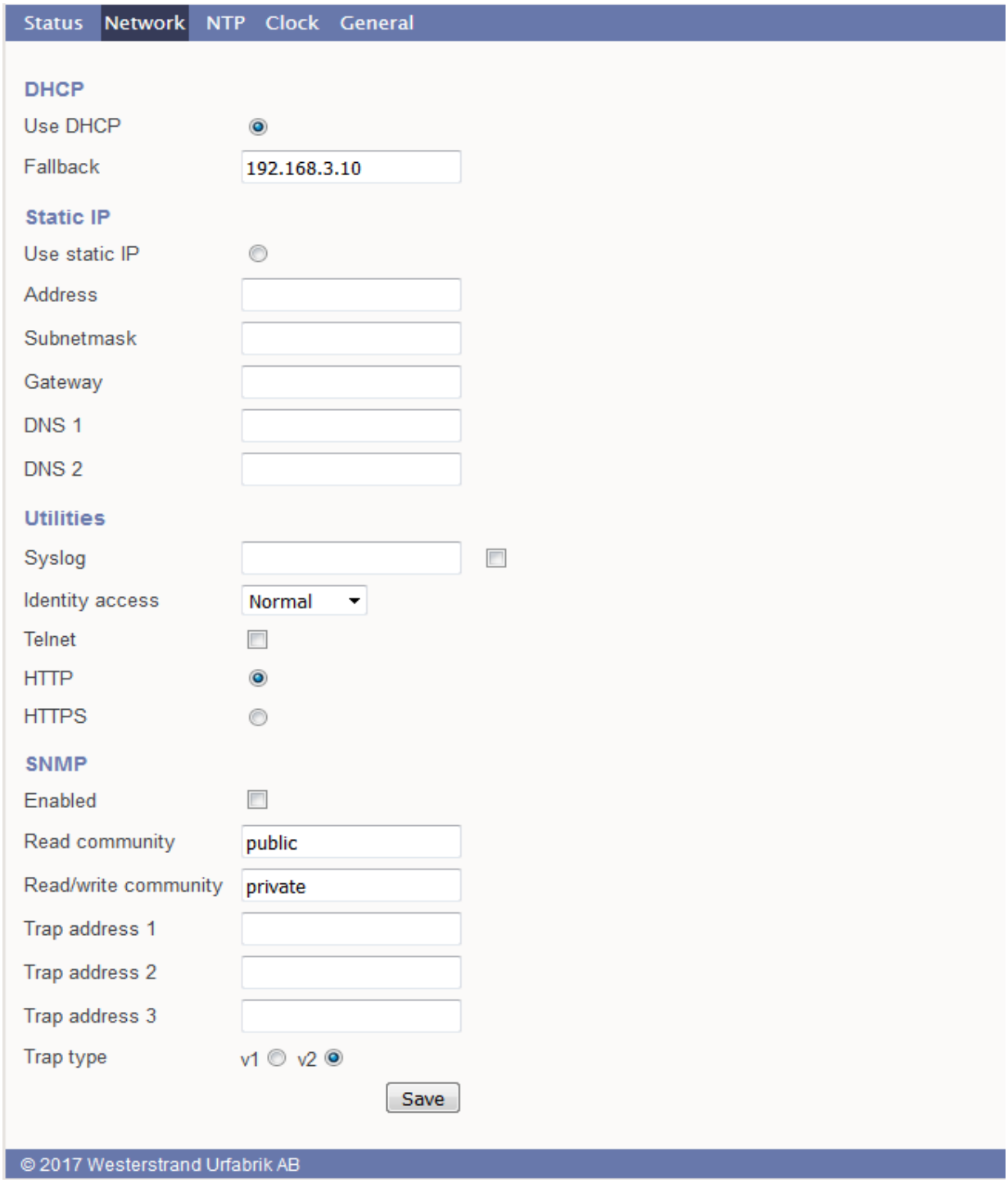


Name	Symbolic name. The name is set in function *General*
UTC/LT	Current time
Timezone	Offset to UTC during normal time (=winter time).
IP	The Clocks IP address
Netmask	Shows the netmask setting
Gateway	Shows the IP address of the gateway
DNS	Shows the IP address of the DNS server
MAC	A MAC address has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

NTP	Synchronised = The clock has been synchronised from a 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. The clock goes to 12:00.
Uptime	The Clocks uptime since last power failure
Firmware	Current 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

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.

HTTP
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.

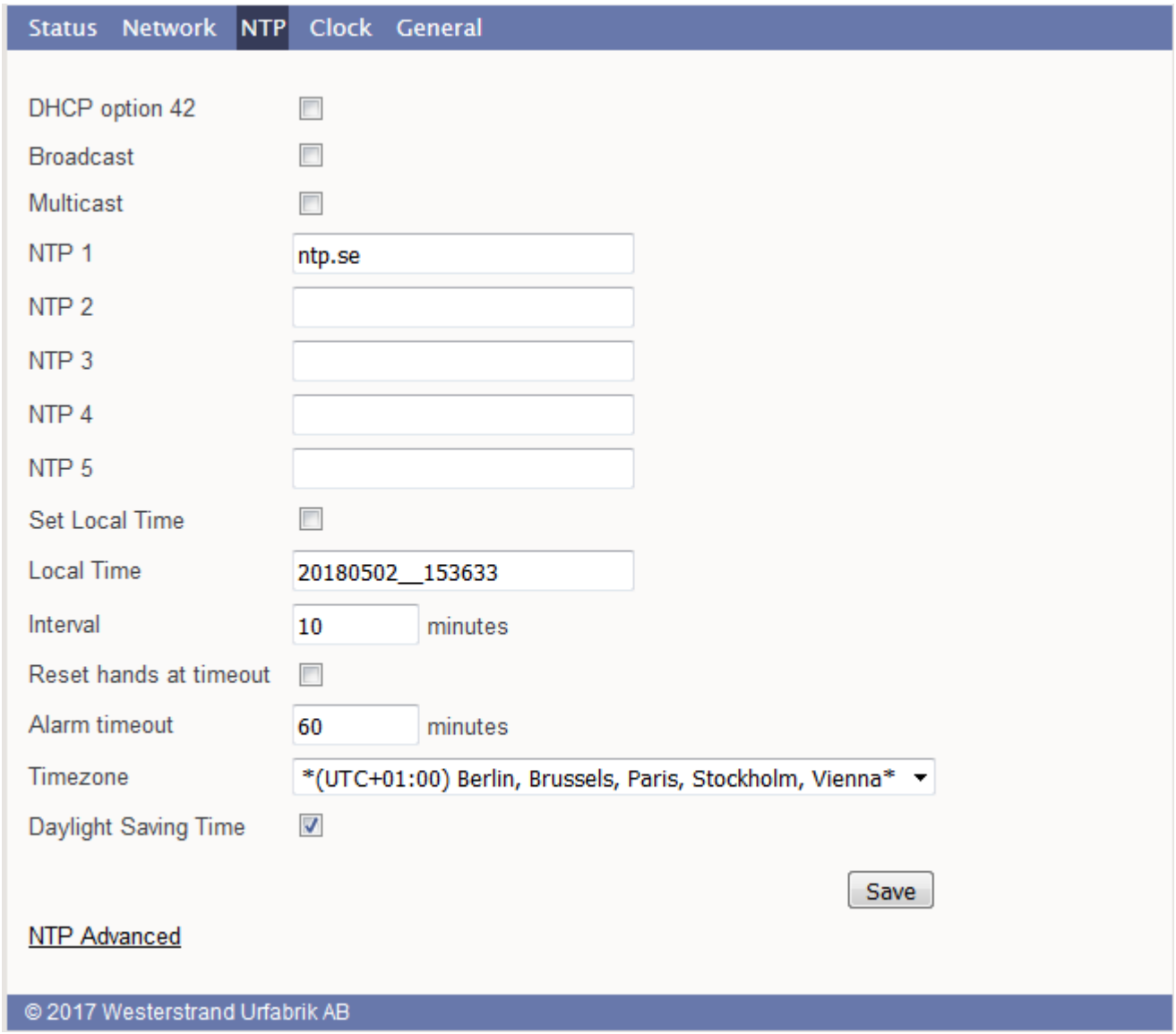
As a NTP Client the unit has three different ways to determine the most accurate and reliable candidates to synchronize the system clock. Which model that is used depends on the specific installation and the customer requirements. The NTP client has also a server list where up to 5 different time servers can be entered.
The three different ways are:
1. FIRST Always use the first server in the list if available. If not available take 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 special clock adjusting algorithm where the speed of internal oscillator is increased or decreased depending on the difference between the internal clock and the NTP message. All of this to avoid false and inaccurate time and to give a, when needed, smooth time adjustment without time jumps.
A clock discipline algorithm is also included. This algorithm measures the oscillators drift over a longer period and makes compensations for the drift.

NTP settings



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

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.

Reset hands at time out

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 hands will go to 12 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

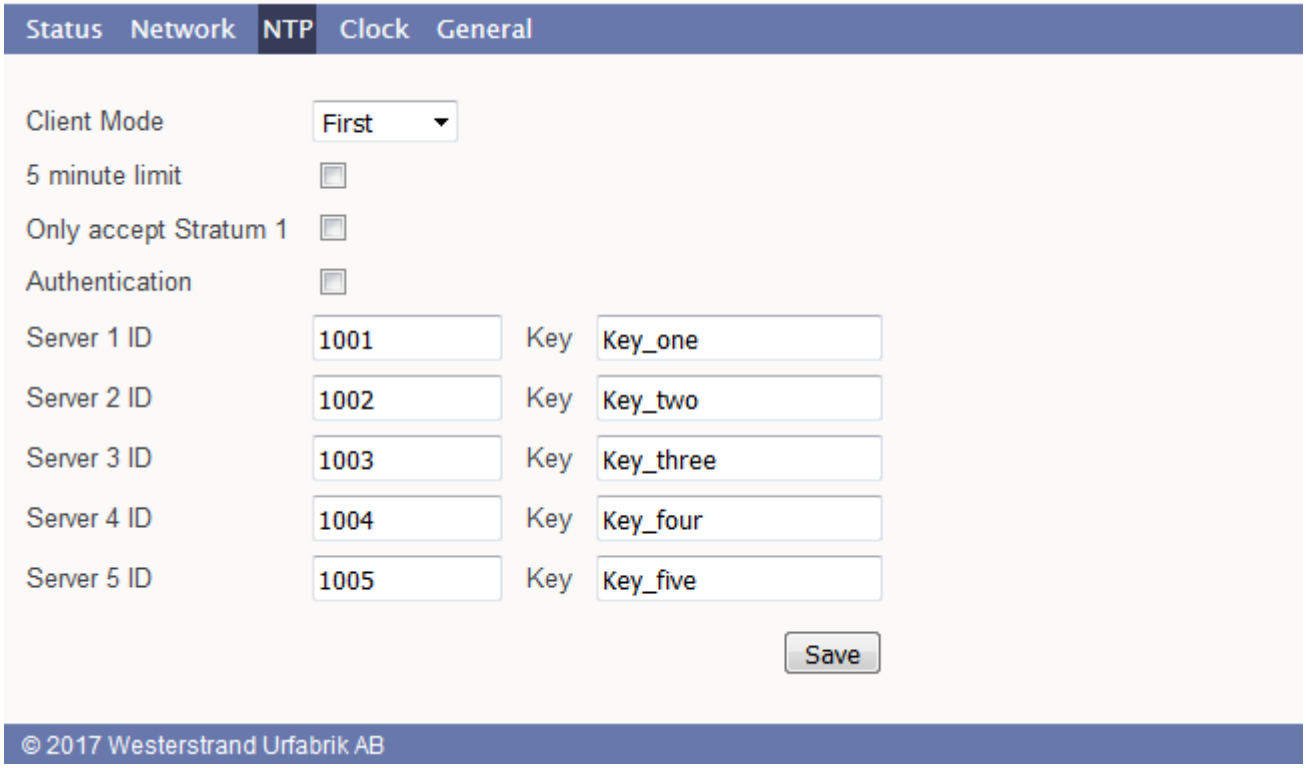
Select country/time zone. A NTP server sends UTC time. The clock will correct this to local time. If Daylight Saving Time (see below) is checked it will also and adjust for DST (Daylight Saving Time) automatically.

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.

5 minute limit

This function makes it possible to set a synchronisation window.
Check box = Off ; Accept all time messages regardless of time difference.
Check box = On ; Accept only time messages that are less than 5 minutes wrong compared to internal time.

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.

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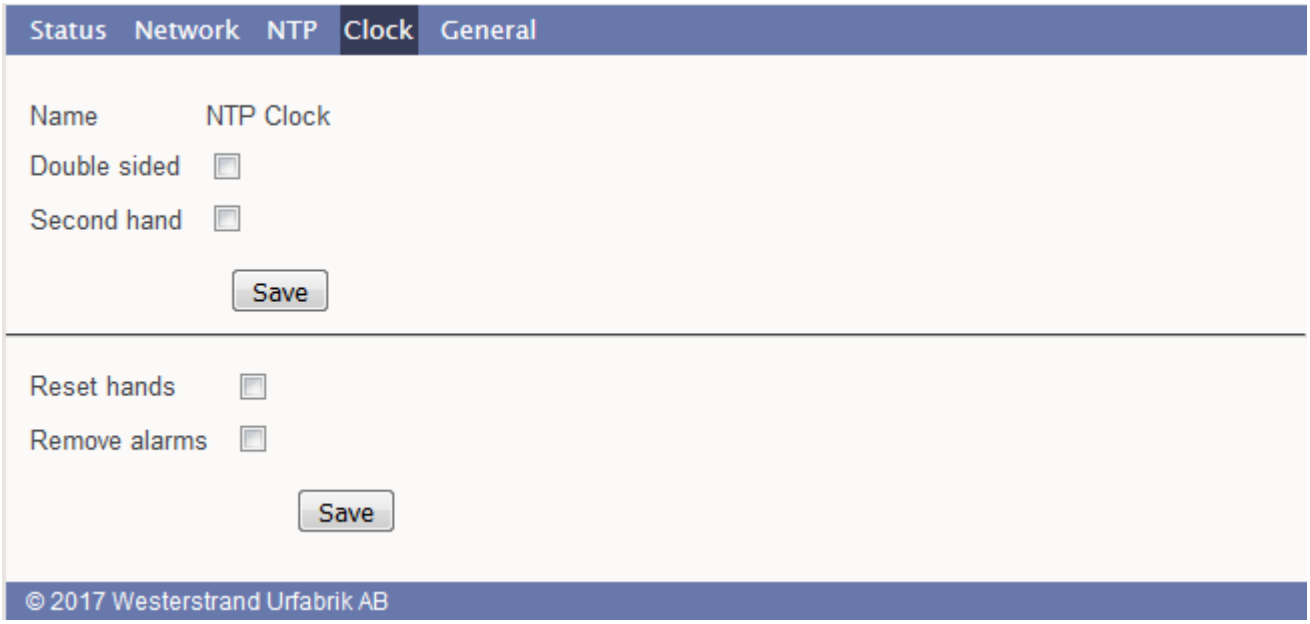
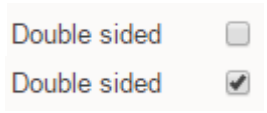
Clock

Used to configure general clock parameters.

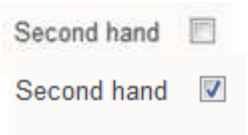


Double sided



= Single sided Clock
= Double sided Clock

Second hand



= No second hand
= The clock has a second hand

Reset hands

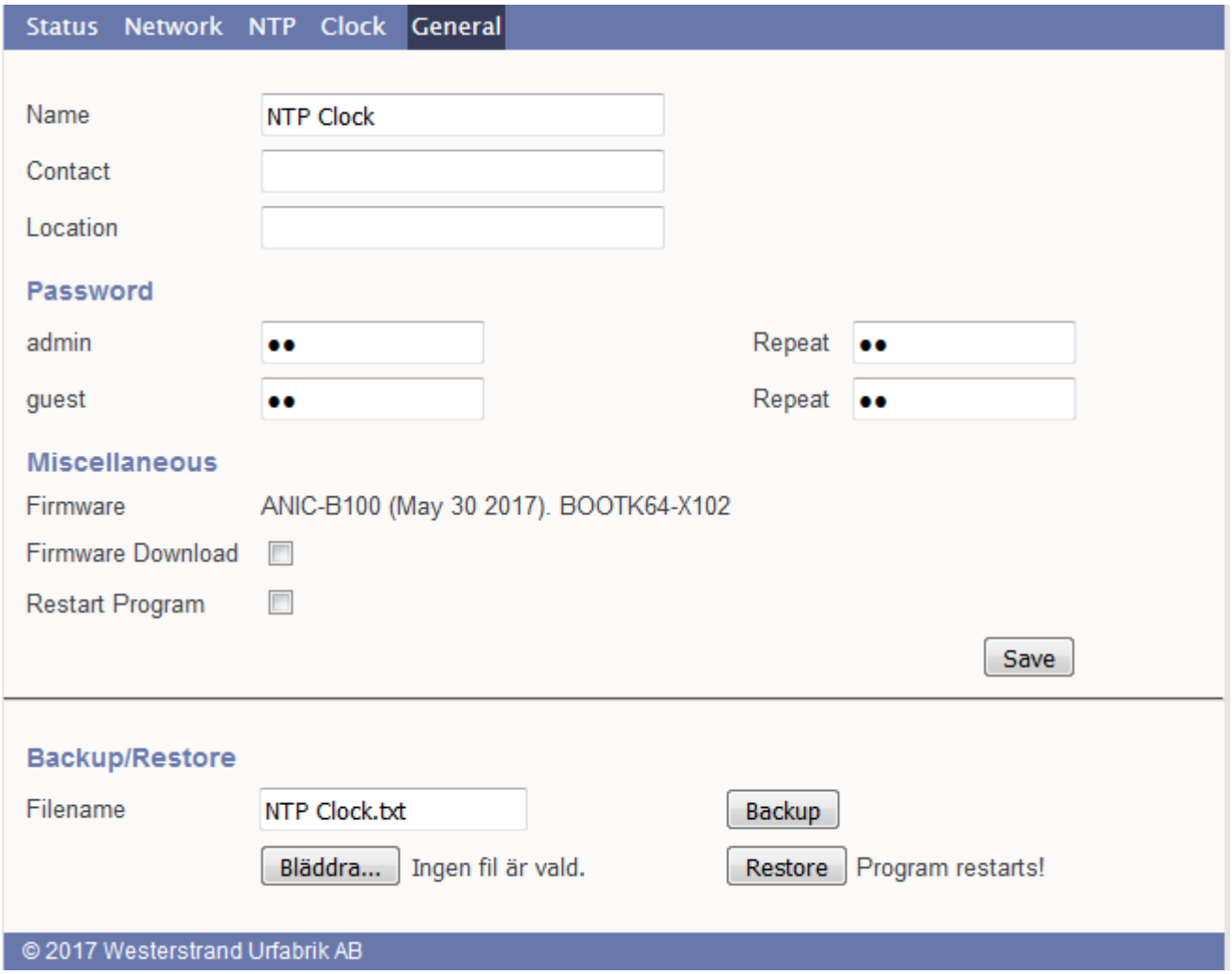
This function will force the hands (pointers) to re-synchronise.

Remove alarms

This function will remove any alarms.

General

Used to configure general parameters.



Name

Symbolic name, max. 64 signs. This name is shown in the status menu.

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*.

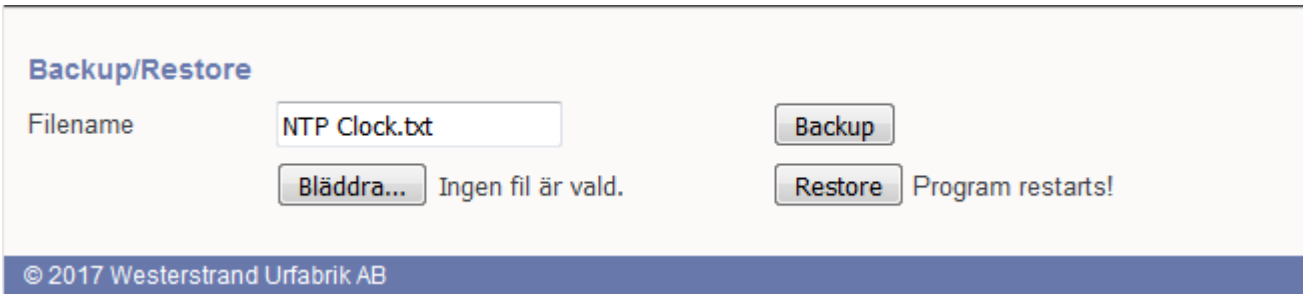
Restart

Restart the Clock.

Backup/Restore

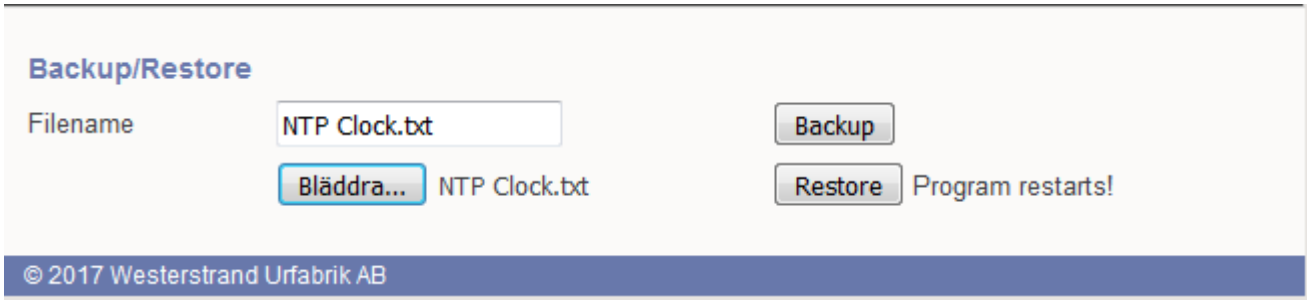
Backup

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



Restore

Select file ([Välj fil]). Here *file NTP Clock.txt* was selected.
Click [Restore].
The clock restarts. Refresh the page.
The MAC- and IP-address never are restored.



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.

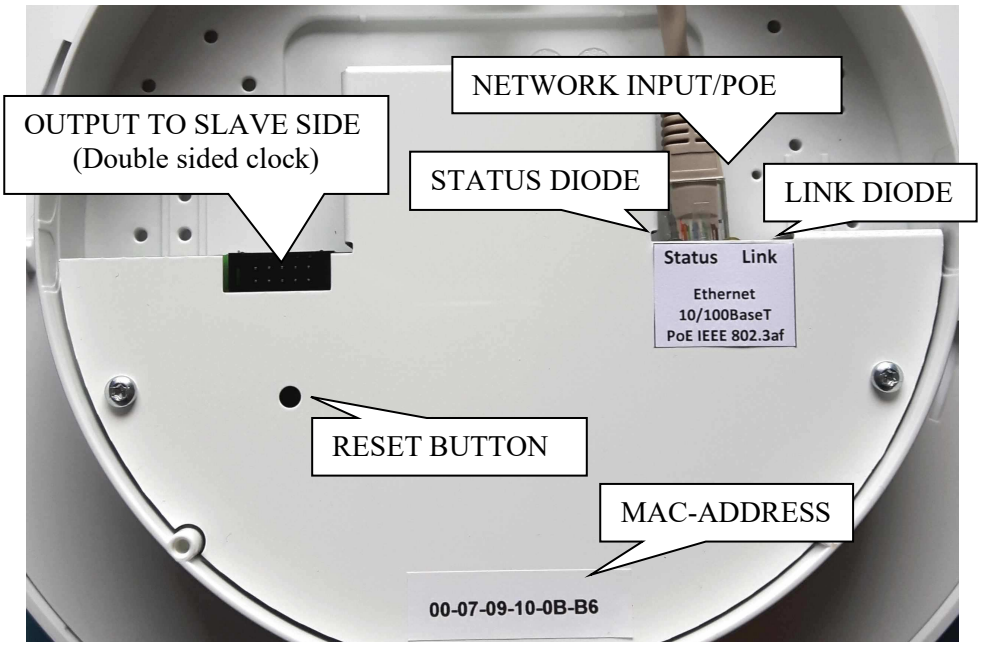
Also other programs, e.g. windows built in client tftp, can be used:
c:\ARM\Anic>tftp 192.168.2.61 put ANIC-B100.MOT
Successful transfer: 1234092 byte 15 sec., 82272 byte/s

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.



Terminal	Description		Remark
Ingång för nätverk/PoE	10/100BASE-T. PoE 802.3af. Kontakt: RJ45		PoE strömförbrukning 2W max.
Indikatorer (lysdioder LED)			
LED	*Anm.*		
LINK	Nätverk Link/Act	Grön lysdiod tänd Link/Act OK	Grön lysdiod släckt = No Link/Act.
STATUS	NTP sync. status	Gul lysdiod tänd = Uret är synkroniserat från NTP-server	Gul lysdiod släckt = Uret är osynkroniserat.
LED driftsättning	Vid en normal driftsättning (Resetknappen är inte intryckt) så blinkar den gröna statusdioden i ca. 2 sekunder och därefter släcks den. När uret har blivit synkroniserat så tänds statusdioden och lyser med fast sken.		
Reset button			
The follwing will happen if the Reset button is pressed:			
The button is pressed while the power is turned on	The program enters boot-loader mode and stays there and awaits a software update. The program stays in this mode until the update is complete or the voltage is interrupted.		
The button is held for 3-9 seconds during normal operation.	Soft reset. The program re-starts.		
The button is held for more than 10 seconds during normal operation.	Cold start. All settings return to factory mode. The program restarts immediately and enters DHCP mode. If there is no DHCP server, after 60 seconds, the clock will get the IP address 192.168.3.10.		

Technical specification

General	
Synchronisation	NTP
Accuracy	0,1 sec/24 h at 22 ° C (stand-alone mode)
Hand movement	Hour hand sweeping. Minute hand stepping, 6 steps/minute. Second hand sweeping.
Time synchronisation	
Total start-up time	Maximum 10 min.
Network	
Protocols supported:	SNTPv4, RFC 4330, SNMP v2c, MIB II (RFC 1213), RFC2863, HTTP, HTTPS, Telnet, FTP, Syslog
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 802.3af
Ethernet:	
Device Management:	Web-Based (requires web browser) or via Telnet. Support for the following web browsers: Firefox, Google Chrome, Microsoft Edge, and Internet Explorer 11.
Additional info.:	Support for DNS
Power supply	
Power over Ethernet	IEEE 802.3af
Power consumption	2 watts
Environmental	
Temperature range	0 ºC till +40 ºC
Protection class	IP 20
Standards compliance	EN 61000-6-3:2001 Emission EN 61000-6-2:2005 Immunity

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Abbreviations

DST	Daylight Savings Time
LT	Local time
NTP	Network Time Protocol
TC	Time code. The time message format transmitted to the movement
UTC	Coordinated Universal Time