



MASTER CLOCK SYSTEM

TECHNICAL & USER MANUAL



Document Scope

This document describes the installation and programming of the following products:

Product Description	Item No.
Marine Master Clock 70000	
Marine Master Clock 70000L with Network Time Server	
Analog NTP Clock with PoE connection	

Revision Information

Rev.	Date	Author	Description
V1.0	26.05.2013	SEN	Final
V1.1	13.04.2013	SEN	Updated 1717en13 to 1717en16
V1.2	25.07.2013	SEN	Added doc.A100K11451 cable calculation. New rev. of cable connection diagram A100K10836
V1.3	16.06.2015	SEN	Masterclock; Protection changed to IP-22, page 8
V1.4	25.11.2015	SEN	Updated cable connection diagram A100K10836
v1.5	12.05.2016	SEN	Updated cable connection diagram A100K10836
v1.6	24.08.2016	SEN	Updated A100K10836 , changes on term.block 6
V1.7	13.11.2018	HKL	New manual versions 1717en19 - 1795en03 - 9539en14
V1.8	17.6.2019	HKL	Power supply 50/60 Hz
V1.9	08.09.2022	ASK	New Manual version Document 11018en02 added
V1.10	19.12.2023	CV/ASK	New manual version Document 1717en21 and Document DOK1086en01 to replace previous versions.

Related Documentation

For further information, refer to the following documentation:

Doc.no.	Documentation
A100K10836 Rev.02	Autocad dwg cable connection diagram
A100K10838	Autocad dwg dimension drawing 70000 & 70000L

Note: Autocad drawings and datasheets are available for all slave clocks

Contents

- 1. User Manual Marine Master Clock**
Document: 1717en21.doc
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- 2. Technical Manual Wired DCF Time Code-Clock**
Document: 1785en03.doc
Date: 2009-11-04
5 pages

- 3. Option Ethernet Marine Master Clock**
Document:
DOK11086en01 Date:
2021-06-16
21 Pages

- 4. Manual Analog NTP Clock with PoE connection**
Document 11018en02
Date: 2020-09-24
21 Pages

- 5. Technical Specification Marine Master Clock**
Document: 9539en14
Date: 2018-08-15
5 Pages

- 6. Cable Connection**
 - Cable Connection Diagram
Document: A100K10836 (1 Page)
 - Cable Calculation
Document: A100K11451 (1 Page)
 - Dimensions Drawing
Document: A100K10838 (1 Page)



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Marine Master Clock





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Important Safeguards

Read all these instructions and save them for later use

- Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product and/or person.
- Slots and openings in the cabinet and the back are provided for ventilation to ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. This product should never be placed near or over a heat source. This product should not be placed in a built-in installation unless proper ventilation is provided.
- Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock.
- Installation must only be done by appropriately skilled personnel.
- Except as explained elsewhere in the operating manual, do not attempt to service this product yourself. Removing covers may expose you to dangerous voltage points or other risks. Refer all servicing in those compartments to a service technician.
- This product is to be connected to mains as a permanent installation and shall be connected by a readily accessible safety switch, mains and/or 24V DC.
- Installation and maintenance of this equipment should only be carried out by qualified personnel.

CAUTION: this equipment must be serviced by an approved technician.
The guarantee shall be cancelled if any modifications are made to this product.



General warning (refer to accompanying documents)



Consult instruction for use



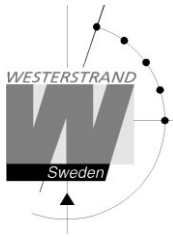
This symbol means that according to local laws and regulations your product shall be disposed of separately from household waste. When this product reaches its end of life, take it to a recycling center designated by local authorities.

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Technical specifications

General

Crystal Frequency:	4,915200 MHz.
Accuracy:	0,1 sec./24 hours (at +20°C).
Microprocessor:	HD6412394.
Connection voltage:	100 - 240V 50/60 Hz and. 24 V DC -5% +20 %.
Max ripple (24V DC):	0,7V RMS.
Power consumption:	65 W (max)
Ambient temperature:	Between 0° C and +50°C.
Relative humidity:	Max.85% non-condensing.
IP rating:	IP20
Weight:	5.6 kg.
CE-Approval, EMC:	Emission acc. to EN61000-6-3, Immunity acc. to. EN61000-6-2.

Slave Clock output

Output 1, 2 and 3:	
Impulse system:	1/1 minute, 1/2 minute, second, Time Code (TC)
Type of time:	LT, UTC
Impulse length:	Minute 0.1-9.9 sec. Second 0.1-1 sec.
Output 4:	
Impulse system:	2-wire: 1/1 minute, 1/2 minute, second, Time Code (TC). 3-wire for Forward/Reverse movement: 1/1-minute alt. 1/2-minut.
Type of time:	LT, UTC
Impulse duration:	Minute 0.1-9.9 sec. Second 0.1-1 sec.
Impulse voltage:	24VDC
Maximum load / output:	2A (The output is equipped with short circuit protection that resets automatically)
Total load all outputs:	2.5A

Relay output

Relay outputs:	2 closing potential-free contacts.
Max. load/relay output:	24 VDC/AC 2A.
Program memory:	100 years (EEPROM)
Number of control functions:	800.

Alarm output

Number of outputs:	2 Changeover potential-free contacts.
Max. load/relay output:	24VDC/AC 2A.
Type of alarms	
Output no. 1 (general alarm):	Overload / short circuit, synchronization alarm
Output no. 2 (power alarm):	Power failure alarm



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Serial ports

The Master Clock is equipped with two serial ports, one RS232 and one RS422/485.

Both ports can be used either as input or output for serial time messages.

If programmed as output the port can be used to send out time to external equipment such as computers etc. If programmed as input the port can be used to synchronize the master clock with an external time source provided with RS232 or RS485 output. The purpose of this is to achieve higher accuracy.

Protocol, data format and baud rate are selectable for respective serial port.

Serial output

Baud rate (selectable): 300, 600, 1200, 2400, 4800, 9600, 19200 baud.

Data format (selectable) 7N1, 7N2, 7O1, 7O2, 7E1, 7E2, 8N1, 8N2, 8O1, 8O2, 8E1, 8E2

No. of data bits: 7 or 8.

Type of parity: None, odd or even.

No. of stop bits: 1 or 2.

Selectable data format:

Available protocols
- ZDA Time string, NMEA 0183
- Westerstrand protocol no. 2, 3, 5, 7 etc.
(Automatic time message protocols)

Type of time (selectable): UTC, LT

Serial input

Baud rate: 4800 baud.

Data format: 8N1

Type of protocol: ZDA Time string, NMEA 0183



General description

Westerstrand Marine Master Clock is the ideal solution for distribution of both Local and UTC time on board ships.

The Master Clock is equipped with several outputs and inputs for control of Slave Clocks as well as distribution of time to computers and other equipment needing correct time. The four Slave Clock outputs can be individually programmed for different types of clocks. External radio receivers / time synchronization sources can be connected when higher accuracy is needed.

For control and regulation of various energy consumers such as electrical striking plates, buzzers for pause signaling etc, the master Clock has a built-in yearly programmer with two relay outputs.

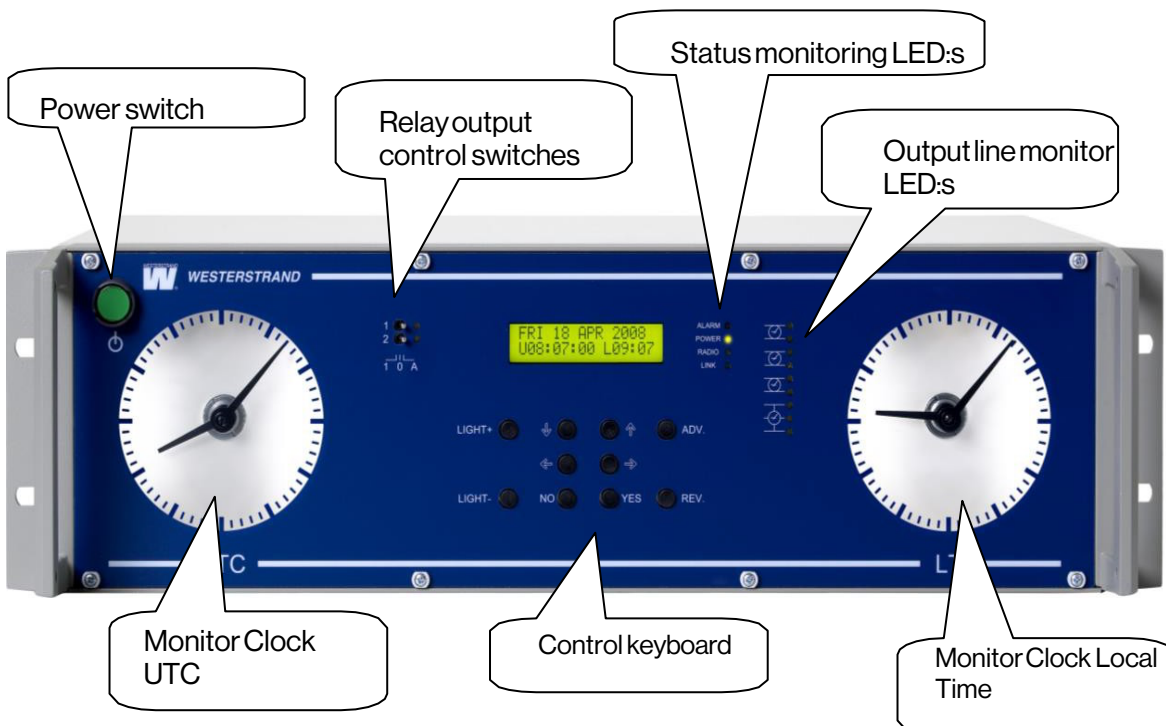
The Master Clock is equipped with 10 buttons and a 2 x 16 character LCD. To facilitate the change of time zone two of the buttons are dedicated for this purpose. A light dimmer makes it possible to adjust the background illumination to the surrounding light level.

The front mounted power switch is an all-pole switch and controls both AC and DC

power. Position IN = Power ON. |

Position OUT = Power OFF. ○

Front panel description





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Keyboard

LIGHT+	Increase LED backlight level
LIGHT-	Decrease LED backlight level
↑↓	Select function / Change and scroll
←	Move left / Cancel / Leave programming mode
→	Move right
NO	Decline
YES	Accept / Enter programming mode
ADV.	Advance Local Time
REV.	Reverse Local Time

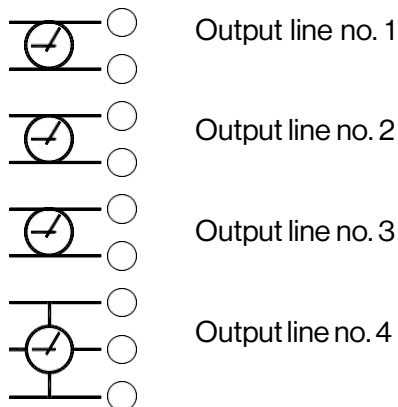
Relay output control switches

1	Always ON
0	Always OFF
A	Automatic position, ON/OFF according to program.

Status monitoring LED:s

Alarm	An alarm has occurred, for instance short circuit on one of the output lines.
Power	Power is ON.
Radio	Indicating signal coming from an external radio receiver.
Link	Indicating Ethernet LAN connection. (option)

Output line monitoring LED:s



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Installation



Installation and maintenance of this equipment should only be carried out by qualified personnel.



This product is to be connected to mains as a permanent installation and shall be connected by a readily accessible safety switch. Make sure the mains are securely installed.



This product must be connected to protective earth (PE).



The Marine Master Clock is intended for stand or cabinet mounting. For connections, see diagram on next page.

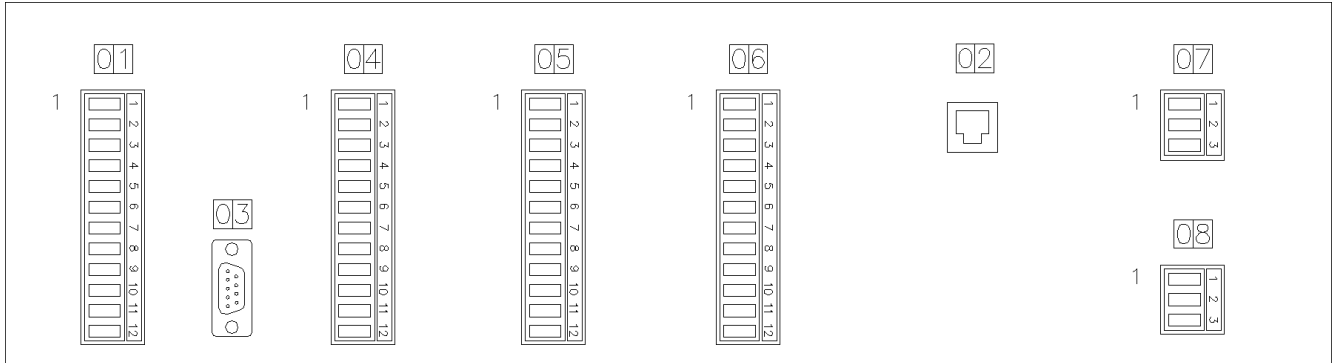
1. Mount the Master Clock.
2. Before connecting the slave clock lines, check the wires for short circuit, faulty connections etc.
3. Connect the slave clock lines.
4. Connect the signal and alarm relays (if used).
5. Connect, if included, other accessories/options such as radio synchronization, RS232 etc.
6. Connect the supply voltage and press the power switch.
7. Proceed to "Startup procedure" page 13.



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Connection diagram



The impulse output voltage is 24V DC and max current is 2A.

01			04			05 (2-WIRE)		05 (3-WIRE)	
PIN NO.	SIGNAL	REMARK	PIN NO.	SIGNAL	REMARK	IMPULSE OUTP. 4		IMPULSE OUTP. 4	
1	CHASSIS GND	RS485 NMEA INPUT	1	IMPULSE 1A	IMPULSE OUTPUT NO. 1	PIN NO.	SIGNAL	PIN NO.	SIGNAL
2	-Rx RS485		2	IMPULSE 1B		1	IMPULSE 4A	1	LT FORWARD
3	+Rx RS485		3	IMPULSE 1A		2	IMPULSE 4B	2	LT COMMON
4	CHASSIS GND	RS485 OUTPUT	4	IMPULSE 1B	IMPULSE OUTPUT NO. 2	3	NO CONNECTION	3	LT REVERSE
5	-Tx RS485		5	IMPULSE 2A		4	IMPULSE 4A	4	LT FORWARD
6	+Tx RS485		6	IMPULSE 2B		5	IMPULSE 4B	5	LT COMMON
7	NC	NO CONNECTION	7	IMPULSE 2A	IMPULSE OUTPUT NO. 3	6	NO CONNECTION	6	LT REVERSE
8	GND	GPS RECEIVER	8	IMPULSE 2B		7	IMPULSE 4A	7	LT FORWARD
9	+		9	IMPULSE 3A		8	IMPULSE 4B	8	LT COMMON
10	DCF		10	IMPULSE 3B	9	NO CONNECTION	9	LT REVERSE	
11	+24	24VDC OUTPUT MAX. LOAD 0.2A	11	IMPULSE 3A	10	IMPULSE 4A	10	LT FORWARD	
12	0V		12	IMPULSE 3B	11	IMPULSE 4B	11	LT COMMON	
						12	NO CONNECTION	12	LT REVERSE

02		03			06			07		08		
PIN NO.	SIGNAL	PIN NO.	SIGNAL	REMARK	PIN NO.	SIGNAL	REMARK	PIN NO.	SIGNAL	PIN NO.	SIGNAL	
ETHERNET 100BASE-T		2	Rx RS232	INPUT	1		ALARM RELAY OUTPUT (24VAC/DC 2A)	24VDC -5% +20% MAX. POWER 65W		100-240VAC 50/60HZ MAX. POWER 65W		
1	RX+	3	Tx RS232	OUTPUT	2			PROGRAM RELAY OUTPUT (24VAC/DC 2A)	PIN NO.	SIGNAL	PIN NO.	SIGNAL
2	RX-	5	GND RS232	SIGN. GND	3				1	+24	1	L
3	TX+	 9-POL D-SUB MALE			4		POWER FAILURE ALARM RELAY OUTPUT (24VAC/DC 2A)	2	0V	2	N	
6	TX-				5			5		3	PE	3
 RJ45					6							
					7							
					8							
					9							
					10							
					11							
					12							



Programming

General

Using 6 buttons and a 2-row 16-character display carries out all programming. Programming is self-instructive and to simplify the dialogue Yes/No questions are used.

Running mode

When the Time Base module is in operation it shows date and time in the display. This is called running mode in this documentation.

MON 28 MAR 2022
U10:11:35 L12:11

- | | |
|------------------------------|-----|
| 1- Select function | ↑↓ |
| 2- Enter programming mode | YES |
| 3- Move sideways | ←→ |
| 4- Change/scroll | ↑↓ |
| 5- Accept | YES |
| 6- Cancel / Leave prog. mode | ← |

MON 28 MAR 2022
U10:11:35 L12:11

SET UTC

SET LT

SLAVE CLOCK

ALARMS

WEEK PROGRAM

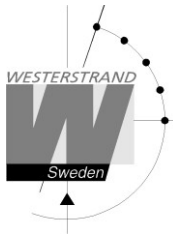
DATE PROGRAM

DISPLAY PROGRAM

TEMPORARY PROGR.

GROUP → PERIODE

SPEC.-FUNCTIONS



Start up procedure

1. Startup questions (this page)
2. Output configuration / Setup (page 14)
3. Enter time of Slave Clocks (page 16)

STARTING

LANGUAGE
ENGLISH?

When the Master Clock is connected for the first time correct/requested language has to be entered. Press NO until requested language occurs in the display e.g. English. Accept with YES.

SET UTC
220328 10:11:00

Set, by using the arrows, the right UTC.
Time format: Year, month, date, hour, minute, second.
Set the time a minute in advance.
Wait for the right time and synchronize using YES.

SET LT
220328 12:11:00

Set, by using the arrows, the right Local Time.
Time format: Year, month, date, hour, minute, second.
Set the time a minute in advance.
Wait for the right time and synchronize using YES.

MON 28 MAR 2022
U10:11:35 L12:11

The Master Clock is now in running mode.



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Output configuration / Setup

Each output can be individually configured regarding different parameters. The setup is done from the special function Setup. If the default setup is used no configuration is needed.

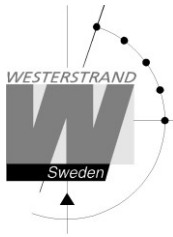
Default setup:

Slave Clock output no. 1	Impulse system:	1/1 minute
	Type of time:	UTC
	Impulse length:	2 sec.
Slave Clock output no. 2	Impulse system:	-----
	Type of time:	
	Impulse length:	
Slave Clock output no. 3	Impulse system:	-----
	Type of time:	
	Impulse length:	
Slave Clock output no. 4	Impulse system:	3-wire for Forward/Reverse, 1/1-minute.
	Type of time:	Local time.
	Impulse length:	2 sec.

Synchronization source
NMEA RS485 (NMEA 0183ZDA Time string)

RS232 output
NMSE (NMEA 0183ZDA Time string)

RS485 output
NMSE (NMEA 0183ZDA Time string)



Set UTC when in operation

MON 28 MAR 2022 U10:11:35 L12:11	Select function using ↓.
SET UTC	Enter the programming mode with YES.
SET UTC 1609266 10:11:00	Set, by using the arrows, the right UTC. Time format: Year, month, date, hour, minute, second. Set the time a minute in advance. Wait for the right time and synchronize using YES.
SET UTC	Leave programming mode by pressing ← several times.
MON 28 MAR 2022 U10:11:00 L12:11	The master clock is now back in running mode.

Set Local Time when in operation

Remark: To do normal Time Zone adjustments use the buttons, ADV and REV.

MON 28 MAR 2022 U10:11:35 L12:11	Select function using ↓.
SET LT	Enter the programming mode with YES.
SET LT 160926 12:11:00	Set, by using the arrows, the right Local Time. Time format: Year, month, date, hour, minute, second. Set the time a minute in advance. Wait for the right time and synchronize using YES.
SET LT	Leave programming mode by pressing ← several times.
MON 28 MAR 2022 U10:11:35 L12:11	The master clock is now back in running mode.



Slave Clock

MON 28 MAR 2022
U10:11:35 L12:11

Select function using ↓.

SLAVE CLOCK

Enter the programming mode with YES.

IMPULSE OUTPUT 1

Select output using ↑↓. Accept with YES.

IMPULSE OUTPUT 1
= 09:07 OFF

IMPULSE OUTPUT 1 = 09:07? (Example)
If the slave clocks connected to impulse output 1 shows 09:07 answer YES, if not, set the time shown by the slave clocks.

IMPULSE OUTPUT 1
= 09:07 OFF

Turn ON impulse output 1 by using ↑↓.

IMPULSE OUTPUT 1
= 09:07 ON

Accept with YES

SLAVE CLOCK

Leave programming mode by pressing ← several times.

MON 28 MAR 2022
U10:11:35 L12:11

The master clock is now back in running mode

NOTE! *If a slave clock runs out by a minute, its cabling must be pole changed and the slave clock to be corrected manually.*

NOTE! *If the time of the slave clocks is ahead of correct/present time the Master Clock will wait until correct time corresponds with the slave clocks.*



Time zone adjustment

To change Local Time zone two buttons are used. The buttons are named ADV and REV.
To advance the Local Time slave clocks to a new time zone press button ADV.

Example:

MON 28 MAR 2022
U10:11:35 L12:11

Press button ADV.

LOCAL TIME ADJ.
60m ?

Use the default value or change by pressing ADV.
Accept with YES.

LOCAL TIME ADJ. !

The Local Time slave clocks will now advance 60 minutes.

MON 28 MAR 2022
U10:11:35 L13:11

When the correction is finished the display is automatically returned to running mode.

To reverse the Local Time slave clocks to a new time zone press button REV.
Example:

MON 28 MAR 2022
U10:11:35 L12:11

Press button REV.

LOCAL TIME ADJ.
- 60m ?

Use the default value or change by pressing REV.
Accept with YES.

LOCAL TIME ADJ. !

The Local Time slave clocks will now be adjusted as below:
1 Min forward clock's stop 60 min
0,5 Min F/B clock's: Reverse 60 Min
TC Clock's: 11 hours forward

MON 28 MAR 2022
U10:11:35 L11:11

When the correction is finished the display is automatically returned to running mode.

Remark: To interrupt a time zone adjustment in progress press button ← and YES.



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Alarms

This function is used to display and erase the different alarms in the master clock.

ALARMS- DISPLAY

To show the alarms

ALARMS- ERASE

To erase the alarms

Example 1, display alarms

MON 28 MAR 2022
U10:11:35 L12:11

Select function using $\uparrow\downarrow$.

ALARMS

Accept with YES.

ALARMS- DISPLAY

Press NO until the wished function is shown.
Accept with YES.

09AUG 15:52
NO RADIO 30

The alarm is displayed.
Press $\uparrow\downarrow$ to see next alarm.
Return to running mode press \leftarrow .

ALARMS- DISPLAY

\leftarrow .

ALARMS

\leftarrow .

MON 28 MAR 2022
U10:11:35 L12:11



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Example 1, erase alarms

MON 28 MAR 2022 U10:11:35 L12:11	Select function using ↑↓.
ALARMS	Accept with YES.
ALARMS- ERASE	Press NO until the wished function is shown. Accept with YES.
09 AUG 15:52 NO RADIO	The alarm is displayed. Press YES to erase the alarm.
ERASE?	Accept with YES.
ALARMS- ERASE	Return to running mode press ←.
ALARMS	←.
MON 28 MAR 2022 U10:11:35 L12:11	



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Alarm list

The following alarms are available

Type of alarm	Alarm code	Indication	Reason for alarm	Action
NO RADIO	30	Red alarm LED lit. General alarm relay activated.	The Master Clock has not been synchronized within the alarm limit.	Check the external synchronization source. If no external source is used inactivate the alarm. See special function/ setup sync. source page 36.
UF LOW	52	Red alarm LED lit. General alarm relay activated.	Impulse voltage below alarm limit.	Remove connected clocks and clear the alarm. If OK, check clocks and wiring.
SHORT CIRCUIT	53	Red alarm LED lit. General alarm relay activated.	Short circuit on impulse amplifier.	Remove short circuit. If OK, clear the alarm.
CURRENT LOW	61	Red alarm LED lit. General alarm relay activated.	Impulse current on output no. 1 is below alarm limit.	Check output connections. If OK, clear the alarm.
CURRENT LOW	62	Red alarm LED lit. General alarm relay activated.	Impulse current on output no. 2 is below alarm limit.	Check output connections. If OK, clear the alarm.
CURRENT LOW	63	Red alarm LED lit. General alarm relay activated.	Impulse current on output no. 3 is below alarm limit.	Check output connections. If OK, clear the alarm.
CURRENT LOW	64	Red alarm LED lit. General alarm relay activated.	Impulse current on output no. 4 is below alarm limit.	Check output connections. If OK, clear the alarm.
CURRENT HIGH	71	Red alarm LED lit. General alarm relay activated.	Impulse current on output no. 1 is above alarm limit.	Check output load. If OK, clear the alarm.
CURRENT HIGH	72	Red alarm LED lit. General alarm relay activated.	Impulse current on output no. 2 is above alarm limit.	Check output load. If OK, clear the alarm.
CURRENT HIGH	73	Red alarm LED lit. General alarm relay activated.	Impulse current on output no. 3 is above alarm limit.	Check output load. If OK, clear the alarm.
CURRENT HIGH	74	Red alarm LED lit. General alarm relay activated.	Impulse current on output no. 4 is above alarm limit.	Check output load. If OK, clear the alarm.
CURRENT HIGH	75	Red alarm LED lit. General alarm relay activated. (Remark: Alarm 75 is only used in a 3-wire Forward/Reverse system.)	Impulse current on output no. 4 is above alarm limit.	Check output load. If OK, clear the alarm.



Week Program & Date Program

Using these two functions, programming of the outputs is made.

Concept description

Program	A "program" refers to programming an output to a certain time. The word program represents a single time event, and several programs are defined as a group of programs. For example: output 2 switches on every working day (Monday-Friday) at 8.00.
Week program	A week program is a program, which is repeated every week. You can for each program choose for which days of the week it shall be valid: Individual or block programming. M = Monday T = Tuesday W = Wednesday T = Thursday F = Friday S = Saturday S = Sunday
Date program	A date program is a program, which is valid for a specific date.
Group	A group of programs, signal events.
Type of signals	There are some different kinds of signals, depending on how the relay output is to be used.
ON/OFF	Is used when a longer lasting switching ON is required, e.g. for controlling fans, door locks, lighting etc.
01s	Is used when a short pulse is required, e.g. for bells/buzzers. Pulse duration selectable from 1-99 seconds.
Astr.	Astr. (Twilight) is a function which closes/opens a predestined relay at sunrise resp. sunset. Which day and month of the year it is, and where the Time Central programmer is located geographically, define the time of the sunrise resp. sunset. The sunrise resp. sunset are calculated in the software of the Y8 module. The geographic position of the Time Central is entered at starting up. A map indicating latitude (°north) and longitude (°east) is enclosed.
Mask	A program that is repeated f. ex every hour is easily entered by the use of mask program. XX.15.00; the program is repeated every hour at minute 15. 08.XX.00; the program is repeated every minute between 08.00 and 09.00. XX.XX.00; The program is repeated every minute.

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To simplify programming 3 sub menus are used:

WEEK PROGRAM
NEW GROUP A

To enter new programs.

WEEK PROGRAM
ERASE GROUP A

To erase a separate existing program.

WEEK PROGRAM
CHANGE GROUP A

To change existing programs.



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Week Program, example 1 (New program)

Example: Outputs No. 2 shall switch on Monday – Friday at 09.00 and off at 17.00.

MON 28 MAR 2022 U10:11:00 L12:11	Select function using ↑↓.
WEEK PROGRAM	Enter programming mode using YES.
WEEK PROGRAM NEW GROUP A	Select new program using YES.
WEEK PROGRAM NEW GROUP A	Select group of programs using ↑↓, accept using YES.
OUTPUT 2 ON -----08:00:00	Select output using ↑↓. Move to the right using →.
OUTPUT 2 ON -----08:00:00	State type of signal using ↑↓.
OUTPUT 2 ON MTWTF-- 08:00:00	State the days the program shall function using ↑↓. Move to the right using →.
OUTPUT 2 ON MTWTF-- 09:00:00	State the time of the program using ↑↓. Move to the right using →. Accept using YES. If the program is approved the text "Program saved" is displayed quickly.
OUTPUT 2 OFF MTWTF-- 17:00:00	Continue with programming OFF for the same output or leave programming by pressing ← several times.
WEEK PROGRAM	
MON 28 MAR 2022 U10:11:00 L12:11	

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Week Program, example 2 (Change program)

Example: A signal on output 1, Monday – Friday at 08.00, shall be changed to 08.15. Signal length is 5 seconds.

MON 28 MAR 2022
U10:11:00 L12:11

Select function using ↑↓.

WEEK PROGRAM

Enter programming mode using YES.

WEEK PROGRAM
CHANGE GROUP A

Select change program using YES.

WEEK PROGRAM
CHANGE **GROUP A**

Select group of programs using ↑↓, accept using YES.

OUTPUT 2 05S
MTWTF-- 08:00:00

Select output using ↑↓. Move to the right using →.

OUTPUT 2 05S
MTWTF-- 08:00:00

Step forward to the program, which is to be changed using NO and YES.

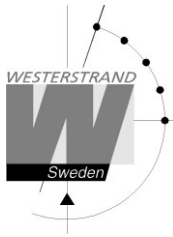
OUTPUT 2 05S
MTWTF-- 08:**15**:00

Change the time to 09.15 using the arrows.
Accept using YES.

WEEK PROGRAM

Leave the programming by pressing ← several times.

MON 28 MAR 2022
U10:11:00 L12:11



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Week Program, example 3 (Erase program)

Example: A signal on output 1, Fridays at 16.30 shall be deleted. Signal length is 5 seconds.

```
MON 28 MAR 2022  
U10:11:00 L12:11
```

Select function using ↑↓.

```
WEEK PROGRAM
```

Enter programming mode using YES.

```
WEEK PROGRAM  
ERASE GROUP A
```

Select erase program using YES.

```
WEEK PROGRAM  
ERASE GROUP A
```

Select group of programs using ↑↓, accept using YES.

```
OUTPUT 1 ON  
MTWTF-- 09:00:00
```

Select output using ↑↓. Move to the right using →.

```
OUTPUT 1 05S  
----F-- 16:30:00
```

Step forward to the program that is to be erased using NO and YES.
Accept using YES.

```
WEEK PROGRAM
```

Leave the programming by pressing ← several times.

```
MON 28 MAR 2022  
U10:11:00 L12:11
```



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Week Program, example 4 (Astronomical function)

Example: Output No. 1 shall switch ON all sunset All days and switch OFF at sunrise.

MON 28 MAR 2022
U10:11:00 L12:11

Select function using $\uparrow\downarrow$.

WEEK PROGRAM

Enter programming mode using YES.

WEEK PROGRAM
NEW GROUP A

Select new program using YES.

WEEK PROGRAM
NEW **GROUP A**

Select group of programs using $\uparrow\downarrow$, accept using YES.

OUTPUT 2 ON
MTWTF-- 08:00:00

Select output using $\uparrow\downarrow$. Move to the right using \rightarrow .

OUTPUT 2 **ASTR**
MTWTF--

State type of signal using $\uparrow\downarrow$.

OUTPUT 2 ASTR
MTWTF--

State the days the program shall function using $\uparrow\downarrow$.

Accept using YES.

If the program is approved the text "Program saved" is displayed quickly.

WEEK PROGRAM

Leave the programming by pressing \leftarrow several times.

MON 28 MAR 2022
U10:11:00 L12:11



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Week Program, example 5 (Block program)

Example: Outputs No. 2 shall switch on Monday, Wednesday and Friday at 09.00.

MON 28 MAR 2022 U10:11:00 L12:11	Select function using ↑↓.
WEEK PROGRAM	Enter programming mode using YES.
WEEK PROGRAM NEW GROUP A	Select new program using YES.
WEEK PROGRAM NEW GROUP A	Select group of programs using ↑↓, accept using YES.
OUTPUT 2 ON -----08:00:00	Select output using ↑↓. Move to the right using →.
OUTPUT 2 ON -----08:00:00	State type of signal using ↑↓.
OUTPUT 2 ON M-W-F-- 08:00:00	State the days the program shall function using ↑↓. Move to the right using →.
OUTPUT 2 ON M-W-F-- 09:00:00	State the time of the program using ↑↓. Move to the right using →. Accept using YES. If the program is approved the text "Program saved" is displayed quickly.
OUTPUT 2 OFF M-W-F-- 09:00:00	Continue with programming OFF for the same output or leave programming by pressing ← several times
WEEK PROGRAM	
MON 28 MAR 2022 U10:11:00 L12:11	



MARINE MASTER CLOCK

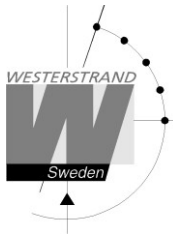
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Week Program, example 6 (Mask program)

Example: Outputs No. 2 shall switch on for 5 seconds every hour at minute 15, all days in the week.

MON 28 MAR 2022 U10:11:00 L12:11	Select function using ↑↓.
WEEK PROGRAM	Enter programming mode using YES.
WEEK PROGRAM NEW GROUP A	Select new program using YES.
WEEK PROGRAM NEW GROUP A	Select group of programs using ↑↓, accept using YES.
OUTPUT 2 ON -----08:00:00	Select output using ↑↓. Move to the right using →.
OUTPUT 2 05S -----08:00:00	State type of signal using ↑↓. 05S = Pulse with 5 seconds length.
OUTPUT 2 05S MTWTFSS 08:00:00	State the days the program shall function using ↑↓. Move to the right using →.
OUTPUT 2 05S MTWTFSS ** :15:00	State the time of the program using ↑↓. ** = every hour. Move to the right using →. Accept using YES. If the program is approved the text "Program saved" is displayed quickly.
WEEK PROGRAM	Leave programming by pressing ← several times.
MON 28 MAR 2022 U10:11:00 L12:11	



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Date Program, example (New program)

Example: Outputs No. 1 shall switch on the 1st of August at 12.00.

MON 28 MAR 2022
U10:11:00 L12:11

Select function using ↑↓.

DATE PROGRAM

Enter programming mode using YES.

DATE PROGRAM
NEW

Select new program using YES.

OUTPUT 1 ON
AUG 01 08:00:00

Select output using ↑↓. Move to the right using →.

OUTPUT 1 **ON**
AUG 01 08:00:00

State type of signal using ↑↓.

OUTPUT 1 ON
AUG 01 08:00:00

State the date the program shall function using ↑↓.
Move to the right using →.

OUTPUT 1 ON
AUG 01 **12:00:00**

State the time of the program using ↑↓.

Move to the right using →.

Accept using YES.

If the program is approved the text "Program saved" is displayed quickly.

OUTPUT 1 OFF
AUG 01 12:00:00

Continue with programming OFF for the same output or leave programming by pressing ← several times.

DATE PROGRAM

MON 28 MAR 2022
U10:11:00 L12:11



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Display Program

MON 28 MAR 2022
U10:11:00 L12:11

Select function using ↑↓.

DISPLAY PROGRAM

Enter display program using YES.

DISPLAY PROGRAM
GROUP **A**

Select program group using ↑↓, accept with YES.

GROUP A
OUTPUT **ALL**

Select output to be displayed using ↑↓, accept with YES.

OUTPUT 2 ON
MTWTF-- 08:00:00

Step forwards alt. Backwards using ↑↓.

DISPLAY PROGRAM

Leave the function display program by pressing ← several times.

MON 28 MAR 2022
U10:11:00 L12:11



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Temporary Program, example

Example: Outputs No. 2 shall switch on immediately 15.35.00 and turn off according to normal week program. The temporary program will automatically be erased when the event has been affected.

MON 28 MAR 2022
U10:11:00 L12:11

Select function using ↑↓.

TEMPORARY PROGR.

Enter programming mode using YES.

OUTPUT 2 ON
15:35:00

Select output using ↑↓. Move to the right using →.

OUTPUT 2 **ON**
15:35:00

State type of signal using ↑↓.
Accept using YES

OUTPUT 2 ON
15:35:00

Accept using YES or change the time of the program using ↑↓.

TEMPORARY PROGR.

Leave the programming by pressing " several times.

MON 28 MAR 2022
U10:11:00 L12:11



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Group => Period

Each program group can be associated to one or several time periods. A time period can consist of one or several dates. Maximum 99 time periods can be used. Program group A is as default associated to a time period covering the complete year, 1/1-31/12.

Example:

A school has one group of programs that are used during the school season and another used during school holidays. School season = Group A, School holidays = Group B.

The school holidays are at the following dates: 1/5, 10/6-15/8, 23/9 and so on...

```
MON 28 MAR 2022  
U10:11:00 L12:11
```

Select function using $\uparrow\downarrow$.

```
GROUP => PERIOD
```

Enter programming mode using YES.

```
GROUP B  
1: _____ - _____
```

Select group of programs using $\uparrow\downarrow$, accept using YES.

```
GROUP B  
1: MAY01 - _____
```

State the date when the period shall begin.
Move to the right using \rightarrow .

```
GROUP B  
1: MAY01 - MAY01
```

State the date when the period shall end. Accept with Yes.

```
GROUP B  
2: _____ - _____
```

Continue with next time period.

```
GROUP B  
2: JUN07 - _____
```

```
GROUP B  
2: JUN07 - AUG15
```

Accept with YES.

```
GROUP => PERIOD
```

Continue with next time period or leave programming by pressing \leftarrow several times.

```
MON 28 MAR 2022  
U10:11:00 L12:11
```



Spec.-Functions

The special functions contain functions used during setup and configuration of the Master Clock. If the default settings are used no configuration is needed.

MON 28 MAR 2022 U10:11:35 L12:11	Select function using ↓.
SPEC.-FUNCTIONS	Accept with YES.
SPEC.-FUNCTIONS STATUS	Press NO until wished function is shown. Accept with YES.
STATUS	Show status information of the different output/ input in the Master Clock.
LANGUAGE	Language selection.
SETUP	Setup / configuration of the different impulse system, type of synchronization etc.
DISPLAY FORMAT	Display format in running mode.
SOFTWARE VERSION	Present software version.
DEFAULT LT ADJ.	Default value used when pressing button ADV or REV.
SPEC.-FUNCTIONS STATUS	Return to running mode press ←.
MON 28 MAR 2022 U10:11:35 L12:11	



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Status

With this function each input/output status can be checked.

Example:

Check the status of the synchronization source receiver.

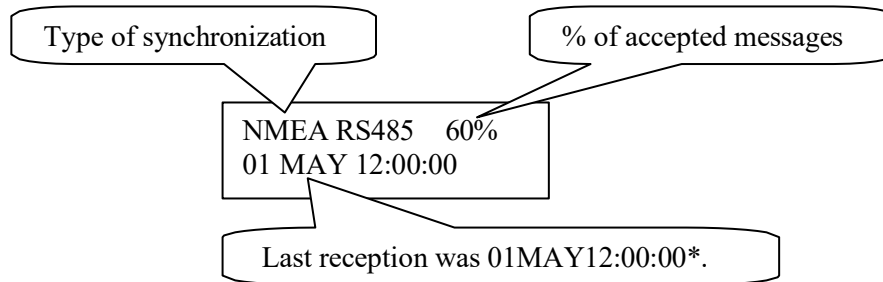
MON 28 MAR 2022 U10:11:35 L12:11	Select function using ↓.
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS STATUS	Accept with YES.
STATUS SYNC.SOURCE	Press NO until wished input/output is shown. Accept with YES.
NMEA RS485 60% 14OCT 19:59:00	The Master Clock has accepted 60% of the synchronization messages. Last reception was 14/10 19:59:00.
STATUS SYNC.SOURCE	Return to running mode press ←.
SPEC.-FUNCTIONS STATUS	←
SPEC.-FUNCTIONS	←
MON 28 MAR 2022 U10:11:35 L12:11	



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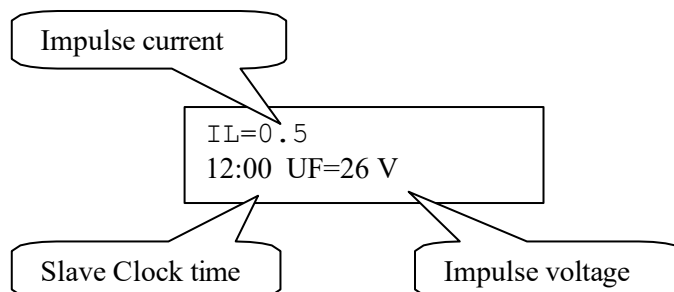
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Status sync. source



*Remark: For W-GPS the marked position always shows the actual second. This information is updated every other second.

Status impulse output





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Language

With this function the language will be selected.

Example:

MON 28 MAR 2022
U10:11:35 L12:11

Select function using ↓.

SPEC.-FUNCTIONS

Accept with YES.
Press NO until wished function is shown.

SPEC.-FUNCTIONS
LANGUAGE

Accept with YES.

LANGUAGE
ENGLISH?

Select, by using the arrows, the wished language.
Accept with YES.

SPEC.-FUNCTIONS
LANGUAGE

Return to running mode press ←.

MON 28 MAR 2022
U10:11:35 L12:11



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Setup

With this function the different output and input can be configured. If the default setup is used no configuration is needed.

Example:

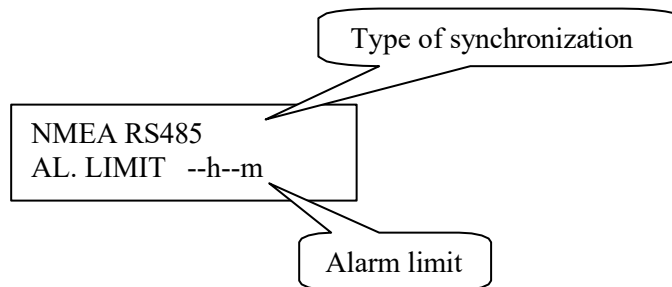
Set the alarm limit for synchronization source alarm to 1 hour. (Default setting is 12 hours.)

MON 28 MAR 2022 U10:11:35 L12:11	Select function using ↓.
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS SETUP	Accept with YES.
SETUP SYNC SOURCE	Press NO until wished input/output is shown. Accept with YES.
NMEA RS485 AL.LIMIT --h -- m	Set, by using the arrows, the alarm limit to 1 hour (01h).
NMEA RS485 AL.LIMIT 01h 00 m	Accept with YES
SETUP SYNC SOURCE	Return to running mode press ←.
SPEC.-FUNCTIONS SETUP	←
SPEC.-FUNCTIONS	←
MON 28 MAR 2022 U10:11:35 L12:11	



Setup sync. source

Below is a description of the different configuration parameters available in the setup menu for sync. source. Please remark that if default settings are used no configuration is needed.



Type of synchronization

State type of external synchronization. The following time sources can be selected:

NMEA RS485 (default)	Synchronization using RS485 input and NMEA ZDA protocol.
NMEA RS232	Synchronization using RS232 input and NMEA ZDA protocol.
W-GPS	Radio synchronization GPS type Westerstrand.
DCF77	Radio synchronization DCF77.
TC	Time code type hard wired DC
-----	No external synchronization

Alarm limit

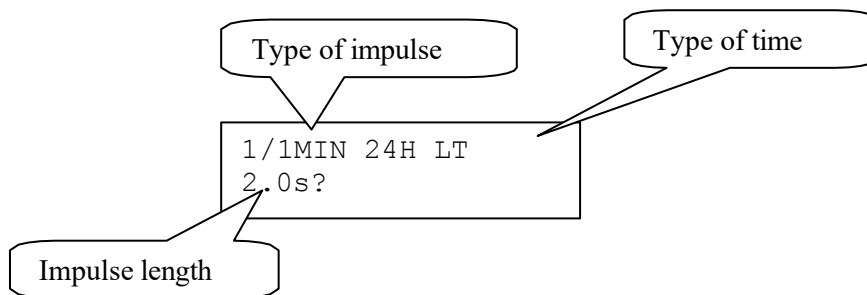
The configuration parameter Alarm limit specifies the time delay before the radio alarm is activated. Default setting is that the radio alarm is inactivated, AL.LIMIT --h--m.



Setup impulse output

Below is a description of the different configuration parameters available in the setup menu for impulse output. Please remark that if default settings are used no configuration is needed.

Impulse type



Type of impulse

Selection of impulse type. The following types are available.

1/1M-24H	Polarized 1/1-minute impulse with 24 hours resetting
1/1M-12H	Polarized 1/1-minute impulse with 12 hours resetting.
1/2M-24H	Polarized 1/2-minute impulse with 24 hours resetting
1/2M-12H	Polarized 1/2-minute impulse with 12 hours resetting.
SEC-12H	Polarized Second impulses with 12 hours resetting.
SEC- 60S	Polarized Second impulses with 60 seconds resetting.
1/2-SEC	Polarized Second impulses with 60 seconds resetting.
TCmarine	Time Code marine
TC-ext	Time Code marine for TC-Clocks diameter 600-900mm.
FW/RW	3-wire for Forward/Reverse, 1/1-minute.
FW/RW1/2	3-wire for Forward/Reverse, 1/2-minute.
1/1M-SS	Polarized 1/1-minute impulse for analogue clocks with sweeping second hand. (2 seconds pulse length in normal mode and 0.5 seconds during correction)
1/2M-12B	Clock signal to Telegraph Logger
-----	No impulse system.

Type of time

LT = Local Time.

UTC = Universal Time Coordinated.



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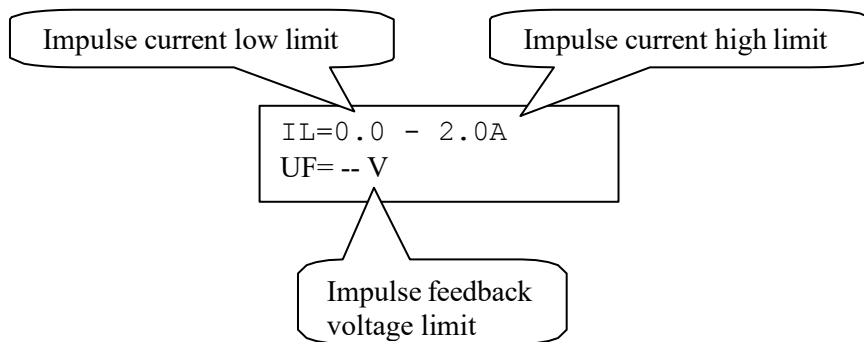
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Impulse length

Configuration of impulse length.

1/1 and 1/2 -minute impulse: 0.1s – 9.9s.
Second impulses: 0.1 – 1.0 s.

Alarm limits



Impulse current low limit

Alarm limit for low current (minimum load). The minimum load can be set from 0A up to 2.0A.

Impulse current high limit

Alarm limit for high current (maximum load). The maximum load can be set from 0A up to 2.0A.

Impulse feedback voltage limit

Alarm limit for feedback impulse voltage.

-- : No limit (default).
01 - 99 : Limit in volts, V.



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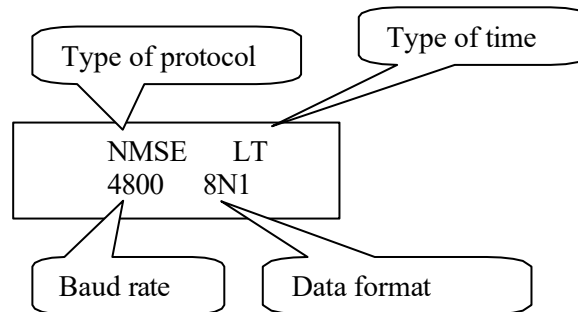
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Setup RS232 and RS485/422 output / input

Below is a description of the different configuration parameters available in the setup menu for the RS232 and RS485 input/ output.

Please remark that if default settings are used no configuration is needed. The RS485/422 input protocol is always fixed to NMEA ZDA Time string and cannot be changed.



Type of protocol

Name of the transmission / reception protocol used in the module. The following protocols are available.

NMEA output from Master Clock

NMMI: NMEA 0183, ZDA Time string, minute update, without hundreds of seconds
NMSE: NMEA 0183, ZDA Time string, second update, without hundreds of seconds
NMMC: NMEA 0183, ZDA Time string, minute update, with hundreds of seconds
NMSC: NMEA 0183, ZDA Time string, second update, with hundreds of seconds

NMin NMEA 0183, ZDA Time string, (input to Master Clock)

Other protocols

1: General 2-way-communication protocol.
2, 3, 5, 7, 16 etc.: Automatic time message protocols.

Type of time

Type of time received or transmitted.

LT = Local Time.

UTC = Universal Time Coordinated.

Baudrate

Available speeds: 300, 600, 1200, 2400, 4800, 9600 baud.

Data format

Data format of message received or transmitted.

No. of data bits, 7 or 8.

Type of parity, none, odd or even.

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No. of stop bits, 1 or 2.

Available formats:

7N1, 7N2, 7O1, 7O2, 7E1, 7E2, 8N1, 8N2, 8O1, 8O2, 8E1, 8E2,

Protocol description

ZDA - Time & Date - UTC, Day, Month, Year and Local Time Zone

1	2	3	4	5	6	7

\$--ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx*hh<CR><LF>

Field Number:

- 1) Universal Time Coordinated (UTC)
- 2) Day, 01 to 31
- 3) Month, 01 to 12
- 4) Year
- 5) Local zone description, 00 to +- 13 hours
- 6) Local zone minutes description, same sign as local hours
- 7) Checksum



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Protocol 2

The message has length 20 bytes according to:

STX F G W 20 YY MM DD HH MM SS ETX BCC

F - Flag bits

7	=0
6	=1
5	=0
4	=0 Winter time, =1 summer time
3	=1 Synced from Radio source, e.g. DCF77
2	=1 Synced from timeserver
1 0	Type of time
OFF OFF	UTC
OFF ON	LOC
ON OFF	NOR

Example:

Assume wintertime time, synced from radio source, synchronized from timeserver, local time:
Bits 6, 3, 2 and 0 are set: 0100 1101 = 4Dh = 'M'

G - UTC offset during wintertime from letter 'P' in 1/2 hour steps.

Example:

Germany $2 \times 1/2 = 1$ hour, so 'P'+2 = 'R'

W	Weekday	'1' Monday .. '7' Sunday
YY	Year	'00'..'99'
MM	Month	'01'..'12'
DD	Day of month	'01'..'31'
HH	Hour	'00'..'23'
MM	Minute	'00'..'59'
SS	Second	'00'..'59'
ETX	03h	
BCC	Exclusive or of bytes F..ETX	

The message is transmitted each second



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Protocol 3

At second 56 this message will be transmitted:

HH:MM:00 SP DD/MN/YY SP NNN SP W CRLF (25 bytes)

HH = Hour '00' – '23'.
: = 3AH
MM = Minute '00' – '59'.
SP = Blank 20H.
DD = Date '01' – '31'.
/ = 2FH
MN = Month '01' – '12'.
YY = Year '00' – '99'.
NNN = Daynumber '001' – '365' (3 bytes).
W = Weekday '1' – '7'.
CR = 0DH.
LF = 0AH.

At second 60 (0) a synchronization sign SUB (1AH) is transmitted.

Remark: The message transmitted at second 56 is **next** minute.

Example:

At 09:07:56 is a message transmitted. The time included in this message will be 09:08:00.

Protocol 5

T:YY:MN:DD:WW:HH:MM:SS CRLF (24 bytes)

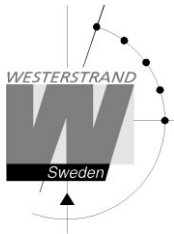
T = T
: = 3AH
YY = Year 00...99
MN = Month 01...12
DD = Day 01...31
WW = Day of week 01...07
HH = Hour 00...23
mm = Minutes 00...59
ss = Seconds 00...59
CR = Carrige return 0Dh.
LF = Line feed 0Ah.

The time message is sent out each minute or each second.

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Protocol 7

STX WW VV YYYY MN DD HH MM SS F G BCC ETX (24 bytes)

STX = 02h (1byte).

WW = Week number '01'-'53'
VV = Weekday '01'-'07'
YYYY = Year '2003-2099'
MN = Month '01'-'12'
DD = Day '01'-'31'
HH = Hour '00'-'23'
MM = Minute '00'-'59'
SS = Second '00'-'59'

F = '0' Winter-time.
= '1' Summer-time.

G = Offset to UTC for winter-time according to (1 byte):
';' (2Ch) -2 hours, ':' (2Eh) -1 hour, '0' (30h) 0 hour.

BCC = Checksum; Exclusive OR of bytes WW..FG in hexadecimal ascii format (2 bytes). Byte STX is NOT included!.

ETX = 03h (1byte).

This message is sent out each second.



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Protocol 16*

STCHHMMSSDDMOMOMOYYHLHLMLMLECT

Code	description	Hex value
STC	Start Transmission Character	02
H	Ten UTC hours	30-32
H	Unit UTC hours	30-39
M	Ten UTC minutes	30-35
M	Unit UTC minutes	30-39
S	Ten UTC seconds	30-35
S	Unit UTC seconds	30-39
D	Ten date UTC	30-33
D	Unit date UTC	30-39
MO	Ten month UTC	30-31
MO	Unit month UTC	30-39
Y	Ten year UTC	30-39
Y	Unit year UTC	30-39
HL	Ten LT hours	30-32
HL	Unit LT hours	30-39
ML	Ten LT minutes	30-35
ML	Unit LT minutes	30-39
ECT	End transmission character	03

* Protocol 16M = Message transmitted each minute.

* Protocol 16S = Message transmitted each second.



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Setup special pulse

Relay output no. 2 can be dedicated to send out a special pulse. When this function is enabled the relay is activated every day for 5 seconds at 02.00 UTC.

Use the procedure below to enable the special pulse.

MON 28 MAR 2022
U10:11:35 L12:11

Select function using ↓.

SPEC.-FUNCTIONS

Accept with YES.
Press NO until wished function is shown.

SPEC.-FUNCTIONS
SETUP

Accept with YES.

SETUP
SPECIAL PULSE

Press NO until wished input/output is shown.
Accept with YES.

SPECIAL PULSE
NO ?

Change to using ↑↓.

SPECIAL PULSE
YES ?

Accept with YES

SETUP
SPECIAL PULSE

Return to running mode press ←.

SPEC.-FUNCTIONS
SETUP

←

SPEC.-FUNCTIONS

←

MON 28 MAR 2022
U10:11:35 L12:11



Setup NMEA LT

This function is valid only if the Master Clock is synchronized from an external NMEA source. Special function sync. source must be set to NMEA RS485 or NMEA RS232.

With this function it can be selected if the Master Clock should use the Local Time (LT) information included in the NMEA time message. The Master Clocks LT will be set to the nearest time with respect to the default value entered in the special function DEFAULT LT ADJ.

Example:

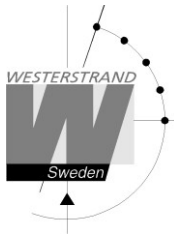
DEFAULT LT ADJ is set to 20 minutes. Local Time is 15:30.

1. Received LT is changed 5 minutes to 15:35, which is closer to 15:30 than 15:50;
Master Clock LT will stay on 15:30.
2. Received LT is changed 10 minutes to 15:40, which is in the middle of 15:30 and 15:50;
Master Clock LT will stay on 15:30.
3. Received LT is changed 15 minutes to 15:45, which is closer to 15:50 than 15:30;
Master Clock LT will change 20 minutes to 15:50.

Default setting is NO, which means that the Local Time information is not used.

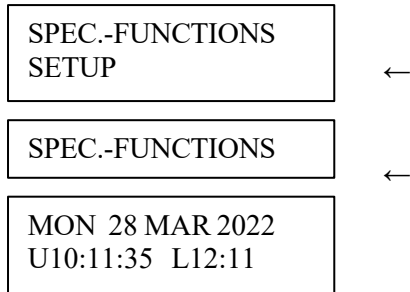
Use the procedure below to change the setting.

MON 28 MAR 2022 U10:11:35 L12:11	Select function using ↓.
SPEC.-FUNCTIONS	Accept with YES.
SPEC.-FUNCTIONS SETUP	Press NO until wished function is shown. Accept with YES.
SETUP NMEA LT	Press NO until wished input/output is shown. Accept with YES.
NMEA LT NO ?	Change to using ↑↓.
NMEA LT YES ?	Accept with YES
SETUP NMEA LT	Return to running mode press ←.



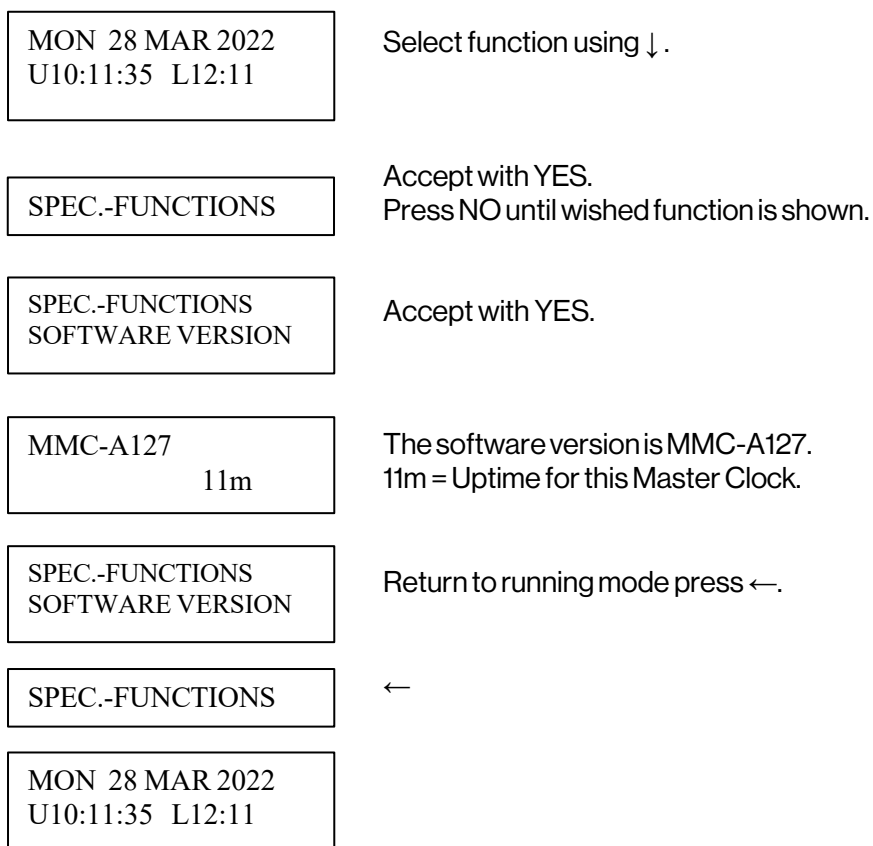
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Software version

This function shows the software version for the Time Base module.



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Default LT adjust

This function is used to enter the default value used when pressing button ADV or REV.

Example:

Change default LT adj. from 60 minutes to 20 minutes.

MON 28 MAR 2022 U10:11:35 L12:11	Select function using ↓.
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS DEFAULT LT ADJ.	Accept with YES.
DEFAULT LT ADJ. 60 m ?	Change to using ↑↓.
DEFAULT LT ADJ. 20 m ?	Accept with YES.
SPEC.-FUNCTIONS DEFAULT LT ADJ.	Return to running mode press ←.
SPEC.-FUNCTIONS	←
MON 28 MAR 2022 U10:11:35 L12:11	



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Display format

With this function the display format in running mode can be selected.

The following three formats can be selected:

MON 28 MAR 2022 10:11:00 LT	Format 1 LT = Local Time. UTC = Universal Time Coordinated.
MON 28 MAR 2022 U10:11:00 L12:11	Format 2 (Default) L = Local Time U = UTC
MON 28 MAR 2022 LT	Format 3, Used for test / fault finding.

Example:

MON 28 MAR 2022 U10:11:35 L12:11	Select function using ↓.
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS DISPLAY FORMAT	Accept with YES.
DISPLAY FORMAT -1- LT	Select, by using the arrows, the wished display format. Accept with YES.
SPEC.-FUNCTIONS DISPLAY FORMAT	Return to running mode press ←.
MON 28 MAR 2022 12:11:00 LT	



Fault tracing

The display is blank

- A. The green LED "POWER" is light?
 - A1. No.
 - A1A. Check the supply voltage.
 - A1B. Power supply wires connected correctly?
 - A2. Yes.
 - A2A. Restart the master clock by switching the supply voltage off and on.

After starting up the master clock, no impulses appear (to correct the slave clocks).

- B1. The master clock awaits the time shown by the slave clocks. Impulses will be distributed when correct time = the time shown by the slave clocks.

Relay outputs are programmed but nothing happens.

- C1. The switch on the front panel is in position 0. Correct position is A.
- C2. Check that the output is working when the switch is in position 1.
- C3. Different program types have different priority. E.g. a programmed date program overrides a signal point in a week program.
Priority order (1=highest, 3=lowest):
1) Date program 2) Group 3) Week program

Alarm messages

- D1. "Short circuit"

Excessive load on the impulse output. Check the slave clock wiring. Impulses are stored (memorized) during the alarm. When the fault is fixed, all the stored impulses are distributed by rapid impulsing.

- D2. "Memory full"

The master clock is out of memory, probably due to incorrect programming. Use week program for repetitive signals or group for a certain period. See the programming instructions in this manual.



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D3. "Exists"

The signal point is already programmed.

D4. "Not programmed"

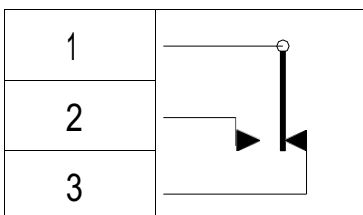
When trying to change a non-existing signal point.

Alarm output

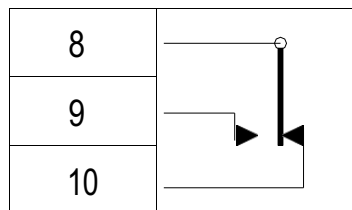
The Master Clock is equipped with two separate alarm relays. One relay for general alarm and one for power failure alarm. See alarm list on page 16 for details.

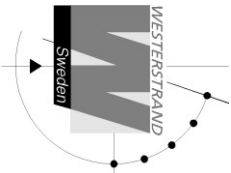
General alarm	1-2	1-3		
Normal mode, no alarm	Open	Closed		
Overload/short circuit alarm	Closed	Open		
Synchronization alarm	Closed	Open		
Power alarm	8-9	8-10		
Normal mode, no alarm	Open	Closed		
Power failure alarm	Closed	Open		

General alarm relay



Power alarm relay



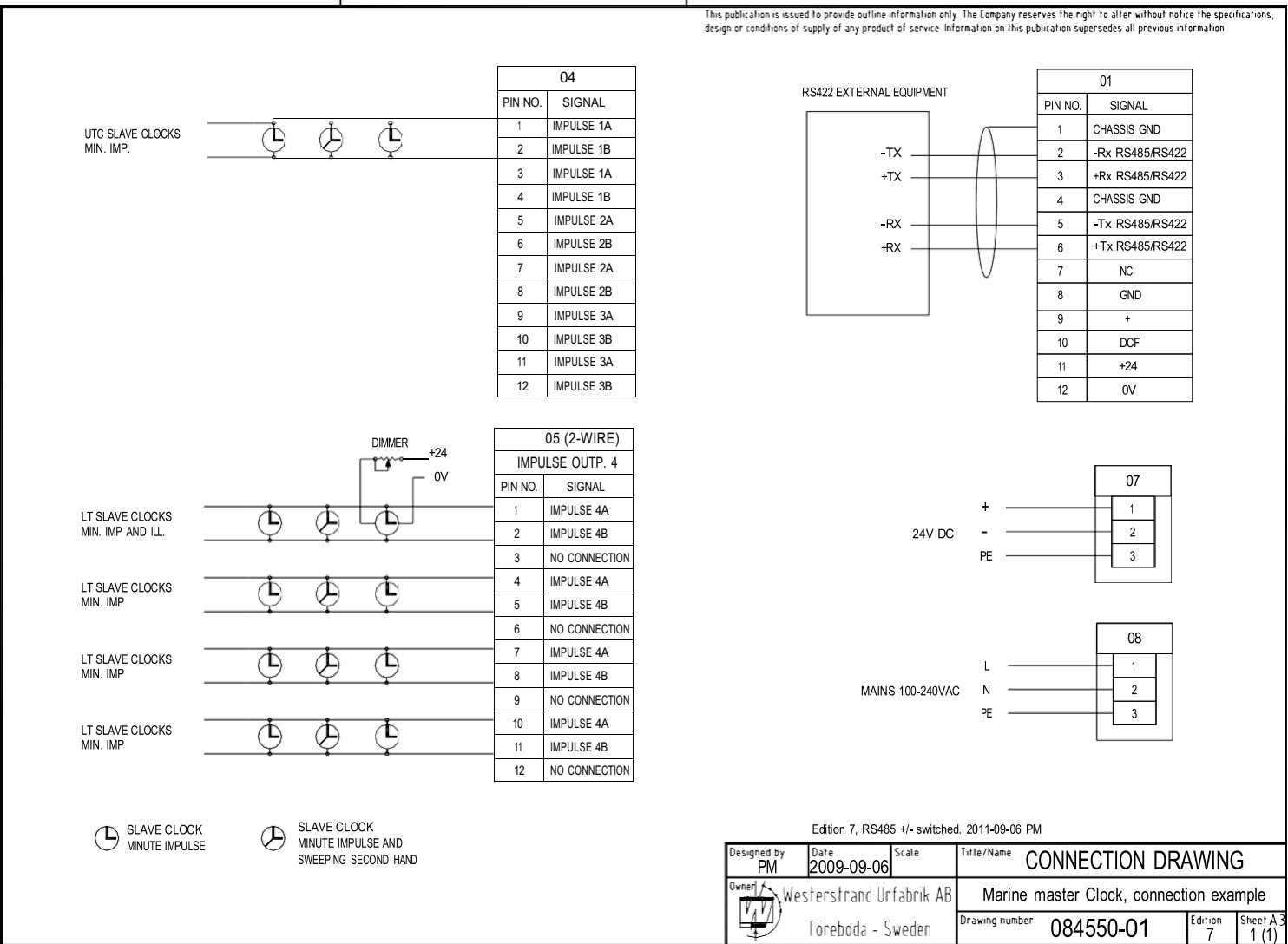


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Connection example

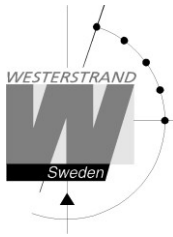
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Detailed interface data

Signal directions refer to the master clock.

Conn no.	Signal	Remark	Description	Signal level
Conn 01				
1	Chassis GND	RS485 NMEA input	RS485 input. 300-38400 Baud. Connector: 3-polar screw terminal, max. conductor size 2.5mm ² . Output protocol see separate description	-7V to 12V, according to RS485 standard.
2	-Rx RS485			
3	+Tx RS485			
4	Chassis GND	RS485 NMEA output	RS485 input. 300-38400 Baud. Connector: 3-polar screw terminal, max. conductor size 2.5mm ² . Output protocol see separate description	-7V to 12V, according to RS485 standard.
5	-Rx RS485			
6	+Tx RS485			
7		Not used	No connection	
8	GND	GPS Receiver	Connection for the GPS receiver: +24V, 0V, DCF. Connector: 3-polar screw terminal, max. conductor size 2.5mm ² .	24VDC, max. output current 0,2A.
9	+			
10	DCF			
11	+24V	24V output	Connector: Screw terminal, max. conductor size 2.5mm ² .	24VDC, max. output current 0,5A.
12	0V			
Conn 02				
		Ethernet	RJ45 connector for Ethernet. 10/100BASE-T. Ethernet version 2/IEEE 802.3	
Conn 03				
2	Rx RS232	RS232 input	RS-232 in/output. 300-38400 Baud. DB9 male connector. Rx, Tx, SG. Output protocol see separate description	Max. +/- 15VDC, according to RS232 standard.
3	Tx RS232	RS232 output		
5	GND RS232	Signal GND		
Conn 04				
1, 3	Impulse 1A	Impulse output no. 1	Impulse output. Connector: Screw terminal, max. conductor size 2.5mm ² .	27V impulses. Max. load 2A.
2, 4	Impulse 1B			
5, 7	Impulse 2A	Impulse output no. 2	Connector: Screw terminal, max. conductor size 2.5mm ² .	27V impulses. Max. load 2A.
6, 8	Impulse 2B			
9, 11	Impulse 3A	Impulse output no. 3	Impulse output. Connector: Screw terminal, max. conductor size 2.5mm ² .	27V impulses. Max. load 2A.
10, 12	Impulse 3B			
Conn 05				
			Impulse output configured for 2-wire clocks	
1, 4, 7, 10	Impulse 4A	Impulse output no. 4	Impulse output. Connector: Screw terminal, max. conductor size 2.5mm ² .	27V impulses. Max. load 2A.
2, 5, 8, 11	Impulse 4B			
Conn 05				
			Impulse output configured for 3-wire clocks	
1, 4, 7, 10	Impulse 4A	Impulse output no. 4	Impulse output. Connector: Screw terminal, max. conductor size 2.5mm ² .	27V impulses. Max. load 2A.
2, 5, 8, 11	Impulse 4B			
Conn 06				
1	Common	Alarm relay output	Common, NC, NO Connector: 3-polar screw terminal, max. conductor size 2.5mm ² .	Max. load: 24VAC/DC 2A
2	NO			
3	NC			
4	Common	Program relay	Common, NC, NO	Max. load:

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5	NO	output no. 1	Connector: 3-polar screw terminal, max. conductor size 2.5mm ² .	24VAC/DC 2A
6	Common	Program relay output no. 2	Common, NC, NO Connector: 3-polar screw terminal, max. conductor size 2.5mm ² .	Max. load: 24VAC/DC 2A
7	NO			
8	Common	Power alarm relay output	Common, NC, NO Connector: 3-polar screw terminal, max. conductor size 2.5mm ² .	Max. load: 24VAC/DC 2A
9	NO			
10	NC			
11		Not used		
12		Not used		
Conn 07				
1	+24V	DC input	24VDC input. +, 0V and protective earth. Connector: 3-polar screw terminal, max. conductor size 2.5mm ² .	24VDC -5% +20%, Power consumption 65W max.
2	0V			
3	PE			
Conn 08				
1	L	AC input	Mains input. Phase, neutral and protective ground. Connector: 3-polar screw terminal, max. conductor size 2.5mm ² .	100-240VAC 50/60Hz. Power consumption 65W max.
2	N			
3	PE			

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WIRED DCF TIME CODE-CLOCK

Max. 400 mm in diameter
for Time zone adjustment

TECHNICAL MANUAL



General

Westerstrand analogue clock for wired DCF Time-Code from Marine Master Clock provides the possibility to create a time distribution system, with high accuracy and high reliability.

The clock is intended for connection to a 2-wire bus which combines power supply and serial Time-Code. A built-in microprocessor receives the Time Code, reads the position of the hands, and sets the clock to correct time. The Time-Code, built up according to the DCF-format, contains information about year, month, day hour and minute. At each minute shift seconds are synchronized as well. The transmission speed is 1 bit/second. 24VDC power supply for the built in electronics is combined with the Time-Code.

The clock is intended for time zone adjustment from a Marine master clock.

Installation

Connect Time code to time code input, connection movement.

The hands will step forward to 12 position and wait there for correct time message.

The speed is approx. 1 step/sec. When an accepted Time message the hands will step forward to correct time.

If the Marine master clock sends out a special time message (Time zone adjustment), the hands will step forward rapidly to correct time.

The speed of the hands is 10 steps/ sec.

Synchronization

When the clock has received and accepted a correct time code message, the hands will step forward rapidly.

If the Marine master clock sends out a special time message (Time zone adjustment), the hands will step forward rapidly to correct time. The speed of hands is 10 steps/ sec.

Automatic feedback control of the hands at 12:00 and 00:00.

If the time code would disappear, the clock continues by means of the built-in quartz crystal.

During a power failure, the clock is temporarily stopped. After the restoration of power, the hands steps forward to the 12.00-position and waits, for a Time-Code to be received.



Technical data

Art.no	113160-20,113160-22,113163-20,113163-22
Connection	2-wire
Connection voltage	24VDC combined with serial Time-Code
Type of time code	DCF-format with Time zone adjustment.
Microcontroller	PIC16F628
Temperature range	-20 C to +50 C
Power consumption	20 mA. (113160-20,113160-22) 30 mA. (113163-20,113163-22)

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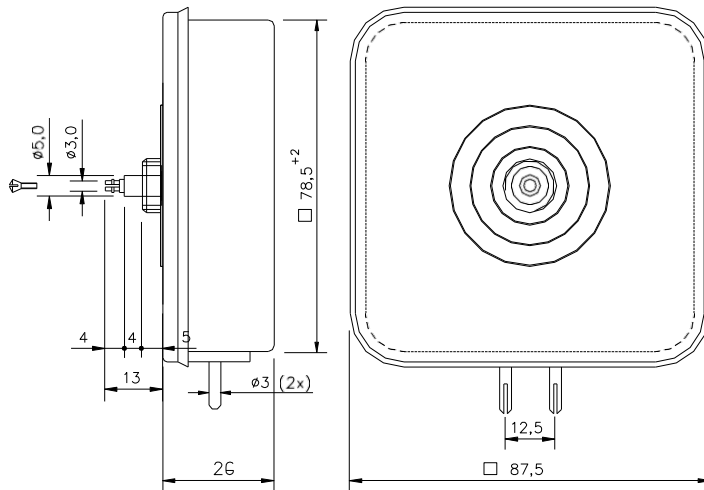
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545 23 TÖREBODA

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Fax. 0506 48051

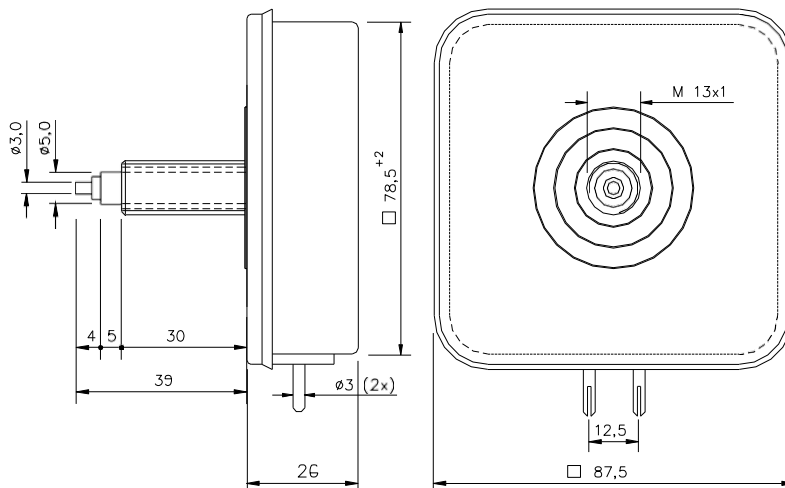
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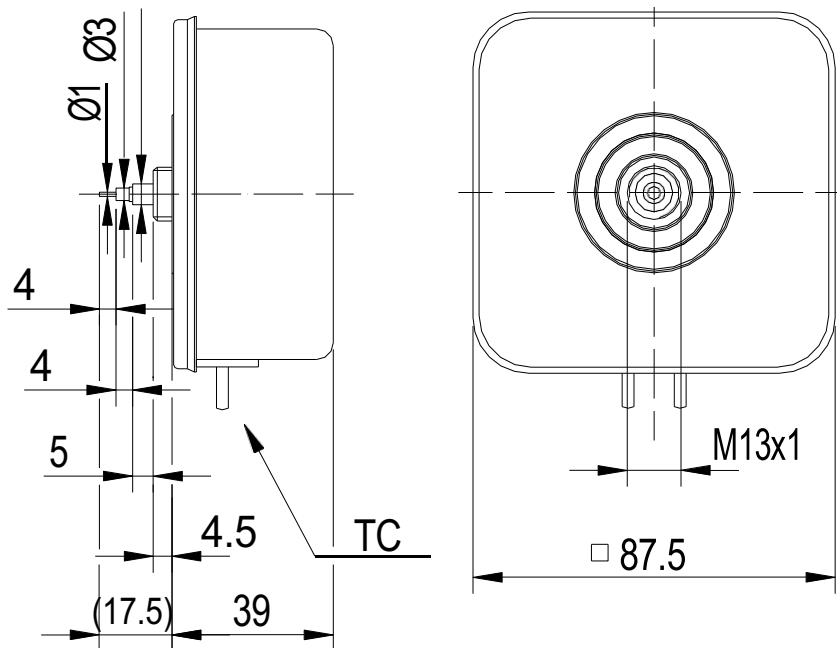
113160-20



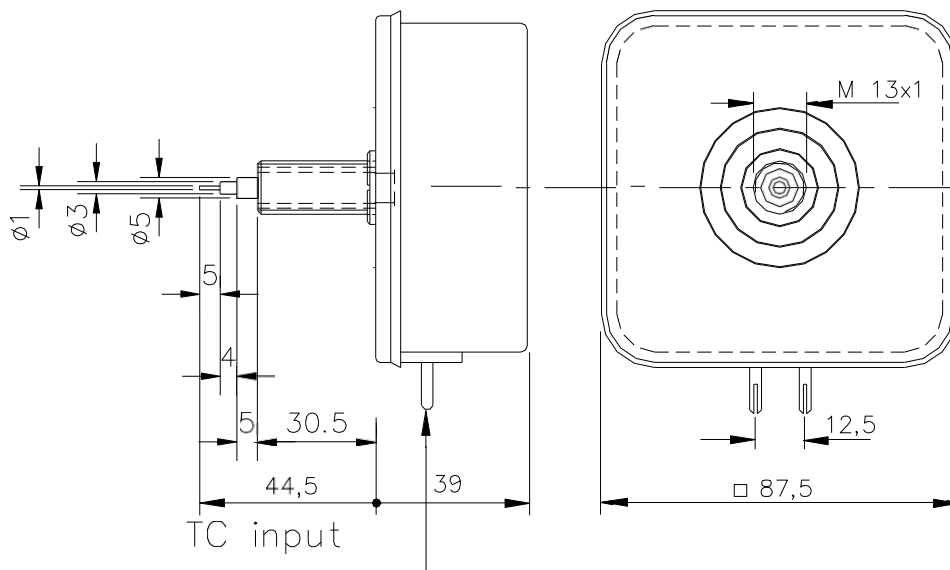
113160-22



113163-20



113163-22

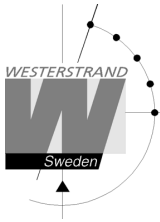




Option

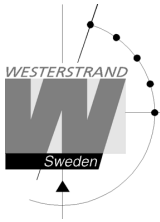
Ethernet

Marine Master Clock



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General

The Ethernet module makes it possible to connect a Master Clock to a LAN (Ethernet Local Area Network). The module can be built into a Marine Master Clock.

The module can be used for Master Clock remote control, programming of relay outputs, alarm distribution, supervision and for distribution of correct time. The module can be configured to work as a NTP server or NTP client.

For transmission of correct and accurate time the NTP (Network Time Protocol) is used. NTP is a part of the protocol family UDP/IP.

When using the Ethernet module for time distribution the Master Clock can act as a NTP primary server or as a NTP client.

Units connected to the LAN, supporting NTP, can receive correct time from the Master Clock via the network module.

Included with the Ethernet module is NyToP, Westerstrand NTP-client for Windows XP/7/8/10.

To configure the different parameters such as IP-address, work mode etc. a normal web

browser is used. The front panel of the Marine Master Clock has a Link indicator LED.

Link indicator LED ON = Link activated. The Master Clocks is connected to a network.

LED OFF = No link activated. The Master Clock is not connected to a network.

Technical data

Article number: 123383-01

Supports application protocols:

(For time distribution) NTP version 1, 2, 3 and 4, RFC5905, SNTPv4, RFC 4330
Daytime Protocol (RFC867), Time Protocol (RFC 868)

Other supported protocols: SNMPv2c, MIBII (RFC1155, RFC1157, RFC1213), HTTP,
HTTPS.

Transport protocol: TCP, UDP/IP, ICMP

Internet protocol: IPv4, (IPv6 ready)

IP-address assignment Dynamic, using DHCP, or fixed IP address.

VLAN support: IEEE standard 802.1Q. The Ethernet port and can be configured to use
one
VLAN ID.

Compatibility: Ethernet version 2/IEEE 802.3

Ethernet: Supports 10/100BASE-T (RJ45)
connections

Device Management: Web-Based (requires web browser)

NTP client software: NyToP, freeware, manual 1672

Application software: QW3Control art. no. 123396-00, manual 1739

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Configuration

Most of the configuration parameters are set via an external PC by using a Web-browser, but some of the settings can also be done from the Master Clock.

The following parameters can be set from the Master Clock by using the special function setup.

- IP address

The following parameters can be viewed from the Master Clock by using the special function status.

- IP address

Setup IP

Example:

Give the module IP-address 192.168.1.66

MON 14 OCT 2021
09:07:00 LTW

Select function by using 

SPEC.-FUNCTIONS

Accept using YES.
Press NO until wished function is displayed.

SPEC.-FUNCTIONS SETUP

Accept using YES.

SETUP
IP

Press NO until the text IP is displayed.
Accept using YES.

IP
192.168.001.066?

Set, by using the arrows, the IP-address 192.168.001.066. Accept using YES.

SETUP
IP

Return to running mode by using 

SPEC.-FUNCTIONS
SETUP



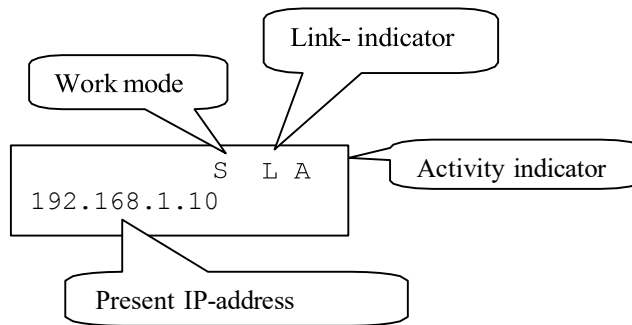
SPEC.-FUNCTIONS



MON 14 OCT 2021
09:07:00 LTW



Status IP



Work mode S = Server. The Master Clock works as a NTP time server. C = Client. The Master Clock works as a NTP time client.

Link indicator L = Link activated. The Master Clock is connected to a network.
= No link activated. The Master Clock is not connected to a network.

Activity indicator A = Showing the network traffic from / to the Master Clock.

Work mode (NTP Server or Client)

The network module can work in two different modes

Server:

The Master Clock works as a NTP time server answering to NTP requests from NTP clients.

Client/Server:

The Master Clock is both NTP client and NTP server.

The work mode is set from the Master Clock, SPEC.-FUNKTIONEN / SETUP / SYNC.SOURCE.

SYNC.SOURCE = NTP CLIENT

The Master Clock acts as a NTP-client receiving its time from an external NTP server.

SYNC.SOURCE = GPS, RDS, DCF etc.;

The Master Clock acts as a NTP server providing connected external clients with correct time.

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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 login a menu is displayed:



Status

Status	Network	NTP	Remote	General
Name	Marine Master Clock Refresh			
UTC	2021-08-17 09:20:21, week 33 Tue			
LT	2021-08-17 11:20:21, week 33 Tue			
Timezone	UTC+02:00, no DST (MLT)			
IP	192.168.13.74 (Static)			
Netmask	255.255.240.0			
Gateway	192.168.1.1			
DNS	192.168.1.13			
MAC	00-07-09-10-29-28			
Status	Synchronized			
NTP	NTP Server			
Alarms	No alarms			
Uptime	16 min, 5 sec			
Firmware	MEC-B115 (Aug 16 2021). BOOTK64-X151			
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Name	Symbolic name of the Master Clock. This is set in function General.
UTC/LT	Current time, UTC and Local Time
Timezone	Time zone offset to UTC
IP	Shows the IP address of unit
Netmask	Shows the netmask setting
Gateway	Shows the IP address of the gateway
DNS	Shows the IP address of the DNS server
MAC	Shows the MAC address of the unit in format 00-07-09-xx-xx-xx
NTP	Work mode NTP Server = The Master Clock is working as NTP Server only. NTP Client + Server = The Master Clock is working as both Server and Client.
Status	Not Synchronized The Master Clock has never been synchronized. Synchronized The Master Clock has been synchronized at some point, either through manual timing or via an external time source. Synchronized in holdover The main clock works as an NTP client and has received time from an external time server but has lost contact with the server and has therefore switched to using its built-in oscillator as a reference.

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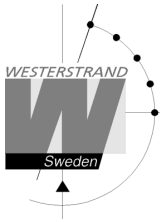
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	Synchronized: (192.168.3.7), Stratum=1, Answers=16 The Master Clock is synchronized and gets its time from an NTP server with IP address 192.168.3.7. This NTP server has stratum level 1 and the main clock has received responses to 16 NTP requests.
Alarms	Shows if the Master Clock has any alarms. Example: No Alarms = The Master Clock is OK. No Radio = The watch has lost synchronization for a long time. 5-minute limit = Received time message is more than 5 minutes incorrect in relation to the clock's internal time. The message is not accepted. Authentication = MD5 authentication failed. See also section Alarm further down in this document
Uptime	Uptime for the Master Clock since last power failure
Firmware	Program version



Network

Enter general network parameters

Status	Network	NTP	Remote	General
DHCP				
Use DHCP	<input type="radio"/>			
Fallback	<input type="text" value="192.168.3.10"/>			
Static IP				
Use static IP	<input checked="" type="radio"/>			
Address	<input type="text" value="192.168.13.101"/>			
Subnetmask	<input type="text" value="255.255.240.0"/>			
Gateway	<input type="text" value="192.168.1.1"/>			
DNS 1	<input type="text" value="192.168.1.13"/>			
DNS 2	<input type="text"/>			
VLAN				
Enable VLAN	<input type="checkbox"/>			
VLAN tag (0-4094)	<input type="text" value="0"/>			
VLAN prio (0-7)	<input type="text" value="0"/>			
Utilities				
Syslog	<input type="text"/>	<input type="checkbox"/>		
Identity access	<input type="text" value="Normal"/>	<input type="checkbox"/>		
Telnet	<input type="checkbox"/>			
HTTP	<input checked="" type="radio"/>			
HTTPS	<input type="radio"/>			
SNMP				
Enable SNMP	<input checked="" type="checkbox"/>			
Read community	<input type="text" value="public"/>			
Read/write community	<input type="text" value="private"/>			
Trap address 1	<input type="text"/>			
Trap address 2	<input type="text"/>			
Trap address 3	<input type="text"/>			
Trap type	v1 <input type="radio"/>	v2 <input checked="" type="radio"/>		
<input type="button" value="Save"/>				

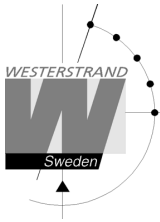
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DHCP

Use DHCP

Unchecked – Static IP address according to static IP below.

Checked – DHCP IP address with fallback according to IP fallback below.

Fallback

If DHCP is activated this will be the DHCP fallback address.

Static IP Use

static IP

To be checked if static IP address is used.

Address

Enter the static IP-address.

Subnetmask

Enter the subnetmask. Default 255.255.255.0

Gateway

Gateway IP address.

DNS

IP address of DNS server. Two different addresses can be entered, DNS1 and DNS2.

VLAN

Virtual Local Area Network.

The Ethernet port and can be configured to use one IEEE 802.1q VLAN ID

Enable VLAN

VLAN is enabled if checked

VLAN tag

A 12-bit value specifying a VLAN ID to which a port belongs. VLAN tags from 0-4094 can be entered here. The selected tag is inserted into the data area of an Ethernet packet.

VLAN prio

Priority Values 0 (default, lowest priority) to 7 (highest priority) which can be used to prioritize network traffic for different types of data.



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

Enable Telnet. Telnet enabled if checked.

Web server

Use of web-browser via HTTP or HTTPS allowed if checked.

HTTP

Use of HTTP (web-browser) if checked

HTTPS

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

SNMP

The Simple Network Management Protocol (SNMP) is used in network management systems to monitor status of devices. This function is used to activate the SNMP, enter the address of one or more SNMP servers and to define the SNMP community.

Trap address. 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.

Enable

SNMP is enabled if checked

Read community: Default public

Read/write Community: Default private

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

The Server can work as NTP Server only or as both NTP Server and NTP Client.

When working as 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.

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Status	Network	NTP	Remote	General
DHCP option 42	<input type="checkbox"/>			
Broadcast	<input type="checkbox"/>			
Multicast	<input type="checkbox"/>			
NTP 1	<input type="text" value="ntp.se"/>			
NTP 2	<input type="text"/>			
NTP 3	<input type="text"/>			
NTP 4	<input type="text"/>			
NTP 5	<input type="text"/>			
Interval	<input type="text" value="1"/> minutes			
<input type="button" value="Save"/>				
NTP Advanced				

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NTP mode

This parameter defines if the unit shall work as an NTP Server only or both NTP Client and NTP Server.

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. Network DHCP must also be activated to enable this feature.

Broadcast

Accept broadcast/multicast time messages. Broadcast address: 255.255.255.255

Multicast

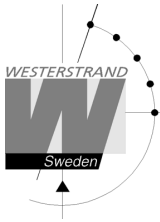
Accept multicast time messages. Multicast address: 224.0.1.1

NTP server

Select NTP servers, e.g. 192.168.1.237 or as an URL ntp.se. Also see DHCP option 042 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.

Interval

Interval in seconds between NTP requests.



NTP Advanced

Advanced NTP settings

Status	Network	NTP	Remote	General
Server				
Server Mode	---	▼	Interval	1 minutes
Stratum when no external sync	1			
Clogging prevention	<input type="checkbox"/>			
My ID	0	Key		
Client				
Client Mode	First ▼			
5 minute limit	<input type="checkbox"/>			
Only accept Stratum 1	<input type="checkbox"/>			
Authentication	<input type="checkbox"/>			
Server 1 ID	0	Key		
Server 2 ID	0	Key		
Server 3 ID	0	Key		
Server 4 ID	0	Key		
Server 5 ID	0	Key		
<input type="button" value="Save"/>				
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Server mode

With this function activated will the server broadcast/multicast NTP messages according to the chosen interval. The server will still answer NTP requests from NTP clients.

Broadcast address: 255.255.255.255

Multicast address: 224.0.1.1

Interval(s)

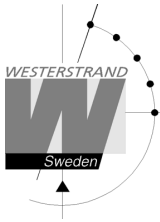
NTP broadcast interval in seconds. This function is used if broadcast/multicast server is activated. See above.

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Stratum when no external sync.

With this function it is defined which stratum level the NTP server shall adopt when it has been synchronized but now is working standalone. Synchronized means that the master clock / time central has received correct time, either from an external sync source, GPS or similar, or that the time is set manually.

If the NTP server has never been synchronized it will have stratum value 16 and LI-bits of the NTP message is set to 3 (clock unsynchronized).

Clogging prevention

The NTP server support access control with a call-gap function and can send kiss-o'-death packets if needed. If this function is activated clients asking for time too often, interval less than 1 second, will be denied and a kiss-o'-death packet will be sent.

My ID / Key

The NTP Server authentication data. Use for MD5 authentication.

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 *

With this feature, the acceptance of incorrect time messages can be limited. The reason for this limitation is to avoid "time jumps" in the event of functional disturbances. If the time message coming from the NTP server differs more than 5 minutes compared to the clocks internal time, this time message will be rejected.

The default setting is no limit.

Check box = Off; No restriction, accept all messages.

Check box = On; Only accept messages with a maximum time difference of 5 minutes.

* Please note that the Time Central has a general sync.limit feature that affects all modules. See Special functions, section Sync. Limits. If this feature is activated it overrides the 5 minute limit setting.

Only accept Stratum 1

This function makes it possible to synchronize to Stratum 1 time servers only. Check box = Off ; synchronize to time server independent of stratum level.

Check box = On ; synchronize only if time server is operating on Stratum 1 level.

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Authentication

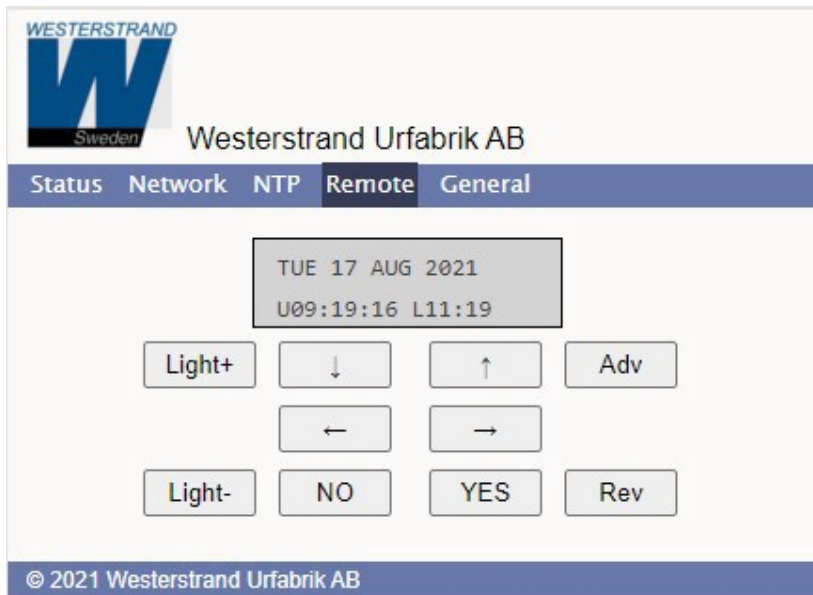
If authentication is activated: Use MD5 authentication.

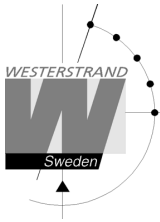
Server ID/Key: Authentication data for the external NTP servers configured in the NTP server list.



Remote

Remote control of the Master Clock





General

Used to configure general parameters.

Status	Network	NTP	Remote	General
Name				
Marine Master Clock				
Contact				
Location				
Password				
admin				
..		Repeat		..
guest				
..		Repeat		..
Miscellaneous				
Firmware MEC-B115 (Aug 16 2021). BOOTK64-X151				
Firmware Download <input type="checkbox"/>				
Restart Program <input type="checkbox"/>				
<input type="button" value="Save"/>				
Backup/Restore				
Filename				
Marine Master Clock.txt		<input type="button" value="Backup"/>		
<input type="button" value="Välj fil"/> Ingen fil har valts		<input type="button" value="Restore"/> Program restarts!		
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Name

Symbolic name, maximum 64 characters. This name is shown in the status menu. Example: Central Master Clock ICC

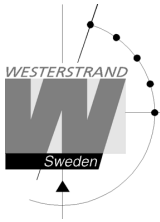
Password

Login password.

Admin = Administrator 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.



Lost password

If the password has been lost network card has to be cold started (FULL RESET). Contact Westerstrand for details.

Firmware Download

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

Restart

Restart the network card.

Backup/Restore

Backup

Save the clock configuration to a file. The clock suggests the Name field as filename (here WDP_Y2 19_ 1HE.txt)

Click [Backup].

Passwords are not saved.

The screenshot shows a web interface titled "Backup/Restore". It has a "Filename" input field containing "WDP_Y2 19_ 1HE.txt". To the right of the input field is a "Backup" button. Below the input field is a "Bläddra..." button and the text "Ingen fil är vald.". To the right of the "Bläddra..." button is a "Restore" button and the text "Program restarts!". At the bottom of the interface is a blue footer with the text "© 2020 Westerstrand Urfabrik AB".

Restore

Select file ([Välj fil]). Here file WDP_Y2 19_ 1HE.txt was selected.

Click [Restore].

The clock restarts. Refresh the page.

The MAC- and IP-address never are restored.

The screenshot shows the same web interface as above, but now the "Bläddra..." button is highlighted in blue, and the text next to it is "WDP_Y2 19_ 1HE.txt". The "Restore" button is also visible, along with the text "Program restarts!". The footer remains "© 2020 Westerstrand Urfabrik AB".

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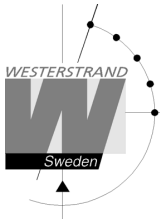


Firmware Download / Wunser

General

The Master Clock has support for firmware upgrade via the network. The utility program Wunser is used for firmware upgrade. Wunser can be downloaded from Westerstrand.se. 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 program is in boot-loader mode, then the clock will answer on PING only.

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



Alarm

The master clock is equipped with several supervision facilities to detect functional disturbances. Via the web browser status tab it is possible to see the Master Clock status including alarm (error) messages. The following alarm messages are available:

Type of alarm	Alarm code	Priority level	Indication	Reason for alarm	Action
RESET	12	-	SNMP trap sent	See action	The firmware in the network controller was restarted
WATCHDOG	16	-	SNMP trap sent	See action	This is not an alarm. It is a alive signal transmitted each 24 hour to tell connected SNMP management systems that the Sub Master Clock is alive.
NO RADIO	30	2	Red alarm LED lit. Alarm relay activated. SNMP trap sent.	The Sub Master Clock has not been synchronized for a longer period.	Check the network settings and connection to the NTP server (Central Master Clock). If OK, clear the alarm.
COMM	41	3	SNMP trap sent.	This is a general alarm for different types of network related errors such as: - NTP server address is incorrect or cannot be found. - No response to NTP request. - Internal Communications errors on the network module.	-Verify the network connections. -Check network settings. -Check the NTP server
STRATUM	44	3	SNMP trap sent	Present NTP server has wrong stratum level.	Check the NTP server.
RESOLVE	46	3	SNMP trap sent	Fail to resolve an URL name	-Verify the network connections. -Check network settings. -Check the NTP server
UFLOW	52	1	Red alarm LED lit. Alarm relay activated SNMP trap sent	Impulse voltage below alarm limit.	Check the load on the impulse output. If OK, clear the alarm.
SHORT CIRCUIT	53	1	Red alarm LED lit. Alarm relay activated. SNMP trap sent	Short circuit on impulse output	Remove the short circuit. If OK, clear the alarm.

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CURRENT LOW	61	1	Red alarm LED lit. Alarm relay activated SNMP trap sent	Impulse current below alarm limit.	Check the load on the impulse output. If OK, check that the alarm limit is correctly configured. If OK, clear the alarm.
CURRENT HIGH	71	1	Red alarm LED lit. Alarm relay activated SNMP trap sent	Impulse current above alarm limit.	Check the load on the impulse output. If OK, check that the alarm limit is correctly configured. If OK, clear the alarm.
POWER DOWN	77	1	Alarm relay activated	By some reason the power to the master clock has been switched off.	Check the mains.

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Manual

Analogue NTP Clock

With Power-Over-Ethernet connection



Contents

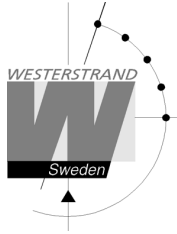
General	2
LAN connection.....	2
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Reset Button.....	18
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General

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 centralized UPS backup, and is fully compatible with both powered and non-powered Ethernet devices. In addition to providing time synchronization 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.

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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>

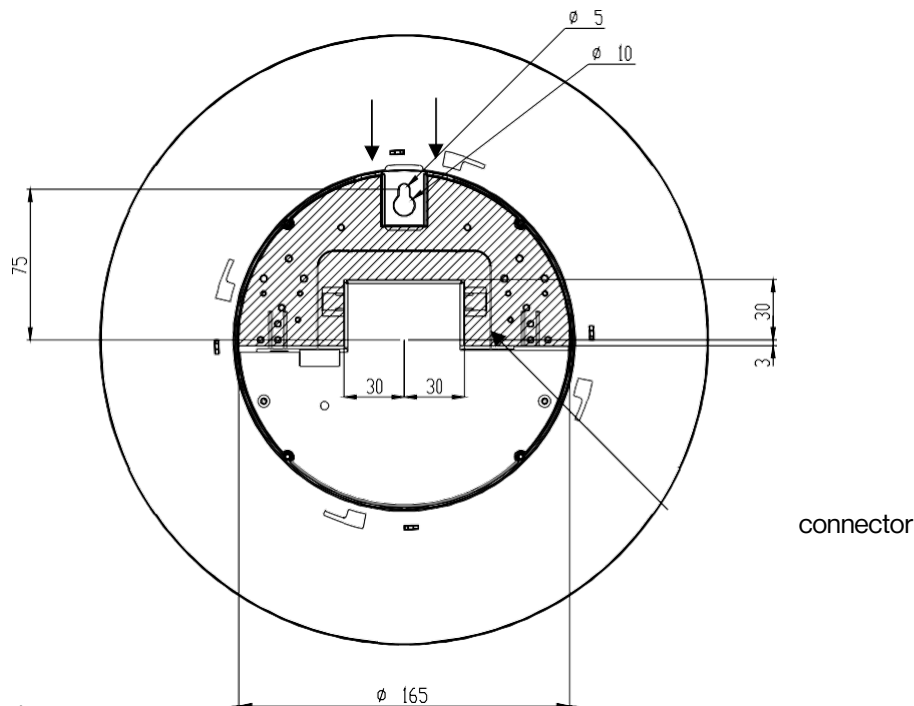


Fig. 1

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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:

Password:

Remember my password

OK Cancel

User name


admin or guest.

Password

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



Status



Westerstrand Urfabrik AB

Status
Network
NTP
Clock
General

Name	NTP Clock	Refresh
UTC	2018-05-02 12:55:27, week 18 Wed	
LT	2018-05-02 14:55:27, week 18 Wed	
Timezone	UTC+01:00, summer (CET)	
IP	192.168.2.28 (DHCP)	
Netmask	255.255.240.0	
Gateway	192.168.1.1	
DNS	192.168.1.13	
MAC	00-07-09-10-0B-B6	
Alarms	No alarms	
NTP	Synchronized: ntp.se (194.58.200.20), s=1, n=2, TO=54 m	
Uptime	0 days, 1004 seconds	
Firmware	ANIC-B100 (May 30 2017). BOOTK64-X102	

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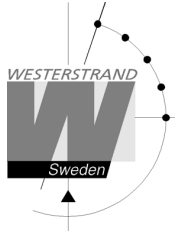
Name	Symbolic name. The name is set in function <i>General</i>
UTC/LT	Current time
Timezone	Offset to UTC during normal time (=winter time).
IP	The Clocks IP address
Netmask	Shows the netmask setting
Gateway	Shows the IP address of the gateway
DNS	Shows the IP address of the DNS server
MAC	A MAC address has format 00-07-09-xx-xx-xx
Alarms	Shows if the Clocks has any alarms. The following alarm texts can be displayed. <i>No Alarms</i> = Clock OK. <i>Not synchronized</i> = The Clock is not synchronized. <i>5-minute limit</i> = The received time message is more than 5 minutes wrong compared to internal time. The message is not accepted. <i>Authentication</i> = The MD5 authentication has failed.

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WESTERSTRAND
Analogue NTP Clock

Document: DOK11018en02
Author: PM/CF
Date: 2020-09-24
Page: 6 of 21

NTP	Synchronized = The clock has been synchronized 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

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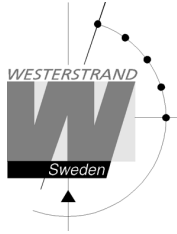


Network

Enter general network parameters.

Status	Network	NTP	Clock	General
DHCP				
Use DHCP	<input checked="" type="radio"/>			
Fallback	<input type="text" value="192.168.3.10"/>			
Static IP				
Use static IP	<input type="radio"/>			
Address	<input type="text"/>			
Subnetmask	<input type="text"/>			
Gateway	<input type="text"/>			
DNS 1	<input type="text"/>			
DNS 2	<input type="text"/>			
Utilities				
Syslog	<input type="text"/>	<input type="checkbox"/>		
Identity access	<input type="text" value="Normal"/>	<input type="checkbox"/>		
Telnet	<input type="checkbox"/>			
HTTP	<input checked="" type="radio"/>			
HTTPS	<input type="radio"/>			
SNMP				
Enabled	<input type="checkbox"/>			
Read community	<input type="text" value="public"/>			
Read/write community	<input type="text" value="private"/>			
Trap address 1	<input type="text"/>			
Trap address 2	<input type="text"/>			
Trap address 3	<input type="text"/>			
Trap type	v1 <input type="radio"/>	v2 <input checked="" type="radio"/>		
<input type="button" value="Save"/>				

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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

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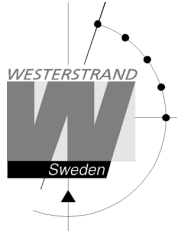
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Use of secure communication protocol HTTPS (web-browser) if checked.

SNMP

This function is used to activate the SNMP, enter the address of one or more SNMP servers and to define the SNMP community.

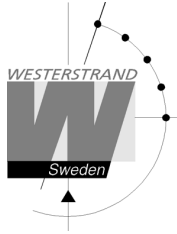
The IP address can be specified as an IP address or as a full domain name. Up to three SNMP server addresses can be entered.

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

Status	Network	NTP	Clock	General
DHCP option 42	<input type="checkbox"/>			
Broadcast	<input type="checkbox"/>			
Multicast	<input type="checkbox"/>			
NTP 1		<input type="text" value="ntp.se"/>		
NTP 2		<input type="text"/>		
NTP 3		<input type="text"/>		
NTP 4		<input type="text"/>		
NTP 5		<input type="text"/>		
Set Local Time	<input type="checkbox"/>			
Local Time		<input type="text" value="20180502__153633"/>		
Interval		<input type="text" value="10"/> minutes		
Reset hands at timeout	<input type="checkbox"/>			
Alarm timeout		<input type="text" value="60"/> minutes		
Timezone		<input type="text" value="*(UTC+01:00) Berlin, Brussels, Paris, Stockholm, Vienna*"/>		
Daylight Saving Time	<input checked="" type="checkbox"/>			
<input type="button" value="Save"/>				
NTP Advanced				

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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

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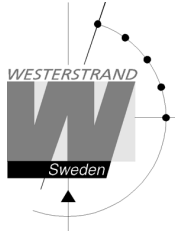
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NTP server

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

Status	Network	NTP	Clock	General
Client Mode		First		
5 minute limit		<input type="checkbox"/>		
Only accept Stratum 1		<input type="checkbox"/>		
Authentication		<input type="checkbox"/>		
Server 1 ID	1001	Key	Key_one	
Server 2 ID	1002	Key	Key_two	
Server 3 ID	1003	Key	Key_three	
Server 4 ID	1004	Key	Key_four	
Server 5 ID	1005	Key	Key_five	
<input type="button" value="Save"/>				
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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 synchronization 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 synchronize to Stratum 1 time servers only.

Check box = Off ; synchronize to time server independent of stratum level.

Check box = On ; synchronize only if time server is operating on Stratum 1 level.

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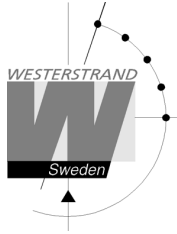
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Authentication

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.

Status Network NTP **Clock** General

Name NTP Clock

Double sided

Second hand

Save

Reset hands

Remove alarms

Save

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Double sided

- Double sided = Single sided Clock
- Double sided = Double sided Clock

Second hand

- Second hand = No second hand
- Second hand = The clock has a second hand

Reset hands

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

Remove alarms

This function will remove any alarms.



General

Used to configure general parameters.

Status	Network	NTP	Clock	General
Name	<input type="text" value="NTP Clock"/>			
Contact	<input type="text"/>			
Location	<input type="text"/>			
Password				
admin	<input type="password" value="••"/>	Repeat	<input type="password" value="••"/>	
guest	<input type="password" value="••"/>	Repeat	<input type="password" value="••"/>	
Miscellaneous				
Firmware	ANIC-B100 (May 30 2017). BOOTK64-X102			
Firmware Download	<input type="checkbox"/>			
Restart Program	<input type="checkbox"/>			
<input type="button" value="Save"/>				
Backup/Restore				
Filename	<input type="text" value="NTP Clock.txt"/>	<input type="button" value="Backup"/>		
	<input type="button" value="Bläddra..."/> Ingen fil är vald.	<input type="button" value="Restore"/>	Program restarts!	
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Name

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

Password

Login password.

Admin = Administrator 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***.

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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.

Backup/Restore

Filename

Ingen fil är vald. Program restarts!

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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.

Backup/Restore

Filename

NTP Clock.txt Program restarts!

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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
```

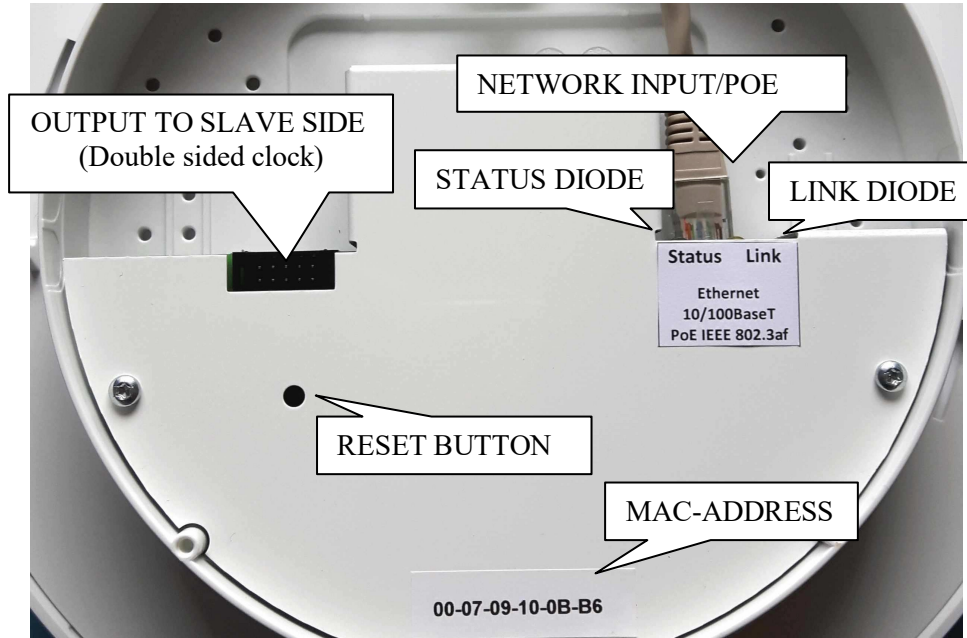
Successful transfer: 1234092 byte 15 sec., 82272 byte/s

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
Input for Network/PoE	10/100BASE-T. PoE 802.3af. Connector: RJ45	PoE consumption 2W max.
Indicator LED		
<i>LED</i>	<i>Note</i>	<i>LED</i>
LINK	Network Link/Act	Green LED Link/Act OK LINK
STATUS	NTP sync. status	Yellow LED on = Clock is on synchronized from NTP-server STATUS
LED commissioning	During normal startup (the reset button is not pressed), the green status LED flashes for approx. 2 seconds and then it turns off. Once the clock has been synchronized, the status diode lights up with a steady light.	
Reset button		
The following 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 power supply 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.	



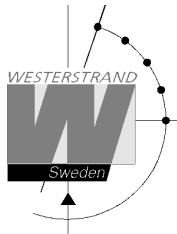
Technical specification

General	
Synchronization	NTP
Accuracy	0,1sec/24h at 22 °C (stand-alone mode)
Hand movement	Hour hand sweeping. Minute hand stepping, 6 steps/minute. Second hand sweeping.
Time synchronization	
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 °C till +40 °C
Protection class	IP 20
Standards compliance	EN 61000-6-3:2001 Emission EN 61000-6-2:2005 Immunity



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



Technical specification Marine Master clock



General

The master clock has 6 buttons and one (2 line x 16 character) LCD. To facilitate time zone change there are 2 separate buttons for this purpose. The master clock also has a dimmer to adjust background illumination.

Technical data

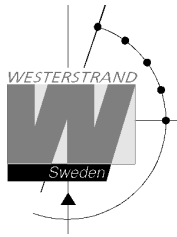
Crystal frequency:	4,915200 MHz.
Accuracy:	0,1 sek./24 hours (+20C).
Microprocessor:	HD6412394.
Time memory:	30 days (Back-up with Super Capacitor)
Ambient temperature:	0 C to +50 C.
Relative humidity:	Max. 85% non-condensing.
Case:	19" case according to drawing 085811-00.
IP rating:	IP20
Weight:	5.0 kg.
CE-approval, EMC	Emission according to EN61000-6-3, Immunity according to EN61000-6-2.

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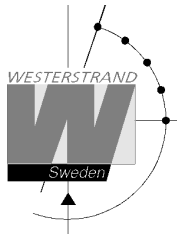


Outputs for slave movements*:

Control clocks:	Analogue display, with background illumination.
<i>Output 1:</i>	
Impulse system:	1/1 minute, 1/2 minute, second, 1/2 second, time code (TC)
Type of time:	LT, UTC
Impulse length:	Minute 0.1-9.9 sec. Second 0.1-1 sec.
<i>Output 2:</i>	
Impulse system:	1/1 minute, 1/2 minute, second, 1/2 second, time code (TC)
Type of time:	LT, UTC
Impulse length:	Minute 0.1-9.9 sec. Second 0.1-1 sec.
<i>Output 3:</i>	
Impulse system:	1/1 minute, 1/2 minute, second, 1/2 second, time code (TC)
Type of time:	LT, UTC
Impulse length:	Minute 0.1-9.9 sec. Second 0.1-1 sec.
<i>Output 4:</i>	
Impulse system:	2-wire, 1/1 minute, 1/2 minute, second, 1/2 second, time code (TC). 3-wire for forward forward/back. 1/1-minute alt. 1/2-minute.
Type of time:	LT, UTC
Impulse length:	Minute 0.1-9.9 sec. Second 0.1-1 sec.
Max. load / output:	2A
Total load all outputs together:	2.5A

The outputs have short circuit protection that is restored automatically.

*Analogue intelligent slave clocks connected to time code output receive the time code and steps to correct time by rapid impulses. The rapid impulses have a speed of approx. 10 steps /second. To step forward 11 hours takes approx. 1 minute and 10 seconds.



Relay outputs

Number of outputs:	2 Changeover potential-free contacts.
Max load/relay output:	230 V 6A.
Program memory:	100 year (EEPROM).
Signal points:	800

Special pulse output

Relay output no. 2 can be dedicated to send out a special pulse.

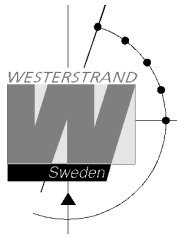
When this function is enabled the relay is activated every day for 5 seconds at 02.00 UTC.

Telegraph Logger Clock signal

If one of the impulse outputs is configured to work as telegraph logger clock signal (1/2M-12B), then relay output no. 2 is used to send out a Counter C.W. signal and cannot be used for other purposes.

Alarm output

Number of outputs:	2 Changeover potential-free contacts.
Type of alarms	
Output no. 1 (general alarm):	Overload / short circuit, synchronization alarm
Output no. 2 (power alarm):	Power failure alarm



Serial ports

The Master Clock is equipped with two serial ports, one RS232 and one RS422/485. Both ports can be used either as input or output for serial time messages.

If programmed as output the port can be used to send out time to external equipment such as computers etc. If programmed as input the port can be used to synchronise the master clock with an external time source provided with RS232 or RS485 output. The purpose of this is to achieve higher accuracy.

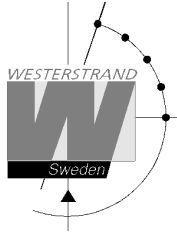
Protocol, data format and baud rate is selectable for respective serial port.

Serial output

Baud rate (selectable):	300, 600, 1200, 2400, 4800, 9600, 19200 baud.
Data format (selectable)	7N1, 7N2, 7O1, 7O2, 7E1, 7E2, 8N1, 8N2, 8O1, 8O2, 8E1, 8E2
No. of data bits:	7 or 8.
Type of parity:	None, odd or even.
No. of stop bits:	1 or 2.
Selectable data format:	
Available protocols	- ZDA Time string, NMEA 0183 - Westerstrand protocol no. 2, 3, 5, 7 etc. (Automatic time message protocols)
Type of time (selectable):	UTC, LT

Serial input

Baud rate:	4800 baud.
Data format:	8N1
Type of protocol:	ZDA Time string, NMEA 0183



Power supply

The master clock has two inputs for power supply, one for AC, and one for 24V DC. As standard the DC-input is a direct connected input without galvanic isolation and no compensation for low input voltage. With option DC/DC the DC-input will be galvanic isolated and low / high input voltage is compensated automatically.

Supply voltage: 90 - 264V 50/60 Hz and 24VDC.

Option DC/DC:

(Galvanic isolated)

Input voltage: 19 - 36VDC

Output voltage: 23 - 30VDC (adjustable)

Isolation voltage: 1500V

Power consumption

AC: 65W

DC: 50W

Options

DC/DC -converter

Ethernet LAN connection

GPS-receiver

Table model

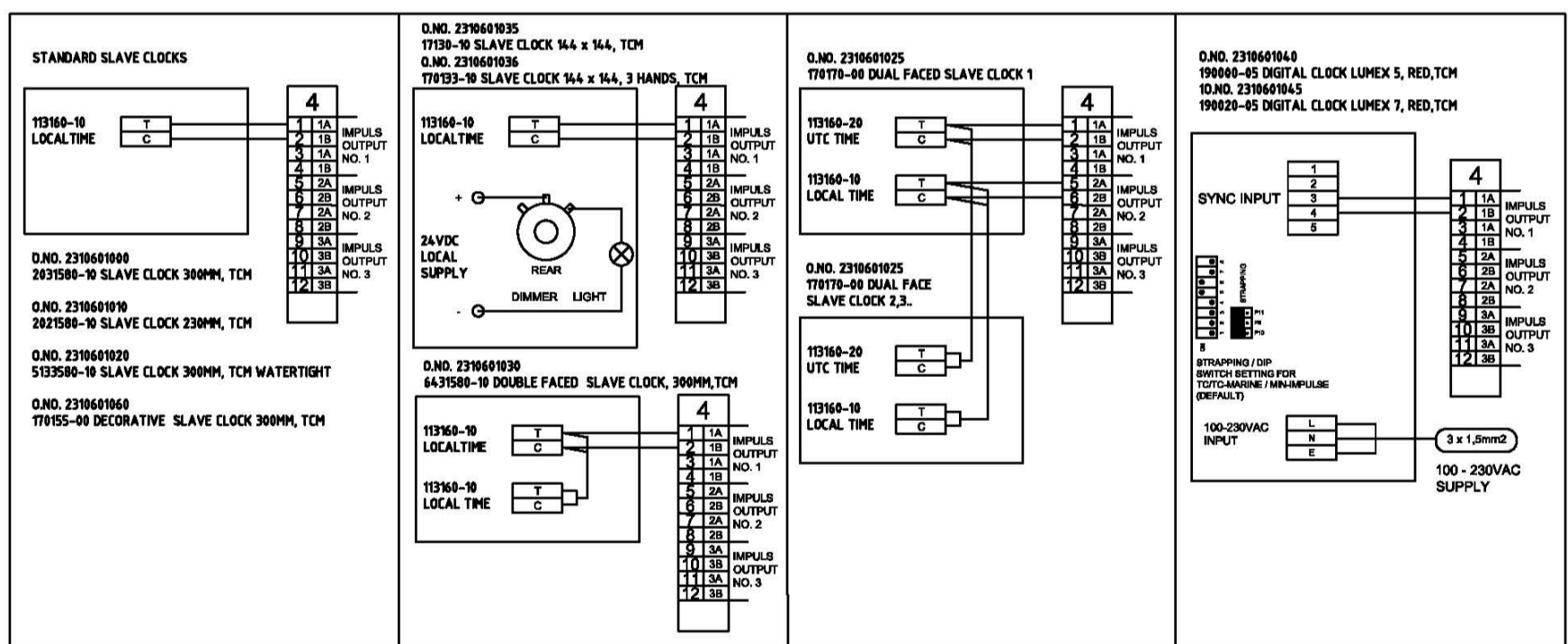
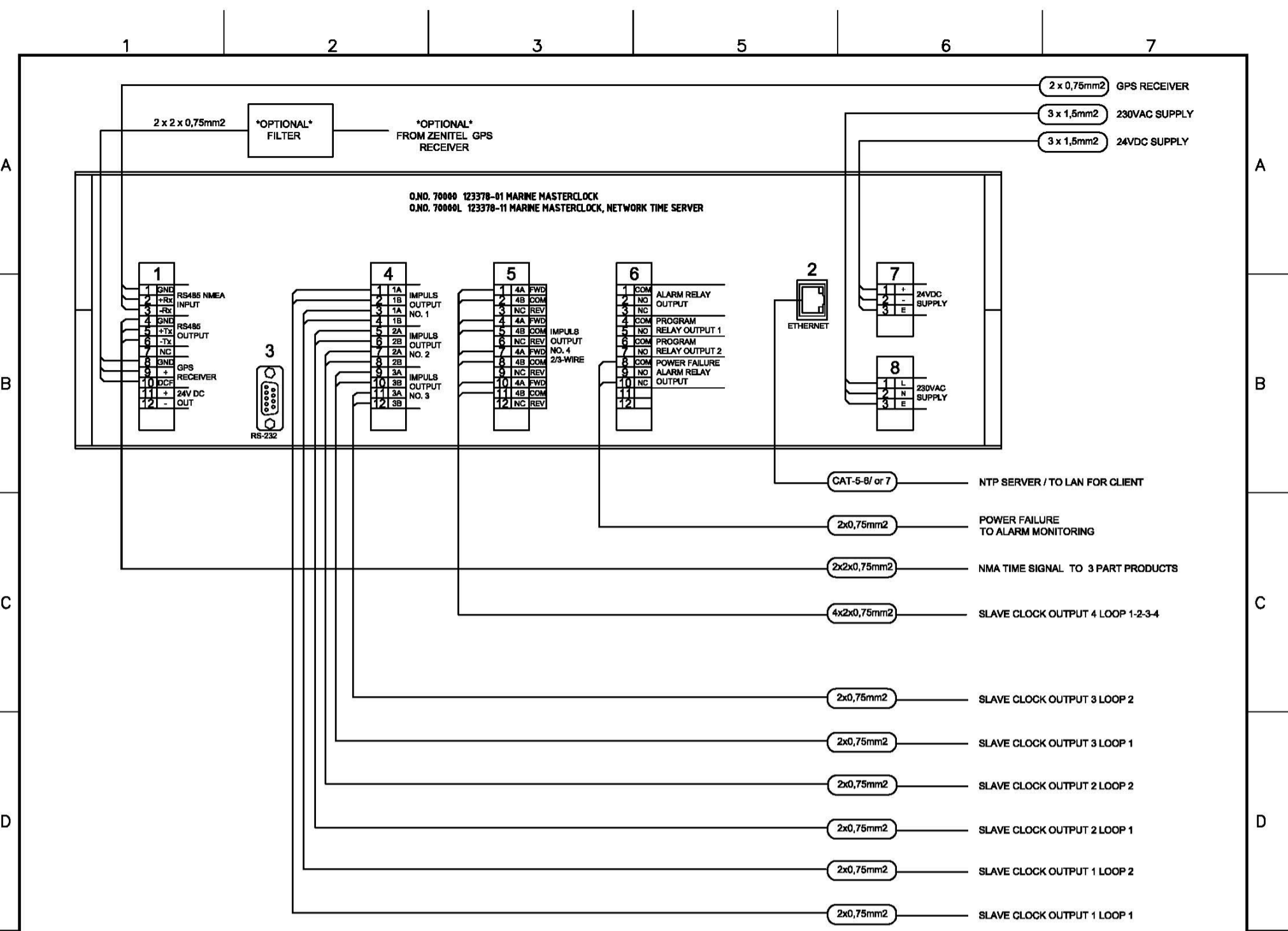
Software for time to computer, WINT

Ethernet LAN (option)

Protocol: NTP according to RFC1305 and RFC1361, TCP/IP

Compatibility: Ethernet version 2/IEEE 802.3

Ethernet: Connection 100BASE-T (RJ45)



NOTE!
 TIMECODE SYSTEM:
 ALL CLOCKS IN ONE OUTPUT (LOOP1 & 2) CAN BE CONNECTED IN PARALLEL
 NON POLARITY DEPENDENT

DOUBLE FACED CLOCK WITH BOTH LOCAL AND UTC TIME MUST BE PROGRAMMED AND CONNECTED SEPARATE (DOUBLE FACED CLOCK 170170-00)

CABLE REQUIREMENTS:
 2 x 0,75mm² < 50M
 2 x 1,5mm² < 100M
 2 x 2,25mm² < 150M
 2 x 3mm² < 200M

CABLE CALCULATION:
 SEE DOCUMENT "CALCULATION OF CABLE AREA IN TIME SYSTEMS"

Rev.	Date	Revision text	Approved	Date
04	24.08.16	Terminal block 6 changed		
03	12.05.16	2310601036 slave clock 3 hands added		
02	25.11.15	Connection for Lumex-5 and Lumex-7 added		
01	25.07.13	Text changed in note!		

VINGTOR STENTOFON MASTER CLOCK SYSTEM Cable Connection Diagram TCM System 7000 General drawing		Prep. by SEN	Date 27.05.10	Project no. -	
		App. by -	Date -	Rev. by SEN	Rev. date 24.08.16
Dwg. no. A100K10836		Rev. no. 04			
Sheet 1/1	Scale -	Size A3	Unit -		

Calculation of Cable Area in Time Systems

General

To make a time system with impulse operated analog and digital slave clocks that performs satisfactorily, the cable from the Master Clock to the Slave Clocks needs to be dimensioned correctly.

A 10% voltage drop is allowed in the cable.

The length and area of the cable and the current (load) on the cable affect the voltage drop.

Formula

$$A = I \times l \times k$$

A = Area [mm²]

l = cable length [m] I = current

[A]

k = 0.015 [constant]

Power Consumption

Impulse Slave Clocks

Analog clocks minute \leq 400 mm: 7.5 mA

Analog clocks minute \leq 900 mm: 15 mA

Analog clocks minute + sweep seconds hand \leq 400 mm: 25 mA

Analog clocks minute 3-wire F/R \leq 400 mm: 10 mA

Digital Clocks: 5 mA

Time-Code (TC) Slave Clocks

Analog clocks minute \leq 400 mm: 14 mA (version with movement 113160-00)

Analog clocks minute \leq 400 mm: 7 mA (version with movement 21634-00)

Analog clocks minute \leq 900 mm: 20 mA

Analog clocks minute + sweep seconds hand \leq 400 mm, indoor: 12 mA

Analog clocks minute + sweep seconds hand \leq 400 mm, outdoor: 20 mA

Analog clocks minute + sweep seconds hand \leq 900 mm: 27 mA

Time-Code Marine (TCM) Slave Clocks

Analog clocks minute \leq 400 mm: 20 mA

Analog clocks minute \leq 900 mm: 20 mA

Analog clocks minute + sweep seconds hand \leq 400 mm, outdoor: 27 mA

Analog clocks minute + sweep seconds hand \leq 900 mm: 27 mA

Example

A time system consists of 40 analog clocks with a diameter of 300 mm.

The power consumption will then be $40 \times 7.5 = 300 \text{ mA} = 0.3 \text{ A}$

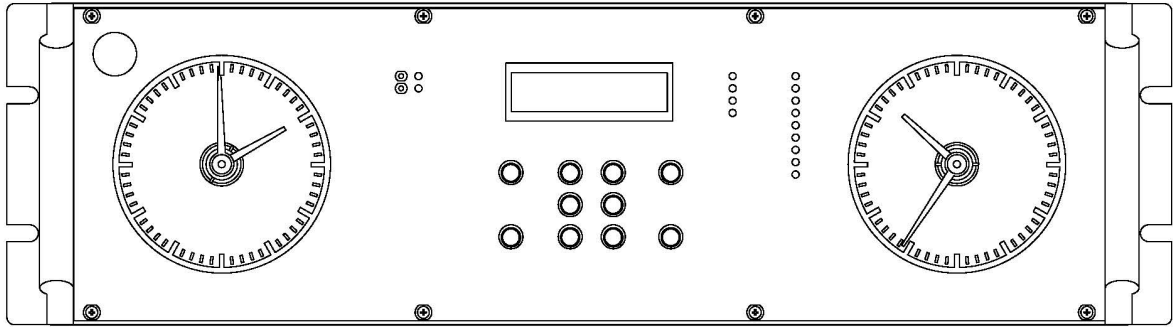
Cable length is 100 meters.

$$A = 100 \times 0.3 \times 0.015 = 0.45 \text{ mm}^2$$

Choose a cable with an area of at least 0.45 mm².

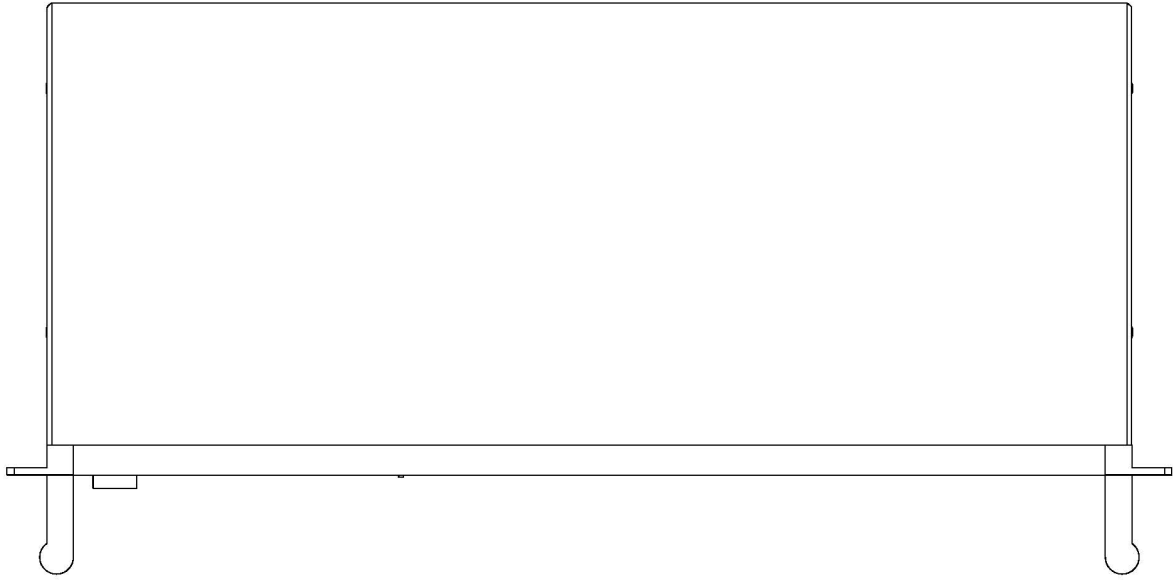
1 2 3 5 6 7

A



B

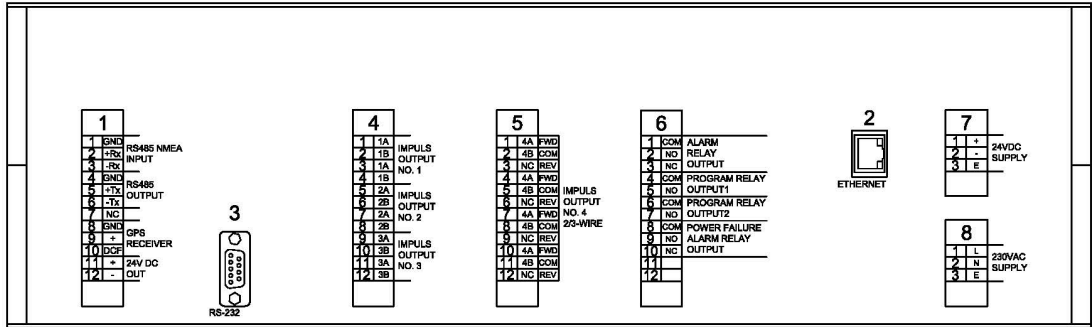
C



D

E

F



G

H

				VINGTOR STENTOFON		Prep. by SEN	Date 25.05.10	Project no. XXX	
				MASTER CLOCK SYSTEM Marine masterclock Type 70000 Item.no. 3005050028 Type 7000L w/ network time server Item.no. 3005050029		App. by SBS	Date 28.05.10	Rev. by SEN	Rev.date 24.08.16
01	24.08.16	Terminal block 6 changed				Dwg.no. A100K10838		Rev.no. 01	
Rev.	Date	Revision text		Approved	Date	Sheet 1/1	Scale xx	Size A3	Unit MM

1 2 3 4 5 6

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