User Manual
Master Clock WDP M+S

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Technical specifications

General

Crystal Frequency:	4,915200 MHz.
Accuracy:	0,1 sec./24 hours (at +20°C).
Microprocessor:	HD6412394.

Slave Clock output

Output 1 and 2:

Impulse system:	1/1 minute, 1/2 minute, second, Time Code (TC)
Type of time:	L = Local time, N = Normal time, U = UTC
Impulse length:	Minute 0.1-9.9 sec. Second 0.1-1 sec.
Maximum load / output:	2A (The output is equipped with short circuit protection with automatic reset).
Total load all outputs:	2A.
Impulse memory:	72 hours (impulse memory with rapid impulsing after power failure).General

Relay outputs

Program memory:	>100 years (EE-memory).
Number of control functions:	800.
Relay outputs:	4 changeover and 4 closing potential-free contacts.
Max. load/relay output:	230 V 6A.
Total load relay outputs:	Number of relay outputs x 6A

Power supply

Connection voltage:	90 - 264V 50 Hz alt. 24 V DC -5% +20 %.
Max ripple (24V DC):	0,7V RMS.
Power consumption:	65 W (max)

Environmental

Ambient temperature:	Between 0°C and +40°C.
Relative humidity:	Max. 85% non-condensing.
Case:	IP 65, light grey plastic (Polystyrol) with transparent protection cover.
CE-Approval, EMC	Emission acc. to EN61000-6-3, Immunity acc. to. EN61000-6-2.

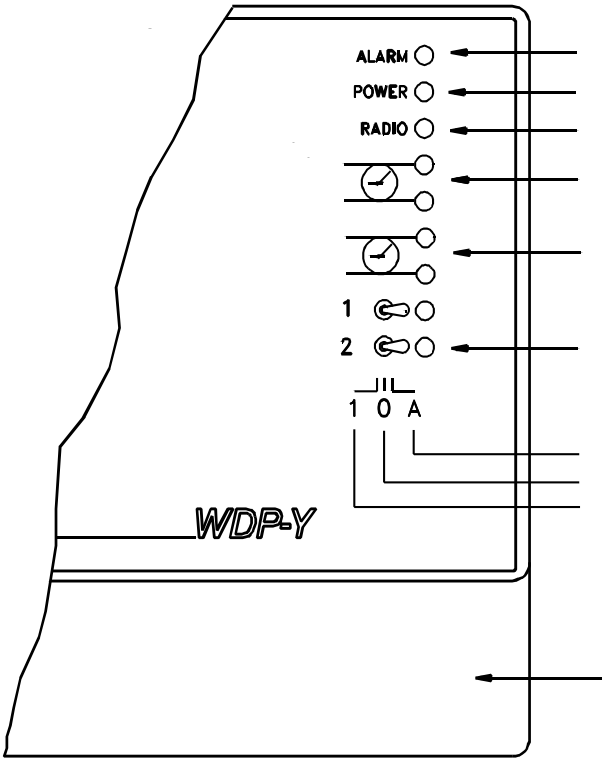
Art. numbers:	WDP M+S	123362-00 (230V AC) 123360-00 (24V DC)

General description

The Master Clock Programmer is a combination of yearly programmer with 8 outputs for control and regulation of various energy consumers such as electrical striking plates, buzzers for pause signalling etc,
and a quartz Master Clock with two outputs for operating Slave Clocks.
In case of power failure the built in Real Time Clock keeps the internal time updated. (the outputs are set to position OFF). Connected Slave Clocks are automatically corrected by rapid impulsing when power returns and the outputs resume their positions
(ON/OFF) which were previously programmed (with a 10 second switching delay between the different outputs. Entered data's are stored for at least 100 years.

The Master Clock Programmer have pre-programmed fixed public holidays and summer/winter time correction (daylight saving). The clock offers full flexibility with regard to programming working days between holidays, public holidays to weekdays, holiday periods etc.

A total of 800 control functions can be programmed over 8 outputs. Repeating daily functions on a certain output only requires 1 control function. Further relay outputs (up to 64) possible by adding one or more Expansion Units, which are connected to the minute impulse line and to current connection voltage.



Indication for alarm
Indication for mains voltage
Indication for radio synchronisation
Indication for outgoing impulse, output 1
Indication for outgoing impulse, output 2
LED-indication for relay ON
Automatic position (A)
Manual OFF (0)
Manual ON (1)
Connection space

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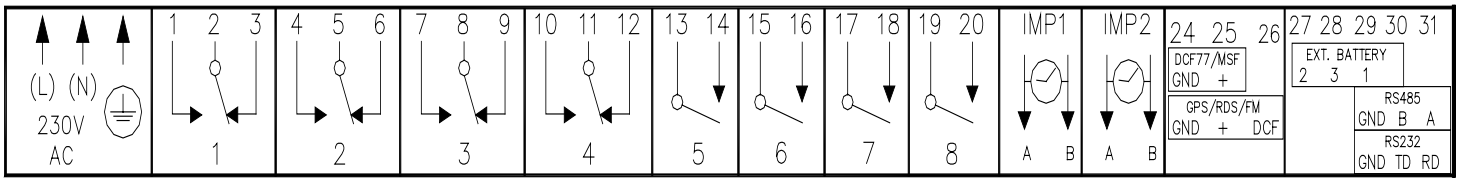
Installation

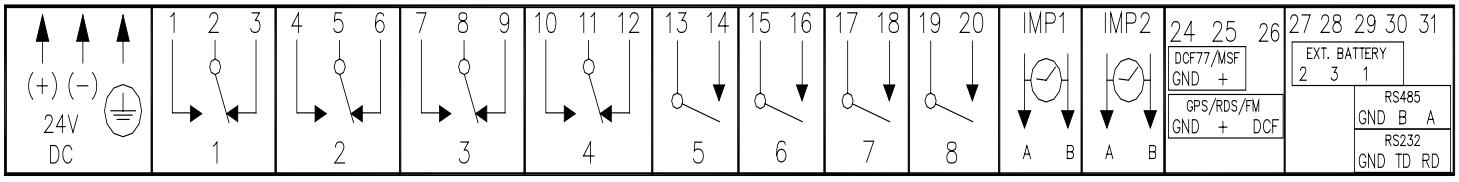
The Master Clock Programmer is intended for wall mounting.

1. Screw in the upper fixing screw halfway and hang up the unit.
2. Screw in the two lower screws, accessible under the connection space cover.
3. Connect the slave clock lines.
4. Connect the signal line/lines (to relay contacts).
1. NOTE! For connection of signals etc., mixed voltages must not be used.
2. Therefore, choose either 230VAC or, for example 24VAC for connection to the relays.
5. Connect, if included, other accessories/options such as radio synchronisation, RS232 etc.
6. Connect the supply voltage.

230VAC



24VDC



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Calculation of cable area in time systems

General

To make a time system with impulse operated analogue and digital slave clocks perform satisfactory, the cable from the Master Clock to the Slave Clocks need to be dimensioned correctly.
A 10% voltage drop is allowed in the cable.
The length and area of the cable and also the current (load) on the cable affect the voltage drop.

Formula

A = l x I x k

A = Area [mm^2]
l = cable length [m]
I = current [A]
k = 0,015 [constant]

Power consumption

Impulse Slave Clocks

Analogue clocks minute ≤ 400 mm: 7,5 mA
Analogue clocks minute ≤ 900 mm: 15 mA
Analogue clocks minute + sweep seconds hand ≤ 400 mm: 25 mA
Analogue clocks minute 3-wire F/R ≤ 400 mm: 10 mA
Digital Clocks: 4 mA

Time-Code (TC) Slave Clocks

Analogue clocks minute ≤ 400 mm: 14 mA (version with movement 113160-00)
Analogue clocks minute ≤ 400 mm: 7 mA (version with movement 21634-00)
Analogue clocks minute ≤ 900 mm: 20 mA
Analogue clocks minute + sweep seconds hand ≤ 400 mm, indoor: 12 mA
Analogue clocks minute + sweep seconds hand ≤ 400 mm, outdoor: 20 mA
Analogue clocks minute + sweep seconds hand ≤ 900 mm: 27 mA

Example

A time system consists of 40 pcs. analogue clocks with diameter 300 mm.
The power consumption will then be 40 x 7,5 = 300 mA = 0,3A.
Cable length is 100 metres.

A = 100 x 0,3 x 0,015 = 0,45 mm^2

Choose a cable with an area of at least 0,45 mm^2.

Connection of hourly correction (SR2/3) clocks

The impulse output can be configured to send out hourly correction pulses according to the SR2/3 standard. See *Special functions /Setup /impulse output* for more details.

The following hourly correction standards are supported:
SR2-58 : (SR2, hourly correction 2-wired, with imp. correction on the 58th minute).
SR2-59 : (SR2, hourly correction 2-wired, with imp. correction on the 59th minute).
SR3-58 : (SR3, hourly correction 3-wired, with imp. correction on the 58th minute).
SR3-59 : (SR3, hourly correction 3-wired, with imp. correction on the 59th minute).

Connection of 2-wired clocks:

Master Clock Slave Clock
19 ---------- PC
20 ---------- AB

Connection of 3-wired clocks:

Master Clock Slave Clock
19 ---------- A
20 ---------- B
24 ---------- C

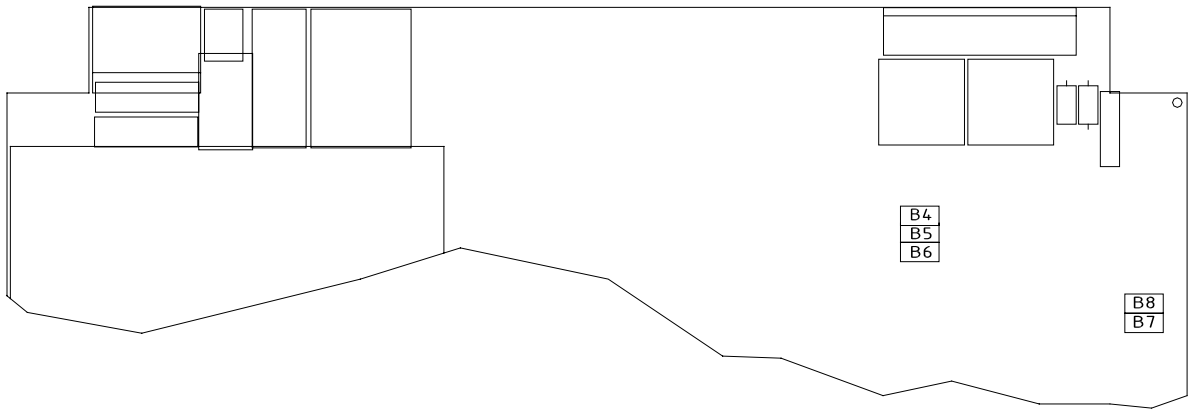
Synchronisation input

General

The Master Clock is equipped with a synchronisation input intended for connection to an external synchronisation source. The sync. source can be either a radio receiver type GPS, RDS, MSF, DCF77 or another Master Clock that transmits synchronisation pulses. The Master Clock is factory prepared for connection to a radio receiver. Detailed connection diagram for different radio receivers can be found in the separate manual delivered together with respectively receiver. If the Master Clock is going to be synchronised from another Master Clock it has to be reconfigured. See below.

Synchronisation from another Master Clock

1. Turn off power.
2. Open the Master Clock by loosening the four screws holding the front panel. Lift the panel and set the jumpers B4-B6 according to the instruction below.
3. Remount the front panel and turn on the power again.
4. Set the sync. source parameter by using the special function *SETUP/SYNC.SOURCE* .
5. Connect the sync. pulses to screw terminal 25 and 26.
6. Set the master clock to correct time +/- 30 sec.
7. When the synchronisation pulses have been accepted by the master clock the colon (:) between hours and minutes in the display starts to flash.



	B4	B5	B6	
PREPARED FOR RADIO RECEIVER	X	X		FACTORY DEFAULT
PREPARED FOR SYNC. PULSE FROM ANOTHER MASTER CLOCK			X	

X = Closed

Serial port RS232/RS485

General

The Master Clock has a serial port for connection to a PC or other similar equipment. The serial port is factory set to RS232. If RS485 connection is used the Master Clock has to be reconfigured according to the jumper instruction below.
Please see section *SPECIALFUNKTION/SETUP/RS232* for details about protocol, baudrate etc.

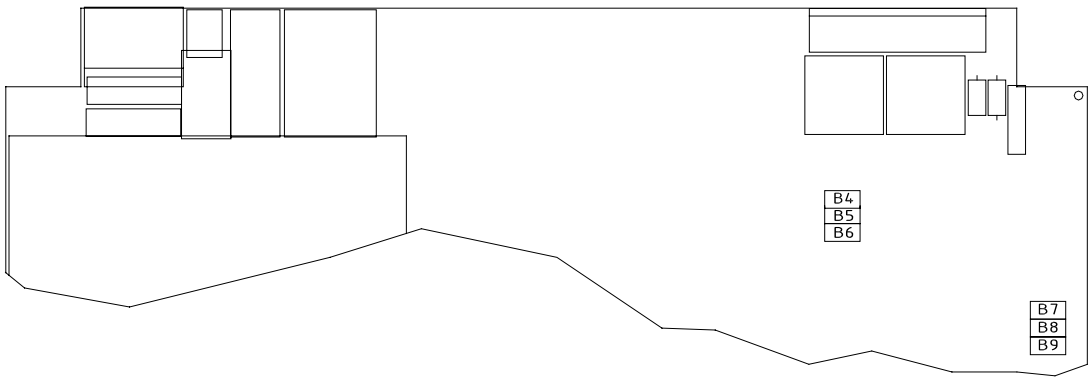
Connection via RS232

Example:

Master Clock	External equipment DTE (9-polig D-sub)	(25-polig D-sub)
GND (29)	5	7
TD (30)	2	3
RD (31)	3	2
	1	7
	4	8
	6	20
	7	4
	8	5

Connection via RS485

1. Turn off power.
2. Open the Master Clock by loosening the four screws holding the front panel. Lift the panel and set the jumpers B7-B9 according to the instruction below.
3. Remount the front panel and turn on the power again.
5. Connect the RS485 signal to screw terminal 29, 30 and 31.



	B7	B8	B9	
PREPARED FOR RS232	X		X	FACTORY DEFAULT
PREPARED FOR RS485		X		

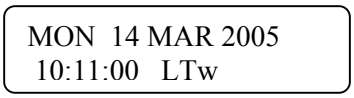
Programming

General

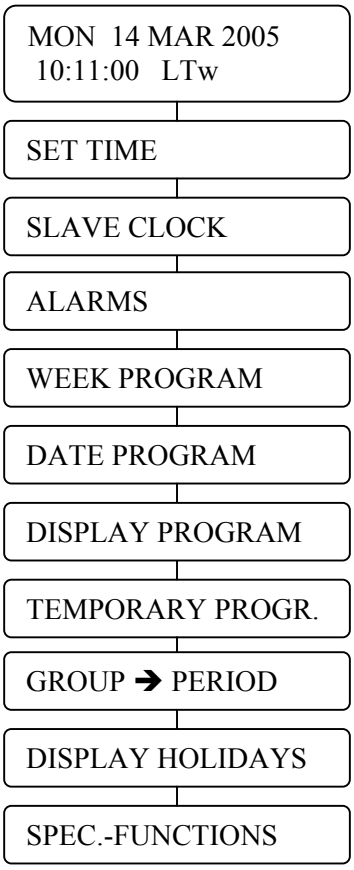
Using 6 buttons and a 2-row 16-character display carries out all programming.
Programming is self-instructive and to simplify the dialogue Yes/No questions are used.

Running mode

When the Master Clock is in operation it shows date and time in the display.
This is called *running mode* in this documentation.
LTs = Local Time summer.
LTw = Local Time winter.



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



Start up

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.
COUNTRY DEU ?	Press **NO** until correct country code occurs. For Germany, select DEU. Accept with YES.
SET TIME 060313 09:07	Set, by using the arrows, the right time format i.e. year, month, day and hour but a few minutes in advance. Wait for the right time and synchronise using **YES**.
SLAVE CLOCK 1 = **12:00** OFF	Now the question: SLAVE CLOCK 1 = 12:00 If the Slave Clocks connected to the first output show 12:00, answer **YES**, if not set the time shown by the slave clocks. Accept using **YES**.
SLAVE CLOCK = 12:00 **ON?**	Accept using **YES**.
SLAVE CLOCK 1 = **12:00:00** OFF	Now the question: SLAVE CLOCK 2 = 12:00:00 If the Slave Clocks connected to the second output show 12:00:00, answer **YES**, if not set the time shown by the slave clocks. Accept using **YES**.
SLAVE CLOCK = 12:00:00 **ON?**	Accept using **YES**.
MON 13 MAR 2006 09:07:00 LTw	The Master Clock is now 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 Programmer will wait until correct time corresponds with the slave clocks.

Set time when in operation

MON 14 MAR 2005 09:07:00 LT	Select function using ↓.
SET TIME	Enter the programming mode with YES.
SET TIME 050613 09:07:00	Set, by using the arrows, the right time. Format; year, month, day and hour but a few minutes in advance. Wait for the right time and synchronise using YES.
SET TIME	Leave programming mode by pressing ← several times.
MON 14 MAR 2005 09:07:00 LT	The master clock is now back in running mode.

Summer to winter (Day light saving)

Resetting between summer and wintertime is fully automatic and does not need programming.

Slave Clock

This function is used to enter the time that the slave clocks are showing.
This is useful if, by some reason, the master clock and the slave clocks should show different times.
When the slave clock time has been entered, the master clock will automatically adjust the slave clocks to correct time.
Please note that before using this function make sure that all connected slave clocks are showing the same time. If any of the slave clocks are showing a divergent time this clock must be manually adjusted to the same time as the other clocks.

The impulses to the slave clocks are temporarily stopped when entering this function.

MON 13 MAR 2006 09:07:00 LTw	Select function using ↓.
SLAVE CLOCK	Enter the programming mode with **YES**.
SLAVE CLOCK 1 = **09**:07 OFF	SLAVE CLOCK = 09.07? (Example) If the slave clocks connected to the first output shows 09.07 answer YES, if not, set the time shown by the slave clocks.
SLAVE CLOCK 1 = 09:**07** OFF	**YES.**
SLAVE CLOCK 1 = 09:07 **ON?**	**YES.**
SLAVE CLOCK 2 = **09**:07:00 OFF	SLAVE CLOCK = 09:07:00? (Example) If the slave clocks connected to the second output shows 09:07:00 answer YES, if not, set the time shown by the slave clocks.
SLAVE CLOCK 2 = 09:**07:** 00 OFF	**YES.**
SLAVE CLOCK 2 = 09:07:**00** ON?	**YES.**
SLAVE CLOCK 2 = 09:07:00 **ON?**	YES.
SLAVE CLOCK	Leave programming mode by pressing ← several times.
MON 13 MAR 2006 09:07:00 LTw	The master clock is now back in running mode.

Alarms

The master clock is equipped with several supervision facilities to detect functional disturbances.
When a functional disturbance is detected the following will happen:

- Red alarm LED is lit.
- Alarm relay* is activated.
- An alarm message is displayed in function ALARM.

The function ALARM is used to display and erase (clear) alarm messages.

Type of alarm	Indication	Reason for alarm	Action
NO RADIO	Red alarm LED lit. Alarm relay activated.	The radio receiver is not working.	Check the radio receiver. If OK, clear the alarm.
UF LOW	Red alarm LED lit. Alarm relay activated	Impulse voltage below alarm limit.	Check the load on the impulse output. If OK, clear the alarm.
SHORT CIRCUIT	Red alarm LED lit. Alarm relay activated	Short circuit on impulse output	Remove the short circuit. If OK, clear the alarm.
CURRENT LOW	Red alarm LED lit. Alarm relay activated	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	Red alarm LED lit. Alarm relay activated	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	Red alarm LED lit. Alarm relay activated Works only if the master clock is equipped with batteries for running reserve.	By some reason the power to the master clock has been switched off.	Check the mains. If OK, clear the alarm.

* One of the relay output can be used as an alarm relay. This function is as default disabled but can be enabled via SPECIAL FUNCTION/ SETUP/ ALARM RELAY/YES.

ALARMS- DISPLAY	
	To show the alarms
ALARMS- ERASE	To erase the alarms

Example 1, display alarms

MON 14 MAR 2005 09:07:00 LT	Select function using ↑↓ .
ALARMS	Accept with YES.
ALARMS- DISPLAY	Press NO until the wished function is shown. Accept with YES.
09MAR 15:52 NO RADIO	The alarm is displayed. Press ↑↓ to see next alarm. Return to running mode press ←.
ALARMS- DISPLAY	←.
ALARMS	←.
MON 14 MAR 2005 09:07:00 LT	

Example 2, erase (clear) alarms

MON 14 MAR 2005 09:07:00 LT	Select function using ↑↓ .
ALARMS	Accept with YES.
ALARMS- ERASE	Press NO until the wished function is shown. Accept with YES.
09JUN 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 14 MAR 2005 09:07:00 LT	

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 Master Clock 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 Master Clock 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 att 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.

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.

Week Program, example 1 (New program)

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

MON 14 MAR 2005 09:07:00 LT	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 14 MAR 2005 09:07:00 LT	

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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 14 MAR 2005 09:07:00 LT	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 14 MAR 2005 09:07:00 LT	

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 14 MAR 2005 09:07:00 LT	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 14 MAR 2005 09:07:00 LT	

Week Program, example 4 (Astronomical function)

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

MON 14 MAR 2005 09:07:00 LT	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 MTWTF-- 08:00:00	Select output using ↑↓. Move to the right using →.
OUTPUT 2 **ASTR** MTWTF--	State type of signal using ↑↓.
OUTPUT 2 ASTR **MTWTF--**	State the days the program shall function using ↑↓. Accept using YES. If the program is approved the text “Program saved” is displayed quickly.
WEEK PROGRAM	Leave the programming by pressing ← several times.
MON 14 MAR 2005 09:07:00 LT	

Week Program, example 5 (Block program)

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

MON 14 MAR 2005 09:07:00 LT	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 14 MAR 2005 09:07:00 LT	

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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 14 OCT 2002 09:07:00 LT	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 14 OCT 2002 09:07:00 LT	

Date Program, example (New program)

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

`MON 14 OCT 2002` `09:07:00 LT`	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 14 OCT 2002` `09:07:00 LT`	

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Display Program

MON 14 MAR 2005 09:07:00 LT	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 14 MAR 2005 09:07:00 LT	

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 effected.

MON 14 MAR 2005 09:07:00 LT	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 14 MAR 2005 09:07:00 LT	

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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 14 MAR 2005` `09:07:00 LT`	Select function using ↑↓ .
`GROUP => PERIOD`	Enter programming mode using YES.
`GROUP **B**` `1:_____ - _____`	Select group of programs using ↑↓, accept using YES.
`GROUP B` `1:**MAY01** - _____`	State the date when the period shall begin. Move to the right using →.
`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 ← several times.
`MON 14 MAR 2005` `09:07:00 LT`	

Display Holidays

This function is used to display the public holidays that are stored.

Example:

MON 14 MAR 2005 09:07:00 LT	Select function using ↑↓ .
DISPLAY HOLIDAYS	Enter display program using YES.
DISPLAY HOLIDAYS 01: 01Jan	Scroll using ↑↓.
DISPLAY HOLIDAYS	Leave the programming by pressing ← several times.
MON 14 MAR 2005 09:07:00 LT	

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 14 MAR 2005 09:07:00 LT	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.
KEYLOCK	Keylock and password function.
LANGUAGE	Language selection.
COUNTRY	Country selection.
POSITION	Selection of position for astronomical function.
SETUP	Setup / configuration of the different impulse system, type of synchronisation etc.
HOLIDAYS	Change holidays
DISPLAY FORMAT	Display format in running mode.
SOFTWARE VERSION	Present software version.
SPEC.-FUNCTIONS STATUS	Return to running mode press ←.
MON 14 MAR 2005 09:07:00 LT	

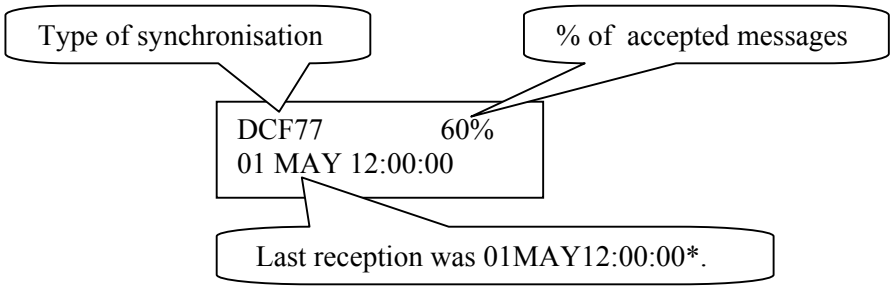
Status

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

Example:
Check the status of the radio receiver.

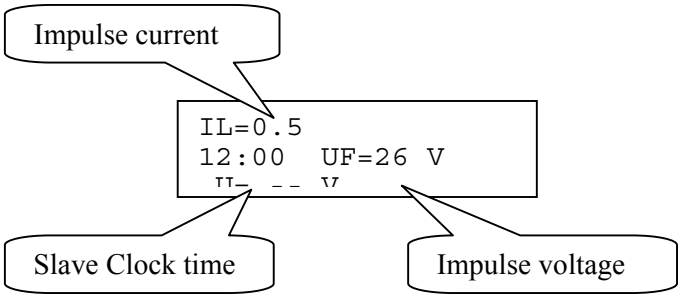
MON 14 MAR 2005 09:07:00 LT	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS STATUS	Accept with YES.
STATUS SYNC.SOURCE	Press NO until wished input/output is shown. Accept with YES.
DCF77 60% 13MAR 19:59:00	The radio receiver has accepted 60% of the radio messages. Last reception was 14/10 19:59:00.
STATUS SYNC.SOURCE	Return to running mode press ←.
SPEC.-FUNCTIONS STATUS	←
SPEC.-FUNCTIONS	←
MON 14 MAR 2005 09:07:00 LT	

Status sync. source

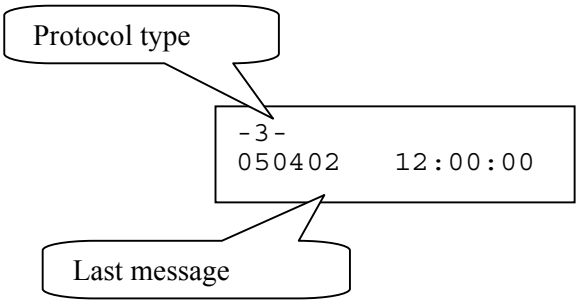


*Remark: The marked position always shows the actual second. This information is updated every other second.

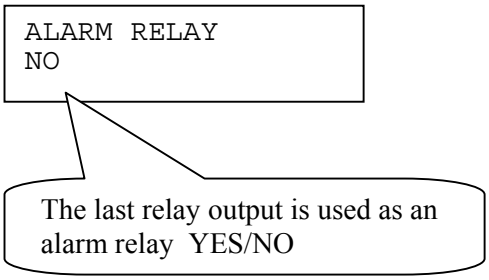
Status impulse output



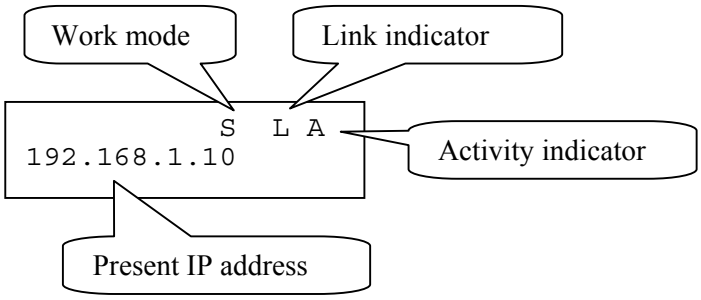
Status RS232/RS485-port



Status Alarm relay



Status IP



Work mode S = Server. The Master Clock is configured to work as an NTP Time Server.
C = Client. The Master Clock is configured to work as an NTP Time Client.

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

Activity indicator A = The Master Clock is accessed via the network.

Keylock

With this function it is possible to lock the keyboard. When activated the keylock will lock all buttons in the Master Clock.
There are two levels of keyboard protection.

1. Low level protection
   Keylock **ON** : Keyboard locked, press ← YES to open.

2. High level protection
   Keylock with **Password** : Keyboard locked, enter password to open.

Remark: "`PASSWORD --`" means that no password is used

Example 1:
Activate keylock without password

MON 14 MAR 2005 09:07:00 LT	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS KEYLOCK	Accept with YES.
KEYLOCK **OFF** PASSWORD --	Change to keylock ON.
KEYLOCK **ON** PASSWORD --	Accept with YES.
KEYLOCK ON PASSWORD **--**	Accept with YES.
SPEC.-FUNCTIONS KEYLOCK	Return to running mode press ←.
MON 14 MAR 2005 09:07:00 LT	

Example 2:
Activate keylock with password

MON 14 MAR 2005 09:07:00 LT	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS KEYLOCK	Accept with YES.
KEYLOCK **OFF** PASSWORD - -	Change to keylock ON.
KEYLOCK **ON** PASSWORD - -	Accept with YES.
KEYLOCK ON PASSWORD **99**	Enter, by using the arrows, a 2-digit password. Accept with YES.
SPEC.-FUNCTIONS KEYLOCK	Return to running mode press ←.
MON 14 MAR 2005 09:07:00 LT	

Language

With this function the language be selected.

Example:

MON 14 MAR 2005 09:07:00 LT	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 14 MAR 2005 09:07:00 LT	

Country

With this function the Country can be selected.
The following country codes are available:

Australia	USA
Belgium	Spain
Denmark	
Norway	New Zealand
Germany	Saudi-Arabia
Austria	UK
Schweiz	Ireland
	Kuwait
Netherlands	Sweden
France	Finland
Luxembourg	
Israel	
Estonia	

Example:

MON 14 MAR 2005 09:07:00 LT	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS COUNTRY	Accept with YES.
COUNTRY D49 ?	Select, by using the arrows, the wished country. Accept with YES.
SPEC.-FUNCTIONS COUNTRY	Return to running mode press ←.
MON 14 MAR 2005 09:07:00 LT	

Position

Enter the geographic position of the Master Clock.
This information is needed for the signal type “Astr.” (Twilight), in order to make it possible for the software to calculate the time of sunset and sunrise.

Example:

MON 14 MAR 2005 09:07:00 LT	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS POSITION	Accept with YES.
POSITION 07E 052N	Press buttons ↓ and ↑ until requested longitude occurs. Press →. State latitude. Accept with YES.
SPEC.-FUNCTIONS POSITION	Return to running mode press ←.
MON 14 MAR 2005 09:07:00 LT	

Setup

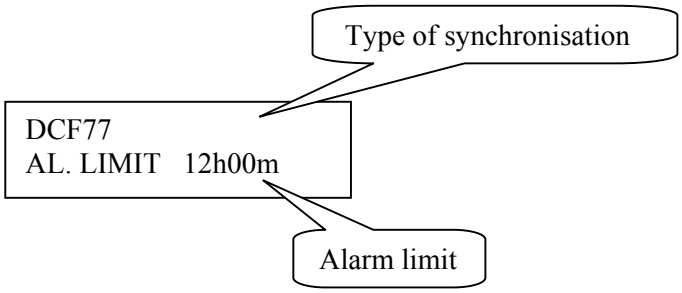
With this function the different output and input can be configured. If the default setup is used no configuration is needed.

Example:
Set the alarm limit for *radio alarm* to 1 hour. (Default setting is 12 hours.)

MON 14 MAR 2005 09:07:00 LT	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.
DCF77 AL.LIMIT --h -- m	Set, by using the arrows, the alarm limit to 1 hour (01h).
DCF77 AL.LIMIT 01h 00 m	Accept with YES
SETUP SYNC SOURCE	Return to running mode press ←.
SPEC.-FUNCTIONS SETUP	←
SPEC.-FUNCTIONS	←
MON 14 MAR 2005 09:07:00 LT	

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 synchronisation

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

--------	No external synchronisation.
DCF77	Radio synchronisation DCF77.
RDS	Radio synchronisation RDS.
GPS	Radio synchronisation GPS.
MSF	Radio synchronisation MSF/RUGBY.
1/1M SYNC	Polarised 1/1-minute impulse, sync.
1/2M SYNC	Polarised 1/2-minute impulse, sync.
1/1M SLAVE	Polarised 1/1-minute impulse, slave.
1/2M SLAVE	Polarised 1/2-minute impulse, slave.
TC	Time code type hard wired DCF.
FMSF	Finnish FM time signal.
NTP CLIENT	The Master Clock is NTP client*

*Only applicable if the Master Clock is equipped with option Ethernet.

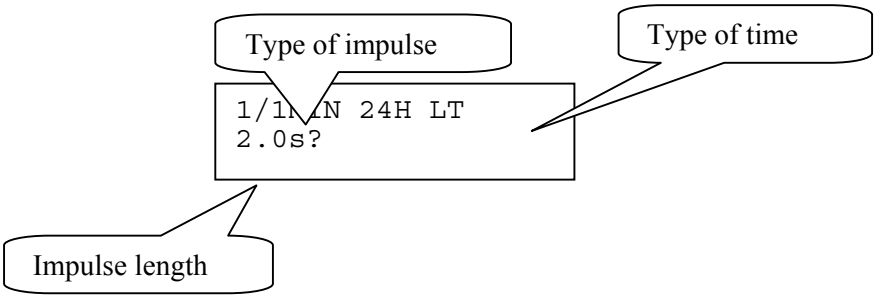
Alarm limit

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	: Polarised 1/1-minute impulse with 24 hours resetting (default).
1/1M-12H	: Polarised 1/1-minute impulse with 12 hours resetting.
1/2M-24H	: Polarised 1/2-minute impulse with 24 hours resetting
1/2M-12H	: Polarised 1/2-minute impulse with 12 hours resetting.
SEC-12H	: Polarised Second impulses with 12 hours resetting.
TC	: Hard wired DCF Time Code.
TC-POL	: Polarised hard wired DCF Time Code
1/1M-UP	: Non polarised (Uni-Polar) PPM synchronisation pulse. Pulse length 1 second.
SR2-58	: (SR2, hourly correction 2-wired, with imp. correction on the 58th minute).
SR2-59	: (SR2, hourly correction 2-wired, with imp. correction on the 59th minute).
SR3-58	: (SR3, hourly correction 3-wired, with imp. correction on the 58th minute).
SR3-59	: (SR3, hourly correction 3-wired, with imp. correction on the 59th minute).
----------	: No impulse system.

Type of time

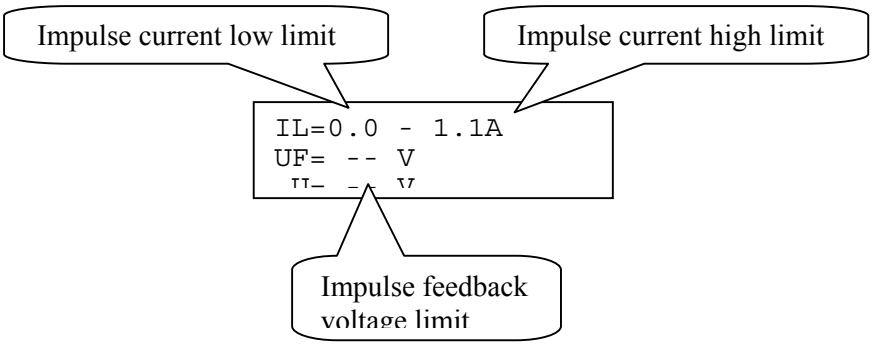
LT = Local Time.
NT = Normal Time (winter time).
UTC = Universal Time Coordinated.

Impulse length
Configuration of impulse length.

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

Remark:
When selecting second impulses with pulse length > 0.5 seconds, the pulse length for rapid impulses is automatically adjusted to 0.5 seconds.

Alarm limits



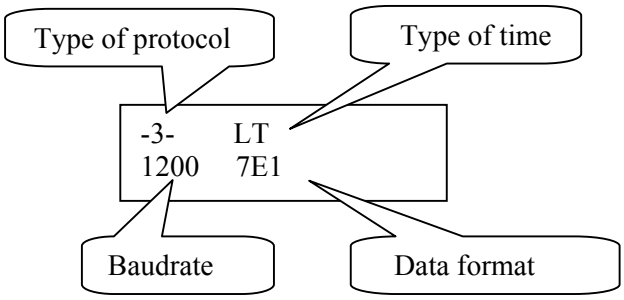
Impulse current low limit
Alarm limit for low current (minimum load). The minimum load can be set from 0A up to 1.1A.

Impulse current high limit
Alarm limit for high current (maximum load). The maximum load can be set from 0A up to 1.1A.

Impulse feedback voltage limit
Alarm limit for feedback impulse voltage.

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

Setup RS232/485 port



Type of protocol

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

1	: General 2-way-communication protocol.
2, 3, 5 and 7	: Automatic time message protocols.
NMMI	:NMEA 0183, ZDA Time string, transmitted every minute.
NMSE	:NMEA 0183, ZDA Time string, transmitted every second.

Type of time

Type of time received or transmitted.

LT = Local Time.
NT = Normal Time (winter time).
UTC = Universal Time Coordinated.

Baudrate

Available speeds:
300, 600, 1200, 2400, 4800, 9600, 19200, 38400 baud.

Data format

Data format of message received or transmitted.
No. of data bits, 7 or 8.
Type of parity, non, odd or even.
No. of stop bits, 1 or 2.

Available formats:
7N1, 7N2, 7O1, 7O2, 7E1, 7E2, 8N1, 8N2, 8O1, 8O2, 8E1, 8E2,

Protocol description

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 Synched from timeserver

1   0      Type of time
OFF OFF    UTC
OFF ON     LOC
ON  OFF    NOR
```

Example:
Assume wintertime time, synched 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 x 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

Protocol 3
At second 56 this message will be transmitted:

```
HH:MM:00 SP DD/MN/YY SP NNN SP W CR LF (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 synchronisation 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 CR LF (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.

Protocol 7

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

STX  = 02h (1 byte).

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..F G  in hexadecimal  ascii
       format (2 bytes). Byte STX is NOT included!.

ETX  = 03h (1 byte).
```

This message is sent out each second.

NMEA

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

```
       1      2  3  4    5  6  7
       |      |  |  |    |  |  |
$--ZDA,hhmmss,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
```

NMMI :NMEA 0183, ZDA Time string, transmitted each minute.
NMSE :NMEA 0183, ZDA Time string, transmitted each second.

Setup Alarm Relay

One of the relay outputs can be used as an alarm relay. This function is as default disabled but can be enabled via this special function.

Enable alarm relay:

MON 13 MAR 2006 09:07:00 LTw	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS SETUP	Accept with YES.
SETUP ALARM RELAY	Press NO until the text ALARM RELAY is shown. Accept with YES.
ALARM RELAY **NO**	Change to YES by pressing ↓.
ALARM RELAY **YES**	Accept with **YES**.
SETUP ALARM RELAY	Return to running mode press ←.
SPEC.-FUNCTIONS SETUP	←.
SPEC.-FUNCTIONS	←.
MON 13 MAR 2006 09:07:00 LTw	

Setup IP

This function can be used to give the Master Clock an IP address if it is equipped with option Ethernet. Please note that IP address as well as all other network parameters can be configured via an external PC using Telnet. See separate manual for this.

Example:
Give the Master Clock IP address 192.168.1.100.

MON 13 MAR 2006 09:07:00 LTw	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS SETUP	Accept with YES.
SETUP IP	Press NO until the text IP is shown. Accept with YES.
IP **192**.168.013.199	Set the first digit group of the IP address using ↑↓. Move to the right using →.
IP 192.**168**.013.199	Continue with the second digit group. Change digits using↑↓. Move to the right using →.
IP 192.168.00**1**.199	Continue with the third digit group. Change digits using↑↓. Move to the right using →.
IP 192.168.13.**100**	Continue with the fourth digit group. Change digits using↑↓. Accept with YES.
SETUP IP	Return to running mode press ←.
SPEC.-FUNCTIONS SETUP	←.
SPEC.-FUNCTIONS	←.
MON 13 MAR 2006 09:07:00 LTw	

Software version

This function shows the software version for the Master Clock.

MON 14 MAR 2005 09:07:00 LT	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS SOFTWARE VERSION	Accept with YES.
QW3-A1301 123342-00 11m	The software version is QW3-A130. 11m = Uptime for this Master Clock.
SPEC.-FUNCTIONS SOFTWARE VERSION	Return to running mode press ←.
SPEC.-FUNCTIONS	←
MON 14 MAR 2005 09:07:00 LT	

Holidays

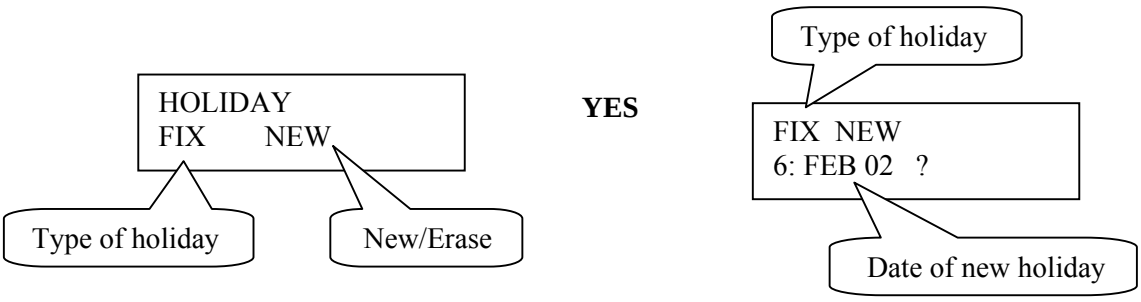
Normal public holidays are pre-programmed and the following year's public holidays are calculated automatically at the turn of the year.

There are two different types of holidays:
- Holidays with *fixed date;* holidays that is appearing at the same date year after year.
- Holidays with *variable date;* holidays that is changing date from year to year.

It is possible to change the existing, pre-programmed holidays.
- *Fixed date holiday* can be inserted (NEW) or deleted (ERASE).
- *Variable date holidays* can be *enabled* or *disabled.* Disabled means that the holiday is deactivated until it is manually enabled again.

Fixed holidays

Example of fixed holidays:
JAN01 New Year's day
DEC25 Christmas day

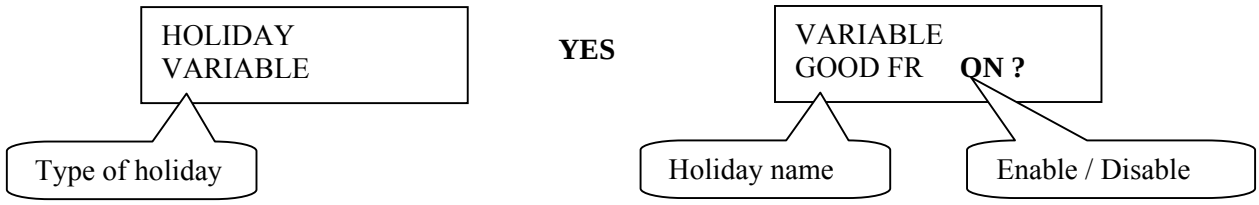


Variable holidays

Example of variable holidays:
Good Friday
Easter Monday

Holiday abbreviations used

Language English		Language French		Language German	
EAST. TH	Easter Thursday				
GOOD FR	Good Friday				
EAST. MO	Easter Monday				
ASCENS.	Ascension				
COR CH	Corpus Christi				
PENT. MO	Pentecost Monday				
PRAY DAY	Pray Day				
JOH. EVE					
JOH. DAY					
ALL ST.	All Saints Day				
WED NOV	Bank holiday				
MO MAY	Bank holiday				
MO JUN	Bank holiday				
MO AUG	Bank holiday				
MO OCT	Bank holiday				



Enable/disable
OFF = This holiday is disabled (not used)
ON = This holiday is enabled (used)

Holidays, example 1, insert a new fixed holiday

Insert January 25 as a new fixed holiday.

MON 13 MAR 2006 09:07:00 LTw	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with **YES**. Press **NO** until wished function is shown.
SPEC.-FUNCTIONS HOLIDAY	Accept with **YES**.
HOLIDAY FIX	Press NO until the text HOLIDAY FIX is shown. Accept with **YES**.
HOLIDAY FIX NEW	Press **YES**
FIX NEW 6:**JAN**--	Press buttons ↓ and ↑ until requested month occurs. Move to the right using →.
FIX NEW 6:JAN**25**	Press buttons ↓ and ↑ until requested day occurs. Accept with **YES**.
FIX NEW 7:-----	Leave this function by pressing ←.
HOLIDAY FIX	←
SPEC.-FUNCTIONS HOLIDAYS	←
MON 13 MAR 2006 09:07:00 LTw	

Holidays, example 2, erase fixed holiday

Erase the fixed holiday January 01.

MON 13 MAR 2006 09:07:00 LTw	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with **YES**. Press **NO** until wished function is shown.
SPEC.-FUNCTIONS HOLIDAY	Accept with **YES**.
HOLIDAY FIX	Press NO until the text HOLIDAY FIX is shown. Accept with **YES**.
HOLIDAY FIX ERASE	Press NO until the text FIX ERASE is shown. Press YES.
FIX ERASE 1:JAN01 ?	Press button ↑ until requested holiday occurs. Accept with **YES**.
FIX ERASE 1:JAN01 ERASE?	Accept with **YES**.
FIX ERASE 1:JAN01 OK	The holiday Jan 01 is erased.
FIX ERASE 2:MAY01	Leave this function by pressing ←.
HOLIDAY FIX	←
SPEC.-FUNCTIONS HOLIDAYS	←
MON 13 MAR 2006 09:07:00 LTw	

Holidays, example 3, disable a variable holiday

Disable holiday Good Friday.

MON 13 MAR 2006 09:07:00 LTw	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with **YES**. Press **NO** until wished function is shown.
SPEC.-FUNCTIONS HOLIDAY	Accept with **YES**.
HOLIDAY VARIABLE	Press NO until the text HOLIDAY VARIABLE is shown. Accept with **YES**.
VARIABLE EAST.TH OFF?	Press → until the text GOOD FR is shown.
VARIABLE GOOD FR **ON**?	Change ON to OFF by pressing button ↑.
VARIABLE GOOD FR **OFF**?	Accept with **YES**.
VARIABLE EAST MO ON?	Press ←.
VARIABLE SAVE ?	Accept with **YES.**
HOLIDAY VARIABLE	←
SPEC.-FUNCTIONS HOLIDAYS	←
HOLIDAYS	←
MON 13 MAR 2006 09:07:00 LTw	

Display format

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

The following two formats can be selected:

MON 14 MAR 2005 10:11:00 LTw	Standard format, default format. LT = Local Time. (LTs when summer time) NT = Normal Time (Winter time). UTC = Universal Time Coordinated.
MON 12 DEC 2001 LTw	Format 2, used for test / fault finding.

Example:

MON 14 MAR 2005 09:07:00 LT	Select function using ↓ .
SPEC.-FUNCTIONS	Accept with YES. Press NO until wished function is shown.
SPEC.-FUNCTIONS DISPLAY FORMAT	Accept with YES.
DISPLAY FORMAT STANDARD	Select, by using the arrows, the wished display format. Accept with YES.
SPEC.-FUNCTIONS DISPLAY FORMAT	Return to running mode press ←.
MON 14 MAR 2005 09:07:00 LT	

Programming form

Function	Group	Output no.	Type of signal	Day/Date	Time

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Map

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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 holiday overrides a signal point in a week program.
Priority order (1=highest, 4=lowest):
1) Date program 2) Holiday 3) Group 4) Week program

Alarm messages

D1. "Short circuit"

Excessive load on the impulse output. Check the slave clock wiring. Impulses are stored (memorised) 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.

D3. "Exists"

The signal point is already programmed.

D4. "Not programmed"

When trying to change a non-existing signal point.

RADIO

Radio synchronisation is not working (DCF)

Check that the LED in the antenna is flashing in second's rhythm. The antenna should be mounted in the clear, with the arrow on the box aiming south. Check that the LED "Radio" on the master clock is flashing in second's rhythm.

Use special function STATUS/SYNC.SOURCE for information on the reception quality.

Accepted radio reception is shown by a flashing colon (:) between hours and minutes in the display.