

USER MANUAL

Economy LED digital clock

ECO-M-DC series



Certification of the Producer

STANDARDS

The digital clock ECO-M-DC has been developed and produced in accordance with the EU Standards 2006/95/ES (LVD), 2004/108/ES (EMC), 2011/65/EU (RoHS), 2002/96/EC (WEEE).

Applied Standards:

EN 60950-1/Cor. (2011)

EN 55022 (2010), class B

EN 55024 (2010)

EN 50121-4/Cor. (2008)



References to the instruction manual

1. The information in this instruction manual can be changed at any time without notice. The current version is available for download on www.mobatime.com.
2. This instruction manual has been composed with the utmost care, in order to explain all details in respect of the operation of the product. Should you, nevertheless, have questions or discover errors in this manual, please contact us.
3. We do not answer for direct or indirect damages which could occur when using this manual.
4. Please read the instructions carefully and only start setting-up the product after you have correctly understood all the information for the installation and operation.
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1 Description

The ECO-M-DC series • elegant and very slim digital clocks for displaying time and date • aluminum metal housing, powder coated • high protection degree IP54 as standard for all versions • 7-segment LED display of high luminance provide for excellent readability from various angles of view • features six combinations of the height and the number of digits • autonomous operation with internal quartz powered from mains • NTP multicast or unicast synchronization powered over PoE (compatible IEEE 802.3af) or mains powered • slave clock operation controlled by MOBALine, DCF 77, GPS, RS485 or by IRIG-B, mains powered • LED display in red, green, yellow, blue or white color • single or double sided clock • wall mounting for single-sided clock • ceiling suspension or wall bracket mounting for double-sided clock

Display features

- time display in four digits (HH:MM) or six digits (HH:MMSS. HH:MM:SS) either 12 or 24 hours format
- date display in four digits (DD.MM.) or six digits (DD.MM.YY, DD.MM.YY.)
- 7 segment LED displays with either 57 mm digit height for a viewing distance up to 25 m or 100 mm digit height for viewing distance up to 40m
- alternating display of time and date
- display available in the red, green, yellow, pure green, blue or white color
- automatic or manual adjustment of the display brightness
- powered from mains with wide input voltage range 100-240VAC, optionally from 24 VDC voltage or through PoE (IEEE 802.3af)
- redundant power option on request

Mechanic

- elegant and slim clock frame, made of aluminium, powder coated in black or silver colour
- front cover made of dark plexiglass for best readability over a wide viewing angle
- single- or double-sided version for wall mounting, ceiling suspension or wall bracket mounting
- double sided version consist of two pieces single sided clock and wall bracket or ceiling suspension
- easy two-step installation and time-saving maintenance, hanging holes for wall mounting
- push buttons, connectors and state LEDs are accessible after dismounting the front plexiglass
- protection degree IP54
- working temperature - 5 to +55°C

Synchronization

- autonomous operation with internal quartz time base with programmable automatic seasonal time change
- NTP multicast or unicast synchronization powered over PoE or mains powered
- slave clock operation with synchronization by MOBALine, Active DCF 77, RS485 or by IRIG-B (depending on version), mains powered
- accuracy better than +/- 0.1 s to the incoming synchronization signal and +/- 0.3 s/day when not synchronized (after 24h synchronization at constant temperature)
- RTC backup by means of lithium battery CR2032 (supercapacitor on request)

Configuration

- Setting of the clock parameters and time, date setting by means by of internal push buttons

For NTP and PoE version only:

- DHCP / manual configuration of the clock parameters or setting over the telnet
- private options of DHCP string for automatic configuration of all clock parameters when connected to net-work
- configuration and monitoring using MOBA-NMS software or SNMP
- firmware update remotely through the network using the TFTP protocol
- IPv6 ready

2 Assembly



The connection to the 110/230 V AC power network can be done only by authorized personnel with appropriate qualification and training.



Clock is intended to be powered from fixed electrical installation of the building.



Suitable disconnecting device shall be attended as part of the electrical installation and both poles of power supply shall be disconnected simultaneously.



Overcurrent protection must be as a part of electrical installation and must include an suitable disconnecting device. The clock is also secured by an internal not-replaceable fuse T 2A.



Danger of electric shock after dismantling the black internal covers.

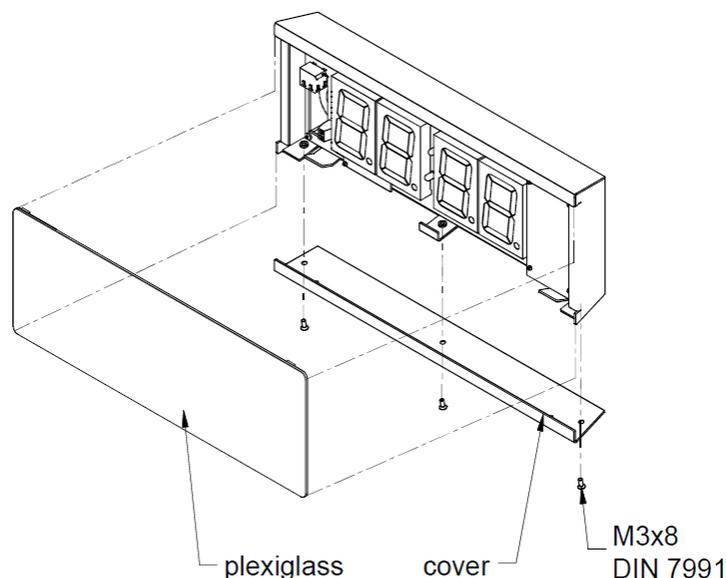


The connection to the 110/230 V AC power network should be carried out when the mains power is off.

2.1 Single-sided clock

- First, prepare the 2 holes in the wall by hinges pitch on the backside of clock.
- Insert the dowels to the prepared holes and screw the appropriate screws into them.
- Remove the screws on the bottom of the clock. Remove the bottom cover and plexiglass.
- Except PoE variant use the power cable of at least $3 \times 0.5 \text{ mm}^2$ (double insulation), maximum of $3 \times 1.5 \text{ mm}^2$ (double insulation).
- Thread the cable(s) through the grommet and hang the clock on the prepared screws in the wall.
- Cut the cable(s) to the appropriate length and connect the wires to corresponding terminals and/or crimp the RJ45 jack to the Ethernet cable respectively.
- Insert the BATT jumper in order to enable the RTC backup (doesn't apply to clocks with supercapacitor option).
- Mount the plexiglass and bottom cover.

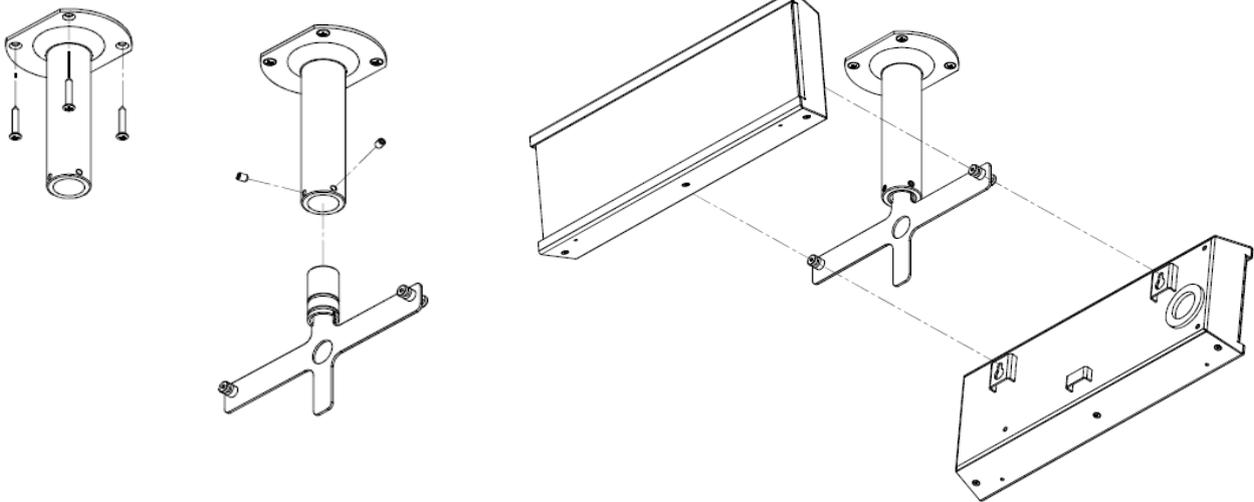
2.2 Assembly diagram



2.3 Double-sided clock

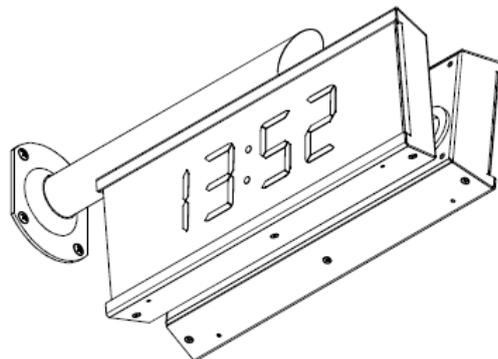
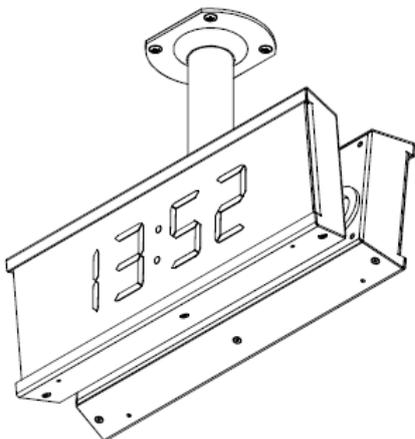
- First, prepare the 4 holes in the ceiling or wall by bracket flange pitch.
- Insert the dowels to the prepared holes and fix into them the ceiling or wall bracket using appropriate screws.
- Remove the screws on the bottom of the Master clock. Remove the bottom cover and plexiglass (see picture in capture 2.1 Single-sided clock).
- Except PoE variant use the power cable of at least $3 \times 0.5 \text{ mm}^2$ (double insulation), maximum of $3 \times 1.5 \text{ mm}^2$ (double insulation).
- Cut the cable(s) to the appropriate length and connect the wires to corresponding terminals and/or crimp the RJ45 jack to the Ethernet cable respectively.
- Insert the BATT jumper in order to enable the RTC backup (doesn't apply to clocks with supercapacitor option).
- Connect the cable from Slave clock to the Master clock.
- Mount the plexiglass and bottom cover.

2.4 Assembly diagram



Ceiling bracket

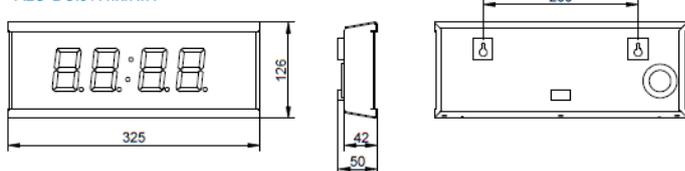
Wall bracket



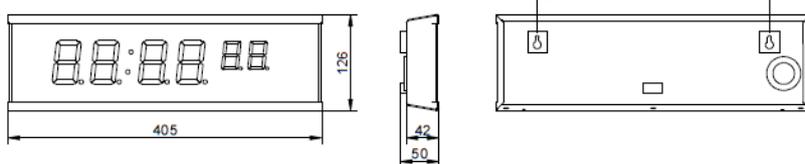
2.5 Dimensions

2.5.1 Single-sided clock

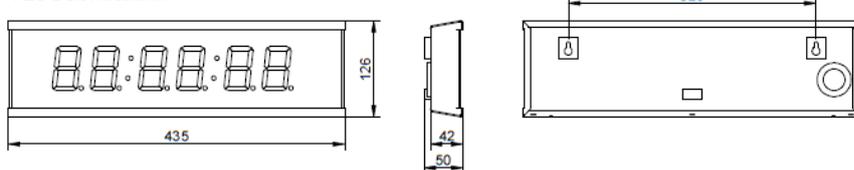
ALU-DC.57.4.x.N.N



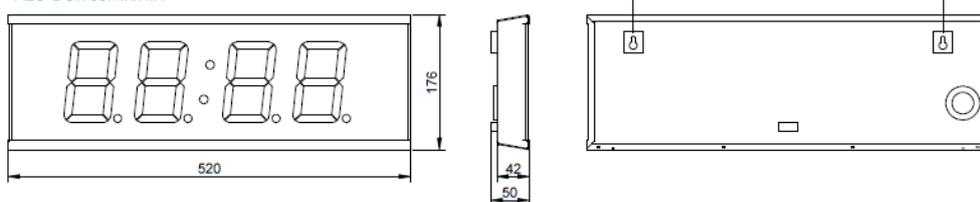
ALU-DC.57.6.x.N.N



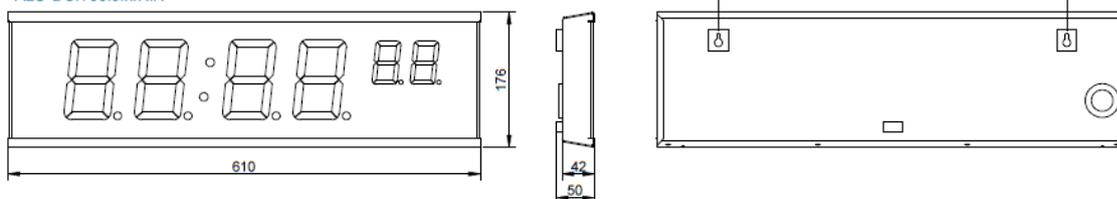
ALU-DC.57X.6.x.N.N



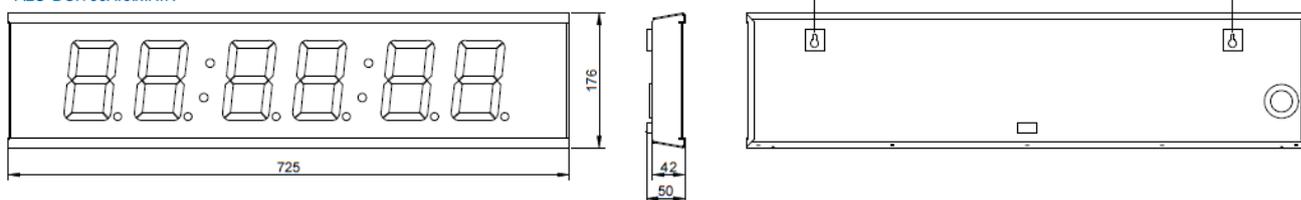
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ALU-DC.100.6.x.N.N

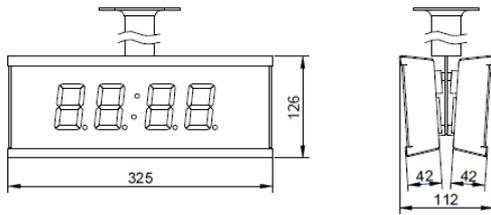


ALU-DC.100X.6.x.N.N

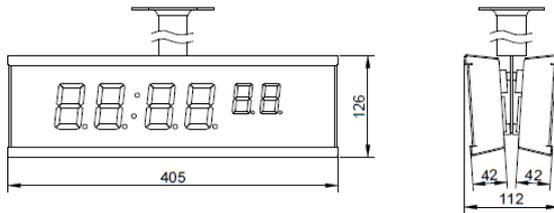


2.5.2 Double-sided clock

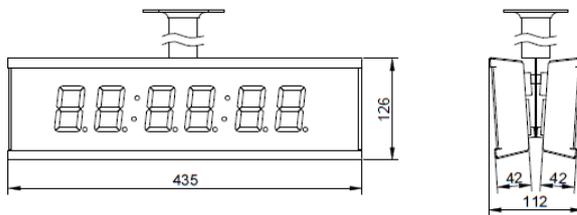
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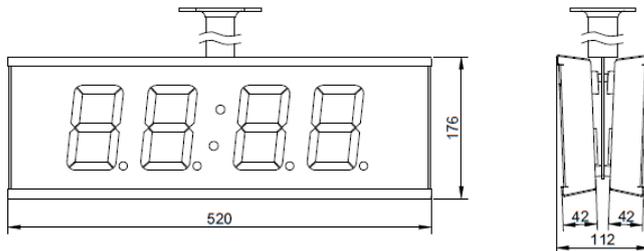
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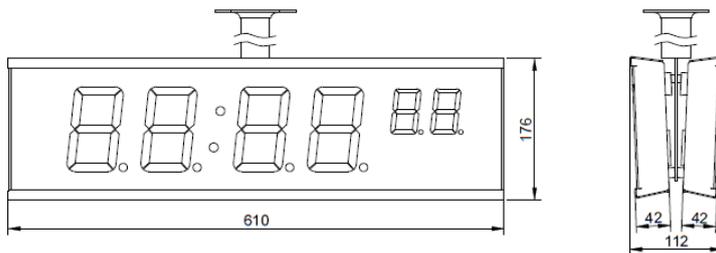
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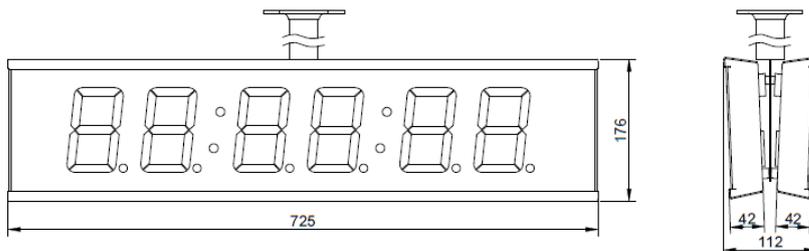
ALU-DC.100.4.x.D.S



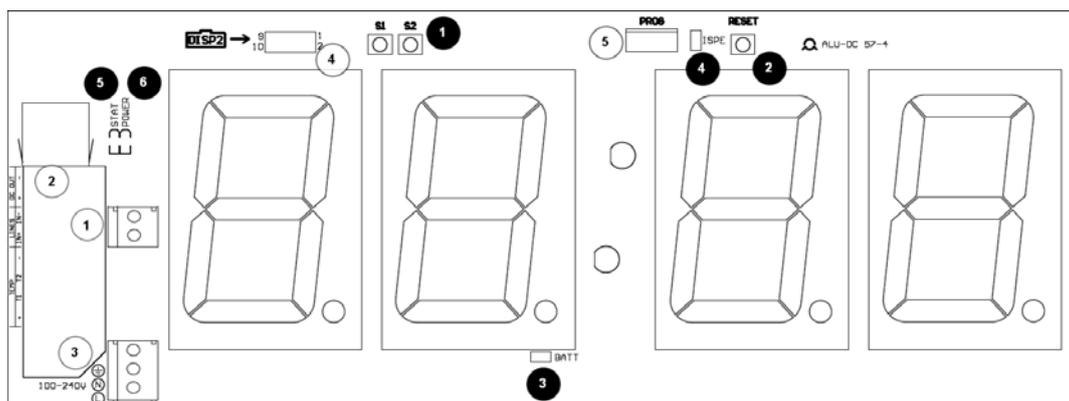
ALU-DC.100.6.x.D.S



ALU-DC.100X.6.x.D.S



2.6 Control elements



Connectors:

- | | |
|---|--|
| ① Line-IN connector | time signal input: MBL, MBLDCF, IRIG-B or RS485 |
| ② Ethernet connector (NTP, PoE, PoEclass) | RJ45 10BaseT/100TX (IEEE 802.3) auto-negotiation
PoE version compatible with IEEE 802.3af |
| ③ Power supply connector (not in PoE) | powering 100 - 240 VAC voltage |
| ④ DISP2 connector | connection of the second side (for double sided clock) |

Setting elements:

- | | |
|----------------------|--|
| ① PB1, PB2 | control push buttons |
| ② RESET | RESET button |
| ③ BATT jumper | backup battery connection |
| ④ ISPE jumper | invoking the firmware programming mode |
| ⑤ STATE LED | state indication |
| ⑥ POWER LED | power indication |

3 MBL, MBLDCF, IRIG and RS485 clock type operation

3.1 MBL type

- Connect the MOBALine signal to the two-pin input signal connector and the mains voltage to the two-pin power connector
- Set the menu items according to following **P3:A, P4:A, P6:A**
- After the connection, the time and date are adjusted automatically following the receipt of valid time information. The synchronization takes 6-15 seconds.
- It is possible to use the MOBALine time zone function, the zone is selected by menu item P5.

The colon permanently lit during the time display signalizes the synchronized clock. See the chapter 6 for further description of parameter setting.

3.2 MBLDCF type

- Connect the MOBALine or Active DCF 77 signal to the two-pin input signal connector and the mains voltage to the two-pin power connector
- Set the menu items according to following **P3:A, P4:A, P6:A**
- After the connection, the time and date are adjusted automatically following the receipt of valid time information. The synchronization takes 6-15 seconds for MOBALine or 3-5 minutes for Active DCF 77.
- For MOBALine it is possible to use the time zone function, the zone is selected by menu item P5.

The colon permanently lit during the time display signalizes the synchronized clock. See the chapter 6 for further description of parameter setting.

3.3 IRIG type

- Connect the IRIG signal to the two-pin input signal connector and the mains voltage to the two-pin power connector
- DCF-FSK, IRIG-B Standard, IRIG-B 123, IRIG-B DIEM, AFNOR A, AFNOR C variants of time signal are supported
- Set the menu items according to following **P3:A, P4:A, P6:A**
- After the connection, the time and date are adjusted automatically following the receipt of valid time information. The synchronization takes 6-15 seconds.

The colon permanently lit during the time display signalizes the synchronized clock. See the chapter 6 for further description of parameter setting.

3.4 Slave clock controlled by IF482 over RS485

- After the connection of the digital clock to the line, time and date are adjusted automatically, following the receipt of valid time information.
- Setting the tune takes place within at least 5 minutes.

3.5 Slave clock controlled by supervised RS485

Supervised RS485 line available on the DTS.480x timeservers offers exact time synchronization as well as monitoring the correct function of connected slave clocks.

- If the ECO-M-DC clock should be monitored set in menu item **P5** unique address in the range 1 to 32. The value "L" means that the clocks are synchronized only (without monitoring).
- It is necessary to register the clock under the used address in DTS.
- The time synchronization starts within a few tens of seconds after start-up.
- Failure of slave clock function is signaled by an alarm in DTS.

4 NTP and PoE clock operation

4.1 Unicast mode

The clock is synchronized to UTC (Universal Time Coordinated) from a NTP server (up to four NTP server IP addresses configurable) and must have assigned its own IP address. The clock requests in defined intervals the actual time from the NTP server. If the server is not available, the clock tries to contact the other defined servers in cyclic way until the valid response from the NTP server is received.

This operating mode supports the monitoring and configuration of the movement via the network connection by means of the Telnet, SNMP or the MOBA-NMS software tool. For supervision and configuration with MOBA-NMS the clock's IP address can be used or the multicast group address having last octet cleared to zero (presuming the multicast is not disabled).

It is necessary to set appropriate time-zone for correct displaying of local time and date – see the chapter 5 for details.

Default network parameters:

IP address	0.0.0.0
subnet mask	0.0.0.0
default gateway	0.0.0.0
NTP server address 1	0.0.0.0
NTP server address 2	0.0.0.0
NTP server address 3	0.0.0.0
NTP server address 4	0.0.0.0
NTP request time [s]	10
DNS server	0.0.0.0
SNMP manager 1	0.0.0.0
SNMP manager 2	0.0.0.0
multicast config address	239.192.54.0
alive notification interval [min]	30
configuration port number	65532
time zone client port number	65534
DHCP	enabled
SNMP	enabled
Multicast support	enabled
Telnet	enabled

4.1.1 Network parameters assignment by DHCP

The menu item **P7** must be set to value **3** (default). Network parameters are automatically obtained from a DHCP server.

The following DHCP options will be evaluated automatically:

[50] IP address

[3] Gateway address

[1] Subnet mask

[42] List with up to four NTP server addresses

[42] Time zone server address (usually same as NTP server address)

[234] SNMP manager address

[43] or [224] Additional options (refer to document BE-800793)

The network administrator must configure the DHCP options accordingly.

Assigned parameters can be checked in the submenu of items **P8** to **P10**.

4.1.2 Manual setting through setup menu

The menu item **P7** must be set to value **2**.

- See chapter 6.2.3 for setting the clock's IP address in the item **P8** submenu
- See chapter 6.2.4 for setting the subnet mask in the item **P9** submenu
- See chapter 6.2.5 for setting the gateway in the item **P10** submenu
- See chapter 6.2.6 for setting the multicast group address in the item **P11** submenu
- See chapter 6.2.7 for setting the unicast NTP server address in the item **P12** submenu.

4.1.3 Manual setting through telnet

The menu item **P7** must be set to value **1** or **2**. To establish the first connection through telnet, the following procedure is needed because the initial IP address of the clock is 0.0.0.0:

- assign a new IP address to the clock's MAC address (marked on the product label) by windows command **arp -s <IP address> <MAC address>**
example: `arp -s 192.168.0.190 00-16-91-FE-90-00`
- reset the clock or power-cycle it and do the following within 2 minutes
- the IP address is temporarily matched to the clock (only valid when the current IP address is 0.0.0.0) by windows command **ping <IP address>**, the clock should answer the two last ECHO requests at least
example: `ping 192.168.0.190`
- do the following within 30 seconds after the ping
connect to the clock and make the needed settings (see lower) by windows command **telnet <IP address>** or use the HyperTerminal application

4.1.4 Setting parameters over telnet:

- request for entering the password appears after connection (default password is 718084)
- the information about software and hardware version followed by the MAC address is displayed after entering the correct password
- inserted commands must be confirmed by pushing the Enter key, use the Backspace key for correcting typing errors
- command `help` or `?` displays help with a command list
- command `reset` resets the clock (changes are written to Flash)
- command `conf -p` displays current parameters from setup menu
- command `conf -n` displays current network parameters
- command `conf -?` displays help for command `conf` parameters
example: `conf -i 192.168.0.190` sets the clock's IP address to 192.168.0.190
- it is necessary to end telnet connection by command `exit`

Windows 7 note: The telnet is not activated in Windows 7 by default. For activating it go to the "Control Panel" in "Start menu", click on "Programs and Features", click on "Turn Windows features on or off" and find the "Telnet Client" check box in the window "Windows Features". Allow the system to install the appropriate files – this should take only a few seconds. The administrator rights are necessary for this operation.

Hyperterminal note: The Hyperterminal application can be used as an alternative to telnet. It is necessary to activate the "Send line ends with line feeds" and "Echo typed characters locally" in the Properties -> Settings -> ASCII setup window.

4.1.5 SNMP

The ECO-DC clock supports SNMP version 2c notifications and parameter reading and setting by means of SNMP GET and SET commands. This allows to integrate the clock to a network management system. The ECO-DC (SNMP agent) can send alarm notifications and alive notifications to a SNMP manager. The IP address of the SNMP manager can be provided to the clock by DHCP, Telnet, SNMP or the MOBA-NMS. The structure of supported parameters is defined in a MIB file (refer to document TE-800728 or BE-800793 for details). In addition the clock supports the “system” node parameters defined by MIB-2 (RFC-1213)

Alarm notifications are asynchronous messages and are used to inform the manager about the appearance / disappearance of alarms.

Alive notifications are sent out periodically to report availability and state of the clock. The interval time can be configured.

SNMP community strings:

read community	romobotime
read / write community	rwmobotime
notification (trap) community	trapmobotime

4.2 Multicast mode

The clock is synchronized to UTC (Universal Time Coordinated) from a NTP server. The clock receives NTP multicast packets transmitted by the NTP server in a specified time cycle. This type of synchronization requires no clock’s own IP address and is therefore suitable for an easy commissioning of the large systems of slave clocks. Further this mode supports monitoring and parameter configuration by means of MOBA-NMS software.

For supervision and configuration with MOBA-NMS the multicast group address can be used or the multicast group address having last octet cleared to zero.

The Multicast operating mode signifies only a minimum amount of configuration work for a network administrator.

It is necessary to set appropriate time-zone for correct displaying of local time and date – see the chapter 5 for details.

Default network parameters:

multicast group address	239.192.54.1
multicast config address	239.192.54.0
configuration port number	65532
time zone client port number	65534

The menu item **P7** must be set to value **1**. See chapter 6.2.6 for setting the multicast group address in the item **P11** submenu.

5 Local time calculation

5.1 Basic setting – control according to source of synchronization

P4	A	Time zone is carried over from the source of synchronization
P5	0	Neither MOBALine time zone nor time zone server are used
P6	A	Display time and date according to source of synchronization incl. daylight saving time

This setting is suitable for digital clocks controlled by a master clock as slave clocks in a time distribution system using the MOBALine, Active DCF 77 or IRIG time signal. An internal time zone table is not used.

5.2 Calculation using MOBALine time zones

P4	A	Time zone is carried over from the source of synchronization. The UTC time calculation is based on the MOBALine information.
P5	1 - 20	Selection of the MOBALine time zone
P6	A	Display time and date according to chosen MOBALine time zone, incl. daylight saving time

This setting is suitable for digital clocks controlled by a master clock as MOBALine slave clocks in a time distribution system with the possibility to display different MOBALine time zones.

5.3 Calculation using Time-zone server MOBATIME

P4	A	NTP protocol uses UTC time zone
P5	1 - 15	Selection of the time zone server time zone
P6	A	Display time and date according to chosen time zone server time zone, incl. daylight saving time

This setting is suitable for NTP and PoE digital clocks controlled by MOBATIME NTP servers, which support the time zone server functionality.

5.4 Calculation using time zone entries preconfigured by MOBA-NMS software

P4	A	NTP protocol uses UTC time zone
P5	0	No time zone server is used
P6	U1-U7	Display time and date according to chosen preconfigured time zone entry, incl. daylight saving time

This setting is suitable for NTP and PoE digital clocks, where several user defined time zone entries should be used. The time zone entries are preconfigured by means of the MOBA-NMS software.

5.5 Calculation according to internal time zone table

P4	0 – 64	According to time zone in which source of synchronization works
P5	0	Neither MOBALine time zone nor time zone server are used
P6	0 – 64, U	Display time and date by calculation from the UTC time according to chosen time zone, incl. daylight saving time

This setting is suitable for autonomous digital clocks or in cases when the displayed time is needed from another time zone than provided by the synchronization source. Displayed time and date calculation is based on the internal time zone table or on the user-specific time zone parameters. This setting is useful also for the NTP synchronization, when no time zone server is available.

6 Control and configuration of the clock using pushbuttons

The clock is controlled and configured using two pushbuttons located in the back side recess

Abbreviations used for the key strokes

PB1L, PB2L pushing of the pushbutton for a period of more than 1 second
PB1S, PB2S short-time pushing of the pushbutton

Functioning of the pushbuttons in the “Clock” mode (time or date displayed)

PB1S time correction to the whole minute (± 30 sec)
PB2S switch between the time and date display
PB1L entry into the time and date setting mode
PB2L entry into the setup menu

6.1 Setting of time and date

The setting of time and calendar date takes place in the following steps: year – days – months – hours – minutes. The entry into the time and date setting mode occurs by pushing the **PB1L** pushbutton.

The display shows the following:



The item to be adjusted is now blinking.

Push the **PB1S** pushbutton to move to another item. After having adjusted the minutes and by pushing the **PB1S**, the entered values are stored (the seconds are set to zero) and the clock returns back to “Clock” mode.

Note: When the time zone for local time and date calculation (menu item P6) is set to the values U1 – U7 or U, the entered time and date is taken as UTC.

Function of the pushbuttons in the “Time and date setting” mode.

PB1S advancement to another item to be set up
PB2S increase of the item to be set up by 1
PB2L continuous increase of the current item

6.2 Setup menu for the setting of the clock parameters

The entry into the parameter setup menu is done by the pushing of the **PB2L** button.

The display shows the following:



The item to be adjusted is now blinking

The options for the parameter setup are shown in the clock menu table.

Function of the pushbuttons in the setup menu mode

- PB1S** storage of the current item and move to another menu item
PB1L storage of values and return into normal display mode, or entry into the submenu, where it is permitted by the program
PB2S increase of the current item by 1
PB2L continuous increase of the current item

Program item	Function	Scope of the values (default values are printed in bold)	
P0	Display brightness	1-30, A (automatic adjustment)	
P1	Time display format	24 h, 12 h	
P2	Display mode	1-3	
		1	continuous display of time
		2	continuous display of date
3	display sequence: time 6 sec, date 3 sec.		
P3	Type of synchronization source	A (automatic setting)	
P4	Time zone of synchronization source	0 - 64, A (automatically)	
P5	Time zone for MOBALine or Time-zone server MOBATIME or clock address for supervised RS485	1-20, 0 (off) – for MBL or MBLDCF variant or 1-15, 0 (off) – for NTP or PoE variant or 0-31, L (listen only) – for RS485 variant	
P6	Time zone for local time and date calculation	0 to 64, A (automatically), U* (user time zone), U1-U7 (preconfigured time zone entry by MOBA-NMS)	
P7	Clock operation mode	1	multicast (without IP address)
		2*	unicast – network param. defined manually
		3*	unicast – network param. assigned by DHCP
P8	IP address	IP*	edit network parameters in manual setting mode or display parameters assigned by DHCP
P9	Subnet mask	Su*	
P10	Gateway	Gg*	
P11	Multicast addr.	Mc*	setting of multicast group address
P12	Unicast NTP addr.	Uc*	setting of NTP unicast server address
SW version		r_._ (e.g.: r1.10)	

* possibility to enter the submenu

Items P7 to P12 available in NTP and PoE variants only



The maximum brightness setting in manual mode can reduce the life cycle of the LED displays in the long run. We recommend leaving the brightness control to "auto" mode (default value).

6.2.1 Submenu for setting the user-specific time zone

Choose the value **U** in the item **P6** (time zone of displayed time and date) in the clock menu, then enter the submenu by pushing the **PB1L** pushbutton for setting the parameters of the user-specific time zone. The item to be set is blinking.

By pushing the **PB2S** button, the adjusted value is increased in steps of 1; by pushing the **PB2L** button, the value will be continuously increased.

The display shows the following (example: -12 hours):



Enter the offset of the required time zone compared to UTC time within -12 to +12 hours. Decimal point means 0,5 hour.

Switch over to setting the way of switching to daylight saving time (DST) by pushing **PB1S**.

The display shows the following:



Option:
n – no DST is used
F – DST defined by fixed date
C – DST defined by calculated date

If the value **F** is set in item **dt:**, enter the submenu for entering fixed date and time by pushing **PB1L**.

DST defined by fixed date and time

The item to be set is blinking. By pushing the **PB2S** button, the adjusted value is increased in steps of 1; by pushing the **PB2L** button, the value will be continuously increased.

Symbols on the display:

Fh change to summer time; entry of the hour at daylight saving begins
bh shift back; entry of the hour at daylight saving ends

The display shows the following:



Enter the hour at which the daylight saving time begins.

Push **PB1S**.

The display shows the following:



Enter the day and the month. Push **PB1S**. Enter the month in which the daylight saving time begins.

Push **PB1S**.

The display shows the following:



Adjust the hour at which the daylight saving time ends.

Push **PB1S**.

The display shows the following:



Enter the day of the month. Push **PB1S**.
Enter the month when the daylight saving time ends.

The daylight saving time has been set to start on April 28th at 2 o'clock and end on October 10th at 3 o'clock in the example described above.

Save the setting and return to item **dt:** by pushing **PB1L**. Another push of the **PB1L** button leads back to the clock menu item **P6**.

DST defined by calculated date

The item to be set is blinking. By pushing **PB2S**, the adjusted value is increased in steps of 1; by pushing the **PB2L** button, the value will be continuously increased.

Symbols in the display:

F change to summer time
b setting the time back

Scope of the setting:

Week 1. – 4., L (the last one), P (last but one) and H (first after 15th day in the month)
Day of the week 1. – 7. (Mo – Su)
Month 1. – 12.

The display shows the following:



Enter the week in which the daylight saving time begins. Push **PB1S**. Enter the day of the week at which the daylight saving time begins.

Push **PB1S**.

The display shows the following:



Enter the month in which the daylight saving time begins. Push **PB1S**. Enter the hour at which the daylight saving time begins.

Push **PB1S**.

The display shows the following:



Enter the week in which the daylight saving time ends. Push **PB1S**. Enter the day of the week at which the daylight saving time ends.

Push **PB1S**.

The display shows the following:



Enter the month in which the daylight saving time ends. Push **PB1S**. Enter the hour at which the daylight saving time ends.

The daylight saving time has been set to start on the last Sunday in March at 2 o'clock and end on the last Sunday in October at 3 o'clock in the example described above.

By pushing **PB1L** save the setting and return to item **dt.**. Another push of the **PB1L** button leads back to the clock menu item **P6**.

6.2.2 Submenu for network services configuration

Choose the value **2** or **3** in the item **P7** (network work mode selection) in the clock menu, then enter the submenu by pushing the **PB1L** pushbutton for configuring the network services (Multicast support in unicast work mode, SNMP service, Telnet service). The item to be set is blinking.

In der Anzeige erscheint:



Set value 1 for enabling the multicast support in the unicast work mode or value 0 for disabling it by pushing the **PB2S**.

Switch to the next parameter – SNMP communication support by pushing the **PB1S**. The display shows the **Sn: 1**. Set value 1 for enabling the SNMP support or value 0 for disabling it by pushing the **PB2S**.

Switch to the next parameter – Telnet support by pushing the **PB1S**. The display shows the **tn: 1**. Set value 1 for enabling the telnet support or value 0 for disabling it by pushing the **PB2S**.

By pushing **PB1L** save the setting and return to item **P7**.

6.2.3 Manual setting of the IP address of the clock

Choose the item **P8** in the main menu and push the **PB1L** button to enter the submenu for setting the IP address. The item to be set is blinking.

By pushing **PB2S**, the adjusted digit value is increased in steps of 1; by pushing the **PB2L** button, the value will be continuously increased.

The display shows the following:



Enter the four octets of the IP address step by step. Switch to the next digit or octet respectively by pushing the **PB1S**. Octets are marked by letters **A**, **b**, **C** and **d**.

By pushing the **PB1L** button, the entered values are stored and the clock returns to the menu item **P8**.

6.2.4 Manual setting of the subnet mask

Choose item **9** in the main menu and push the **PB1L** button to enter the submenu for setting the subnet mask. The item to be set is blinking.

By pushing **PB2S**, the adjusted value is increased in steps of 1; by pushing the **PB2L** button, the value will be continuously increased.

The display shows the following:



Enter the four octets of the subnet mask step by step. Switch to the next octet by pushing the **PB1S** button. The octets are marked by the letters **A**, **b**, **C** and **d**.

By pushing the **PB1L** button, the entered values are stored and the clock returns to the menu item **P9**.

6.2.5 Manual setting of the default gateway IP address

Choose the item **P10** in the main menu and push the **PB1L** button to enter the submenu for setting the default gateway IP address. The item to be set is blinking. By pushing **PB2S**, the adjusted digit value is increased in steps of 1; by pushing the **PB2L** button, the value will be continuously increased.

The display shows the following:



Enter the four octets of the gateway IP address step by step. Switch to the next digit or octet respectively by pushing the **PB1S** button. The octets are marked by the letters **A**, **b**, **C** and **d**.

By pushing the **PB1L** button, the entered values are stored and the clock returns to the menu item **P10**.

6.2.6 Submenu for setting the multicast group address

Choose the menu item **P11** and then enter the submenu by pushing the **PB1L** pushbutton for setting the multicast group address. The item to be set is blinking. By pushing the **PB2S** button, the adjusted digit value is increased in steps of 1; by pushing the **PB2L** button, a continuous increase of the value takes place.

The display shows the following:



Enter the four octets of the IP address step by step. Switch to the next digit or octet respectively by pushing the **PB1S** button. Octets are marked by the letters **A**, **b**, **C** and **d**.

By pushing the **PB1L** button, the entered values are stored and the clock returns to the menu item **P11**.

6.2.7 Submenu for setting of the NTP unicast synchronization

Choose the menu item **P12** then enter the submenu by pushing the **PB1L** pushbutton for setting the parameters of the NTP unicast synchronization. The item to be set is blinking.

By pushing the **PB2S** button, the adjusted digit value is increased in steps of 1; by pushing the **PB2L** button, the value will be continuously increased.

The display shows the following:



Set the four octets of the NTP server's IP address step by step. Switch to the next digit or octet respectively by pushing the **PB1S** button. Octets are marked by letters **A**, **b**, **C** and **d**.

After the last octet setting, set the constant x which determines the interval of synchronization in seconds.

By pushing the **PB1L** button, the entered values are stored and the clock returns to the menu item **P12**.

Note: Through the setup menu, it is possible to set only one NTP server IP address. If more than one NTP server addresses were previously configured (using telnet or MOBA-NMS tool), after opening the P12 submenu the IP address of currently active NTP server is displayed. When the IP address was modified and the configuration is saved using the setup menu, the IP address is stored to the definition of the first NTP server, the other NTP server addresses are cleared including those defined by the NTP server domain names.

6.3 Parameter reset

If necessary, the clock parameters can be set to factory defaults by the following procedure:

- Enter the clock menu, move to the software version item by several pushes of the **PB1S**.
- Keep pushing both buttons on the clock frame simultaneously until the display shows **C0:00**
- Use the **PB2** button to set the value behind the colon to **04**
- Keep pushing both buttons simultaneously until the display shows **FAC1** and the clock resets

7 Update firmware of NTP and PoE version using TFTP32 tool

- create a folder on the computer hard drive and copy the files "tftpd32.ini", "tftpd32.chm" and "tftpd32.exe" into it, then run "tftpd32.exe"
- copy the new firmware file "dc3app.bin" as well
- run "tftpd32.exe", leave only the TFTP Server in the window Settings -> Global Settings checkbox active, don't change other settings
- open the active folder setting window with the Browse button and browse for the folder containing the firmware file
- connect to the clock by the windows command **telnet <IP address>**
example: telnet 192.168.0.190
- the request for the telnet password will appear; after entering the valid password, the information about the software and hardware version followed by the MAC address appears
- enter the command **fu** in the telnet window for starting the automatic update of the clock's firmware from the "dc3app.bin" file
- after the command is entered, information about the sent file and its progress is displayed in the tftpd32 window; the telnet connection is then terminated automatically
- wait approx. 1 minute after the file sending is finished, connect again to the clock through telnet
- after successfully entering the password, check if the indicated firmware version is correct, otherwise it is necessary to repeat the whole procedure
- enter the **exit** command to close the telnet connection, close the tftpd32 window

8 Time zone table

Time zone entries in the standard season table (version 10.1).

Time zone	City / State	UTC Offset	DST Change	Standard → DST	DST → Standard
00	UTC (GMT), Monrovia, Casablanca	0	No		
01	London, Dublin, Edinburgh, Lisbon	0	Yes	Last Sun. Mar. (01:00)	Last Sun. Oct. (02:00)
02	Brussels, Amsterdam, Berlin, Bern, Copenhagen, Madrid, Oslo, Paris, Rome, Stockholm, Vienna, Belgrade, Bratislava, Budapest, Ljubljana, Prague, Sarajevo, Warsaw, Zagreb	+1	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
03	Athens, Istanbul, Helsinki, Riga, Tallinn, Sofia, Vilnius	+2	Yes	Last Sun. Mar. (03:00)	Last Sun. Oct. (04:00)
04	Bucharest, Romania	+2	Yes	Last Sun. Mar. (03:00)	Last Sun. Oct. (04:00)
05	Pretoria, Harare, Kaliningrad	+2	No		
06	Amman	+2	Yes	Last Thu. Mar. (23:59)	Last Fri. Oct. (01:00)
07	UTC (GMT)	0	No		
08	Kuwait City, Minsk, Moscow, St. Petersburg, Volgograd	+3	No		
09	Praia, Cape Verde	-1	No		
10	UTC (GMT)	0	No		
11	Abu Dhabi, Muscat, Tbilisi, Samara	+4	No		
12	Kabul	+4.5	No		
13	Adamstown (Pitcairn Is.)	-8	No		
14	Tashkent, Islamabad, Karachi, Yekaterinburg	+5	No		
15	Mumbai, Calcutta, Madras, New Delhi, Colombo	+5.5	No		
16	Astana, Thimphu, Dhaka, Novosibirsk	+6	No		
17	Bangkok, Hanoi, Jakarta, Krasnoyarsk	+7	No		
18	Beijing, Chongqing, Hong kong, Singapore, Taipei, Urumqi, Irkutsk	+8	No		
19	Tokyo, Osaka, Sapporo, Seoul, Yakutsk	+9	No		
20	Gambier Island	-9	No		
21	South Australia: Adelaide	+9.5	Yes	1 st Sun. Oct (02:00)	1 st Sun. Apr. (03:00)
22	Northern Territory: Darwin	+9.5	No		
23	Brisbane, Guam, Port Moresby, Magadan, Vladivostok	+10	No		
24	Sydney, Canberra, Melbourne, Tasmania: Hobart	+10	Yes	1 st Sun. Oct. (02:00)	1 st Sun. Apr. (03:00)
25	UTC (GMT)	0	No		
26	UTC (GMT)	0	No		
27	Honiara (Solomon Is.), Noumea (New Caledonia),	+11	No		

28	Auckland, Wellington	+12	Yes	Last Sun. Sep. (02:00)	1 st Sun. Apr. (03:00)
29	Majuro (Marshall Is.), , Anadyr	+12	No		
30	Azores	-1	Yes	Last Sun. Mar. (00:00)	Last Sun. Oct. (01:00)
31	Middle Atlantic	-2	No		
32	Brasilia	-3	Yes	3 rd Sun. Oct. (00:00)	3 rd Sun. Feb. (00:00)
33	Buenos Aires, Santiago	-3	No		
34	Newfoundland, Labrador	-3.5	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
35	Atlantic Time (Canada)	-4	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
36	La Paz	-4	No		
37	Bogota, Lima, Quito, Easter Island, Chile	-5	No		
38	New York, Eastern Time (US & Canada)	-5	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
39	Chicago, Central Time (US & Canada)	-6	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
40	Tegucigalpa, Honduras	-6	No		
41	Phoenix, Arizona	-7	No		
42	Denver, Mountain Time	-7	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
43	Los Angeles, Pacific Time	-8	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
44	Anchorage, Alaska (US)	-9	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
45	Honolulu, Hawaii (US)	-10	No		
46	Midway Islands (US)	-11	No		
47	Mexico City, Mexico	-6	Yes	1 st Sun. Apr. (02:00)	Last Sun. Oct. (02:00)
48	Adak (Aleutian Is.)	-10	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
49	UTC (GMT)	0	No		
50	UTC (GMT)	0	No		
51	UTC (GMT)	0	No		
52	UTC (GMT)	0	No		
53	UTC (GMT)	0	No		
54	Scoresbysund, Greenland	-1	Yes	Last Sun. Mar. (00:00)	Last Sun. Oct. (01:00)
55	Nuuk, Qaanaaq, Greenland	-3	Yes	Last Sat. Mar. (22:00)	Last Sat. Oct. (23:00)
56	Qaanaaq, Greenland (old)	-4	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
57	Western Australia: Perth	+8	No		
58	Caracas	-4.5	No		
59	CET standard time	+1	No		
60	Santiago, Chile (old)	-4	Yes	2 nd Sun. Oct. (00:00)	2 nd Sun. Mar. (00:00)
61	Chile, Easter Island (old)	-6	Yes	2 nd Sat. Oct. (22:00)	2 nd Sat. Mar. (22:00)
62	Baku	+4	Yes	Last Sun. Mar. (04:00)	Last Sun. Oct. (05:00)
63	UTC (GMT)	0	No		
64	UTC (GMT)	0	No		

In countries where the DST switch date changes annually (e.g. Iran, Israel), the time zone has to be defined manually in the user time zone table (entries 80 – 99).

Legend:

UTC: Universal Time Coordinate, equivalent to GMT
DST: Daylight Saving Time
DST Change: Daylight Saving Time changeover
Standard → DST: Time change from Standard time (Winter time) to Summer time
DST → Standard: Time change from Summer time to Standard time (Winter time)

Example:

2nd last Sun. Mar. (02:00) Switch over on the penultimate Sunday in March at 02.00 hours local time.

9 Technical data

9.1 Standard design of the clock

Technical data		ECO-M-DC.57.4	ECO-M-DC.57.6	ECO-M-DC.57x.6	ECO-M-DC.100.4	ECO-M-DC.100.6	ECO-M-DC.100x.6
Display	height of the digits	57	57/38	57	100	100/57	100
	number of digits	4	4+2	6	4	4+2	6
Time display format	HH : MM	√			√		
	HH : MM ^{SS}		√			√	
	HH : MM : SS			√			√
Date display format	DD. MM	√			√		
	DD. MM ^{YY}		√			√	
	DD.MM.YY			√			√
Automatic or manual display brightness		√					
Viewing distance		25 m			40 m		
Powering	100 - 240 VAC	√	√	√	√	√	√
	24 VDC ± 20%	√	√	√	√	√	√
	PoE / PoEclass (IEEE 802.3af)	√	√	√	√	√	√ ^{*1}
Max. power consumption	single sided	8 VA	8 VA	8 VA	8 VA	8 VA	11 VA
	single sided PoE	7 VA	7 VA	7 VA	7 VA	7 VA	10 VA
	double sided	15 VA	15 VA	15 VA	15 VA	15 VA	21 VA
	double sided PoE	14 VA	14 VA	14 VA	14 VA	14 VA	14 VA
Quartz base	running reserve (time+date)	2 years with lithium battery CR2032 ² / 12 hours with supercapacitor					
	accuracy	+/- 0.3 s/day without synchronization (after 24h synchronization at constant temp.)					
Operating conditions	temperature	-5 to + 55°C					
	humidity	0 to 95% (without condensation)					
	protection degree	IP 54					
Weight in kg	single sided design	0,9	1,2	1,3	1,9	2,6	2,8
	double sided design	2	2,5	2,6	4	5,4	5,9
Dimensions (WxHxD) mm	single sided design	325 x 126 x 42	405 x 126 x 42	435 x 126 x 42	520 x 176 x 42	610 x 176 x 42	725 x 176 x 42
	double sided design	325 x 126 x 105	405 x 126 x 105	435 x 126 x 105	520 x 176 x 105	610 x 176 x 105	725 x 176 x 105

* Notes:

- PoE/PoEclass version cannot be combined with models double sided ECO-M-DC.100x.6 with green, pure green, blue and white display colour
- Clocks are delivered with disconnected backup battery CR2032 for unlimited battery shelf life, battery must be connected during the installation

9.2 Voltage range and electric current consumption of the lines

Type of slave line	Voltage range	Electric current consumption
MOBALine	5 – 30 VAC	6 – 34 μ A
Active DCF 77	+ - 12 – 30 V	10 – 18 mA
IRIG B	20 mVpp – 2 Vpp	20 μ A – 2 mA

10 Accessories and Maintenance

10.1 Single sided clock

- instruction manual 1 pc
- wood screws including dowels 2 pcs

10.2 Double sided clock

- instruction manual 1 pc
- wood screws including dowels for fastening the console 4 pcs
- interconnecting cable for second side 1 pc
- Allen key for fastening the console 1 pc

10.3 Cleaning

Clean only the clock surface. Use soft rags and antistatic detergents.

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