# USER MANUAL

# Generation 4 digital clock

## References to the User manual

1 The information in this User manual can be changed at any time without notice.
The current version is available for download at **www.mobatime.com/support/resources/**.

2 This User 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 on this manual,
please contact us.

3 We do not answer for direct or indirect damages, which could occur, when using this user 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.

5 The installation must only be carried out by skilled staff.

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Czech Republic.

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# 1 Introduction

Thank you for choosing MOBATIME digital clocks.

This instruction manual contains menu settings, description of synchronization types, all clock types including mounting and technical parameters tables and always up-to-date time zone table.

**Overall warning:**

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

⚠  Danger of electric shock when dismounting the cover with warning triangle.

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

# 2 MENU

The clock are set and controlled by two push buttons or by remote controller.

Position of push buttons depends on the clock type. Mostly push buttons are located on the upper side of the frame.

## Description of buttons:

**PB1** . . . . . . . . . . push button 1, short press

**PB2** . . . . . . . . . . push button 2, short press

**PB1L** . . . . . . . . . push button 1, long press (longer than 1 second)

**PB2L** . . . . . . . . . push button 2, long press (longer than 1 second)

**PB3L** . . . . . . . . . push button 3, long press (longer than 1 second)

## Function of buttons:

**PB1** . . . . . . . . . . moving "up" in menu / submenu, decreasing of the set value

**PB2** . . . . . . . . . . moving "down" in menu / submenu, increasing of the set value

**PB1L** . . . . . . . . . exit from menu / submenu / of set value, exit without saving

**PB2L** . . . . . . . . . entry into the menu / submenu / of set value, save and exit

## Function of remote controller buttons:

**<<** . . . . . . . . . . . . moving "up" in menu / submenu

**>>** . . . . . . . . . . . . moving "down" in menu / submenu

**ESC** . . . . . . . . . . exit from menu / submenu / of set value, exit without saving

**OK** . . . . . . . . . . . entry into the menu / submenu / of set value, save and exit

**MENU** . . . . . . . . entry into the menu from mains screens / entry into the menu from stopwatch display

**TIMER** . . . . . . . . entry into stopwatch display from main screens

**CLOCK** . . . . . . . . exit from stopwatch display into the mains screens

**DATE** . . . . . . . . . exit from stopwatch display into the mains screens

**TEMP** . . . . . . . . exit from stopwatch display into the mains screens

**+** . . . . . . . . . . . . increasing of the set value

**−** . . . . . . . . . . . . decreasing of the set value

> ⬭ **Setting of individual items in the submenu can be found in chapters 2.3.x.**

## 2.1 MENU navigation scheme using the push buttons

**Main screens**

PB2L

PB1L

**Main menu**

PB1

Time
Date
Calendar week
Sensor 1
Sensor 2
Sensor 3 (DT)
Sensor 4 (DT)

PB2

PB1L

PB1

dISP
SYNC
NEt
SEN1−4
StoP
tIME
SYSt
r0.01

PB2

PB1L

PB2L

**dISP**

PB2L

PB1

d1: 1
d2: 3
d3: 0
...

PB2

PB1L

PB3L

**Stopwatch display**

PB2L

PB1L

**Example of setting dISP MENU:**

**dISP**

PB1

d1: 1
d2: 3
d3: 0
...

PB2

PB2L  SAVE

PB2L

d1: 1

PB1L  ESC

**Increasing / decreasing value**

d3: 1

PB2  PB1

d3: 2

PB2  PB1

d3: 3

**Example of setting NEt MENU:**

**NEt**

PB1

n1: 0
n2: 3
n3:IP
...

PB2

PB1L

PB2L

**IP**

PB1

A 192
b 168
C 000
d 012

PB2

PB1L  ESC

A 192

PB2L  PB2L

A 192

PB2L

A 192

PB2L  SAVE

## 2.2 MENU navigation scheme using the remote controller
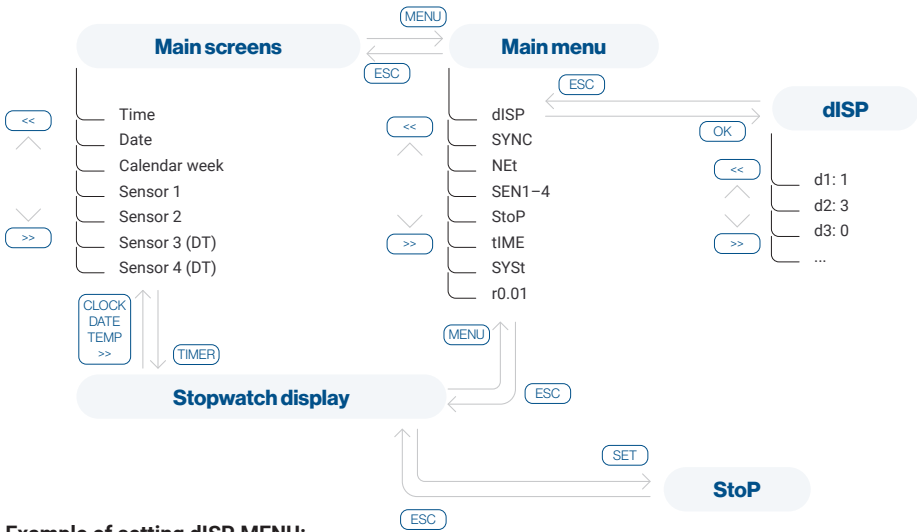
MENU

**Main screens** ⇄ **Main menu**

ESC

<<
∧

Time
Date
Calendar week
Sensor 1
Sensor 2
Sensor 3 (DT)
Sensor 4 (DT)

∨
>>

<<
∧

∨
>>

ESC

dISP
SYNC
NEt
SEN1−4
StoP
tIME
SYSt
r0.01

OK

ESC

**dISP**

<<
∧

∨
>>

d1: 1
d2: 3
d3: 0
...

CLOCK
DATE
TEMP
>>

TIMER

MENU

**Stopwatch display** ⇄

ESC

ESC

SET

**StoP**

ESC

**Example of setting dISP MENU:**

**dISP**

<<
∧

∨
>>

d1: 1
d2: 3
d3: 0
...

OK   SAVE

OK

dI: 1

ESC   ESC

**Increasing / decreasing value**

d3: 1

+   ∨       ∧   −

d3: 2

+   ∨       ∧   −

d3: 3

**Example of setting NEt MENU:**

**NEt**

<<
∧

∨
>>

n1: 0
n2: 3
n3:IP
...

ESC

OK

**IP**

<<
∧

∨
>>

A 192
b 168
C 000
d 012

ESC   ESC

A 192

OK        OK

A 192

OK

A 192

OK   SAVE
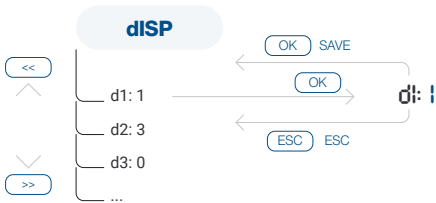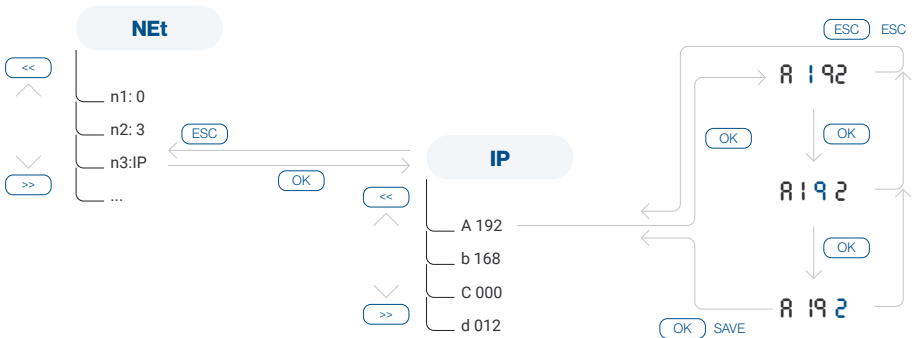
## 2.3  The clock MENU tables

### 2.3.1  MENU

| Program item | Function | Description |
|---|---|---|
| dISP | display of time, date, temperature | enter the **d** submenu |
| SYNC | synchronization | enter the **o** submenu |
| Net | network parameters | enter the **n** submenu |
| SEN1-4<br>SEN3,4 only for DT | sensors - 1st-4th temperature (temperature, combined sensors) | enter the **t** submenu |
| StoP | stopwatch | enter the **h** submenu |
| tIME | setting of time and date | enter the submenu for **time and date setting** |
| SYSt | system menu | enter the **c** submenu |
| r_._<br>(e.g. r6.17) | | software version |

> 💬  If value in menu table contains *, submenu is accessible.

Example:

| Item | Function | Range | |
|---|---|---|---|
| n4 | IP address | IP* | edit IPv4 network parameters in manual setting mode or display parameters assigned by DHCPv4 |

⌄⌄

**Submenu for displaying and edit IPv4 address**

| A | 1st octet IPv4 address | 0−255<br>set digit by digit |
|---|---|---|
| b | 2nd octet IPv4 address | 0−255<br>set digit by digit |
| C | 3rd octet IPv4 address | 0−255<br>set digit by digit |
| d | 4th octet IPv4 address | 0−255<br>set digit by digit |

## 2.3.2 Submenu for display setting – dISP

| Item | Function | Range | |
|------|----------|-------|---|
| d1 | display brightness | 1–30, **A (automatically)** | |
| d2 | time zone of displayed time and date | 0–64, **A (automatically)**, U1–U7 (preconfigured time zone entry by MOBA-NMS) | |
| d3 | time constants for automatic data switching over | 1–6, U, 0 | |
| | | **1** | **continuous display of time** |
| | | 2 | continuous display of date |
| | | 3 | continuous display of temperature |
| | | 4 | continuous display of stopwatch |
| | | 5 | display sequence: time 6 s, date 3 s |
| | | 6 | display sequence: time 8 s, date 3 s, temperature 3 s |
| | | U | time constants set up by user, in seconds for each specific displayed data |
| | | 0 | automatic switching over disabled |
| d4 | 12hour format | **0** | **disabled** |
| | | 1 | enabled |
| d5 | time with leading zero | 0 | disabled |
| | | **1** | **enabled** |
| d6 | date with leading zero | **0** | **disabled** |
| | | 1 | enabled |
| d7 | **only for DA digital clock** | | |
| | second circle format | **1** | **accumulating ring of second markers** |
| | | 2 | take actual second from full shining circle step by step |
| | | 3 | full shining circle, actual second off |
| | | 4 | three shining seconds, the first is showing actual second |
| | | 5 | two shining seconds, the first is showing actual second |
| d8 | clock address for IR remote control | 1–99 | |
| d9 | IR controller ''autolock'' | 1–60, U (''automatic lock'' is OFF) | |
| | | time in minutes for ''autolock'' since the last press of button on the IR control | |
| 10 | time constant for display of time | 0–60 seconds | |
| 11 | time constant for display of date | 0–60 seconds | |
| 12 | time constant for display of calendar week | 0–60 seconds | |

| Item | Function | Range |
|------|----------|-------|
| 13 | time constant for display of temperature 1 | 0−60 seconds |
| 14 | time constant for display of humidity 1 | 0−60 seconds |
| 15 | time constant for display of pressure 1 | 0−60 seconds |
| 16 | time constant for display of temperature 2 | 0−60 seconds |
| 17 | time constant for display of humidity 2 | 0−60 seconds |
| 18 | time constant for display of pressure 2 | 0−60 seconds |

## 2.3.2.1 Remote control lock

The clock can be locked against unauthorized or unwanted operation using the remote controller. The address and time of automatic locking after the last button press on the remote control can be set. The address can be selected in the dISP menu → item **d8**. The time of automatic locking is set in the dISP menu → item **d9**.

### Manual lock

To lock all clocks within the range of the IR remote controller beam, long press the **F2** button. Clock lock is indicated by displaying **LOC** on the clock display.

### Automatic lock

Automatic lock of the clock after x minutes (set in the **dISP** menu → item **d9**) is not indicated on the display.

### Clock address display

The address display is enabled by long pressing the **F3** button and is indicated on the display as **Axx**, where xx represents the set address with initial zero (A01 → address 1).

### Unlocking the clock

To unlock all clocks within the range of the IR remote controller beam, long press the **F1** button. Clock unlock is indicated by displaying **UNL** on the clock display.

To unlock only specific clock with a specific address, press **F1** followed by the clock address in two-digit format with leading zero.

Thus, for a clock with address 5, the sequence will be as follows:   F1 → 0 → 5

Successful unlocking is indicated by displaying **UNL** on the clock display.

### 2.3.3 Submenu for time synchronization – SYNC

| Item | Function | | Range | |
|------|----------|---|-------|---|
| o1 | time zone of synchronization | | 1–64, A (automatically) | |
| o2 | type of synchronization source | | 1–11, A (automatically) | |
| | | A | auto detection (DCF serial code MOBATIME, MOBALine, IRIG-B or NTP) | |
| | | 1 | autonomous operation without synchronization | |
| | | 2 | **only for LGC variant** | |
| | | | synchronization DCF | |
| | | 3 | **only for LGC variant** | |
| | | | MOBATIME serial code | |
| | | 4 | **only for LGC variant** | |
| | | | MOBALine | |
| | | 5 | **only for LGC variant** | |
| | | | 24 V VDC impulses, minute intervals | |
| | | 6 | **only for LGC variant** | |
| | | | 24 V VDC impulses, half minute intervals | |
| | | 7 | **only for LGC variant** | |
| | | | 24 V VDC impulses, second intervals | |
| | | 8 | **only for LGC variant** | |
| | | | DCF-FSK- IRIG-B Standard, IRIG-B 123, IRIG-B DIEM, AFNOR A, AFNOR C | |
| | | 9 | active DCF code | |
| | | 10 | **only for GPS** | |
| | | | GPS | |
| | | 11 | **only with RS 485 option** | |
| | | | RS 485 | |
| o3 | **only for LGC variant** | | | |
| | impulse line processing mode | | 1–4 | |
| | | 1 | polarized impulses, synchronization and time adjustment | |
| | | 2 | polarized impulses, time synchronization only | |
| | | 3 | non-polarized impulses, synchronization and time adjustment | |
| | | 4 | non-polarized impulses, time synchronization only | |

| Item | Function | Range | |
|------|----------|-------|---|
| o4 | **only for LGC variant** | | |
| | time zone for MOBALine | 1-20, 0 (off) | |
| o5 | **only for NTP, PoE, WiFi and WiFi5 variant** | | |
| | time zone server MOBATIME | 1-15, 0 (off) | |
| o6 | **only with RS 485 option** | | |
| | protocol for RS 485 communication | 1−6 | |
| | | **1** | **IF482** |
| | | 2 | supervised RS 485 |
| | | 3 | ITRON2000 |
| | | 4 | NMEA 0183 |
| | | 5 | DC4 MASTER |
| | | 6 | DC4 SLAVE |
| o7 | **only with RS 485 option** | | |
| | clock address for the serial protocols | 1−31, L (listen only) | |
| o8 | **only with RS 485 option** | | |
| | modulation speed for RS 485 | 1−7 | |
| | | 1 | 1 200 Baud |
| | | 2 | 2 400 Baud |
| | | 3 | 4 800 Baud |
| | | **4** | **9 600 Baud** |
| | | 5 | 19 200 Baud |
| | | 6 | 38 400 Baud |
| | | 7 | 57 600 Baud |
| o9 | **only with RS 485 option** | | |
| | transmission parameters for RS 485 | number of bits | **8** |
| | | | 7 |
| 10 | | number of stop bits | **1** |
| | | | 2 |
| 11 | | parity | n − no parity |
| | | | o − odd |
| | | | **E − even** |
| 12 | timeout for indication of state without synchronization | to* | |
| 13 | offset of displayed time | oF* | |

### 2.3.3.1 SYNC submenus

**Submenu for setting timeout for signaling a state without synchronization**

| ddd | setting of timeout for signaling a state without synchronization | ddd = timeout value in hours set digit by digit range: 1 ÷ 255 hours |
|---|---|---|

**Submenu for offset setting of displayed time on display**

| -ddd | setting of displayed time on display | - = negative offset value<br>-150 means offset value -1.5 s<br>ddd = offset value in multiples of 10 ms set digit by digit, the range of each digit is 0 – 9<br>range: -999 ÷ 999 (*10 ms) |
|---|---|---|

## 2.3.4 Submenu for setting of network parameters – NEt

> 🔌 **Only for NTP, PoE, WiFi and WiFi5.**

| Item | Function | Range | |
|------|----------|-------|---|
| n1 | IP mode | **0** | **NTP, PoE: IPv4 / IPv6** |
| | | | **WiFi: not supported** |
| | | 1 | NTP, PoE: IPv4 |
| | | | WiFi: IPv4 |
| | | 2 | NTP, PoE: IPv6 |
| | | | WiFi: not supported |
| n2 | communication mode | **0** | **unicast** |
| | | 1 | multicast |
| n3 | DHCPv4 mode | 0 | disabled |
| | | **1** | **enabled** |
| n4 | IP address | IP* | edit IPv4 network parameters in manual setting mode or display parameters assigned by DHCPv4 |
| n5 | subnet mask | Su* | |
| n6 | gateway | Gt* | |
| n7 | multicast address | Mc* | setting IPv4 of multicast group address (possible to set if Net submenu item is set to n2: 1) |
| n8 | unicast NTP address | Uc* | setting IPv4 of NTP unicast server address |
| n9 | NTP poll interval | Pi* | setting of pool interval in range 10-999 seconds in submenu |
| 10 | address autoconfiguration (SLAAC) | 0 | disabled |
| | | **1** | **enabled** |
| 11 | DHCPv6 mode | 0 | disabled |
| | | **1** | **enabled** |
| 12 | **only for WiFi or WiFi5 variant** | | |
| | WiFi mode | **1** | **user-defined wireless network** |
| | | 2 | default wireless network: MOBA-WIFI |
| | | 3 | AP mode |
| 13 | multicast mode for configuration of digital clock | 0 | disable multicast mode |
| | | **1** | **enable multicast mode** |
| 14 | SNMP protocol | 0 | disable SNMP |
| | | **1** | **enable SNMP** |

| Item | Function | Range | |
|------|----------|-------|---|
| 15 | web server | 0 | disable web server |
| | | **1** | **enable web server** |
| LOCL | Link Local Address | submenu for displaying IPv6 address | |
| SLAC | autoconfiguration SLAAC | | |
| dHCP | first address from DHCPv6 | | |
| MANU | manually set IPv6 addres IPv6 address was manually set in a way other than via menu, e.g. web interface | | |
| PrEF | prefix for manually set IPv6 address | | |
| GAtE | gateway from autoconfiguration SLAAC | | |
| MAC | MAC address | submenu for displaying MAC address | |

## 2.3.4.1 NEt submenus

### Submenu for displaying and edit IPv4 address

| A | 1st octet IPv4 address | 0−255 set digit by digit |
|---|------------------------|---------------------------|
| b | 2nd octet IPv4 address | 0−255 set digit by digit |
| C | 3rd octet IPv4 address | 0−255 set digit by digit |
| d | 4th octet IPv4 address | 0−255 set digit by digit |

### Submenu for setting the NTP polling interval

| ddd | setting the polling interval for NTP | ddd = value of the polling interval set digit by digit, the range of each digit is 0−9 range: 10 ÷ 999 seconds |
|-----|--------------------------------------|------------------------------------------------------------------------------------------------------------|

## Submenu for displaying IPv6 address (read only)

| | | |
|---|---|---|
| -b1- | name of the 1st block of the IPv6 address | |
| hhhh | hexadecimal value of the 1st block of the IPv6 address | cannot be edited |
| -b2- | name of the 2nd block of the IPv6 address | |
| hhhh | hexadecimal value of the 2nd block of the IPv6 address | cannot be edited |
| -b3- | name of the 3rd block of the IPv6 address | |
| hhhh | hexadecimal value of the 3rd block of the IPv6 address | cannot be edited |
| -b4- | name of the 4th block of the IPv6 address | |
| hhhh | hexadecimal value of the 4th block of the IPv6 address | cannot be edited |
| -b5- | name of the 5th block of the IPv6 address | |
| hhhh | hexadecimal value of the 5th block of the IPv6 address | cannot be edited |
| -b6- | name of the 6th block of the IPv6 address | |
| hhhh | hexadecimal value of the 6th block of the IPv6 address | cannot be edited |
| -b7- | name of the 7th block of the IPv6 address | |
| hhhh | hexadecimal value of the 7th block of the IPv6 address | cannot be edited |
| -b8- | name of the 8th block of the IPv6 address | |
| hhhh | hexadecimal value of the 8th block of the IPv6 address | cannot be edited |

## Submenu for displaying MAC address
## (only last two octets can be edited under special conditions; conditions not yet set)

| | | |
|---|---|---|
| L1 | 1st octet of MAC address | 0x00 |
| L2 | 2nd octet of MAC address | 0x16 |
| L3 | 3rd octet of MAC address | 0x91 |
| L4 | 4th octet of MAC address | 0xFD, 0xFD |
| L5 | 5th octet of MAC address | 0x00-0xFF |
| L6 | 6th octet of MAC address | 0x00-0xFF |

## 2.3.5 Submenu for sensor settings – SEN1 / SEN2 / SEN3 / SEN4

💬 Depending on sensor type. SEN1 and SEN2 for all clock types, SEN3 and SEN4 only for DT.

| Item | Function | Range | |
|------|----------|-------|---|
| t1 | sensor type | 0–11, P1, P2, P3, 0 | |
| | | P3 | TPHB preset value |
| | | P2 | TPH preset value |
| | | P1 | TP preset value |
| | | -- | no sensor |
| | | **0** | **TP3/30** |
| | | 1 | TPH 1m |
| | | 2 | **only for NTP, PoE, WiFi or WiFi5 variant** |
| | | | TP LAN |
| | | 3 | **only for NTP, PoE, WiFi or WiFi5 variant** |
| | | | TP LAN PoE |
| | | 4 | **only for NTP, PoE, WiFi or WiFi5 variant** |
| | | | TPHP LAN |
| | | 5 | **only for NTP, PoE, WiFi or WiFi5 variant** |
| | | | TPHP LAN PoE |
| | | 6 | **only for NTP, PoE, WiFi or WiFi5 variant** |
| | | | TPH PoE |
| | | 7 | **only for NTP, PoE, WiFi or WiFi5 variant** |
| | | | TPHB LAN |
| | | 8 | **only with RS 485 option** |
| | | | TP RS485 |
| | | 9 | **only with RS 485 option** |
| | | | TPHP RS485 |
| | | 10 | **only with RS 485 option** |
| | | | TPH RS485 |
| | | 11 | **only with RS 485 option** |
| | | | TPHB RS485 |
| t2 | correction of displayed temperature | ct* | submenu for setting the temperature correction in range -9.9 ÷ 9.9 |
| t3 | display of temperature units | 0 | disabled - no units displayed |
| | | **1** | **enabled - units displayed** |
| t4 | temperature units | **°C** | |
| | | °F | |

| Item | Function | Range | |
|------|----------|-------|---|
| t5 | **only for DT information displays** | | |
| | display of temperature with decimal number | **0** | **no decimal, value rounded** |
| | | 1 | with decimal |
| t6 | correction of displayed humidity | cH* | submenu for setting the humidity correction in range -9.9 ÷ 9.9 |
| t7 | display of humidity units | 0 | disabled - no units displayed |
| | | **1** | **enabled - units displayed** |
| t8 | humidity units | **rH** | |
| | | Hr | |
| t9 | **only for DT information displays** | | |
| | display of humidity with decimal number | **0** | **no decimal, value rounded** |
| | | 1 | with decimal |
| 10 | correction of displayed pressure | cP* | submenu for setting the pressure correction in range -999 ÷ 999 |
| 11 | display of pressure units | 0 | disabled - no units displayed |
| | | **1** | **enabled - units displayed** |
| 12 | pressure unit | **hP** | |
| 13 | **only for DT information displays** | | |
| | display of pressure with decimal number | **0** | **no decimal, value rounded** |
| | | 1 | with decimal |
| 14 | preset temperature value | Pt* | submenu for setting the preset temperature value in range -999 ÷ 999<br>DT range: -99.9 ÷ 999.9 |
| 15 | preset humidity value | PH* | submenu for setting the preset humidity value in range 0 ÷ 99<br>DT range: 0.0 ÷ 99.9 |
| 16 | preset pressure | | submenu for setting the preset pressure value in range 0 ÷ 9999<br>(if display of preset value is enabled) |
| 17 | input number for sensor One-Wire | **1** | **input TEMP1** |
| | | 2 | input TEMP2 |
| 18 | **only with RS 485 option** | | |
| | type of communication protocol for RS 485 sensors | 1 | Modbus |
| | | 2 | Spinel |
| 19 | **only with RS 485 option** | | |
| | RS 485 sensor address | 0−61 | |

| Item | Function | Range | |
|------|----------|-------|---|
| 20 | **only with RS 485 option** | | |
| | modulation speed for RS 485 sensors | 1–7 | |
| | | 1 | 1 200 Baud |
| | | 2 | 2 400 Baud |
| | | 3 | 4 800 Baud |
| | | **4** | **9 600 Baud** |
| | | 5 | 19 200 Baud |
| | | 6 | 38 400 Baud |
| | | 7 | 57 600 Baud |
| 21 | **only with RS 485 option** | | |
| | type of communication mode for RS 485 sensors | **0** | **MASTER** |
| | | 1 | passive LISTENER |
| 22 | **only for NTP, PoE, WiFi or WiFi5 variant** | | |
| | type of communication protocol for LAN sensors | 1 | Modbus |
| | | 2 | Spinel |
| 23 | **only for NTP, PoE, WiFi or WiFi5 variant** | | |
| | LAN sensor IP address | IP* | submenu for setting the IPv4 address of sensor |

## 2.3.5.1 SEN1 / SEN2 / SEN3 / SEN4 submenus

| ct | submenu for setting the temperature correction | |
|---|---|---|
| -d.d | setting of the displayed temperature correction on display | - = negative correction value<br>d.d = value of correction set digit by digit, the range of each digit is 0−9<br>range: -9.9 ÷ 9.9 °C |

| cH | submenu for setting the humidity correction | |
|---|---|---|
| -d.d | setting of the displayed humidity correction on display | - = negative correction value<br>d.d = value of correction set digit by digit, the range of each digit is 0−9<br>range: -9.9 ÷ 9.9 |

| cP | submenu for setting the pressure correction | |
|---|---|---|
| -ddd | setting of the displayed pressure correction on display | - = negative correction value<br>ddd = value of correction set digit by digit, the range of each digit is 0−9<br>range: -999 ÷ 999 |

| Pt | submenu for setting the preset temperature value | |
|---|---|---|
| ddd | setting of the preset temperature value | dd.d = preset value set digit by digit, the range of each digit is 0−9<br>range: -99 ÷ 999 |
| -.d | decimal part | d = value<br>range: 0 ÷ 9 |

| PH | submenu for setting the preset humidity value | |
|---|---|---|
| dd | setting of the preset humidity value | dd.d = preset value set digit by digit, the range of each digit is 0−9<br>range: 0 ÷ 9 |
| -.d | decimal part | d = value<br>range: 0 ÷ 9 |

| PP | submenu for setting the preset pressure value | |
|---|---|---|
| dddd | setting of the preset pressure value | dd.d = preset value set digit by digit, the range of each digit is 0−9<br>range: 0 ÷ 9999 |
| -.d | decimal part | d = value<br>range: 0 ÷ 9 |

## 2.3.6 Submenu for stopwatch setting – StoP

| Item | Function | Range | |
|------|----------|-------|---|
| PrES | setting of stopwatch start time | | |
| h1 | counting direction | 1–4 | |
| | | **1** | **upwards** |
| | | 2 | downwards from a set time value, with stop at zero |
| | | 3 | downwards from a set time value, with automatic restart from the specified time value |
| | | 4 | downwards from a set time value, until zero and keeping the count into negative values |
| h2 | control mode (corresponding PBs are listed in brackets) | 1–4 | |
| | | **1** | **S/S (PB3)** — **altering START - STOP - UNFREEZE of display (if freezed display)** |
| | | | **HOLD (PB1)** — **FREEZE of displayed data with the counter proceeding in the counting** |
| | | | **RESET (PB1L)** — **setting the counter to zero in STOP operating mode, for counting up, and return to a preset value in all other counting modes** |
| | | 2 | S/S (PB3) — altering START - STOP - UNFREEZE of display (if freezed display) |
| | | | HOLD (PB1) — the first press of PB causes the display to freeze on the respective time achieved and lets counter running; further activation of PBs shows the intermediate time elapsed from the first press |
| | | | RESET (PB1L) — reset of the counter in the STOP mode while in counting up, return to preset value in other counting modes |
| | | 3 | S/S (PB3) — count up from zero or from preset value in countdown mode, next press of push button causes the display to freeze and to resume the count from zero in counting up or from preset value in countdown mode |
| | | | HOLD (PB1) — unfreeze of display, leaving the counter to continue in counting |
| | | | RESET (PB1L) — counter reset to zero or return to preset value followed with counter stop |

| Item | Function | Range | | |
|------|----------|-------|---|---|
| h2 | control mode (corresponding PBs are listed in brackets) | 4 | S/S (PB3) | triggering the counter |
| | | | HOLD (PB1) | stopping the counter |
| | | | RESET (PB1L) | resetting the counter or return to preset value with counter stop |
| | | 5 | S/S (BRB10) | Alternately: 1) Start 2) Stop 3) Reset |
| | | 6 | S/S (BRB10) | Alternately: 1) Stopwatch display + Start 2) Stop 3) Default display + Reset |
| h3 | counting unit | 1–4 | | |
| | | **1** | | **counting in increments of $^1/_{100}$ sec. (with 4-digit display the counting goes on until 59.99 sec., and then continues with displaying minutes : seconds), up to 59 minutes and 59.99 seconds maximum** |
| | | 2 | | counting in increments of 1 second (with 4-digit display the counting goes on until 59 minutes and 59 seconds, and then with displaying of hours : minutes), until 23 hours, 59 minutes and 59 seconds at maximum |
| | | 3 | | counting in 1 minute steps, until 23 hours and 59 minutes |
| | | 4 | | counting in periods after one day, subtraction or addition always takes place around midnight, capacity of counting up to 9999 days when counting is stopped, the dost is displayed after the last digit |
| h4 | **only for REL / REL-IP option** | | | |
| | contact closing | 0–30, C | | |
| | | **0** | | **function disabled** |
| | | 1–30 | | time period of contact for stopwatches, passing through zero while operating in countdown mode, starting from preset value |
| | | C | | contact is closed during active counting |
| h5 | **only for DA digital clocks** | | | |
| | percentage value display | 0–1 | | |
| | | **0** | | **function disabled** |
| | | 1 | | when counting down from preset value, the second circle displays the countdown time in percent |

| Item | Function | Range | |
|------|----------|-------|---|
| h6 | external keyboard connection | 0–1 | |
| | | **0** | **function disabled** |
| | | 1 | connected;<br>temperature sensors TP 3m/30m and TPH 1m cannot be connected |
| h7 | timeout to switch to default display for BRB | 0–99 | |
| | | **0** | **function disabled** |
| | | 1–99 | time in seconds to go to the default display after stopping the stopwatch or reaching the target time |

## 2.3.6.1 StoP submenu

**Submenu for setting the start time of the stopwatch**

| HH:MM | HH | hour setting, range 0–99 |
|-------|------|---------------------------|
| | MM | minute setting, range 0–59 |
| SS.HsHs | SS | second setting, range 0–59 |
| | HsHs | $^1/_{100}$ second setting, range 0–99 |

## 2.3.6.2 Stopwatch control diagram (menu item h2)

### Control mode 1

**STOPWATCH DISPLAY**
displays zeroes or preset value

S/S
PB3

**START**
stopwatch starts
counting

HOLD
PB1

**FREEZE**
freeze of displayed data,
counter proceeds counting

S/S
PB3

S/S
PB3

**UNFREEZE**
unfreezing the display

**STOP**
stopwatch stops counting

S/S
PB3

**START**
stopwatch starts counting

RESET
PB1L

**RESET**
setting the counter to zero
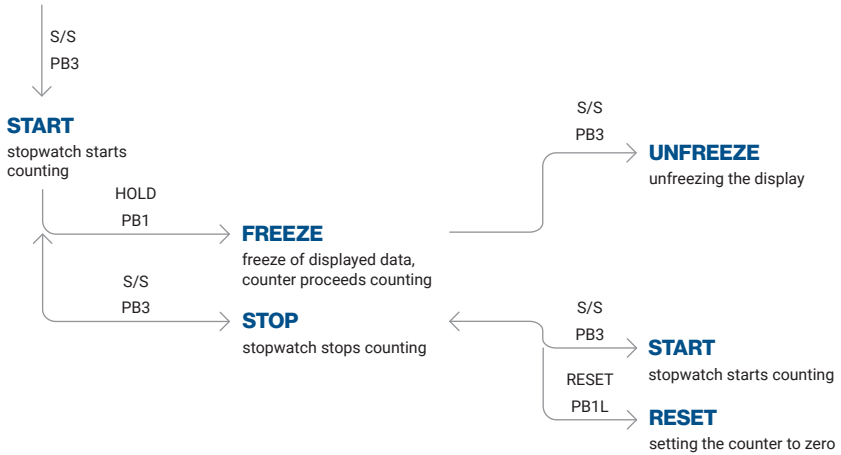
### Control mode 2

**STOPWATCH DISPLAY**
displays zeroes or preset value

S/S
PB3

**START**
stopwatch starts
counting

HOLD
PB1

**FREEZE**
freeze of displayed data,
counter proceeds counting

HOLD
PB1

**INTERMEDIATE TIME**
further activations of push button
displays intermediate time elapsed
from the first press

S/S
PB3

**UNFREEZE**
unfreezing the display

S/S
PB3

**STOP**
stopwatch stops counting

S/S
PB3

**START**
stopwatch starts counting

RESET
PB1L

**RESET**
setting the counter to zero
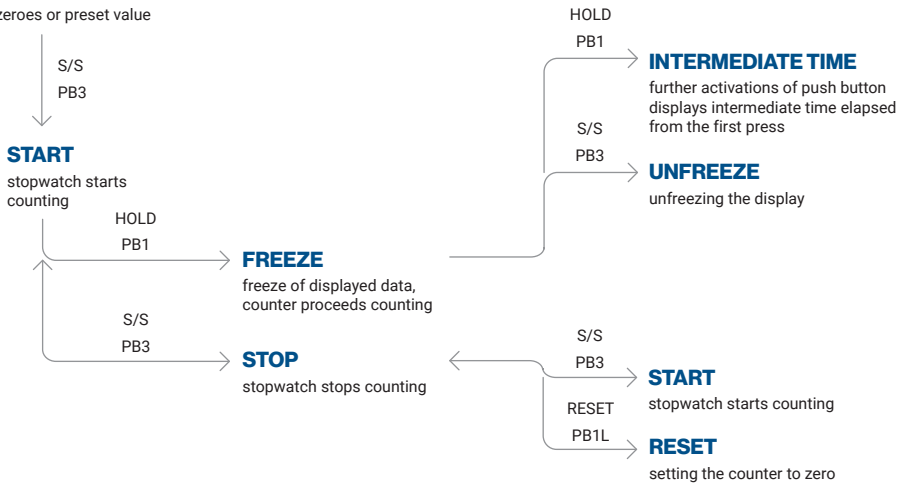
# Control mode 3

**STOPWATCH DISPLAY**
displays zeroes or preset value

S/S
PB3

**START**
stopwatch starts
counting

S/S
PB3

**FREEZE**
freeze of displayed data
and resume counting from
zero in counting up or from
preset time value in countdown mode

RESET
PB1L

**RESET**
setting the counter to zero
or preset value

S/S
PB3

**FREEZE**
freeze of displayed data
and resume counting from zero
in counting up or from preset time
value in countdown mode

HOLD
PB1

**UNFREEZE**
unfreezing the display

RESET
PB1L

**RESET**
setting the counter to zero
or preset value

S/S
PB3

**START**
stopwatch starts counting

RESET
PB1L

**RESET**
setting the counter to zero or preset value

# Control mode 4

**STOPWATCH DISPLAY**
displays zeroes or preset value

S/S
PB3

**START**
stopwatch starts
counting

HOLD
PB1

**STOP**
stopwatch stops counting

S/S
PB3

**START**
stopwatch starts
counting

RESET
PB1L

**RESET**
setting the counter to zero
or preset value
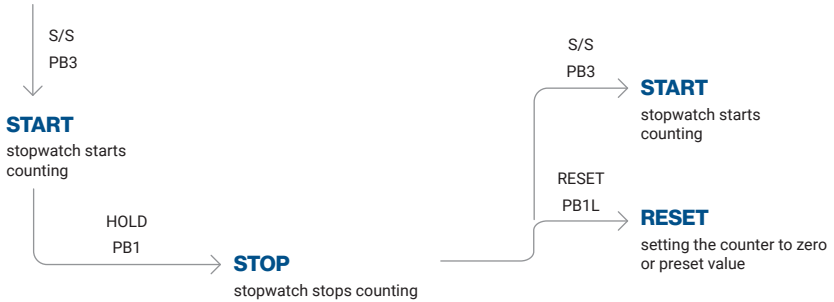
# Control mode 5 and 6

**h2:5 = BRB**
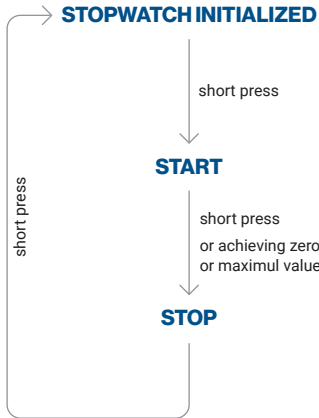
**h2:6 = BRB with default display**
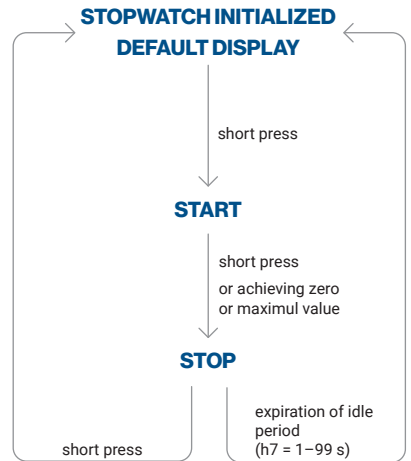


Default stopwatch display:

1  Display OFF (the display is OFF) for **d3:4** setting (stopwatch only)
2  Display Time, Date or Temperature for **d3:0, 1, 2, 3, 5, 6, U** setting

## 2.3.6.3 BRB10 connection

The BRB10 button is connected via the **NO** contact to the **TEMP** connector (or **CTRL** connector for DSC clocks) on the clock PCB.

1)



2)
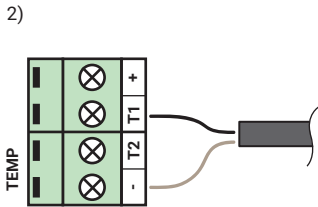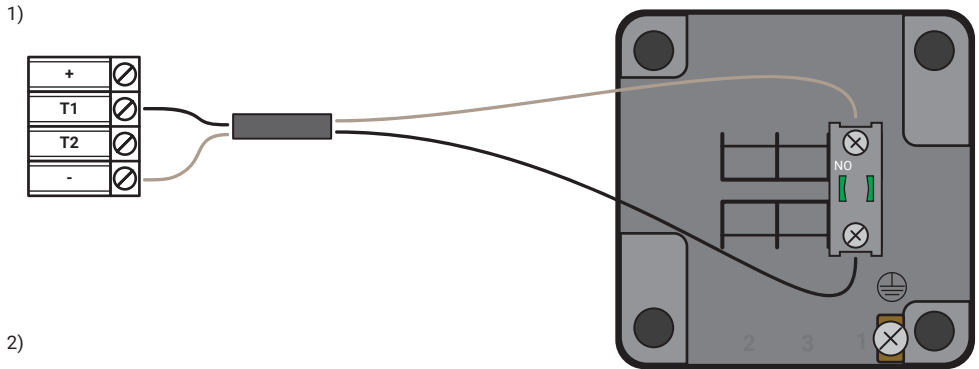
BRB10 button body after disassembly of the top part.



3)
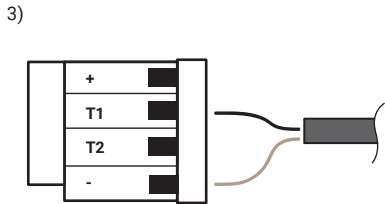
## 2.3.7  Submenu for time and date setting – tIME

| Item | Function | Range | |
|------|----------|-------|---|
| HH:MM | time | submenu for setting time | |
| DD.MM. | date | submenu for setting date and year | |
| 20YY | year | | |

### 2.3.7.1  tIME submenus

**Submenu for setting time**

| HH:MM | HH | setting of time, range 0−23 |
|-------|-----|------------------------------|
| | MM | setting of minutes, range 0−59 |

**Submenu for setting date and year**

| DD.MM. | DD | setting of day, range 1−31 |
|--------|-----|------------------------------|
| | MM | setting of month, range 1−12 |
| 20YY | YY | setting of year, range 0−99 |

**Note:**

If the set date is out of valid range while saving the set year, it will be automatically corrected. The menu will not be saved, it will return back to the beginning of setting the day and it is necessary to go through the entire setting menu again to confirm or modify the suggested date changes.

## 2.3.8 Submenu for system MENU – SYST

| Item | Function | Range | |
|---|---|---|---|
| c0 | diagnostic tools | **1*** | **display test** |
| | | 2* | display of active alarms |
| | | 3* | display of internal temperature |
| | | 4* | display of test results |
| | | 5* | display of calibration deviation |
| c1 | default settings | **0** | **no function** |
| | | 1* | invoke default settings |

## 2.3.8.1 SYST submenus

### Submenu for diagnostic tools

| 1 | lighting up all segments of the display - 88.:88. | | |
|---|---|---|---|
| 2 | AL:-- or AL:xx | AL:-- | if any alarm is not active |
| | | AL:xx | xx represents active alarm bit to browse between active bites, use **>>** on the controller or **PB2** |
| 3 | dd°C | dd = internal temperature in °C example: 25 °C | |
| 4 | PASS, FAIL, Not | PASS | tested in production with a pass result |
| | | FAIL | tested in production with a failed result |
| | | Not | not tested in production |
| 5 | -- --, or 0xxx, or xx.xx | -- -- | calibration deviation greater than 1000 ppm |
| | | 0xxx | calibration deviation greater than 100 ppm |
| | | xx.xx | calibration deviation less than 100 ppm |
| | negative deviation is indicated by a lit dot at the first digit currently running calibration is indicated by a flashing decimal point | | |

### Submenu for default settings

| 1 | FAC | **FAC** inscription flashes by confirming **OK** on controller or **PB2L** will invoke the default setting |
|---|---|---|

# 3 Local time calculation

## 3.1 Basic setting – control according to source of synchronization

| Item | Function | Description |
| --- | --- | --- |
| o1 | A | time zone is taken over according to the source of synchronization |
| o2 | 2–8, 11, A | synchronization signal type |
| o4 | 0 | MOBALine time zone is not used |
| o5 | 0 | time zone server is not used |
| d2 | A | display time and date according to source of synchronization incl. daylight saving time |

This setting is suitable for digital clocks synchronized by a DCF receiver or controlled by a master clock as slave clock in a time distribution system. The internal time one table is not used.

## 3.2 Calculation using MOBALine time zones

| Item | Function | Description |
| --- | --- | --- |
| o1 | A | time zone is taken over according to the source of synchronization, the UTC time calculation is based on the MOBALine information |
| o2 | 4 | MOBALine |
| o4 | 1–20 | selection of the MOBALine time zone |
| d2 | A | display time and date according to chosen MOBALine time zone, incl. daylight saving time |

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

## 3.3 Calculation using time zone server MOBATIME

| Item | Function | Description |
| --- | --- | --- |
| o1 | A | NTP protocol uses UTC time zone |
| o2 | A | automatic |
| o5 | 1–15 | selection of the time zone server time zone |
| d2 | A | display time and date according to chosen time zone server time zone, incl. daylight saving time |

This setting is suitable for NTP, PoE, WiFi and WiFi5 digital clocks controlled by MOBATIME NTP servers which supports the time zone server functionality.

## 3.4 Calculation using time zone entries preconfigured by MOBA-NMS software

| Item | Function | Description |
|------|----------|-------------|
| o1 | A | NTP protocol uses UTC time zone |
| o2 | A | automatic |
| o5 | 0 | no time zone server is used |
| d2 | U1−U7 | display time and date according to chosen preconfigured time zone entry, incl. daylight saving time |

This setting is suitable for NTP, PoE, WiFi and WiFi5 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.

## 3.5 Calculation according to internal time zone table

| Item | Function | Description |
|------|----------|-------------|
| o1 | 0−64 | according to the time zone in which source of synchronization works (e.g. value 2 for DCF in west Europe) |
| o2 | 1−8, 11, A | autonomous operation or any type of the synchronizing signal |
| o4 | 0 | MOBALine time zone is not used |
| o5 | 0 | time zone server is not used |
| d2 | 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 where the displayed time is needed in 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 – See chapter 9 Time zone table v11.

# 4 Non-network clock operation

Configure the position of DIP switch according to the source of synchronization (DCF position if the source is DCF, otherwise do not configure the position for MOBATIME serial code, polarized impulse line, MOBALine or IRIG-B).

Choose the item **o2** in SYNC menu and set the type of synchronization. The auto-detection mode (**o2: A**), when the type of synchronization signal is set automatically, is applicable for DCF signal, MOBATIME serial code, IRIG-B. The permanently lit colon during the time display signalizes the clock is synchronized by the synchronization source.

## 4.1 Autonomous clock synchronized by DCF 77 receiver

- Set value **A** in SYNC menu items **o1**, **o2** and in dISP menu item **d2**.
- Connect the DCF 77 receiver to the clock terminal board placed on the anchoring plate (LINE IN terminals) using a twin-wire cable.
- The maximum wire length depends on its diameter (approx. 100–300 m).
- In case the connection is correct and the input signal is at high level, the LED on the receiver is flashing periodically once a second with one pulse left out at the 59th second.

  ⚠  **If the polarity is incorrect, the LED does not flash. In such case, interchange the two wires.**

- Install the receiver at a place with a high-level radio signal. Do not install the receiver near sources of interfering signals, such as personal computers, TV sets or other types of power consumers (the digital clock itself generates interfering signals too).
- Position the receiver with its transparent cover (DCF 450) or the arrow on the cover (DCF 4500) facing the transmitter (located in Frankfurt, Germany). Presuming the good quality DCF 77 signal the synchronization takes place in approx. 3 to 4 minutes. In case of poor quality of the signal (mainly during the day time), the first time setting is to be done manually. The red LED of the receiver displays a working connection by flashing once a second without flickering.
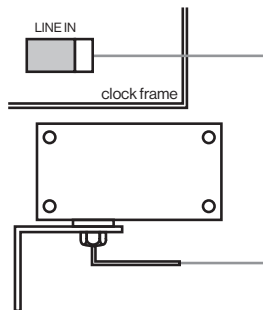
## 4.2 Autonomous clock synchronized by GPS receiver

- Set values **o2:10**, **o1:A** in the SYNC menu and the desired time zone is dISP menu item **d2**.
- Connect the GPS antenna to SMA connector.
- Presuming the good position of the GPS receiver the synchronization takes place in approx. 10 to 20 minutes.
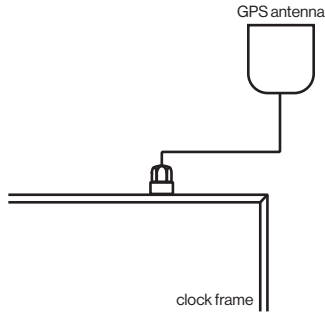


## 4.3 Autonomous clock synchronized by GPS receiver (GNSS 4500)

- Set value **A** in SYNC menu items **o1**, **o2** and the desired time zone in dISP menu item **d2**.
- Using jumper JP17 set the power supply output (DC OUT) on pins 3, 4 of the JP1 connector.
- Connect GPS receiver (GNSS 4500) to the clock terminal board placed on the anchoring plate (LINE IN and DC OUT terminals) using four-wire cable.

   ⚠ **Please note the correct polarity of the wires – see the GPS user manual.**

- For the correct placing of the receiver please follow the GPS user manual.
- Presuming the good position of the GPS receiver (GNSS 4500) the synchronization takes place in approx. 10 to 20 minutes.
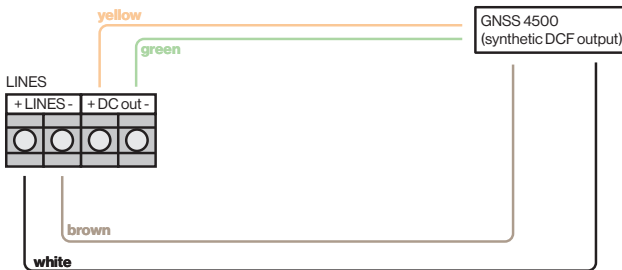
# 4.4 Slave clock controlled by synchronizing impulses

On digital clock connected in time distribution system controlled by synchronizing impulses choose the item **o2** in the SYNC menu and set it according type impulse lines (one minute, half minute, second pulses) and in item **o3** choose mode of processing impulse line (polarized / unpolarized impulses, synchronization and time setting / synchronization only).

Set the value **A** in SYNC menu item **o1** and in dISP menu item **d2**.
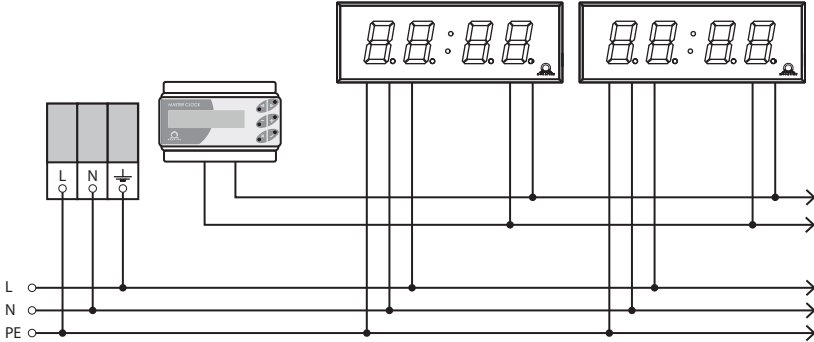


## 4.4.1 Synchronization and time setting – o3 mode 1 and 3

- Clocks are set according to the slave line time on the **MASTER** clock.
- Stop the slave line on **MASTER** clock.
- Set all **SLAVE** clocks on the same time. Set the current date on the digital clock. The clock stand still and the colon flashes in 2 second interval.
- Set the time of the slave line to the same time as on **SLAVE** clocks.
- Run the slave line on **MASTER** clock.
- After receiving each impulse, the displayed time is increased by one minute (or by 30 seconds or 1 second respectively).
- After expiration of run-out time the **SLAVE** clocks are synchronized by the time information generated by the **MASTER** clock, the colon flashes constantly.
- In case of the line fault, the clock displays the right time information based on its own quartz time base. When the normal operation of the line resumes, the **SLAVE** clock adjusts itself to the time equal to the **MASTER** clock.

## 4.4.2  Synchronization only – o3 mode 2 and 4

- The clock time-base is synchronized by incoming pulses in normal operation of the slave line.
- Set current date and time on the **SLAVE** clock according the **MASTER** clock time with accuracy of ±30 seconds (or ±15 seconds, or ±0.5 second respectively).
- The colon flashes in 2 second interval.
- After 2–3 minutes are the clocks synchronized with the **MASTER** clock. The colon is permanently lit during the display of time.
- In case of the line fault, the clock displays the right time information based on its own quartz time base. When the normal operation of the line resumes, the clock synchronizes with the incoming pulses.

## 4.5  Slave clock controlled by MOBATIME serial code, MOBALine or IRIG-B

- After connection of the digital clock to the signal source, time and date are adjusted automatically, following the receipt of valid time information.
- The time setting with using the serial coded line takes place within at least 3 to 4 minutes, for MOBALine and IRIG-B within 6 to 15 seconds.
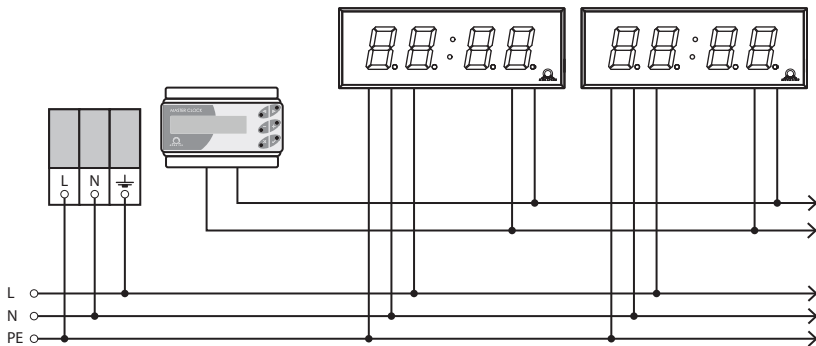


## 4.6  Slave clock controlled by IF482 over RS 485

- After 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.

# 5 NTP and PoE clock operation

Clocks support IPv4 and IPv6 protocols. You can disable individual protocols by setting parameter **n1**. The default clock setting allows both protocols at the same time (**n1: 0**).

For IPv4 mode, DHCPv4 is enabled by default (**n3: 1**).

IPv6 mode allows up to 4 different priority IP addresses in downward order:

- DHCPv6
- manually configured IP address (fix)
- autoconfiguration (SLAAC / RA)
- local address link

By setting parameter **n10** you can disable DHCPv6 and / or auto-configuration (SLAAC) by setting parameter **n11**.

For IPv6 mode, DHCPv6 and auto-configuration (SLAAC) are enabled by default:

1 for DHCPv6 menu item **n10: 1**
2 for SLAAC menu item **n11: 1**


Calculation of Link Local Address:

fe80 :: 2 [2nd octet MAC]: [3rd octet MAC] ff: fe [4th octet MAC]: [5th octet MAC] [6th octet MAC]


Example:

- MAC:    00: 16:91 : 12:34:56

- IPv6:   fe80 :: 216: 91ff: fe12: 3456
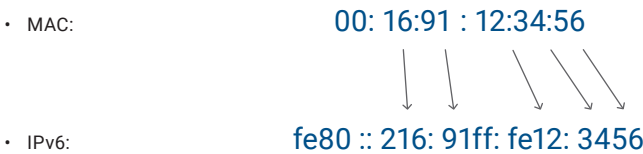
## 5.1  Unicast mode

The clock is synchronized to UTC (Universal Time Coordinated) from a NTP server (up to four IPv4 / IPv6 addresses for NTP server configurable) and must have assigned its own IPv4 / IPv6 address. The clock requests in defined intervals (adjustable in menu item **n9**) 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 web interface (**n15: 1**), SNMP (**n14: 1**) or the MOBA-NMS software tool. For supervision and configuration with MOBA-NMS, the clock's IPv4 / IPv6 address can be used or the multicast group (**n7**) address having last octet cleared to zero (presuming the multicast is not disabled – **n13: 1**).

It is necessary to set appropriate time-zone for correct displaying of local time and date (see chapter 3 for details).

### Default network parameters:

| | |
|---|---|
| IP mode | IPv4 / IPv6 |
| IPv4 address | 0.0.0.0 |
| IPv4 subnet mask | 0.0.0.0 |
| IPv4 default gateway | 0.0.0.0 |
| NTP server address 1 | 0.0.0.0 / 0:0:0:0:0:0:0:0 |
| NTP server address 2 | 0.0.0.0 / 0:0:0:0:0:0:0:0 |
| NTP server address 3 | 0.0.0.0 / 0:0:0:0:0:0:0:0 |
| NTP server address 4 | 0.0.0.0 / 0:0:0:0:0:0:0:0 |
| NTP request time [s] | 10 |
| DNS server | 0.0.0.0 / 0:0:0:0:0:0:0:0 |
| SNMP manager 1 | 0.0.0.0 / 0:0:0:0:0:0:0:0 |
| SNMP manager 2 | 0.0.0.0 / 0:0:0:0:0:0:0:0 |
| multicast config address | 239.192.54.1 / FF38::EFC0:3601 (FF38:239.192.54.1) |
| alive notification interval [min] | 30 |
| configuration port number | 65532 |
| time zone client port number | 65534 |
| DHCPv4 | enabled |
| SNMP | enabled |
| multicast support | enabled |
| IPv6 fix address / prefix | 0:0:0:0:0:0:0:0 / 64 |
| IPv6 link local address | fe80::2[2nd octet MAC]:[3rd octet MAC]ff:fe[4th octet MAC]:[5th octet MAC][6th octet MAC] |
| DHCPv6 | enabled |
| autoconfiguration (SLAAC) | enabled |
| web server | enabled |
| web server password | mobatime |

### 5.1.1 Network parameters assigned by DHCP

IP clock mode must be set to IPv4 mode (**n1: 0/1**). The NEt menu item **n3** must be set to value **1**. Network parameters are automatically obtained from a DHCPv4 server.

The following DHCP options will be evaluated automatically:

[50]        IP address

[3]         gateway address

[1]         subnet mask

[42]        list of up to four NTP server addresses / time zone address (usually the same as the NTP server address)

[6]         DNS servers

[26]        MTU

[60]        vendor Class ID

[43]
or [223]    additional options (refer to document BE-800793)

The network administrator must configure the DHCPv4 options accordingly. Assigned parameters can be checked in the submenu of items **n4**−**n6**.

### 5.1.2 Manual setting through setup menu

The NEt menu parameter **n3** must be set to value **0** (DHCPv4 set to disabled).

•   Enter the item **n4** submenu for setting the clock's IP address.
•   Enter the item **n5** submenu for setting the subnet mask.
•   Enter the item **n6** submenu for setting default gateway.
•   Enter the item **n7** submenu for setting multicast group address.
•   Enter the item **n8** submenu for setting unicast NTP server address.

### 5.1.3 Setting network parameters over DHCPv6

IP clock mode must be set to IPv6 mode (**n1: 0/2**). The NEt menu item **n11** must be set to value **1**. The network parameters are automatically retrieved from the DHCPv6 server.

The following DHCPv6 options can be processed:

[3]         non-temporary addresses

[16]        vendor class

[17]        vendor options

[23]        DNS servers

[24]        DNS domains

[25]        identify association for prefix delegation

[31]        SNTP

The network administrator must set the DHCPv6 options accordingly.

## 5.1.4  Setting network parameters over autoconfiguration (SLAAC)

IP clock mode must be set to IPv6 mode (**n1: 0/2**). The NEt menu item **n10** must be set to value **1**. The network parameters are automatically retrieved from the DHCPv6 server.

The following SLAAC options can be processed:

[3]         prefix info

[5]         MTU

[24]        route info

[25]        RDNSS

The network administrator must set the SLAAC options accordingly.

## 5.1.5  SNMP

The  clock supports SNMP version 2c notifications and parameter reading and setting by means of SNMP GET and SET commands. This allows integrating the clock to a network management system. The digital clock (SNMP agent) can send alarm and alive notifications to a SNMP manager. The IP address of the SNMP manager can be provided to the clock by DHCP, web interface, SNMP or the MOBA-NMS. The structure of supported parameters is defined in a MIB file (refer to document 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 alarm.

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 | romobatime |
| read / write community | rwmobatime |
| notification (trap) community | trapmobatime |

## 5.2 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 chapter 3 for details).

**Default network parameters:**

| | |
|---|---|
| IPv4 multicast group address | 239.192.54.1 |
| IPv4 multicast config address | 239.192.54.0 |
| IPv6 multicast group address | FF38::EFC0:3601 (FF38::239.192.54.1) |
| IPv6 multicast config address | FF38::EFC0:3600 (FF38::239.192.54.0) |
| configuration port number | 65532 |
| time-zone client port number | 65534 |

The NEt menu item **n2** must be set to value **1**.

# 6  Firmware update

Firmware update can be done in several ways, such as:

·  management software MOBA-NMS
·  WEB server
·  SNMP

## 6.1  Firmware update via MOBA-NMS

For instruction about firmware update via MOBA-NMS, please visit **http://www.mobatime.com**.

## 6.2  Firmware update via WEB server

·  Install TFTP server (e.g. *tftpd32*).
·  Allow access in Windows security window after opening TFTP server file.
·  Place firmware file with name *device.upd* to folder from which your TFTP server serve files.
·  Open web interface of digital clock, which you want to update.

> The IP address of clock can be found in NEt menu table → item **n4** – see page 17.
>
> Type IP address of clock to the URL bar of your browser.

·  In the web interface, please navigate to section **Command**.
·  Update will be invoked by pressing **Apply**.
·  In dependence of your TFTP server, information about update progress is displayed.
·  Wait about 1 minute after firmware download.
·  Check whether the firmware version is correct.

⚠  **If the firmware version is not correct, it is necessary to repeat procedure.**

## 6.3  Firmware update via SNMP

·  Install TFTP server (e.g. *tftpd32*).
·  Allow access in Windows security window after opening TFTP server file.
·  Place firmware file with name *device.upd* to folder from which your TFTP server serve files.
·  Open your SNMP manager software and load MIB file.
·  Find variable *mbnscCommandFirmwUpd* and set it to *device.upd*.
·  In dependence of your TFTP server, information about update progress is displayed.
·  Wait about 1 minute after firmware download.
·  Check whether the firmware version is correct.

⚠  **If the firmware version is not correct, it is necessary to repeat procedure.**

# 7 Specifications

## 7.1 ECO-DC

### Basic features
- digits of 57 / 75 / 100 mm height, which corresponds to readability distance of 25 / 32 / 40 m
- digits in red, pure green blue, yellow, white and green color
- display composed of 7-segment LEDs
- manual or automatic adjustment of the luminosity of LED diodes
- altering time and date display with adjustable time period
- time display format in four digits (HH : MM) or six digits (HH : MM $^{SS}$ or HH : MM : SS), 12 or 24- hour cycle
- date display format in four digits (DD. MM.) or six digits (DD. MM.$^{YY}$ or DD. MM. YY)
- AM/PM indication for 12-hour cycle
- temperature indication in °C or °F (providing the temperature sensor is connected)
- TEMP connector is used to connect temperature sensors or stopwatch control

### Mechanic
- clock frame made of ABS plastic in black color
- anti-reflection front cover made of plexiglass
- single or double sided design
- wall mounting (only for single sided design), ceiling suspension or wall bracket mounting
- connectors, push buttons and state LEDs are accessible on the back side in the recess
- protection degree IP 30 (IP 32 on request)
- equipment protection glass II – plastic case, no PE connection (except combination with DCF receiver)
- working temperature -5 to +55 °C

### Synchronization
- autonomous operation with internal quartz time base
- accuracy ±0.1 s/day at constant temperature – software trimming
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-G; mains powered
- RTC backup with supercapacitor

### Configuration
- setting of the clock parameters and time / date by means of push buttons or IR remote control

### Network connection options
- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

## 7.1.1 Technical parameters

| ECO-DC. | | 57.4 | 57.6 | 57x.6 | 75.4 |
|---|---|---|---|---|---|
| Display | digit height [mm] | 57 | 57/38 | 57 | 75 |
| | number of digits | 4 | 4 + 2 | 6 | 4 |
| Time and date display format | HH : MM | ✓ | | | ✓ |
| | HH : MM SS | | ✓ | | |
| | HH : MM : SS | | | ✓ | |
| | DD. MM. | ✓ | | | ✓ |
| | DD. MM. YY | | ✓ | | |
| | DD. MM. YY | | | ✓ | |
| Viewing distance [m] | | 25 | | | 32 |
| Synchronization | NTP | NTP protocol, mains powered | | | |
| | PoE | NTP protocol, PoE powered | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | |
| Power | mains powered | 100−240 VAC, 50−60 Hz | | | |
| | PoE | IEEE 802.3 af-Class 3 | | | |
| | VDC | 18−55 V, see Voltage table, chpt. 8 | | | |
| | VDISP | supply voltages depends on display color, see Voltage table, chpt. 8 | | | |
| Power consumption AC / DC [VA] | single sided | 7 | 8 | 8 | 7 |
| | double sided | 11 | 16 | 16 | 11 |
| Power consumption PoE [VA] | single sided | 7 | 8 | 8 | 7 |
| | double sided | 11 | 15 | 15 | 11 |
| Quartz base and running reserve | running reserve | 96 hours by means of supercapacitor | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | |
| | range -50 to +125 °C | ±2.0 °C | | | |
| Operation environment | temperature | -5 to +55 °C | | | |
| | protection degree | IP 30 (IP 32 on request) | | | |
| Weight [kg] | single sided | 0.75 | 1.15 | 1.25 | 1.25 |
| | double sided | 2 | 2.8 | 3 | 3 |
| Dimensions [mm] W x H x D | single sided | 341 122 49 | | | |
| | double sided | 341 122 99 | | | |

| ECO-DC. | | 75.6 | 75x.6 | 100.4 | 100.6 | 100x.6 |
|---|---|---|---|---|---|---|
| Display | digit height [mm] | 75/57 | 75 | 100 | 100/57 | 100 |
| | number of digits | 4 + 2 | 6 | 4 | 4 + 2 | 6 |
| Time and date display format | HH : MM | | | ✓ | | |
| | HH : MM $^{SS}$ | ✓ | | | ✓ | |
| | HH : MM : SS | | ✓ | | | ✓ |
| | DD. MM | | | ✓ | | |
| | DD. MM. $^{YY}$ | ✓ | | | ✓ | |
| | DD. MM. YY | | ✓ | | | ✓ |
| Viewing distance [m] | | 32 | | 40 | | |
| Synchronization | NTP | NTP protocol, mains powered | | | | |
| | PoE | NTP protocol, PoE powered | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | |
| Power | mains powered | 100−240 VAC, 50−60 Hz | | | | |
| | PoE | IEEE 802.3 af-Class 3 | | | | |
| | VDC | 18−55 V, see Voltage table, chpt. 8 | | | | |
| | VDISP | supply voltages depends on display color, see Voltage table, chpt. 8 | | | | |
| Power consumption AC / DC [VA] | single sided | 8 | 8 | 7 | 8 | 10 |
| | double sided | 16 | 16 | 11 | 16 | 18 |
| Power consumption PoE [VA] | single sided | 8 | 8 | 7 | 8 | 10 [1] |
| | double sided | 15 | 15 | 11 | 15 | − [1] |
| Quartz base and running reserve | running reserve | 96 hours by means of supercapacitor | | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | |
| Operation environment | temperature | -5 to +55 °C | | | | |
| | protection degree | IP 30 (IP 32 or IP 40 on request) | | | | |
| Weight [kg] | single sided | 1.8 | 1.8 | 1.8 | 1.9 | 2 |
| | double sided | 4.1 | 4.1 | 4.1 | 4.3 | 4.5 |
| Dimensions [mm] W x H x D | single sided | 580 480 53 | | | | |
| | double sided | 580 480 120 | | | | |

**Note:**

1  PoE not available for ECO-DC100x.6 double sided

# 7.1.3 Dimensions and assembly diagram

ECO-DC.x.x.N.N
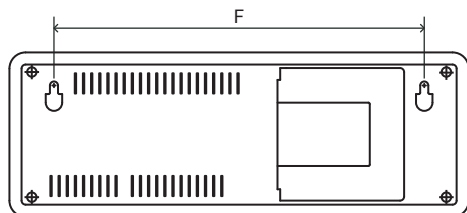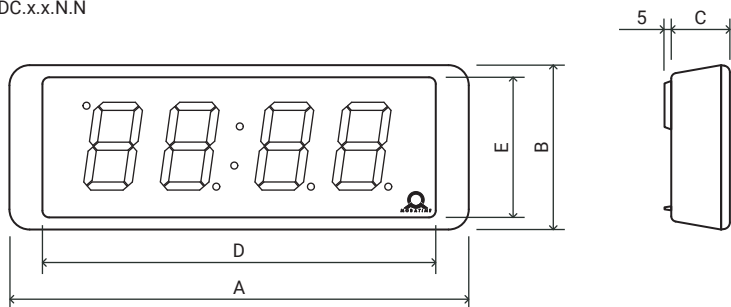
ECO-DC.x.x.x.S
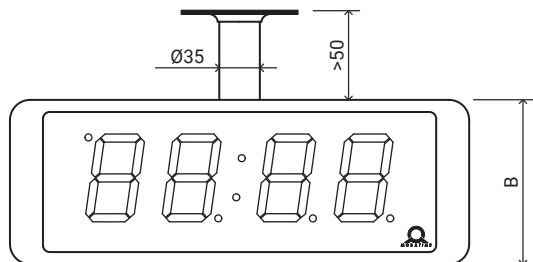
ceiling suspension
double sided

ceiling suspension
single sided
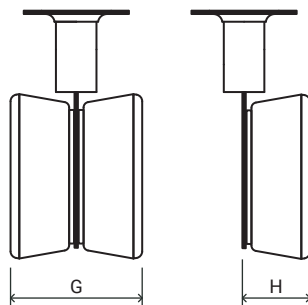
ECO-DC.x.x.x.B
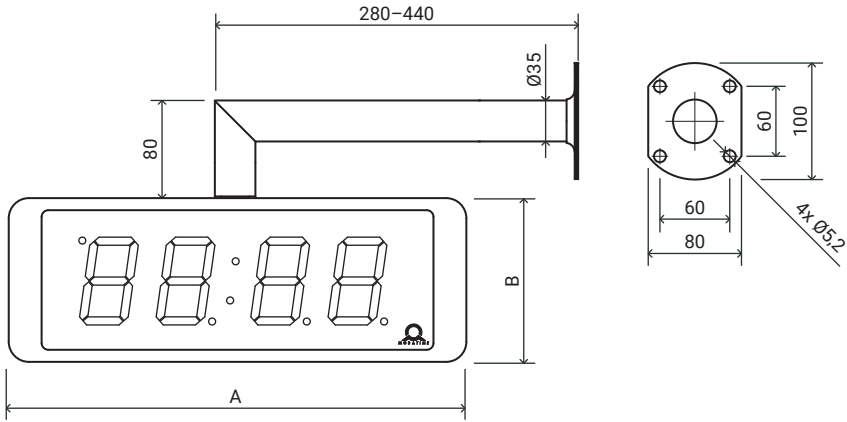


## Dimensions table [mm]

| ECO-DC. | 57.4 | 57.6 | 57x.6 | 75.4 | 75.6 | 75x.6 | 100.4 | 100.6 | 100x.6 |
|---------|------|------|-------|------|------|-------|-------|-------|--------|
| A | | 341 | | | | | 580 | | |
| B | | 122 | | | | | 180 | | |
| C | | 44 | | | | | 53 | | |
| D | | 292 | | | | | 520 | | |
| E | | 104 | | | | | 150 | | |
| F | | 275 | | | | | 520 | | |
| G | | 99 | | | | | 120 | | |
| H | | 52 | | | | | 60 | | |

## 7.1.4  Mounting

### 7.1.4.1  Single sided

- Drill two anchoring holes into the wall of a diameter adequate to accommodate supplied wood-type screws with dowels. See the assembly diagram for appropriate hole spacing.
- Mount the hanging screws with the dowels to drilled holes in a way that the heads of the screws are approx. 3–5 mm from the wall.
- Shorten all the incoming cables appropriately.
- Mount the wide 2-pin connector to the incoming powering cable.
- Mount the 2-pin connector to the synchronization signal cable or crimp the RJ45 modular connector to the incoming Ethernet cable.
- Connect all interconnecting cables into the corresponding connectors in the clock's back side recess.
- Hang the clock to the hanging screws.
- If the clock has to be tilted down slightly, cut the supporting element on the bottom of the back side accordingly.

### 7.1.4.2  Double sided

- The double sided clock consists of two parts, one serving as the **MASTER** display (this one encompasses the terminal to connect powering voltage and synchronization source), and the other serving as the **SLAVE** display (with the terminal for the connection of interconnecting cable). Both clock parts are interconnected via a 10-core flat cable.
- Connect the 10-core interconnecting cable into the corresponding plug on the clock control PCB of the slave display.
- The cable must never be connected or disconnected when power of the **MASTER** part is on.
- Drill four anchoring holes into the ceiling (or wall) of a diameter adequate to accommodate supplied wood-type screws with dowels.
- Interlace the incoming cables through the suspension pipe. Faster the ceiling suspension (or wall bracket) to ceiling (or wall) using 4 wood screws of 5 mm diameter.
- Interlace the incoming cables through the pipe insert on the anchoring plate. Slip-on the plate onto suspension in a way that the screws fit into the upper groove on the pipe insert. Fix the connection by tightening the screw using an Allen key.
- Hang the **SLAVE** display of the clock to one side of the anchoring plate.
- Shorten all the incoming cables appropriately.
- Mount the wide 2-pin connector to the incoming powering cable.
- Mount the 2-pin connector to the synchronization signal cable or crimp the RJ45 modular connector to the incoming Ethernet cable.
- Connect all the interconnecting cables into the corresponding connector in clock back side recess.
- Hang the **MASTER** display of the clock to the anchoring plate.
- If the clock has to be tilted down slightly, cut the supporting element on the bottom of the back side accordingly.
- Loosen the screws on the suspension using the Allen key, and lift the clock into the suspension in a way that the screws fit into the lower groove on the pipe insert. Secure the attachment by tightening the screw using Allen Key.

#### 🗨 Note:

During the disassembly first withdraw the clock, and suspend the suspension on the upper groove at the pipe insert.

## 7.1.5 Control elements



| | | | |
|---|---|---|---|
| **1** | TEMP / CTRL connector | **A** | pushbuttons |
| **2** | LAN connector – for PoE and NTP | **B** | link LED |
| **3** | 100–240 VAC (except PoE) | **C** | activity LED |
| **4** | LINES IN connector – for LGC | **D** | state LED |
| **5** | DISP2 – connection for second side of the clock | **E** | powering LED indication |

## 7.1.6 Cable connection

Installation LINES wire connection



TEMP wire connection – 1 or 2 temperature sensors
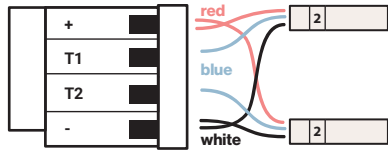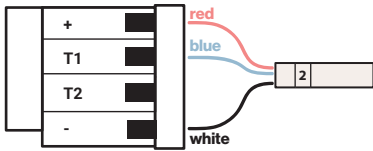


CTRL wire connection
(stopwatch control connects to TEMP connector)
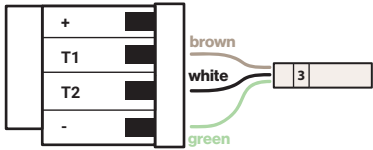


POWER connection
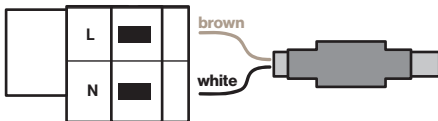
## 7.2 ECO-M-DC

### Basic features

- digits of 57 / 75 / 100 mm height, which corresponds to readability distance of 25 / 32 / 40 m
- digits in red, pure green blue, yellow, white and green color
- display composed of 7-segment LEDs
- manual or automatic adjustment of the luminosity of LED diodes
- altering time and date display with adjustable time period
- time display format in four digits (HH : MM) or six digits (HH : MM $^{SS}$ or HH : MM : SS), 12 or 24-hour cycle
- date display format in four digits (DD. MM.) or six digits (DD. MM.$^{YY}$ or DD. MM. YY)
- AM/PM indication for 12-hour cycle
- temperature indication in °C or °F (providing the temperature sensor is connected)
- TEMP connector is used to connect temperature sensors or stopwatch control

### Mechanic

- clock frame made of aluminium sheets in black or silver color
- anti-reflection front cover made of plexiglass
- single or double sided design
- wall mounting (only for single sided design), ceiling suspension or wall bracket mounting
- push buttons, connectors and state LEDs are accessible after dismounting the front plexiglass
- protection degree IP 54
- working temperature -5 to +55 °C

### Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature)
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- RTC backup with supercapacitor (lithium battery on request)

### Configuration

- setting of the clock parameters and time / date by means of push buttons or IR remote control

### Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

## 7.2.1 Technical specifications

| ECO-M-DC. | | 57.4 | 57.6 | 57x.6 | 75.4 | 75.6 |
|---|---|---|---|---|---|---|
| Display | digit height [mm] | 57 | 57/38 | 57 | 75 | 75/57 |
| | number of digits | 4 | 4 + 2 | 6 | 4 | 4 + 2 |
| Time and date display format | HH : MM | ✓ | | | ✓ | |
| | HH : MM $^{SS}$ | | ✓ | | | ✓ |
| | HH : MM : SS | | | ✓ | | |
| | DD. MM | ✓ | | | ✓ | |
| | DD. MM. $^{YY}$ | | ✓ | | | ✓ |
| | DD. MM. YY | | | ✓ | | |
| Viewing distance [m] | | 25 | | | 32 | |
| Synchronization | NTP | NTP protocol, mains powered | | | | |
| | PoE | NTP protocol, PoE powered | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | |
| Power | mains powered | 100–240 VAC, 50–60 Hz | | | | |
| | PoE | IEEE 802.3 af-Class 3 | | | | |
| | VDC | 18–55 V, see Voltage table, chpt. 8 | | | | |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 | | | | |
| Power consumption AC / DC [VA] | single sided | 7 | 8 | 8 | 7 | 8 |
| | double sided | 11 | 16 | 16 | 11 | 16 |
| Power consumption PoE [VA] | single sided | 7 | 8 | 8 | 7 | 8 |
| | double sided | 11 | 15 | 15 | 11 | 15 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | |
| Operation environment | temperature | -5 to +55 °C | | | | |
| | protection degree | IP 54 | | | | |
| Weight [kg] | single sided | 0.9 | 1.2 | 1.3 | 1.4 | 1.9 |
| | double sided | 2 | 2.5 | 2.6 | 3 | 4 |
| Dimensions [mm] W x H x D | single sided | 325 126 50 | 405 126 50 | 435 126 50 | 395 143 50 | 490 143 50 |
| | double sided | 325 126 114 | 405 126 114 | 435 126 114 | 395 143 114 | 490 143 114 |

| ECO-M-DC. | | 75x.6 | 100.4 | 100.6 | 100x.6 |
|---|---|---|---|---|---|
| Display | digit height [mm] | 75 | 100 | 100/57 | 100 |
| | number of digits | 6 | 4 | 4 + 2 | 6 |
| Time and date display format | HH : MM | | ✓ | | |
| | HH : MM SS | | | ✓ | |
| | HH : MM : SS | ✓ | | | ✓ |
| | DD. MM | | ✓ | | |
| | DD. MM. YY | | | ✓ | |
| | DD. MM. YY | ✓ | | | ✓ |
| Viewing distance [m] | | 32 | 40 | | |
| Synchronization | NTP | NTP protocol, mains powered | | | |
| | PoE | NTP protocol, PoE powered | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | |
| Power | mains powered | 100−240 VAC, 50−60 Hz | | | |
| | PoE [1] | IEEE 802.3 af-Class 3 | | | |
| | VDC | 18−55 V, see Voltage table, chpt. 8 | | | |
| | VDISP | supply voltages depends on display color, see Voltage table, chpt. 8 | | | |
| Power consum. AC / DC [VA] | single sided | 8 | 7 | 8 | 10 |
| | double sided | 16 | 11 | 16 | 18 |
| Power consum. PoE [VA] | single sided | 8 | 7 | 8 | 10 [1] |
| | double sided | 15 | 11 | 15 | − [1] |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | |
| | range -50 to +125 °C | ±2.0 °C | | | |
| Operation environment | temperature | -5 to +55 °C | | | |
| | protection degree | IP 54 | | | |
| Weight [kg] | single sided | 2.1 | 1.9 | 2.6 | 2.8 |
| | double sided | 4.4 | 4 | 5.4 | 5.9 |
| Dimensions [mm] W x H x D | single sided | 540 143 50 | 520 176 50 | 610 176 50 | 725 176 50 |
| | double sided | 540 143 114 | 520 176 114 | 610 176 114 | 725 176 114 |

**Note:**

1  PoE not available for ECO-M-DC100x.6 double sided

## 7.2.3 Dimensions and assembly diagram

ECO-M-DC.N.N
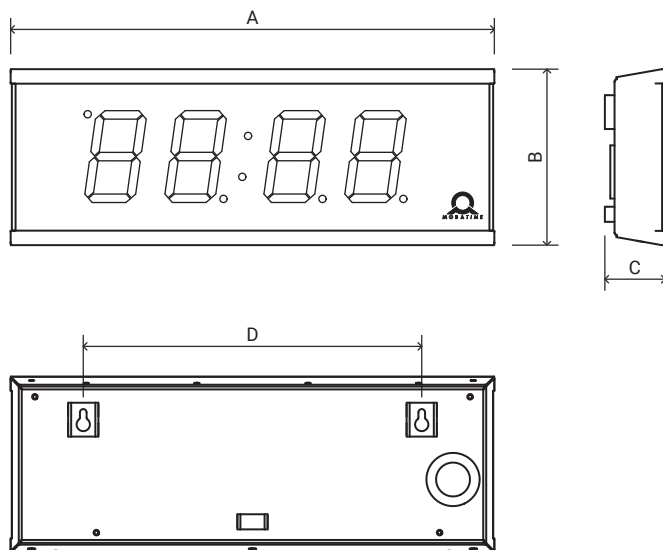


ECO-M-DC.x.S
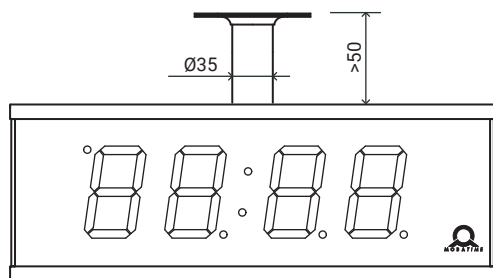
ceiling suspension
single sided ceiling
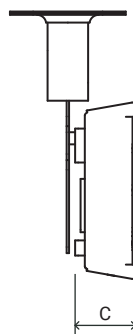
suspension double
sided
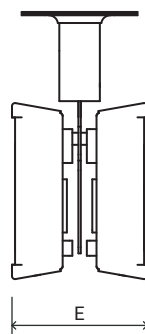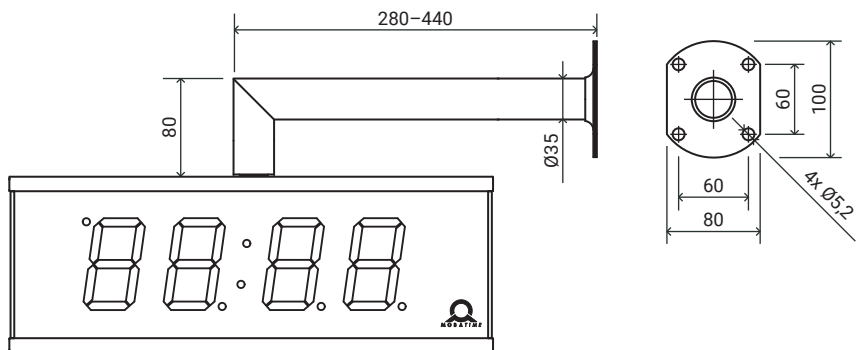
## Dimensions table [mm]

| ECO-M-DC. | 57.4 | 57.6 | 57x.6 | 75.4 | 75.6 |
|---|---|---|---|---|---|
| A | 325 | 405 | 435 | 395 | 490 |
| B | 126 | 126 | 126 | 143 | 143 |
| C | 50 | 50 | 50 | 50 | 50 |
| D | 200 | 300 | 320 | 270 | 330 |
| E | 114 | 114 | 114 | 114 | 114 |

| ECO-M-DC. | 75x.6 | 100.4 | 100.6 | 100x.6 |
|---|---|---|---|---|
| A | 540 | 520 | 610 | 725 |
| B | 143 | 176 | 176 | 176 |
| C | 50 | 50 | 50 | 50 |
| D | 360 | 400 | 450 | 540 |
| E | 114 | 114 | 114 | 114 |

## 7.2.4  Mounting

### 7.2.4.1  Single sided

1  Prepare 2 holes in the wall by hinges pitch on the backside of the clock.
2  Insert the dowels to the prepared holes and screw the appropriate screws into them.
3  Remove four screws on the bottom of the clock. Remove the bottom cover and plexiglass.
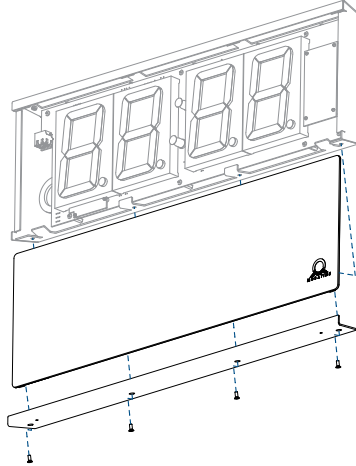


4  Except PoE variant use the power cable of at least 3 x 0.5 mm2 (double isolation), maximal 3 x 1.5 mm2 (double isolation).
5  Thread the cable(s) through the grommet and hang the clock on the prepared screws in the wall.



Rubber grommet
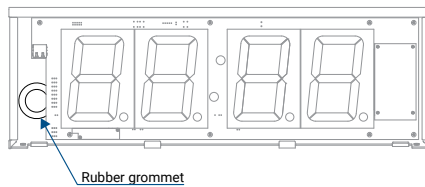
6  Cut the cable(s) to the appropriate length and connect the wires to corresponding terminals or crimp the RJ45 jack to the Ethernet cable respectively.
7  Mount the plexiglass and bottom cover.

## 7.2.4.2 Double sided

- First, prepare the 4 holes in the ceiling or wall by bracket flange pitch.
- Insert the dowels to the prepared holes and fix them into the ceiling (or wall) using appropriate screws.
- Remove the screws on the bottom of the **MASTER** clock. Remove the bottom cover and plexiglass.
- Except PoE variant use the power cable of at least 3 x 0.5 mm2 (double isolation), maximal 3 x 1.5 mm2 (double isolation).
- Cut the cable(s) to the appropriate length and connect the wires to corresponding terminals or crimp the RJ45 jack to the Ethernet cable respectively.
- Connect the cable from **SLAVE** clock to **MASTER** clock.
- Mount the plexiglass and bottom cover.

## 7.2.5  Control PCB

**Back side**
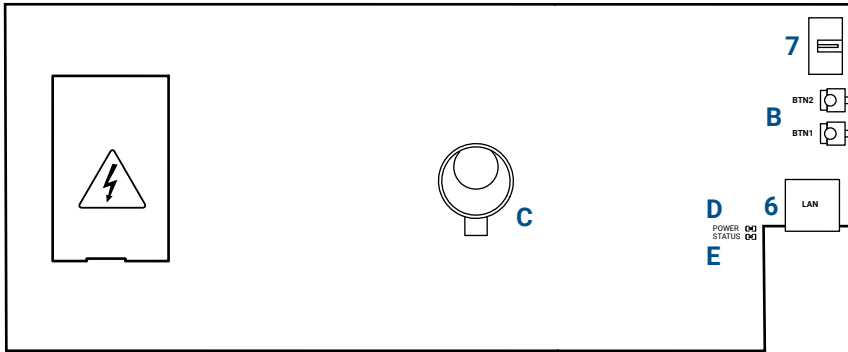


**Front side**
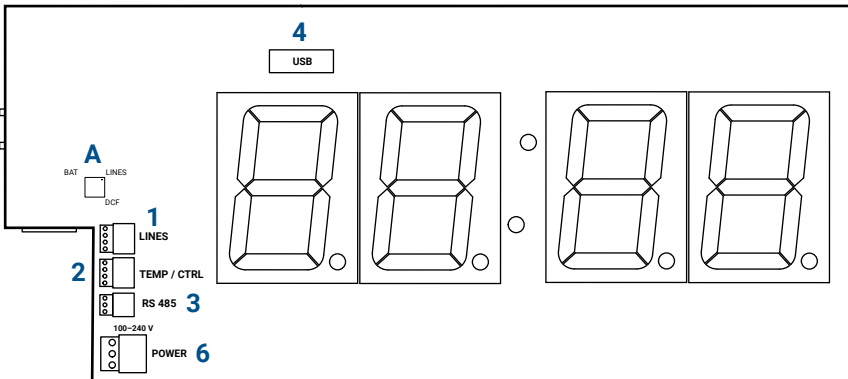


| | |
|---|---|
| **1** LINES / DC OUT connector – for LGC | **A** line type DCF or other variants – for LGC |
| **2** TEMP / CTRL connector | **B** push-buttons PB1, PB2 |
| **3** RS 485 connector – for RS 485 option | **C** battery – option BAT |
| **4** USB connector – for LGC and GPS | **D** powering LED indication |
| **5** LAN connector – for PoE, PoE+ and NTP | **E** state LED |
| **6** 100–240 VAC (except PoE and PoE+) | |
| **7** DISP2 – connection for second side of the clock | |

## 7.2.6  Cable connection
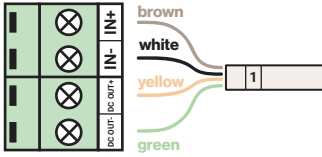
Installation LINES / DC OUT wire connection



TEMP wire connection – 1 or 2 temperature sensors
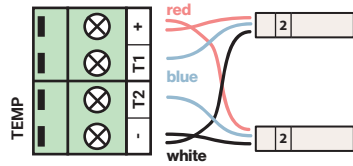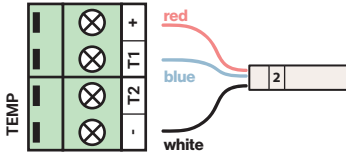


CTRL wire connection
(stopwatch control connects to TEMP connector)
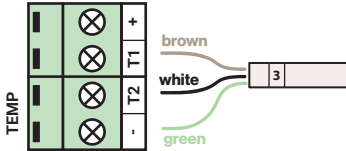


RS 485 wire connection
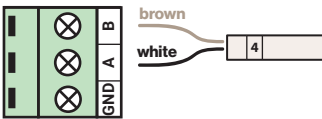


POWER connection
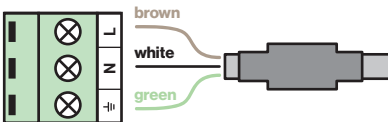
# 7.3  DC

## Basic features

- digits of 20 / 57 / 75 / 100 / 180 / 250 mm height, which corresponds to readability distance of 9 / 25 / 32 / 40 / 70 / 100 m
- digits in red, pure green blue, yellow, white and green color
- display composed of 7-segment LEDs (SMD LEDs for certain models on request)
- manual or automatic adjustment of the luminosity of LED diodes
- altering time, date and temperature display with adjustable time period
- time display format in four digits (HH : MM) or six digits (HH : MM $^{SS}$ or HH : MM : SS), 12 or 24-hour cycle
- date display format in four digits (DD. MM.) or six digits (DD. MM.$^{YY}$ or DD. MM. YY)
- AM/PM indication for 12-hour cycle (not available for DC.20)
- temperature display in °C or °F (providing the temperature sensor is connected)
- TEMP connector is used to connect temperature sensors or stopwatch control

## Mechanic

clock frame made of anodized aluminium in black or silver color, powder coated

anti-reflection front cover made of plexiglass

single or double sided design

wall mounting (only for single sided design), ceiling suspension or wall bracket mounting

panel or rack mounting (DC.20)

push buttons placed on the upper side of the clock frame

protection degree IP 40 (IP 54 on request)

working temperature -5 to +55 °C

## Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature)
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- RTC backup with supercapacitor (lithium battery on request)

## Configuration

- setting of the clock parameters and time / date by means of push buttons or IR remote control

## Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

## 7.3.1 Technical parameters

| DC. | | 20.6 | 20x.12 | 57.4 | 57.6 | 57x.6 | 75.4 | 75.6 | 75x.6 |
|---|---|---|---|---|---|---|---|---|---|
| Display | digit height [mm] | 20/14 | 20 | 57 | 57/38 | 57 | 75 | 75/57 | 75 |
| | number of digits | 4 + 2 | 12 | 4 | 4 + 2 | 6 | 4 | 4 + 2 | 6 |
| Time and date display format | HH : MM | | | ✓ | | | ✓ | | |
| | HH : MM [SS] | ✓ | | | ✓ | | | ✓ | |
| | HH : MM : SS | | ✓ | | | ✓ | | | ✓ |
| | DD. MM. | | | ✓ | | | ✓ | | |
| | DD. MM. [YY] | ✓ | | | ✓ | | | ✓ | |
| | DD. MM. YY | | ✓ | | | ✓ | | | ✓ |
| Viewing distance [m] | | 9 | | | 25 | | | 32 | |
| Synchronization | NTP | NTP protocol, mains powered | | | | | | | |
| | PoE | NTP protocol, PoE powered | | | | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | | | | |
| Power | mains [1] | 100−240 VAC, 50−60 Hz | | | | | | | |
| | PoE | IEEE 802.3 af-Class 3 | | | | | | | |
| | VDC | 18−55 V, see Voltage table, chpt. 8 | | | | | | | |
| | VDISP | supply voltages depends on display color, see Voltage table, chpt. 8 | | | | | | | |
| Power consum. AC / DC [VA] | single sided | 3 | 5 | 7 | 8 | 8 | 7 | 8 | 8 |
| | double sided | | − | 11 | 16 | 16 | 11 | 16 | 16 |
| Power consum. PoE [VA] | single sided | 3 | 5 | 7 | 8 | 8 | 7 | 8 | 8 |
| | double sided | | − | 11 | 15 | 15 | 11 | 15 | 15 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | | | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | | | | |
| Operation environment | temperature | -5 to +55 °C | | | | | | | |
| | humidity | 0 to 95 %, without condensing | | | | | | | |
| | protection degree | IP 40 | | IP 40 (IP 54 on request) | | | | | |
| Weight [kg] | single sided | 0.55 | 2.2 | 1.4 | 1.8 | 1.9 | 1.9 | 2.4 | 2.5 |
| | double sided | | − | 2.6 | 3 | 3.2 | 3.5 | 4.2 | 4.3 |
| Dimensions [mm] W x H x D | single sided | 144 77 147 | 483 44 145 | 333 118 39 | 423 118 39 | 454 118 39 | 400 140 39 | 525 140 39 | 550 140 39 |
| | double sided | | − | 333 118 78 | 423 118 78 | 454 118 78 | 400 140 78 | 525 140 78 | 550 140 78 |

| DC. | | 100.4 | 100.6 | 100x.6 | 180.4 | 180.6 | 180x.6 | 250.4 | 250x.6 |
|---|---|---|---|---|---|---|---|---|---|
| Display | digit height [mm] | 100 | 100/57 | 100 | 100 | 180/100 | 180 | 250 | 250 |
| | number of digits | 4 | 4 + 2 | 6 | 4 | 4 + 2 | 6 | 4 | 6 |
| Time and date display format | HH : MM | ✓ | | | ✓ | | | ✓ | |
| | HH : MM SS | | ✓ | | | ✓ | | | |
| | HH : MM : SS | | | ✓ | | | ✓ | | ✓ |
| | DD. MM. | ✓ | | | ✓ | | | ✓ | |
| | DD. MM. YY | | ✓ | | | ✓ | | | |
| | DD. MM. YY | | | ✓ | | | ✓ | | ✓ |
| Viewing distance [m] | | | 40 | | | 70 | | 100 | |
| Synchronization | NTP | NTP protocol, mains powered | | | | | | | |
| | PoE | NTP protocol, PoE powered | | | | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | | | | |
| Power | standard | 100−240 VAC, 50−60 Hz | | | | | | | |
| | PoE [2] | IEEE 802.3 af-Class 3 | | | − | | | IEEE 802.3 af-Class 3 | |
| | VDC | 18−55 V, see Voltage table, chpt. 8 | | | | | | | |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 | | | | | | | |
| Power consum. AC / DC [VA] | single sided | 7 | 8 | 10 | 25 | 30 | 36 | 8 | 12 |
| | double sided | 11 | 16 | 18 | 50 | 60 | 75 | 16 | 22 |
| Power consum. PoE [VA] | single sided | 7 | 8 | 10 [3] | 6 [3] | − | 7 [3] | 8 [3] | 12 [3] |
| | double sided | 11 | 15 | − [3] | 10 [3] | − | 13 [3] | − [3] | |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | | | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | | | | |
| Operation environment | temperature | -5 to +55 °C | | | | | | | |
| | humidity | 0 to 95 %, without condensing | | | | | | | |
| | protection degree | IP 40 (IP 54 on request) | | | IP 40 | | | | |
| Weight [kg] | single sided | 2.4 | 3.1 | 3.5 | 6.3 | 9.3 | 10.4 | 10 | 14 |
| | double sided | 4.4 | 5.6 | 6 | 10.2 | 15.3 | 17.6 | 15 | 20 |
| Dimensions [mm] W x H x D | single sided | 510 169 39 | 652 169 39 | 728 169 39 | 880 264 39 | 1 146 264 39 | 1 260 264 39 | 1 230 350 39 | 1 720 350 39 |
| | double sided | 510 169 78 | 652 169 78 | 728 169 78 | 880 264 78 | 1 146 264 78 | 1 260 264 78 | 1 230 350 78 | 1 720 350 78 |

## Notes:

1  for DC.20 with external AC / DC adapter

2  DC.100x.6 – only for single sided clock
   DC.180.4 and DC.180x.6 – only for red and yellow display with option SL
   DC.250.4..SL and DC.250x.6..SL – only for single sided clock with red and yellow display
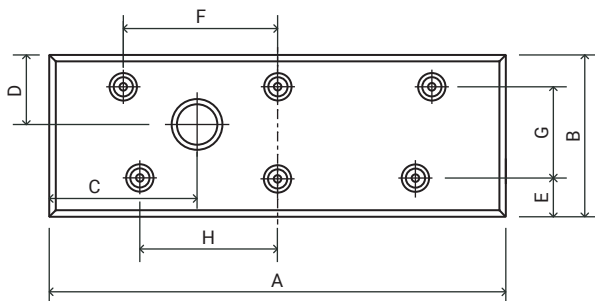
## Overall notes:

- option SL can only be combined with model DC.57, DC.100, DC.180 and DC.250 and display in red, pure green, blue, yellow or white

- DC.20 available only with red and green display color

- wall bracket mounting for DC.180x.6, DC.250.4 and DC.250x.6 is not possible

## 7.3.3  Dimensions and assembly diagram

DC.57 / DC.75 / DC.100

ceiling suspension
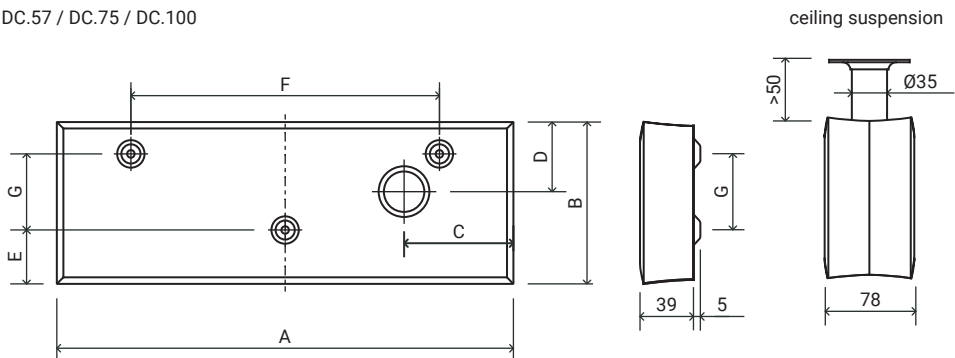
DC.180 / DC.250.4

DC.250x.6
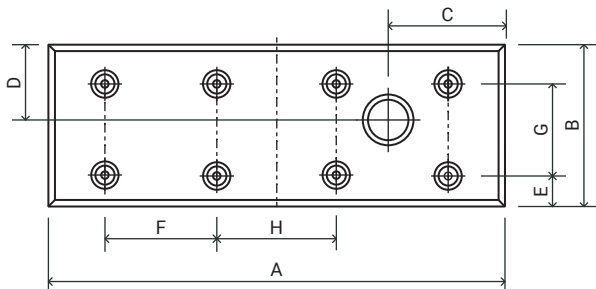
wall bracket mounting
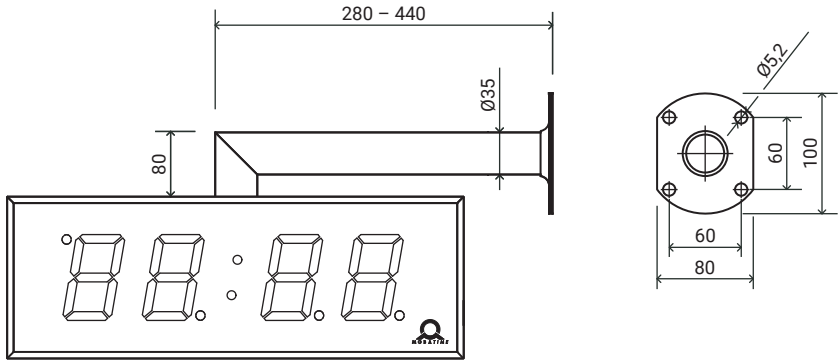


## Dimensions table [mm]

| DC. | 57.4 | 57.6 | 57x.6 | 75.4 | 75.6 | 75x.6 | 100.4 |
|---|---|---|---|---|---|---|---|
| A | 333 | 423 | 454 | 400 | 525 | 550 | 510 |
| B | 118 | 118 | 118 | 140 | 140 | 140 | 169 |
| C | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| D | 51 | 51 | 51 | 55 | 55 | 55 | 51 |
| E | 40 | 40 | 40 | 35 | 35 | 35 | 36 |
| F | 225 | 225 | 256 | 300 | 425 | 450 | 300 |
| G | 55 | 55 | 55 | 75 | 75 | 75 | 110 |
| H | – | – | – | – | – | – | – |

| DC. | 100.6 | 100x.6 | 180.4 | 180.6 | 180x.6 | 250.4 | 250x.6 |
|---|---|---|---|---|---|---|---|
| A | 652 | 728 | 880 | 1 146 | 1 260 | 1 230 | 1 720 |
| B | 169 | 169 | 264 | 264 | 264 | 350 | 350 |
| C | 80 | 80 | 300 | 470 | 470 | 980 | 250 |
| D | 51 | 51 | 120 | 120 | 120 | 175 | 175 |
| E | 36 | 36 | 44 | 44 | 44 | 40 | 40 |
| F | 400 | 470 | 300 | 400 | 400 | 575 | 555 |
| G | 110 | 110 | 180 | 180 | 180 | 270 | 270 |
| H | – | – | 260 | 450 | 520 | 575 | 530 |

DC.20.6...N.F



locking screw

22

76,5

56

locking screw

42

144

146,8

133

134

ethernet connector

state LED

push-buttons

power connector

DC.20x.12...N.R

482,6

150

145

POWER ● SW1 ○
STATE ● SW2 ○

M O B A T I M E

435

5

143

2
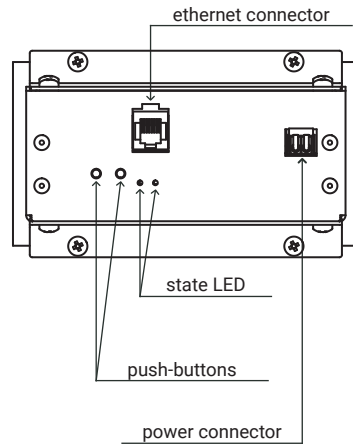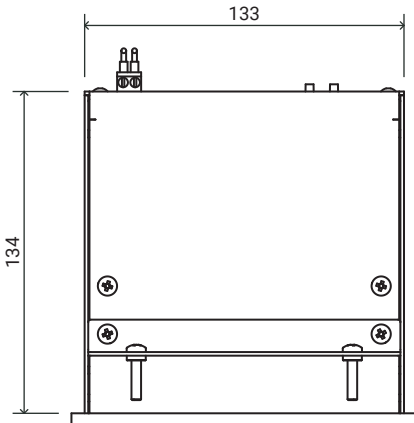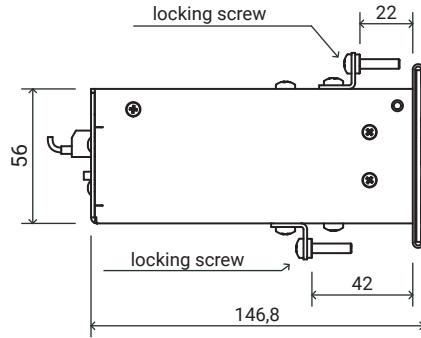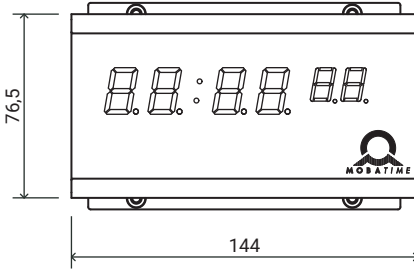
ethernet connector
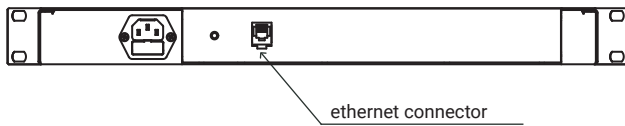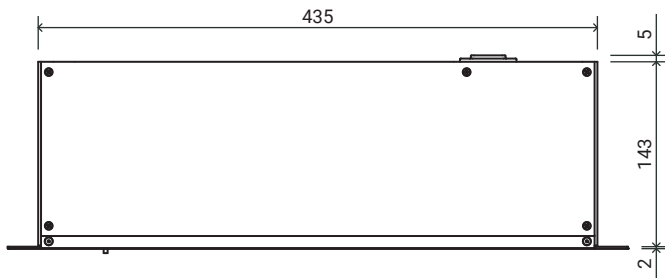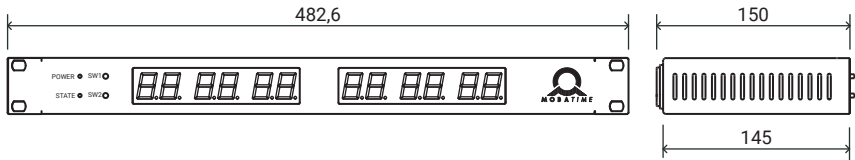
## 7.3.4  Mounting

### 7.3.4.1  Single sided

- The frame is fixed using two suspensions (above) and two sliding springs (bottom). Lift-off the anchoring plate using a screwdriver inserted in between the sheet and the frame at the sliding spring point on the clock bottom side.
- Disconnect the interconnecting cables by decoupling the terminals on the control PCB.
- Drill three anchoring holes into the wall of a diameter adequate to accommodate wood-type screws of 4–5 mm diameter. As a template for marking the position of the holes the anchoring plate can be used.
- Interlace the incoming conductors through the opening in the anchoring plate and fix the sheet to the wall.
- Connect the incoming conductors in accordance with the descriptive sheet on the terminal board, placed on the anchoring plate. Give the conductors an appropriate shape or cut them off to a length that will not obstruct the placement of the clock onto the anchoring plate.
- Check and configure the position of DIP switch according to the type of synchronization signal.
- Mount the connectors to the cable of the temperature sensor, to the keyboard cable, Ethernet cable or to the RS 485 interface cable if these have been delivered.
- Push the temperature sensor connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB.
- Connect the interconnecting cables into the corresponding terminals on the clock control PCB.

  ⚠ **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

- Put the clock opposite to the anchoring plate and suspend it onto the upper springs. Care should be taken when placing the cables between the frame edge and the anchoring plate, so an not to nip them. Snap the clock in onto the springs by pushing on the lower part of the frame.
- Check whether the anchoring plate on the sides fits exactly into the groove in the clock frame.
- Remove the blind cap from the opening on the clock bottom side.
- Insert Allen key into the opening on the clock bottom side. Turn the key softly in anticlockwise direction. The frame catch will snap in.
- Replace the blind cap on the opening.
- To loosen the frame catch, use the reverse procedure (turn clockwise)

### 7.3.4.2  Double sided

- The double sided clock consists of two parts, one serving as the control module (this one encompasses the jacks to connect powering voltage, synchronization source, the temperature sensor and the keyboard to the clock), and the other one serving as the display module (with the terminal for the connection of the interconnecting cable). Both clock parts are interconnected via a 10-core flat cable. The clock suspension part is delivered separately.
- Interlace the incoming conductors through the pipe which servers as the clock suspension. Secure the ceiling suspension (or wall bracket) to the ceiling (or the wall) using 4 wood screws of 5 mm diameter.
- The frame is fixed using two suspensions (above) and two sliding springs (bottom). Lift-off both parts of the clock from the anchoring plate using a screwdriver inserted in between the sheet and the frame at the point where there are the sliding springs on the clock bottom side
- Disconnect the interconnecting cables by decoupling the terminals on the control PCB.
- Interlace the incoming conductors through the pipe insert on the anchoring plate, to the side which finds itself to the opposite of the terminal board. Slip-on the plate onto the suspension in a way that the screws fit into the upper groove on the pipe insert. Fix the connection by tightening the screw using an Allen key.
- Interlace the incoming co conductors through the opening located next to the terminal board and  connect the conductors to the terminal board on the anchoring plate, in accordance with the descriptive nameplate. Give an appropriate shape to the conductors of cut them off at a length which does not obstruct the mounting of the clock onto the anchoring plate.

- Check and configure the position of DIP switch according to the type of synchronization signal.
- Mount the connectors to the cable of the temperature sensor, to the keyboard cable, Ethernet cable or the RS 485 interface connectors if these have been delivered.
- Place the display part of the clock to the anchoring plate, at a position which is opposite to the terminal board and suspend this part onto the upper strings. Interlace the 10-core interconnecting cable through the lower opening which finds itself at the closest to the terminal board on the anchoring plate.
- Care should be taken when placing the cables between the frame edge and the anchoring plate, so as not to nip them. Snap the clock onto the springs by pushing on the lower frame part.
- Connect the 10-core interconnecting cable and the interconnecting cables into the corresponding plugs on the clock control PCB.

> ⚠ **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

- Push the temperature sensor connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB.
- Put the control part of the clock opposite to the anchoring plate and suspend it onto the upper strings. Care should be taken when placing the cables between the frame edge and the anchoring plate, so as not to nip them. Snap the clock in onto the springs by pushing on the lower part of the frame.
- Check whether the anchoring plate on the sides fits exactly into the grooves established in both parts of the digital clock (these must be pushed against each other in a way to mask the anchoring plate – after placing the parts the plate shall not be seen).
- Remove the blind cap from the opening on the both lower sides of the clock.
- Insert Allen key into the opening on the lower side of the clock. Turn the key softly in anticlockwise direction. The frame catch will snap in. Secure both parts of the clock
- Replace the blind cap on the opening.
- Loosen the screw on the suspension using Allen key and lift the clock into the suspension in a way that the screws fit into the lower groove on the pipe insert. Secure the attachment by tightening the screw using the Allen key.
- To loosen the frame catch, use the reverse procedure (turn clockwise).

🗩 **Note:**

During the disassembly first withdraw the clock and suspend the suspension on the upper groove at the pipe insert.

## 7.3.4.3  Rack mounting DC.20.12...N.R

- The clock designed for the 19-inch rack has built-in height of 1U and similar design as other rack-mounted equipment
- Specify a position in the rack with minimal height of 1U.
- Fasten cage nuts into the vertical rails (the rails are usually part of the rack) on the mounting position of the clock.
- Interlace all connectors which are to be connected to the clocks (power cord, synchronization, ...) to the location of mounting.
- Connect the interconnecting cables into the corresponding terminals on the clock.
- Mount the clock into the rack in a way that back parts of the front panel touch the vertical rail at their sides and the four mounting holes are just in front of the cage nuts.
- Use four M6 screws (again a part of the rack) and secure the clock.
- The clock mounting is complete.

## 7.3.4.4  Panel mounting accessible from back side DC.20.6...N.F

- This type of clock is possible to mount only to the panel with maximum thickness 40 mm. Moreover, access from the back side of the panel is necessary.
- Prepare a rectangular opening with dimensions 138x60 mm in the panel in the mounting location.
- From the back side of the panel interlace all cables which are to be connected to the clock.
- Unscrew "L"-shaped brackets from the top and bottom part of the clock body.
- Mount the clock into the prepared opening.
- Continue mounting from the back side of the panel.
- Screw "L"-shaped strips back on the clock body.
- Secure the clock in the panel by tightening of fastener screws in "L"-shaped strips.
- Connect the interconnecting cables into the corresponding terminals.
- The clock mounting is complete.

## 7.3.5  Control PCB

Not used in DC.20.
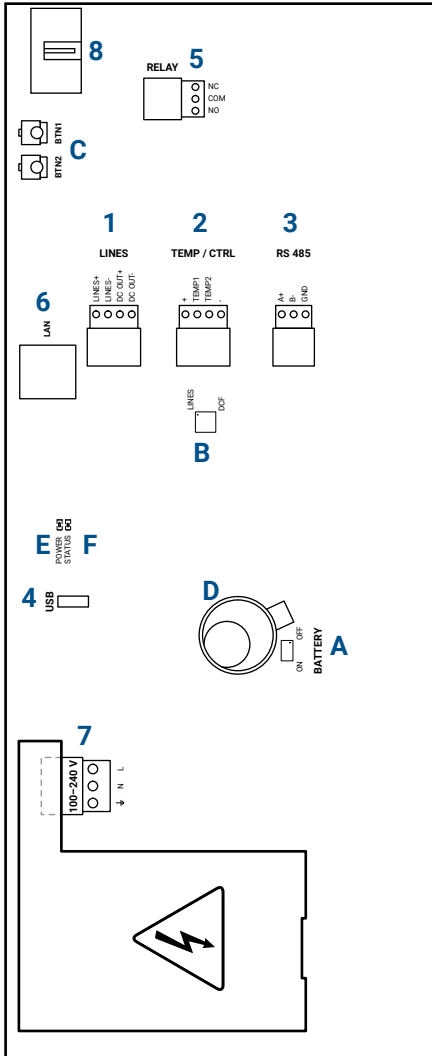


1   LINES / DC OUT connector – for LGC

2   TEMP / CTRL connector

3   RS 485 connector – for RS 485 option

4   USB connector – for LGC and GPS

5   RELAY connector – for option REL/REL-IP

6   LAN connector – for PoE, PoE+ and NTP

7   100–240 VAC (except PoE and PoE+)

8   DISP2 – connection for second side
    of the clock

A   connecting / disconnecting the backup
    battery – option BAT

B   line type DCF or other variants – for LGC

C   push-buttons PB1, PB2

D   battery – option BAT

E   powering LED indication

F   state LED

## 7.3.6  Connecting terminal block

Not used in DC.20.

**For NTP and WiFi variant**
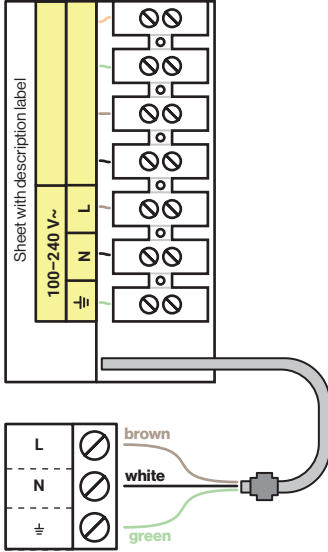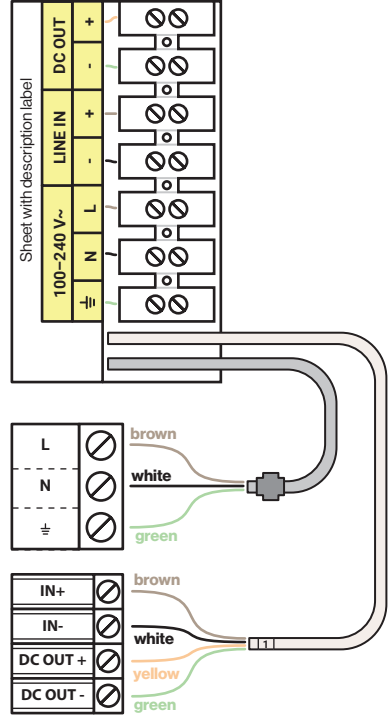


**For other variants**

## 7.3.7  Cable connection
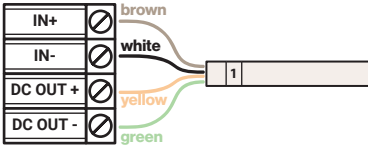
Installation LINES / DC OUT wire connection

| IN+ | ⊘ | brown |
| IN- | ⊘ | white |
| DC OUT + | ⊘ | yellow |
| DC OUT - | ⊘ | green |

**1**

TEMP wire connection – 1 or 2 temperature sensors

| + | ⊘ | red |
| TEMP1 | ⊘ | blue |
| TEMP2 | ⊘ | |
| - | ⊘ | white |

**2**

| + | ⊘ | red |
| TEMP1 | ⊘ | blue |
| TEMP2 | ⊘ | |
| - | ⊘ | white |

**2**

**2**

CTRL wire connection
(stopwatch control connects to TEMP connector)

| + | ⊘ | |
| TEMP1 | ⊘ | brown |
| TEMP2 | ⊘ | white |
| - | ⊘ | green |

**3**

RS 485 wire connection

| A+ | ⊘ | brown |
| B- | ⊘ | white |
| GND | ⊘ | |

**4**

RELAY connection

| NC | ⊘ | brown |
| COM | ⊘ | white |
| NO | ⊘ | green |

**10**
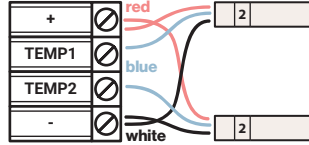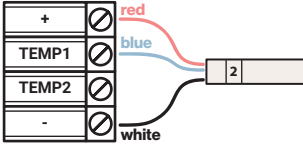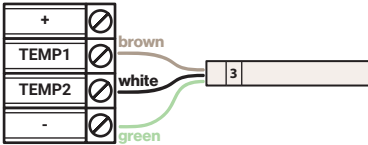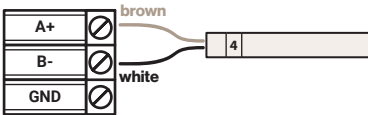
POWER connection
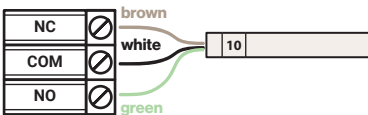
| L | ⊘ | brown |
| N | ⊘ | white |
| ⏚ | ⊘ | green |

# 7.4 ECO-SLH-DC

## Basic features

- digits of 57 / 100 mm height, which corresponds to readability distance of 25 / 40 m
- digits in red, pure green blue, yellow, white and green color
- single-line or two-line display
- manual or automatic adjustment of the luminosity of LED diodes
- altering time, date and temperature display with adjustable time period
- time display format in four digits (HH : MM) or six digits (HH : MM $^{SS}$ or HH : MM : SS), 12 or 24-hour cycle
- date display format in four digits (DD. MM.) or six digits (DD. MM.$^{YY}$ or DD. MM. YY)
- AM/PM indication for 12-hour cycle
- temperature display in °C or °F (providing the temperature sensor is connected)
- TEMP connector is used to connect temperature sensors or stopwatch control

## Mechanic

- front panel made of stainless steel (AISI 304, brushed)
- anti-reflection front cover, made of polycarbonate
- single sided design
- flush mounting into the wall or panel
- protection degree IP 54
- working temperature -5 to +55 °C

## Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature)
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- RTC backup with supercapacitor (lithium battery on request)

## Configuration

- setting of the clock parameters and time / date by means of push buttons or IR remote control

## Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

## 7.4.1 Technical specifications

| ECO-SLH-DC. | | 57.4 | 57.4.2 | 57.6 | 57.6.2 | 57x.6 |
|---|---|---|---|---|---|---|
| Display | digit height [mm] | 57 | 57 | 57/38 | 57/38 | 57 |
| | number of digits | 4 | 4 | 4 + 2 | 4 + 2 | 6 |
| | number of rows | 1 | 2 | 1 | 2 | 1 |
| Time and date display format | HH : MM | ✓ | ✓ | | | |
| | HH : MM SS | | | ✓ | ✓ | |
| | HH : MM : SS | | | | | ✓ |
| | DD. MM | ✓ | ✓ | | | |
| | DD. MM. YY | | | ✓ | ✓ | |
| | DD. MM. YY | | | | | ✓ |
| Viewing distance [m] | | 25 | | | | |
| Synchronization | NTP | NTP protocol, mains powered | | | | |
| | PoE | NTP protocol, PoE powered | | | | |
| | WiFi [1] | WiFi 2.4 GHz, NTP protocol | | | | |
| | WiFi5 [1] | WiFi 2.4/5 GHz, NTP protocol | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | |
| Power | mains powered | 100–240 VAC, 50–60 Hz | | | | |
| | PoE | IEEE 802.3 af-Class 3 | | | | |
| | VDC | 18–55 V, see Voltage table, chpt. 8 | | | | |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 | | | | |
| Power consumption | AC / DC [VA] | 7 | 11 | 8 | 16 | 8 |
| | PoE [VA] | 7 | 11 | 8 | 15 | 8 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | |
| Operating environment | temperature | -5 to +55 °C | | | | |
| | humidity | 0 to 95 %, without condensing | | | | |
| | protection degree | IP 54 | | | | |
| Weight [kg] | | 2.6 | 4 | 3.3 | 5 | 3.5 |
| Dimensions [mm] W x H x D | | 380 150 39 | 380 260 39 | 470 150 39 | 470 260 39 | 500 150 39 |

**Notes:**

1 antenna should be placed out of the panel where clock is mounted

| ECO-SLH-DC. | | 57x.6.2 | 100.4 | 100.6 | 100x.6 |
|---|---|---|---|---|---|
| Display | digit height [mm] | 57 | 100 | 100/57 | 100 |
| | number of digits | 6 | 4 | 4 + 2 | 6 |
| | number of rows | 2 | 1 | 1 | 1 |
| Time and date display format | HH : MM | | ✓ | | |
| | HH : MM SS | | | ✓ | |
| | HH : MM : SS | ✓ | | | ✓ |
| | DD . MM | | ✓ | | |
| | DD. MM. YY | | | ✓ | |
| | DD. MM. YY | ✓ | | | ✓ |
| Viewing distance [m] | | 25 | 40 | | |
| Synchronization | NTP | NTP protocol, mains powered | | | |
| | PoE | NTP protocol, PoE powered | | | |
| | WiFi [1] | WiFi 2.4 GHz, NTP protocol | | | |
| | WiFi5 [1] | WiFi 2.4/5 GHz, NTP protocol | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | |
| Power | mains powered | 100–240 VAC, 50–60 Hz | | | |
| | PoE | IEEE 802.3 af-Class 3 | | | |
| | VDC | 18–55 V, see Voltage table, chpt. 8 | | | |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 | | | |
| Power consumption | AC / DC [VA] | 16 | 7 | 8 | 10 |
| | PoE [VA] | 15 | 7 | 8 | 10 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | |
| | range -50 to +125 °C | ±2.0 °C | | | |
| Operating environment | temperature | -5 to +55 °C | | | |
| | humidity | 0 to 95 %, without condensing | | | |
| | protection degree | IP 54 | | | |
| Weight [kg] | | 5.5 | 4.7 | 5.8 | 6.5 |
| Dimensions [mm] W x H x D | | 500 260 39 | 555 220 39 | 695 220 39 | 770 220 39 |

## 7.4.3 Dimensions and assembly diagram

without back cover
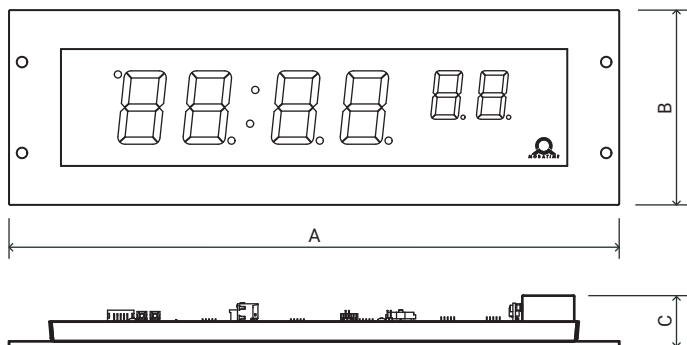


back cover
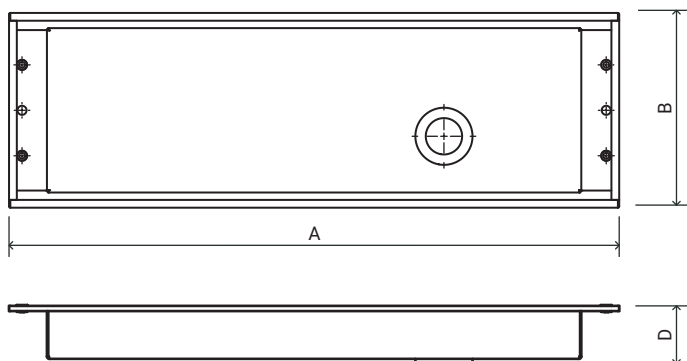


### Dimensions table [mm]

| ECO-SLH-DC. | 57.4 | 57.4.2 | 57.6 | 57.6.2 | 57x.6 | 57x.6.2 | 100.4 | 100.6 | 100x.6 |
|---|---|---|---|---|---|---|---|---|---|
| A | 380 | 380 | 470 | 470 | 500 | 500 | 555 | 695 | 770 |
| B | 150 | 260 | 150 | 260 | 150 | 260 | 220 | 220 | 220 |
| C | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 |
| D | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 41 |

## 7.4.4  Mounting

### 7.4.4.1  Single sided – without back cover

There exists two basic possibilities of mounting: mounting of clock into the wall niche and mounting into the panel. For both mounting is very important to prepare the appropriate holes to drawings and the clock body.

· For wall niche mounting drill four anchoring holes into the wall of a diameter adequate to accommodate appropriate screws of 4 to 5 mm diameter. As a template for marking the position of the holes the clock body can be used.
· For panel mounting drill four anchoring holes of 2.6 mm diameter into the panel to accommodate screws of 4 to 5 mm diameter. As a template for marking the position of the holes the clock body can be used.
· On mains powered clock connect the incoming conductors in accordance with the description on the power supply unit using WAGO or equivalent clamps.
· Mount the connectors to the cable of the synchronization signal line, the temperature sensor cable, to the keyboard cable, Ethernet or to the RS 485 if these are used.
· Push the synchronization line connector, the temperature sensor connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB.

⚠  **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

· Put the clock into prepared hole. Check if any cables is not pinched between the clock body and hole / niche edges.
· Fix the clock by four screws to panel / wall.

### 7.4.4.2  Single sided – with back cover

There exists two basic possibilities of mounting: mounting of clock into the wall niche and mounting into the panel. For both mounting is very important to prepare the appropriate to drawings and the clock body.

· The clock consists of clock part and back cover. Dismount 4 screws and remove the cover.
· For wall niche mounting drill two anchoring holes into the wall of a diameter adequate to accommodate appropriate screws of 4 to 5 mm diameter. As a template for marking the position of the holes the back cover can be used.
· For panel mounting drill two anchoring holes of 2.6 mm diameter into the panel to accommodate appropriate screws of 4 to 5 mm diameter. As a template for marking the position of the holes the back cover can be used.
· Pull the incoming conductors through the hole in the back side of the cover and fix the cover to the wall / panel using screws.
· On mains powered clock connect the incoming conductors in accordance with the description on the power supply unit using WAGO or equivalent clamps.
· Mount the connectors to the cable of the synchronization signal line, the temperature sensor cable, Ethernet cable or to the RS 485 if these are used.
· Push the synchronization line connector, the temperature sensor connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB.

⚠  **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

· Put the clock into prepared hole. Check if any cables is not pinched between the clock body and back cover.
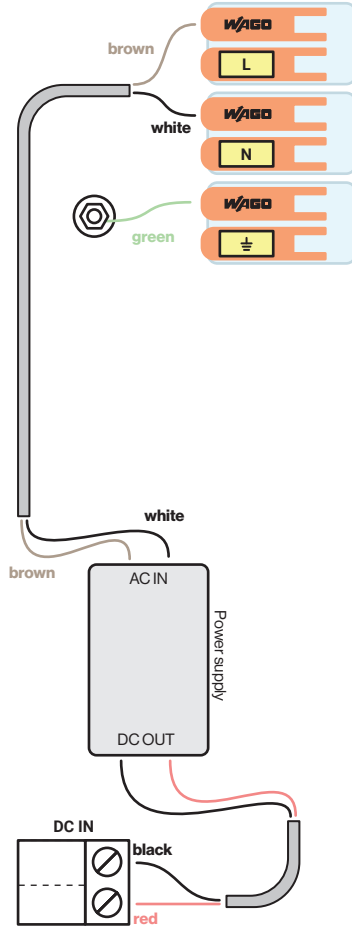· Fix the clock by four delivered screws to back cover.

## 7.4.5 Control PCB
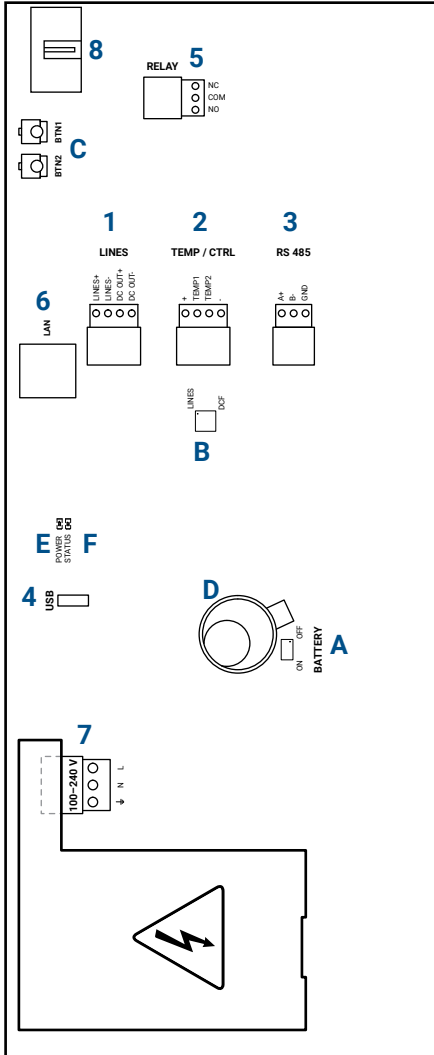


1. LINES / DC OUT connector – for LGC

2. TEMP / CTRL connector

3. RS 485 connector – for RS 485 option

4. USB connector – for LGC and GPS

5. RELAY connector – for option REL/REL-IP

6. LAN connector – for PoE, PoE+ and NTP

7. 100–240 VAC (except PoE and PoE+)

8. DISP2 – connection for second side of the clock

A. connecting / disconnecting the backup battery – option BAT

B. line type DCF or other variants – for LGC

C. push-buttons PB1, PB2

D. battery – option BAT

E. powering LED indication

F. state LED

## 7.4.6 Connecting terminal block

Except PoE.

## 7.4.7  Cable connection

Installation LINES / DC OUT wire connection

| | | |
|---|---|---|
| **IN+** | ⊘ | brown |
| **IN-** | ⊘ | white |
| **DC OUT +** | ⊘ | yellow |
| **DC OUT -** | ⊘ | green |

TEMP wire connection – 1 or 2 temperature sensors

| | | |
|---|---|---|
| **+** | ⊘ | red |
| **T1** | ⊘ | blue |
| **T2** | ⊘ | |
| **-** | ⊘ | white |

| | | |
|---|---|---|
| **+** | ⊘ | red |
| **T1** | ⊘ | blue |
| **T2** | ⊘ | |
| **-** | ⊘ | white |

CTRL wire connection
(stopwatch control connects to TEMP connector)

| | | |
|---|---|---|
| **+** | ⊘ | |
| **T1** | ⊘ | brown |
| **T2** | ⊘ | white |
| **-** | ⊘ | green |

RS 485 wire connection

| | | |
|---|---|---|
| **A+** | ⊘ | brown |
| **B-** | ⊘ | white |
| **GND** | ⊘ | |

RELAY wire connection

| | | |
|---|---|---|
| **NC** | ⊘ | brown |
| **COM** | ⊘ | white |
| **NO** | ⊘ | green |

DC IN connection

| | | |
|---|---|---|
| **–** | ⊘ | black |
| **+** | ⊘ | red |

# 7.5  SLH-DC

## Basic features

- digits of 57 / 100 mm height, which corresponds to readability distance of 25 / 40 m
- digits in red, pure green blue, yellow, white and green color
- single-line or two-line display
- manual or automatic adjustment of the luminosity of LED diodes
- altering time, date and temperature display with adjustable time period
- time display format in four digits (HH : MM) or six digits (HH : MM $^{SS}$ or HH : MM : SS), 12 or 24-hour cycle
- date display format in four digits (DD. MM.) or six digits (DD. MM.$^{YY}$ or DD. MM. YY)
- AM/PM indication for 12-hour cycle
- temperature display in °C or °F (providing the temperature sensor is connected)
- TEMP connector is used to connect temperature sensors or stopwatch control

## Mechanic

- front panel made of stainless steel (AISI 304, brushed)
- anti-reflection front cover made of polycarbonate
- single or double sided design
- wall mounting (for single sided design), ceiling suspension, wall bracket or flush mounting
- protection degree IP 54
- working temperature -5 to +55 °C

## Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature)
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- RTC backup with supercapacitor (lithium battery on request)

## Configuration

- setting of the clock parameters and time / date by means of push buttons or IR remote control

## Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

## 7.5.1 Technical specifications

| SLH-DC. | | 57.4 | 57.4.2 | 57.6 | 57.6.2 | 57x.6 |
|---|---|---|---|---|---|---|
| Display | digit height [mm] | 57 | 57 | 57/38 | 57/38 | 57 |
| | number of digits | 4 | 4 | 4 + 2 | 4 + 2 | 6 |
| | number of rows | 1 | 2 | 1 | 2 | 1 |
| Time and date display format | HH : MM | ✓ | ✓ | | | |
| | HH : MM SS | | | ✓ | ✓ | |
| | HH : MM : SS | | | | | ✓ |
| | DD. MM. | ✓ | ✓ | | | |
| | DD. MM. YY | | | ✓ | ✓ | |
| | DD. MM. YY | | | | | ✓ |
| Viewing distance [m] | | 25 | | | | |
| Synchronization | NTP | NTP protocol, mains powered | | | | |
| | PoE | NTP protocol, PoE powered | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | |
| Power | mains powered | 100−240 VAC, 50−60 Hz | | | | |
| | PoE | IEEE 802.3 af-Class 3 | | | | |
| | VDC | 18−55 V, see Voltage table, chpt. 8 | | | | |
| | VDISP | supply voltages depends on display color, see Voltage table, chpt. 8 | | | | |
| Power consum. AC / DC | single sided [VA] | 7 | 11 | 8 | 16 | 8 |
| | double sided [VA] | 11 | – | 16 | – | 16 |
| Power consum. PoE | single sided [VA] | 7 | 11 | 8 | 15 | 8 |
| | double sided [VA] | 11 | – | 15 | – | 15 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | |
| Operating environment | temperature | -5 to +55 °C | | | | |
| | humidity | 0 to 95 %, without condensing | | | | |
| | protection degree | IP 54 | | | | |
| Weight [kg] | single sided | 2.6 | 4 | 3.3 | 5 | 3.5 |
| | double sided | 4 | – | 5 | – | 5.5 |
| | flush | 2.6 | 4 | 3.3 | 5 | 3.5 |
| Dimensions [mm] | | see dimensions table, chapter 7.5.3 | | | | |

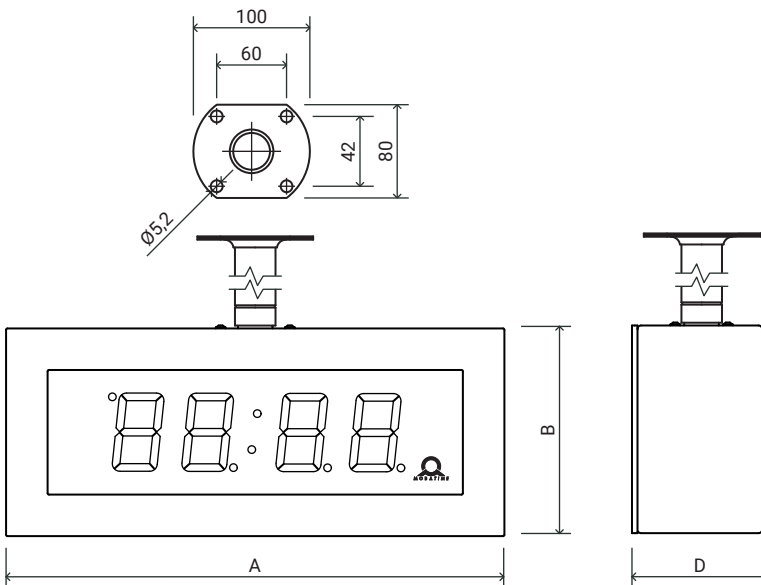| SLH-DC. | | 57x.6.2 | 100.4 | 100.6 | 100x.6 |
|---|---|---|---|---|---|
| Display | digit height [mm] | 57 | 100 | 100/57 | 100 |
| | number of digits | 6 | 4 | 4 + 2 | 6 |
| | number of rows | 2 | 1 | 1 | 1 |
| Time and date display format | HH : MM | | ✓ | | |
| | HH : MM SS | | | ✓ | |
| | HH : MM : SS | ✓ | | | ✓ |
| | DD. MM. | | ✓ | | |
| | DD. MM. YY | | | ✓ | |
| | DD. MM. YY | ✓ | | | ✓ |
| Viewing distance [m] | | 25 | 40 | | |
| Synchronization | NTP | NTP protocol, mains powered | | | |
| | PoE | NTP protocol, PoE powered | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | |
| Power | mains powered | 100–240 VAC, 50–60 Hz | | | |
| | PoE | IEEE 802.3 af-Class 3 | | | |
| | VDC | 18–55 V, see Voltage table, chpt. 8 | | | |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 | | | |
| Power consum. AC / DC | single sided [VA] | 16 | 7 | 8 | 10 |
| | double sided [VA] | – | 11 | 16 | 18 |
| Power consum. PoE | single sided [VA] | 15 | 7 | 8 | 10 [1] |
| | double sided [VA] | – | 11 | 15 | – [1] |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | |
| | range -50 to +125 °C | ±2.0 °C | | | |
| Operating environment | temperature | -5 to +55 °C | | | |
| | humidity | 0 to 95 %, without condensing | | | |
| | protection degree | IP 54 | | | |
| Weight [kg] | single sided | 5.5 | 4.7 | 5.8 | 6.5 |
| | double sided | – | 7.3 | 9 | 10 |
| | flush | 5.5 | 4.7 | 5.8 | 6.5 |
| Dimensions [mm] | | see dimensions table, chapter 7.5.3 | | | |

**Note:**

1  PoE not available for SLH-DC.100x.6 double sided
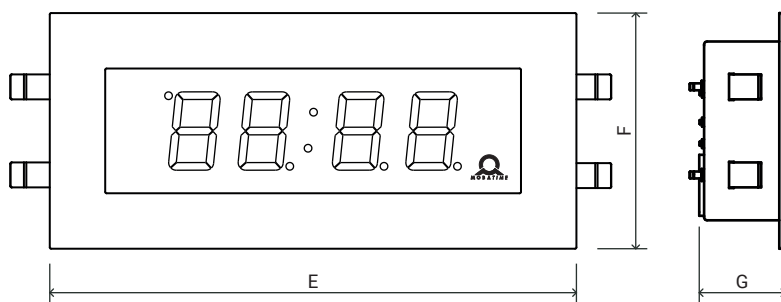
## 7.5.3 Dimensions and assembly diagram

wall mounting
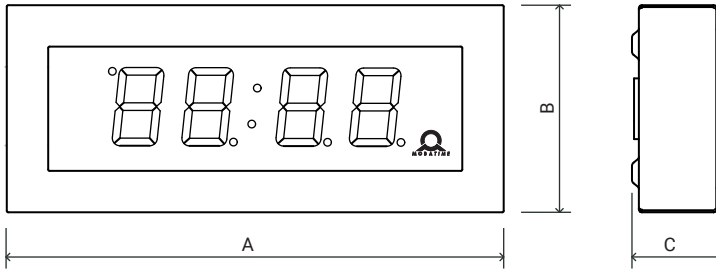


ceiling suspension

flush mounting



## Dimensions table [mm]

| SLH-DC. | 57.4 | 57.4.2 | 57.6 | 57.6.2 | 57x.6 | 57x.6.2 | 100.4 | 100.6 | 100x.6 |
|---------|------|--------|------|--------|-------|---------|-------|-------|--------|
| A | 360 | 360 | 450 | 450 | 480 | 480 | 555 | 695 | 770 |
| B | 150 | 260 | 150 | 260 | 150 | 260 | 220 | 220 | 220 |
| C | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 |
| D | 95 | – | 95 | – | 95 | – | 95 | 95 | 95 |
| E | 380 | 380 | 470 | 470 | 500 | 500 | 555 | 695 | 770 |
| F | 170 | 280 | 170 | 280 | 170 | 280 | 220 | 220 | 220 |
| G | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 |

## 7.5.4  Mounting

### 7.5.4.1  Single sided – wall mounting

- The clock consists of two parts. Visible front stainless steel panel with display and back stainless steel body with connecting terminal block. Both parts of the clock are held together by neodymium magnets.
- Remove the front panel from the clock body. The panel is held by magnets, relatively high force required to remove it.
- Disconnect the interconnecting cables by decoupling the terminals on the control PCB. Disconnect the earth wire connecting the clock body to the front panel.
- Drill appropriate number of anchoring holes into the wall of a diameter adequate to accommodate appropriate screws of 4 to 5 mm diameter. Use dowels if necessary. As a template for marking the position of the dowels, the clock body can be used.
- Pull the incoming conductors through the hole in the clock body and fix the clock body to the wall.
- On the mains powered clock loosen the screw on the underside of the 230 VAC terminal cover and remove the cover. Unscrew the cable clamp.
- Connect the incoming conductors in accordance with the descriptive sheet placed next to the connecting terminal block. Give the conductors an appropriate shape or cut them off to a length that will not obstruct the placement of the front part of the clock into the clock body.
- On mains powered clock mount the 230 VAC terminal cover back and secure it by tightening the screw on the underside of the cover.
- Carefully shape all incoming cables into the clock and secure them by screwing the cable clamp.
- Mount the connectors to the cable of the temperature sensor, to the keyboard cable, Ethernet or to the RS 485 interface connectors if these are used.
- Push the temperature sensor, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB.

    ⚠ **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

- Connect the interconnecting cables into the corresponding terminals on the clock control PCB. Reconnect the earth wire to connect the clock body to the front panel.
- Put the front panel into the clock body. Check the cables to prevent them from being pinched between the back of the front panel and the clock body.

### 7.5.4.2  Single sided – ceiling suspension

- The single sided clock consists of two parts, one front panel and stainless steel clock body with connecting terminal block. The front panel is held together by neodymium magnets. The clock suspension part is delivered separately.
- Pull the incoming conductors through the pipe which serves as the clock suspension. Fix the ceiling suspension to the ceiling using 4 appropriate screws of 5 mm diameter. Use dowels if necessary.
- Remove the front panel from the clock body. The panel is held by magnets, relatively high force required to remove it.
- Disconnect the interconnecting cables by decoupling the terminals on the control PCB. Disconnect the earth wire connecting the clock body to the front panel.
- Pull the incoming conductors through the pipe insert in the clock body. Slip-on the clock body onto the suspension in a way that the screws fit into the lower groove on the pipe insert. Fix the connection by tightening the screw using an Allen key.
- On mains powered clock loosen the screw on the underside of the 230 VAC terminal cover and remove the cover. Unscrew the cable clamp.

- Connect the conductors to the terminal block on the clock body in accordance with the descriptive nameplate. Give an appropriate shape to the conductors or cut them off at a length which does not obstruct the mounting of the clock into the clock body.
- Carefully shape all incoming cables into the clocks and secure them by screwing the cable clamp.
- Mount the connectors to the cable of the temperature sensor, to the keyboard cable, Ethernet cable or to the RS 485 interface connectors if these are used.
- Push the temperature sensors connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB.

  ⚠ **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

- Connect the interconnecting cables into the corresponding terminals on the clock control PCB. Reconnect the earth wire to connect the clock body to the front panel.
- Put the front panel into the clock body. Care should be taken when placing the cables between the clock body edge and the back side of the display front panel so as not to nip them.

## 7.5.4.3  Double sided – ceiling suspension

- The double sided clock consist of three parts, one front panel serving as the control module (this one encompasses the jacks to connect powering voltage, synchronization source, the temperature sensor and the keyboard to the clock), and the rear panel serving as the display module (with the terminal for the connection of the interconnecting cable). This part is stainless steel clock body with connecting terminal block. Both panel are interconnected via a 10-core flat cable. Front panel of the clock is held by neodymium magnets. The read panel is fixed by the screws and it is not necessary to dismount it. The clock suspension part is delivered separately.
- Pull the incoming conductors through the pipe which serves as the clock suspension. Fix the ceiling suspension to the ceiling using 4 appropriate screws of 5 mm diameter. Use dowels if necessary.
- Remove the front panel from the clock body. The panel is held by magnets, relatively high force required to remove it.
- Disconnect the interconnecting cables by decoupling the terminals on the control PCB. Disconnect the earth wire connecting the body to the front panel.
- Pull the incoming conductors through the pipe insert in the clock body. Slip-on the clock body onto the suspension in a way that the screws fit into the lower groove on the pipe insert. Fix the connection by tightening the screw using an Allen key.
- On mains powered clock loosen the screw on the underside of the 230 VAC terminal cover and remove the cover.
- Connect the conductors to the terminal block on the clock body in accordance with the descriptive nameplate. Give an appropriate shape to the conductors or cut them off at a length which does not obstruct the mounting of the clock into the clock body.
- Mount the connectors to the cable of the temperature sensor, to the keyboard cable, Ethernet cable or to the RS 485 interface connectors if these are used.
- Push the temperature sensor connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB of the **MASTER** display.

  ⚠ **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

- Connect the interconnecting cables into the corresponding terminals on the clock control PCB including 10-core flat cable. Reconnect the earth wire to connect the clock body to the front panel.
- Put the **MASTER** display front panel to the clock body. Care should be taken when placing the cables between the clock body edge and the back side of the control front panel so as not to nip them.

## 7.5.4.4  Single sided – flush mounting

- The clock consists of two parts. Visible front stainless steel panel with display and back stainless steel body with connecting terminal block. Both parts of the clock are held together by neodymium magnets.
- Remove the front panel from the clock body. The panel is held by magnets, relatively high force required to remove it.
- Disconnect the interconnecting cables by decoupling the terminals on the control PCB. Disconnect the earth wire connecting the clock body to the front panel.
- In case of the wall panel / drywall mounting remove at least 2 clamps on one side of the clock body.
- Pull the incoming conductors through the hole in the clock body and fix the clock body into prepared hole using four clamps on the sides (the wall panel / drywall mounting) or four appropriate screws 4 to 5 mm diameter (wall niche mounting). Use dowels if necessary.
- On mains powered clock loosen the screw on the underside of the 230 VAC terminal cover and remove the cover. Unscrew the cable clamp.
- Connect the incoming conductors in accordance with the descriptive sheet placed next to the connecting terminal block. Give the conductors an appropriate shape or cut them off to a length that will not obstruct the placement of the front part of the clock into the clock body.
- On mains powered clock mount the 230 VAC terminal cover back and secure it by tightening the screw on the underside of the cover.
- Carefully shape all incoming cables into the clocks and secure them by screwing the cable clamp.
- Mount the connectors to the keyboard and Ethernet cables.
- Push the temperature sensor connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB.

    ⚠ **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

- Connect the interconnecting cables into the corresponding terminals on the clock control PCB. Reconnect the earth wire to connect the clock body to the front panel.
- Put the front panel into the clock body. Check the cables to prevent them from being pinched between the back of the front panel and the clock body.
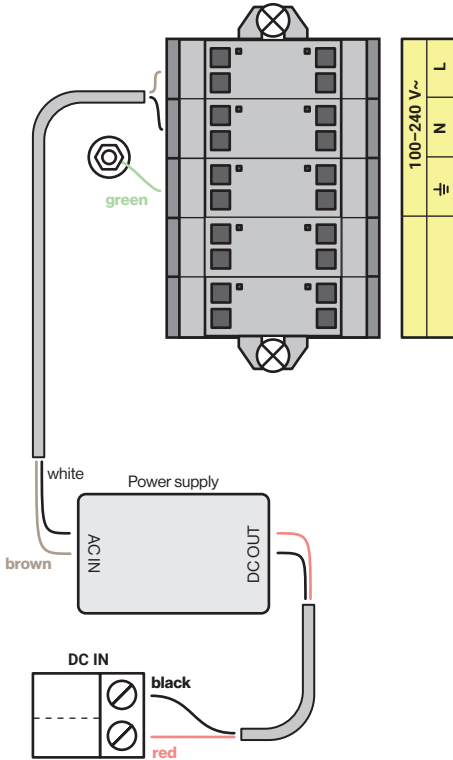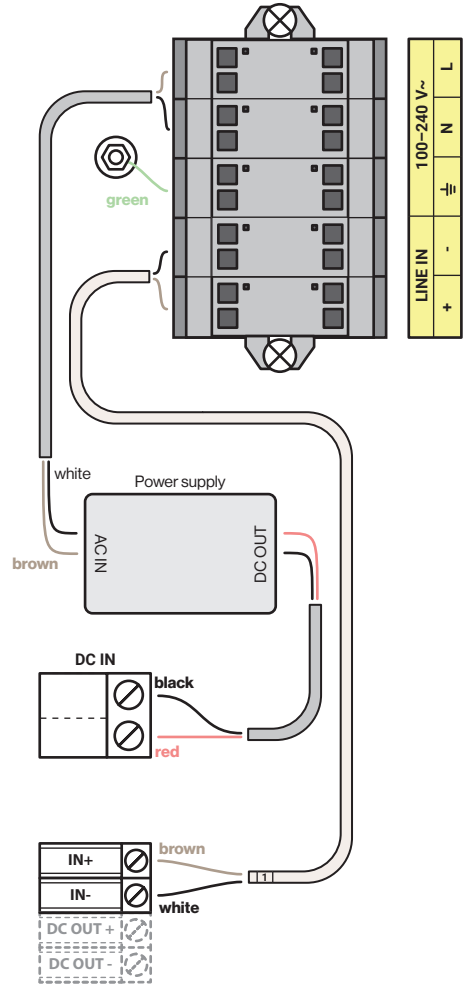
## 7.5.5 Control PCB
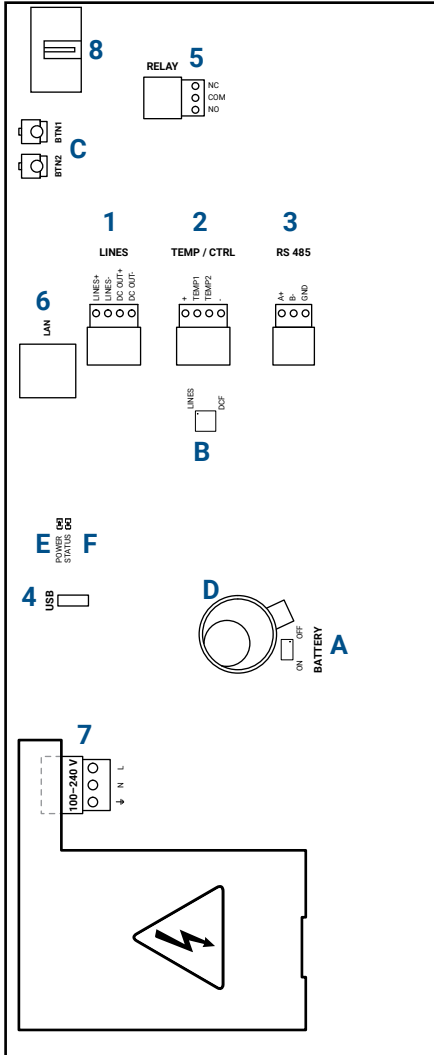


1. LINES / DC OUT connector – for LGC

2. TEMP / CTRL connector

3. RS 485 connector – for RS 485 option

4. USB connector – for LGC and GPS

5. RELAY connector – for option REL/REL-IP

6. LAN connector – for PoE, PoE+ and NTP

7. 100–240 VAC (except PoE and PoE+)

8. DISP2 – connection for second side of the clock

A. connecting / disconnecting the backup battery – option BAT

B. line type DCF or other variants – for LGC

C. push-buttons PB1, PB2

D. battery – option BAT

E. powering LED indication

F. state LED

## 7.5.6  Connecting terminal block

**For NTP and WiFi variant**



**For other variants**

## 7.5.7 Cable connection
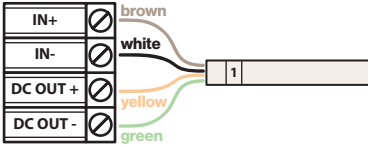
Installation LINES / DC OUT wire connection

| | | |
|---|---|---|
| IN+ | ⊘ | brown |
| IN- | ⊘ | white |
| DC OUT + | ⊘ | yellow |
| DC OUT - | ⊘ | green |

1

TEMP wire connection – 1 or 2 temperature sensors

| | | |
|---|---|---|
| + | ⊘ | red |
| T1 | ⊘ | blue |
| T2 | ⊘ | |
| - | ⊘ | white |

2

| | | |
|---|---|---|
| + | ⊘ | red |
| T1 | ⊘ | blue |
| T2 | ⊘ | |
| - | ⊘ | white |

2

2

CTRL wire connection
(stopwatch control connects to TEMP connector)

| | | |
|---|---|---|
| + | ⊘ | |
| T1 | ⊘ | brown |
| T2 | ⊘ | white |
| - | ⊘ | green |

3

RS 485 wire connection

| | | |
|---|---|---|
| A+ | ⊘ | brown |
| B- | ⊘ | white |
| GND | ⊘ | |

4

RELAY wire connection

| | | |
|---|---|---|
| NC | ⊘ | brown |
| COM | ⊘ | white |
| NO | ⊘ | green |

10

DC IN connection

| | | |
|---|---|---|
| – | ⊘ | black |
| + | ⊘ | red |
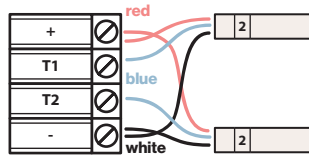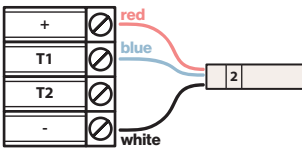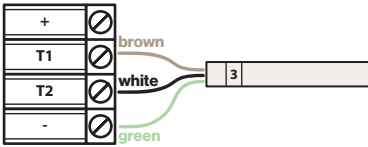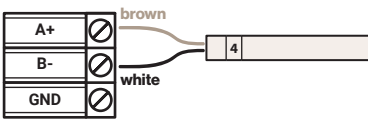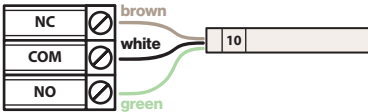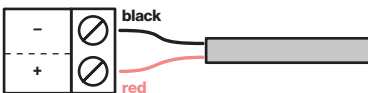
## 7.6 DA

### Basic features

- digits of 18 / 45 / 57 mm height, which corresponds to readability distance of 8 / 20 / 25 m
- digits in red, pure green blue, yellow, and white color
- display composed of SMD LEDs
- manual or automatic adjustment of the luminosity of LED diodes
- altering time, date and temperature display with adjustable time period
- time display format in four digits (HH : MM) or six digits (HH : MM $^{SS}$ or HH : MM : SS), 12 or 24-hour cycle
- date display format in four digits (DD. MM.) or six digits (DD. MM.$^{YY}$ or DD. MM. YY)
- AM/PM indication for 12-hour cycle
- temperature display in °C or °F (providing the temperature sensor is connected)
- TEMP connector is used to connect temperature sensors or stopwatch control

### Mechanic

- clock frame made of anodized aluminium profiles, black or silver color
- anti-reflection front cover made of plexiglass
- single or double sided design
- wall mounting (for single sided design), ceiling suspension, wall bracket, flush mounting or table standing
- push buttons placed on the upper side of the clock frame
- protection degree IP 40 (IP 20 for DA.18 table mounting)
- working temperature -5 to +55 °C

### Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature)
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- RTC backup with supercapacitor (lithium battery on request)

### Configuration

- setting of the clock parameters and time / date by means of push buttons or IR remote control

### Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

# 7.6.1 Technical parameters

| DA. | | 18.6...T | 18.6...F | 45.6 | 57.6 |
|---|---|---|---|---|---|
| Display | digit height [mm] | 18/13 | | 45/32 | 57/38 |
| | number of digits | 4 + 2 | | | |
| Time and date display format | HH : MM | ✓ | | | |
| | HH : MM SS | ✓ | | | |
| | DD. MM | ✓ | | | |
| | DD. MM. YY | ✓ | | | |
| Viewing distance [m] | | 8 | | 20 | 25 |
| Synchronization | NTP | NTP protocol, mains powered | | | |
| | PoE | NTP protocol, PoE powered | | | |
| | WiFi | – | | WiFi 2.4 GHz, NTP protocol | |
| | WiFi5 | – | | WiFi 2.4/5 GHz, NTP protocol | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | |
| Power | standard | 12 VDC [1] | | 100−240 VAC, 50−60 Hz | |
| | VDC | – | | 18−55 V, see Voltage table, chpt. 8 | |
| | VDISP | supply voltages depends on display color, see Voltage table, chpt. 8 | | | |
| | PoE single sided [2] | IEEE 802.3 af-Class 3 | | | |
| | PoE double sided [2] | – | | IEEE 802.3 af-Class 3 | |
| Power consumption | single sided [VA] | 4.5 | | 6 | |
| | double sided [VA] | – | | 11 | |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | |
| | range -50 to +125 °C | ±2.0 °C | | | |
| Operating conditions | temperature | -5 to +55 °C | | | |
| | humidity | 0 to 95 %, without condensing | | | |
| | protection degree | IP 20 | IP 40 | IP 40 (on request IP 54) | |
| Weight [kg] | single sided | 0.7 | 0.5 | 2 | 2.5 |
| | double sided | – | | 3.3 | 4.1 |
| Dimensions [mm] W x H x D | single sided | 130 142 176 | 144/125 144/135 54/52 | 260 260 39 | 325 325 39 |
| | double sided | – | | 260 260 78 | 325 325 78 |

## Notes:

1  DA.18 mains power by external power adapter (including in delivery), except for PoE

2  PoE variant cannot be combined with DA.75.6 with pure green, white and blue display color

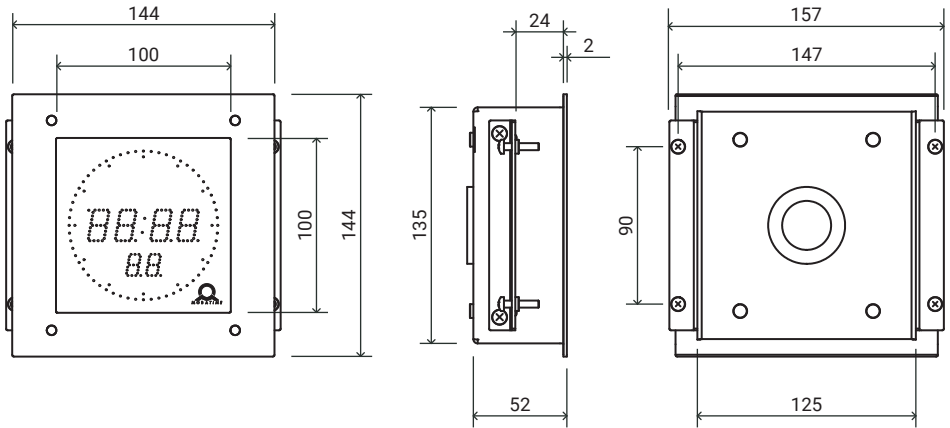## 7.6.2 Dimensions and assembly diagram
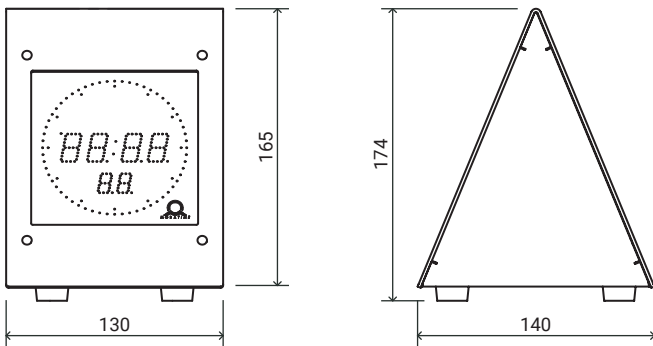
DA.45 / DA.57
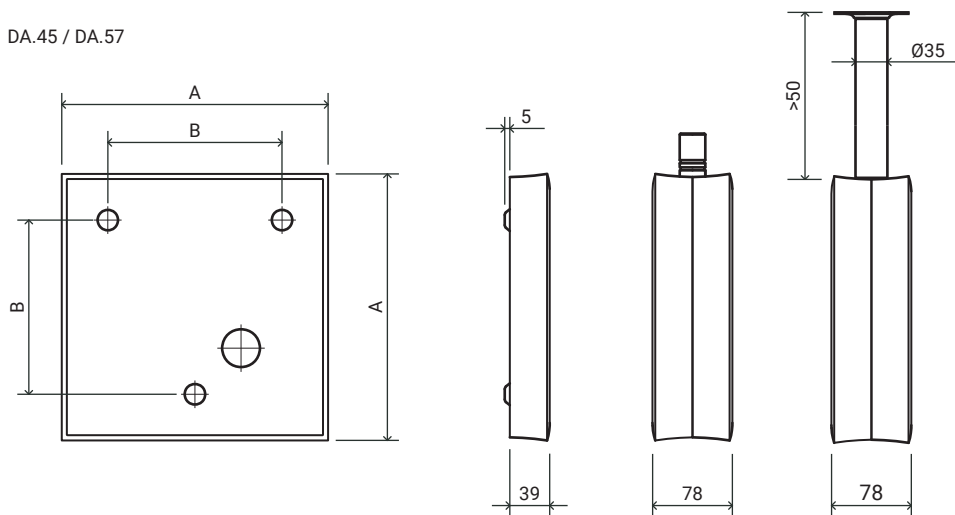


DA.45 / DA.57 − wall bracket
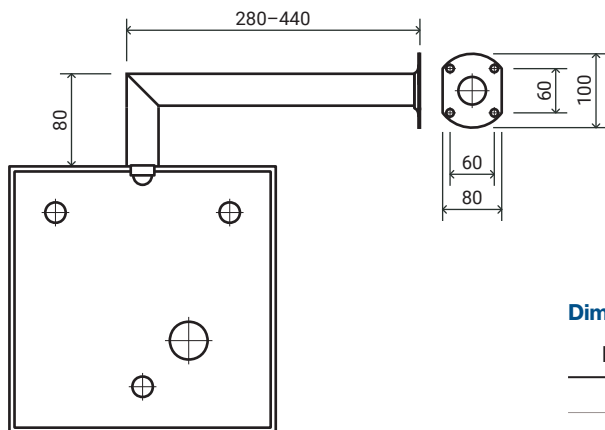


### Dimension table [mm]

| DA. | 45.6 | 57.6 |
|---|---|---|
| A | 260 | 325 |
| B | 170 | 235 |

DA.18.6...F



DA.18.6...T

### 7.6.3  Mounting

### 7.6.3.1  Single sided DA.45 / DA.57

- The frame is fixed using two suspension (above) and two sliding (bottom) springs. Lift-off the anchoring plate using a screwdriver inserted in between the sheet and the frame at the sliding spring point on the clock bottom side.
- Disconnect the interconnecting cables by decoupling the terminals on the control PCB.
- Drill three anchoring holes into the wall, of a diameter adequate to accommodate wood-type screws of 4–5 mm diameter. As a template for marking the position of the holes, the anchoring plate can be used.
- Interlace the incoming conductors through the opening in the anchoring plate and fix the sheet to the wall.
- Connect the incoming conductors in accordance with the descriptive sheet on the terminal board, placed on the anchoring plate. Give the conductors an appropriate shape or cut them off to a length that will not obstruct the placement of the clock onto the anchoring plate.
- Mount the connectors to the cable of the temperature sensor, to the keyboard, Ethernet cable or to the RS 485 interface connectors if these are used.
- Push the temperature sensor connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminal on the control PCB.

    ⚠ **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

- Connect the interconnecting cables into the corresponding terminals on the clock control PCB.
- Put the clock opposite to the anchoring plate and suspend it onto the upper springs. Care should be taken when placing the cables between the frame edge and the anchoring plate, so as not to nip them. Snap the clock in onto the springs by pushing on the lower part of the frame.
- Check whether the anchoring plate on the sides fits exactly into the groove in the clock frame.
- Remove the blind cap from the opening on the clock bottom side
- Insert Allen key into the opening on the bottom side of the clock. Turn the key softly in anticlockwise direction. The frame catch will snap in.
- Replace the blind cap on the opening.
- To loosen the frame catch, use the reverse procedure (turn clockwise).

### 7.6.3.2  Double sided DA.45 / DA.57

- The double sided clock consists of two parts, one serving as the control module (this one encompasses the jacks to connect powering voltage, synchronisation source, the temperature sensor and the keyboard to the clock), and the other serving as the display module (with the terminal for the connection of the interconnecting cable). Both clock parts are interconnected via a 10-core flat cable. The clock suspension part is delivered separately.
- Interlace the incoming conductors through the pipe which servers as the clock suspension. Secure the ceiling suspension (or the side console) to the ceiling (or the wall) using 4 wood screws of 5 mm diameter
- The frame is fixed using two suspensions (above) and two sliding (bottom) springs. Lift-off both parts of the clock from the anchoring plate using a screwdriver inserted in between the sheet and the frame at the point where the are the sliding springs on the clock bottom side.
- Disconnect the interconnecting cables by decoupling the terminals on the control PCB.
- Interlace the incoming conductors through the pipe insert on the anchoring plate, to the side which finds itself to the opposite of the terminal board. Slip-on the plate onto the suspension in a way that the screws fit into the upper groove on the pipe insert. Fix the connection by tightening the screw that using an Allen key.
- Interlace the incoming conductors thought the opening located next to the terminal board and connect the conductors to the terminal board on the anchoring plate.
- Mount the connectors to the cable of the temperature sensor, to the keyboard cable, Ethernet cable or to the RS 485 interface connectors if these are used.

- Place the display part of the clock to the anchoring plate, at a position which is opposite to the terminal board, and suspend this part onto the upper springs. Interlace the 10-core interconnecting cable through the lower opening which finds itself at the closest to the terminal board on the anchoring plate.
- Care should be taken when placing the cables between the frame edge and the
- Connect the 10-core interconnecting cable and the interconnecting cables into the corresponding plugs on the clock control PCB.
- Push the temperature sensor connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB.

⚠ **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

- Put the control part of the clock opposite to the anchoring plate and suspend it onto the upper springs. Care should be taken when placing the cables between the frame edge and the anchoring plate, so as not to nip them. Snap the clock in onto the springs by pushing on the lower part of the frame
- Check whether the anchoring plate on the sided fits exactly into the grooves established in both parts of the digital clock (these must be pushed against each other in a way to mask the anchoring plate - after placing the parts the plate shall not be seen).
- Remove the blind cap from the opening on the both lower sides of clock.
- Insert Allen key into the opening on the lower side of the clock. Turn the key softly in anticlockwise direction. The frame catch will snap in. Secure both parts of the clock.
- Replace the blind cap
- Loosen the screws on the suspension using Allen key and lift the clock into the suspension in a way that the screws fit into the lower groove on the pipe insert. Secure the attachment by tightening the screws using the Allen key.
- To loosen the frame catch use the reverse procedure (turn clockwise).

🗩 **Note:**
During the disassembly first withdraw the clock, and suspend the suspension on the upper groove at the pipe insert.

## 7.6.3.3  Panel flush mounting DA.18

- Prepare opening for clock. Minimal dimensions should be W 126 x H 136 mm.
- Dismount front part of clock (frame with plexiglass and electronics) – it is fixed to rear part of clock by magnets.
- Pull the cables through the rubber grommet and insert the rear part of the clock to the prepared opening.
- Pull fixing "Z" profiles one by one through rectangular openings on the sided of the rear part and fix them using supplied screws M4x12 DIN 7985. Fix the clock in panel using these mounting screws with appropriate torque.
- Mount the part of clock back.

## 7.6.3.4  Panel mounting accessible from the rear side DA.18

- Prepare opening for clock. Minimal dimensions should be W 126 x H 136 mm.
- Dismount front part of clock (frame with plexiglass and electronics) – it is fixed to rear part of clock by magnets.
- Insert rear part of clock to the prepared opening and mount profiles "L" on the sided of the clock using M4x12 DIN 7985 screws. Fix the clock into the opening using 4 mounting screws with appropriate torque.
- Pull the cables through the rubber grommet, mount connectors on the cables and connect them to the corresponding terminals on the clock control PCB.
- Mount front part of clock back.

### 7.6.3.5  Wall flush mounting DA.18

- Put a paper pattern on the wall. According to pattern drill wall plug holes Ø8 mm to a depth of 100 mm and mark the corners of the mounting opening.
- Prepare opening for the clock. Minimal dimensions W 131 x H 141 mm, depth 55 mm.
- Insert the dowels to the mounting holes Ø8 mm.
- Dismount front part of clock (frame with plexiglass and electronics) – it is fix to rear part of clock by magnets.
- Pull the cables through the rubber grommet. Insert the rear part of the clock into the opening and fix it slightly using 4 screws DIN 7982 ST3,5.
- Align the clock with the wall surface using 4 screws M5x12 DIN7985 and fix it using 4 screws DIN 7982 ST3,5 using appropriate torque.
- Mount connectors on the cables and connect them to the corresponding terminals on the clock control PCB
- Mount the front part of clock back.

### 7.6.3.6  Table mounting DA.18

This version of clock is primarily designed as free-standing on 4 rubber foot. The clock can also be securely fixed to one place on the table, follow these steps:

- Using screwdriver dismount 4 rubber legs on the bottom of the clock.
- Using your fingers dismount round bottom cover
- Choose some place for the clock on the table. In the middle of this place make a hole for cables.
- Put the cover on the table so that the central hole of the cover in concentric with the hole in the table.
- Fix the cover to the table with the appropriate screws in locations 3 holes in the cover.
- Pull the cables through the hole in the cover and table and mount connectors on the cables and connect them to the corresponding terminals on the clock control PCB.
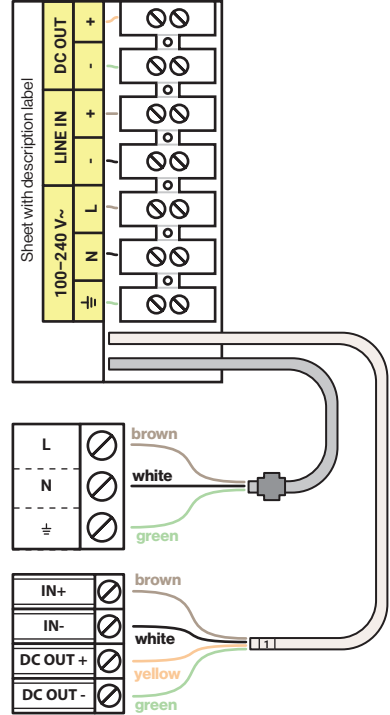- Clip the clock on the cover.

## 7.6.4 Connecting terminal block

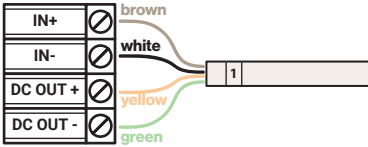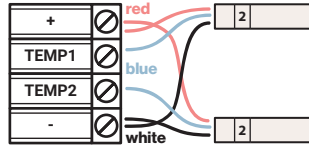Not used in DA.18.

**For NTP and WiFi variant**
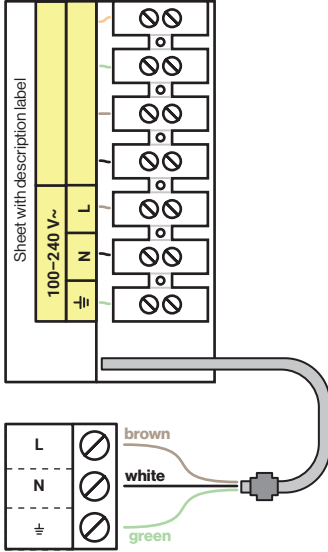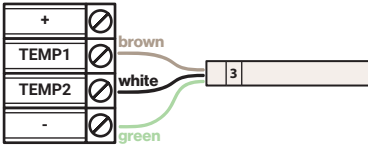
**For other variants**

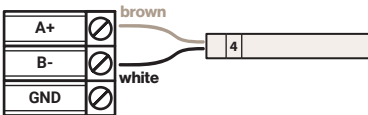## 7.6.5  Cable connection

Installation LINES / DC OUT wire connection

| IN+ | ⊘ | brown |
| IN- | ⊘ | white |
| DC OUT + | ⊘ | yellow |
| DC OUT - | ⊘ | green |

1

TEMP wire connection – 1 or 2 temperature sensors

| + | ⊘ | red |
| TEMP1 | ⊘ | blue |
| TEMP2 | ⊘ | |
| - | ⊘ | white |

2

| + | ⊘ | red |
| TEMP1 | ⊘ | blue |
| TEMP2 | ⊘ | |
| - | ⊘ | white |

2

2

CTRL wire connection
(stopwatch control connects to TEMP connector)

| + | ⊘ | |
| TEMP1 | ⊘ | brown |
| TEMP2 | ⊘ | white |
| - | ⊘ | green |

3

RS 485 wire connection

| A+ | ⊘ | brown |
| B- | ⊘ | white |
| GND | ⊘ | |

4

RELAY connection

| NC | ⊘ | brown |
| COM | ⊘ | white |
| NO | ⊘ | green |

10
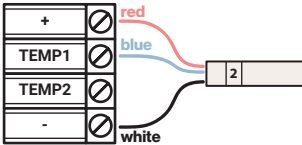
POWER connection
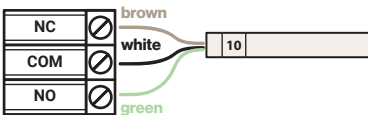
| L | ⊘ | brown |
| N | ⊘ | white |
| ⏚ | ⊘ | green |
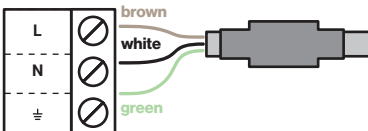
## 7.7  ECO-M-DK

### Basic features

- digits of 75 mm height, which corresponds to readability distance of 32 m
- digits in red or yellow color
- display composed of SMD LEDs
- manual or automatic adjustment of the luminosity of LED diodes
- altering time, date and temperature display with adjustable time period
- time display format in four digits (HH : MM), 12 or 24-hour cycle
- date display format in six characters and two digits (SAT; 25 APR)
- AM/PM indication for 12-hour cycle
- temperature display in °C or °F, up to two sensors connectable
- possibility of display one or two temperatures
- TEMP connector is used to connect temperature sensors or stopwatch control

### Mechanic

- clock frame made of aluminium sheets, black or silver color, any other RAL color on request
- anti-reflection front cover made of plexiglass
- single or double sided design
- wall mounting (for single sided design), ceiling suspension
- push buttons, connectors and state LEDs are accessible after dismounting the front plexiglass
- protection degree IP 54
- working temperature -5 to +55 °C

### Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature)
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- RTC backup with supercapacitor (lithium battery on request)

### Configuration

- setting of the clock parameters and time / date by means of push buttons or IR remote control

### Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

---

## 7.7.1 Technical specifications

| ECO-M-DK. | | 75.4.V1 |
|---|---|---|
| Display | digit height [mm] | 75/50 |
| | number of digits | 4 / date |
| Time and date display format | HH : MM | ✓ |
| | day of week | 2 or 3 characters |
| | day of month | 2 digits |
| | month | 3 characters |
| | supported languages | Czech, Slovak, English, German, French, Italian, Russian, Spanish, Portuguese, Polish |
| Viewing distance [m] | | 32 |
| Synchronization | NTP | NTP protocol, mains powered |
| | PoE | NTP protocol, PoE powered |
| | WiFi | WiFi 2.4 GHz, NTP protocol |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B |
| Power | mains powered | 100−240 VAC, 50−60 Hz |
| | PoE | IEEE 802.3 af-Class 3 |
| | VDC | 18−55 V, see Voltage table, chpt. 8 |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 |
| Power consumption | single sided [VA] | 7 |
| | double sided [VA] | 11 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 1 year with lithium battery (on request) |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C |
| | range -50 to +125 °C | ±2.0 °C |
| Operating environment | temperature | -5 to +55 °C |
| | humidity | 0 to 95 %, without condensing |
| | protection degree | IP 54 |
| Weight [kg] | single sided | 0,9 |
| | double sided | 2 |
| Dimensions [mm] W x H x D | single sided | 340 340 42 |
| | double sided | 340 340 115 |

## 7.7.3  Dimensions and assembly diagram

ECO-M-DK.75.4.V1
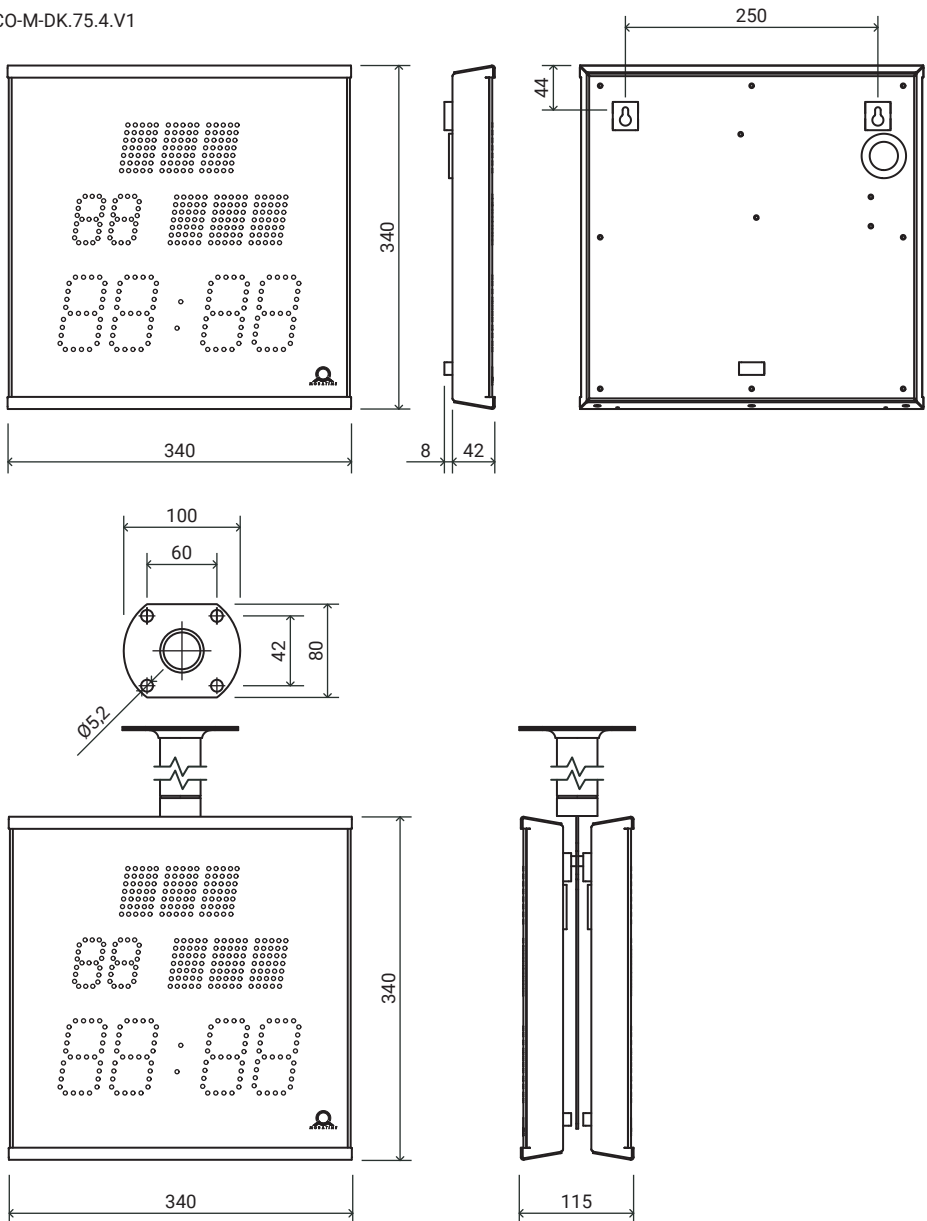
### 7.7.4  Mounting
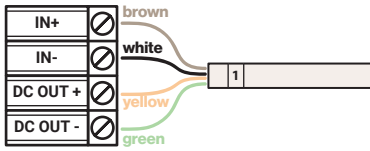
### 7.7.4.1  Single sided

- Prepare two holes in the wall by hinges pitch on the backside of the 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.
- 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 or crimp the RJ45 jack to the Ethernet cable respectively.
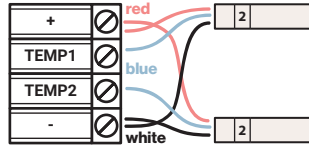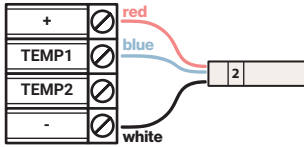- Mount the plexiglass and bottom cover.

### 7.7.4.2  Double sided

- Prepare four holes in the ceiling (or the wall) by bracket flange pinch.
- Insert the dowels to the prepared holes and fix into them the ceiling suspension (or the wall bracket) using appropriate screws.
- Remove the screws on the bottom of the **MASTER** clock. Remove the bottom cover and plexiglass.
- Cut the cable(s) to the appropriate length and connect the wires to corresponding terminals or crimp the RJ45 jack to the Ethernet cable respectively.
- Connect the cable from **SLAVE** clock to the **MASTER** clock.
- Mount the plexiglass and bottom cover.
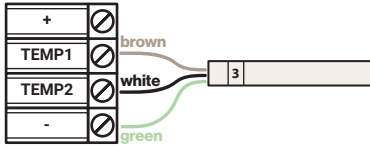
## 7.7.5  Cable connection
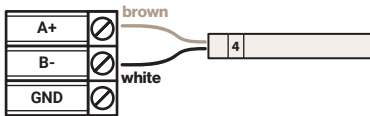
Installation LINES / DC OUT wire connection

| | | |
|---|---|---|
| IN+ | ⊘ | brown |
| IN- | ⊘ | white |
| DC OUT + | ⊘ | yellow |
| DC OUT - | ⊘ | green |

| 1 |

TEMP wire connection – 1 or 2 temperature sensors

| | | |
|---|---|---|
| + | ⊘ | red |
| TEMP1 | ⊘ | blue |
| TEMP2 | ⊘ | |
| - | ⊘ | white |

| 2 |

| | | |
|---|---|---|
| + | ⊘ | red |
| TEMP1 | ⊘ | blue |
| TEMP2 | ⊘ | |
| - | ⊘ | white |

| 2 |
| 2 |

CTRL wire connection
(stopwatch control connects to TEMP connector)

| | | |
|---|---|---|
| + | ⊘ | |
| TEMP1 | ⊘ | brown |
| TEMP2 | ⊘ | white |
| - | ⊘ | green |

| 3 |

RS 485 wire connection

| | | |
|---|---|---|
| A+ | ⊘ | brown |
| B- | ⊘ | white |
| GND | ⊘ | |

| 4 |

RELAY connection

| | | |
|---|---|---|
| NC | ⊘ | brown |
| COM | ⊘ | white |
| NO | ⊘ | green |

| 10 |

POWER connection
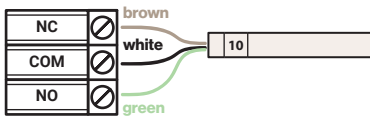
| | | |
|---|---|---|
| L | ⊘ | brown |
| N | ⊘ | white |
| ⏚ | ⊘ | green |
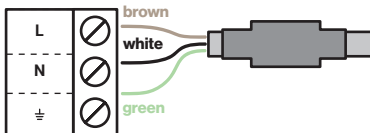
# 7.8 DK

## Basic features

- digits of 57 mm height, which corresponds to readability distance of 25 m
- digits in red or green color
- display composed of SMD LEDs
- manual or automatic adjustment of the luminosity of LED diodes
- altering time, date and temperature display with adjustable time period
- time display format in four digits (HH : MM) or six digits (HH : MM $^{SS}$), 12 or 24-hour cycle
- date display format in eleven character and two digits (SAT 25 APRIL_____)
- AM/PM indication for 12-hour cycle
- temperature display in °C or °F, up to two sensors connectable
- TEMP connector is used to connect temperature sensors or stopwatch control
- possibility of setting up the time zone, the display can cycle between up to five different places and display actual time and city name

## Mechanic

- clock frame made of anodized aluminium profiles, black or silver color
- anti-reflection front cover made of plexiglass
- single or double sided design
- wall mounting (for single sided design), ceiling suspension, wall bracket
- push buttons placed on the upper side of the clock frame
- protection degree IP 40
- working temperature -5 to +55 °C

## Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature)
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- RTC backup with supercapacitor (lithium battery on request)

## Configuration

- setting of the clock parameters and time / date by means of push buttons or IR remote control
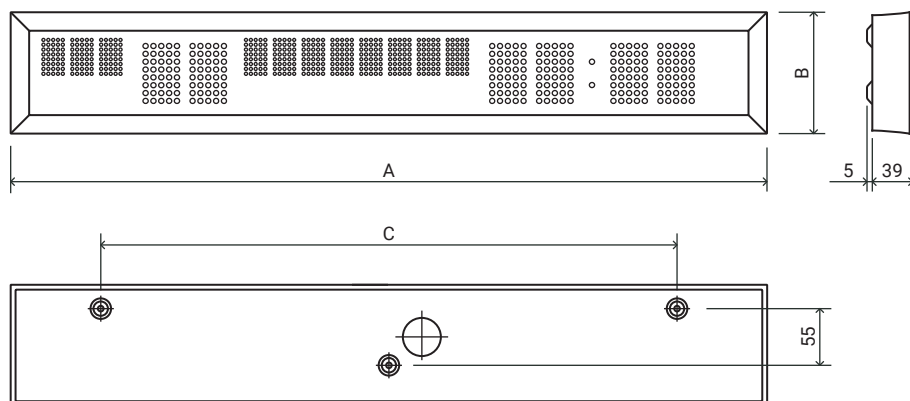
## Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

## 7.8.1  Technical parameters

| DK. | | 57.4 | 57.6 |
|---|---|---|---|
| Display | digit height [mm] | 57 | 57/36 |
| | number of digits | 4 | 4 + 2 |
| | height of digits [mm] | 30 | 30 |
| Time and date display format | HH : MM | ✓ | |
| | HH : MM $^{SS}$ | | ✓ |
| | day of week | 3 characters | |
| | date | 2 digits for day + 8 characters for month | |
| Viewing distance [m] | | 25 | |
| Synchronization | NTP | NTP protocol, mains powered | |
| | PoE | NTP protocol, PoE powered | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | |
| Power | mains powered | 100−240 VAC, 50−60 Hz | |
| | PoE | IEEE 802.3 af-Class 3 | |
| | VDC | 18−55 V, see Voltage table, chpt. 8 | |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 | |
| Power consumption AC / DC [VA] | single sided | 11 | 11 |
| | double sided | 15 | 15 |
| Power consumption PoE [VA] | single sided | 11 | 16 |
| | double sided | 11 | 15 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | |
| | range -50 to +125 °C | ±2.0 °C | |
| Operation environment | temperature | -5 to +55 °C | |
| | humidity | 0 to 95 %, without condensing | |
| | protection degree | IP 40 | |
| Weight [kg] | single sided | 2,4 | 2,8 |
| | double sided | 4,4 | 5,1 |
| Dimensions [mm] W x H x D | single sided | 735 118 39 | 800 118 39 |
| | double sided | 735 118 78 | 800 118 78 |

## 7.8.2 Dimensions and assembly diagram

DK.57.4 / DK.57.6



wall bracket mounting
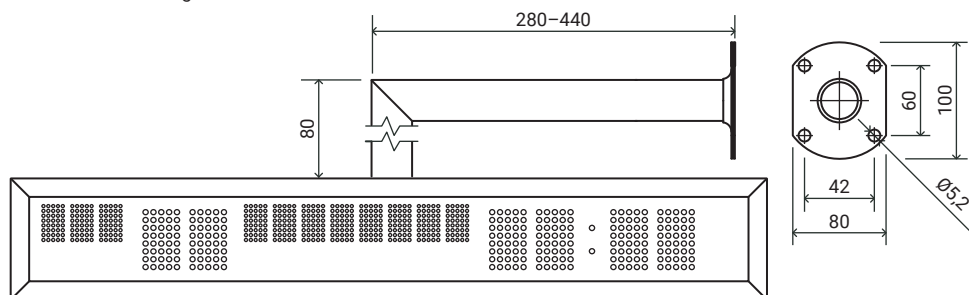


ceiling suspension mounting
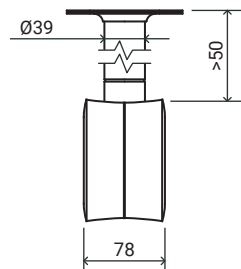


### Dimension table [mm]

| DK. | 57.4 | 57.6 |
|-----|------|------|
| A | 735 | 800 |
| B | 118 | 118 |
| C | 460 | 540 |

### 7.8.3  Mounting

### 7.8.3.1  Single sided

- The frame is fixed using two suspensions (above) and two sliding springs (bottom). Lift-off the anchoring plate using a screwdriver inserted in between the sheet and the frame at the sliding spring point on the clock bottom side.
- Disconnect the interconnecting cables by decoupling the terminals on the control PCB.
- Drill three anchoring holes into the wall of a diameter adequate to accommodate wood-type screws of 4 to 5 mm diameter. As a template for marking the position of the holes, the anchoring plate can be used.
- Interlace the incoming conductors through the opening in the anchoring plate and fix the sheet to the wall.
- Connect the incoming conductors in accordance with the descriptive sheet on the terminal board, placed on the anchoring plate. Give the conductors an appropriate shape or cut them off to a length that will not obstruct the placement of the clock onto the anchoring plate.
- Mount the connectors to the cable of the temperature sensor, to the keyboard cable, Ethernet cable or to the RS 485 interface connectors if these are used.
- Push the temperature sensor connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB.

   ⚠ **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

- Connect the interconnecting cables into the corresponding terminals on the clock control PCB.
- Put the clock opposite to the anchoring plate and suspend it onto the upper springs. Care should be taken when placing the cables between the frame edge and the anchoring plate, so as not to nip them. Snap the clock in onto the springs by pushing on the lower part of the frame.
- Check whether the anchoring plate on the sides fits exactly into the groove in the clock frame.
- Remove the blind cap from the opening on the clock bottom side.
- Insert Allen key into the opening on the bottom side of the clock. Turn the key softly in anticlockwise direction. The frame will snap in.
- Replace the blind cap on the opening.
- To loosen the frame catch, use the reverse procedure (turn clockwise).

### 7.8.3.2  Double sided

- The double sided clock consists of two parts, one serving as the control module (this one encompasses the jacks to connect power voltage, synchronization source, the temperature sensor and the keyboard to the clock) and the other serving as the display module (with the terminal for the connection of the interconnecting cable). Both clock parts are interconnected via a 10-core flat cable. The clock suspension part is delivered separately.
- Interlace the incoming conductors through the pipe which servers as the clock suspension. Secure the ceiling suspension (or wall bracket) to the ceiling (or the wall) using 4 wood screws of 5 mm diameter.
- The frame is fixed using two suspensions (above) and two sliding springs (bottom). Lift-off both parts of the clock from the anchoring plate using a screwdriver inserted in between the sheet and the frame at the point where there are the sliding springs on the clock bottom side.
- Disconnect the interconnecting cables by decoupling the terminals on the control PCB.
- Interlace the incoming conductors through the pipe insert on the anchoring plate to the side which finds itself to the opposite of the terminal board. Slip-on the plate onto the suspension in a way that the screws fit into the upper groove on the pipe insert. Fix the connection by tightening the screw using an Allen key.
- Interlace the incoming conductors through the opening located next to the terminal board and connect the conductors to the terminal board on the anchoring plate in accordance with the descriptive nameplate. Give an appropriate shape to the conductors or cut them off at a length which does not obstruct the mounting of the clock onto the anchoring plate.

- Mount the connectors to the cable of temperature sensor, to the keyboard cable, Ethernet cable or to the RS 485 interface connector if these are used.
- Place the display part of the clock to the anchoring plate at a position which is opposite to the terminal board and suspend this part onto the upper springs. Interlace the 10-core interconnecting cable through the lower opening which finds itself at the closest to the terminal board on the anchoring plate.
- Care should be taken when placing the cables between the frame edge and anchoring plate, so as not to nip them. Snap the clock onto the springs by pushing by pushing on the lower frame part.
- Connect the 10-core interconnecting cable and the interconnecting cables into the corresponding plugs on the clock control PCB.
- Push the temperature sensor connector, the keyboard connector, Ethernet connector or the RS 485 jacks into the corresponding terminals on the control PCB.

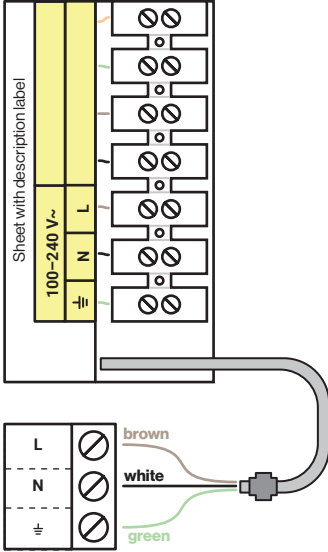   ⚠ **Be careful not to swap the terminals. Check the markings of the jack-plugs.**

- Put the control part of the clock opposite to the anchoring plate and suspend it onto the upper springs. Care should be taken when placing the cables between the frame edge and the anchoring plate, so as not to nip them. Snap the clock in onto the springs by pushing on the lower part of the frame.
- Check whether the anchoring plate on the sides fits exactly into the grooves established in both parts of the calendar digital clock (these must be pushed against each other in a way to mask the anchoring plate – after placing the parts the plate shall not be seen).
- Remove the blind cap from the opening on the both lower sides of clock.
- Insert Allen key into the opening on the lower side of the clock. Turn the key softly in anticlockwise direction. The frame catch will snap in. Secure both parts of the clock.
- Replace the blind cap on the opening.
- Loosen the screws on the suspension using Allen key and lift the clock into the suspension in a way that the screws fit into the lower groove on the pipe insert. Secure the attachment by tightening the screw using the Allen key.
- To loosen the frame catch use the reverse procedure (turn clockwise).
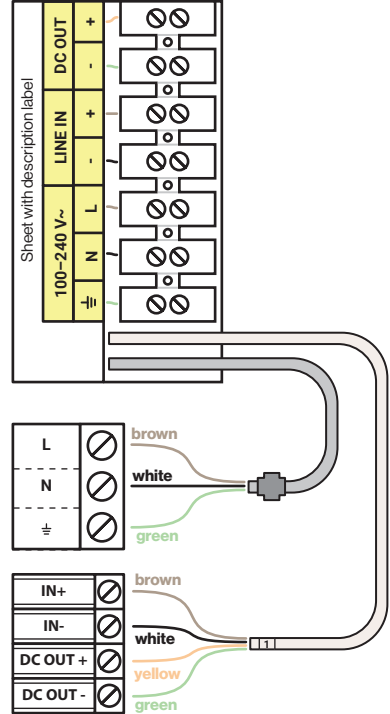
🗩 **Note:**
During the disassembly first withdraw the clock and suspend the suspension on the upper groove at the pipe insert.

## 7.8.4  Connecting terminal block
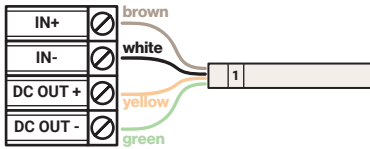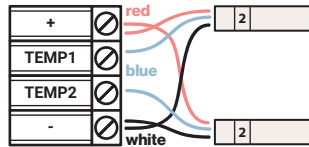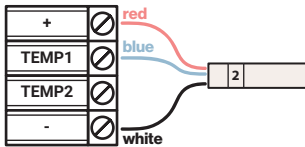
**For NTP and WiFi variant**
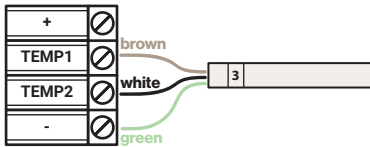


**For other variants**

## 7.8.5  Cable connection

Installation LINES / DC OUT wire connection

| IN+ | ⊘ | brown |
|---|---|---|
| IN- | ⊘ | white |
| DC OUT + | ⊘ | yellow |
| DC OUT - | ⊘ | green |

TEMP wire connection – 1 or 2 temperature sensors

| + | ⊘ | red |
|---|---|---|
| TEMP1 | ⊘ | blue |
| TEMP2 | ⊘ | |
| - | ⊘ | white |

| + | ⊘ | red |
|---|---|---|
| TEMP1 | ⊘ | blue |
| TEMP2 | ⊘ | |
| - | ⊘ | white |

CTRL wire connection
(stopwatch control connects to TEMP connector)

| + | ⊘ | |
|---|---|---|
| TEMP1 | ⊘ | brown |
| TEMP2 | ⊘ | white |
| - | ⊘ | green |

RS 485 wire connection

| A+ | ⊘ | brown |
|---|---|---|
| B- | ⊘ | white |
| GND | ⊘ | |

RELAY connection

| NC | ⊘ | brown |
|---|---|---|
| COM | ⊘ | white |
| NO | ⊘ | green |
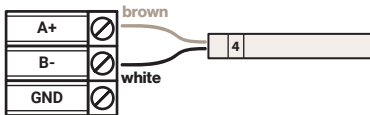
POWER connection
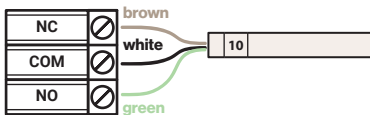
| L | ⊘ | brown |
|---|---|---|
| N | ⊘ | white |
| ⏚ | ⊘ | green |
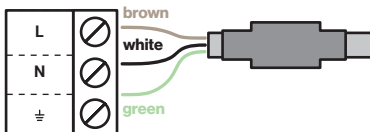
# 7.9  ECO-M-DSC

## Basic features

- digits of 100 / 180 / 190 mm height, which corresponds to readability distance of 40 / 70 / 75 m
- digits in red color
- display composed of SMD LEDs
- manual or automatic adjustment of the luminosity of LED diodes
- altering time, date and temperature display with adjustable time period
- time display format in four digits (HH : MM) or six digits (HH : MM : SS), 12 or 24-hour cycle
- date display format in four digits (DD. MM.) or six digits (DD. MM. YY)
- AM/PM indication for 12-hour cycle
- temperature display in °C or °F (providing the temperature sensor is connected)
- TEMP connector is used to connect temperature sensors and stopwatch control

## Mechanic

- clock frame made of powder coated aluminium sheets in black or silver color, powder coated, any other RAL color on request
- front cover, made of mineral glass with anti-reflective foil
- single or double sided design
- wall mounting (only for single sided design) or ceiling suspension
- push buttons are placed on inside of the clock (behind the cover)
- protection degree IP 65
- working temperature -25 to +65 °C

## Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.3 s/day
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- synchronization by means of GPS signal
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- RTC backup with supercapacitor (lithium battery on request)

## Configuration

- setting of the clock parameters and time / date by means of push buttons or IR remote control
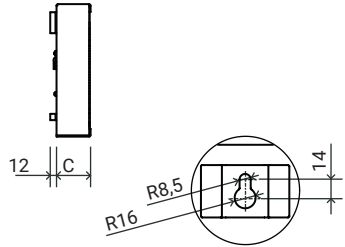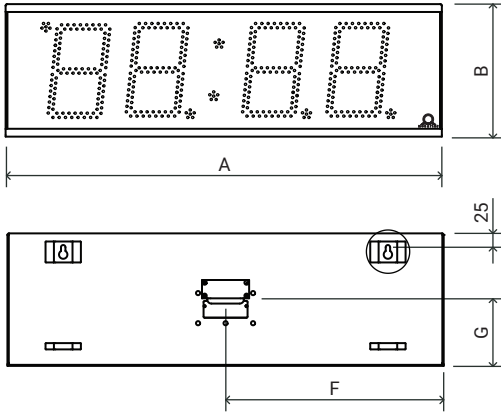
## Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

# 7.9.1 Technical specifications

| ECO-M-DSC. | | 100.4 | 100x.6 | 180.4 | 180x.6 | 190.4 | 190x.6 |
|---|---|---|---|---|---|---|---|
| Display | digit height [mm] | 100 | 100 | 180 | 180 | 190 | 190 |
| | number of digits | 4 | 6 | 4 | 6 | 4 | 6 |
| Time and date display format | HH : MM | ✓ | | ✓ | | ✓ | |
| | HH : MM : SS | | ✓ | | ✓ | | ✓ |
| | DD. MM | ✓ | | ✓ | | ✓ | |
| | DD. MM. YY | | ✓ | | ✓ | | ✓ |
| Viewing distance [m] | | 40 | | 70 | | 75 | |
| Synchronization | NTP | NTP protocol, mains powered | | | | | |
| | PoE [1] | NTP protocol, PoE powered | | | | | |
| | PoE+ [1] | NTP protocol, PoE+ powered | | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | | |
| | GPS | GPS signal | | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | | |
| Power | mains powered | 100–240 VAC, 50–60 Hz | | | | | |
| | PoE single sided [2] | IEEE 802.3af Class3 | – | | | | |
| | PoE+ single sided [3] | – | IEEE 802.3at | | – | IEEE 802.3at | – |
| | PoE+ double sided [4] | IEEE 802.3at | – | | | | |
| | VDC | 18–55 V, see Voltage table, chpt. 8 | | | | | |
| | VDISP | supply voltages depends on display color, see Voltage table, chpt. 8 | | | | | |
| Power consumption | single sided [VA] | 15 | 22 | 23 | 33 | 23 | 33 |
| | double sided [VA] | 29 | 42 | 44 | 66 | 44 | 66 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | | |
| | accuracy | ±0.3 s/day | | | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | | |
| Operating environment | temperature | -25 to +65 °C | | | | | |
| | humidity | 0 to 95 %, without condensing | | | | | |
| | protection degree | IP 65 | | | | | |
| Weight [kg] | single sided | 4.3 | 4.9 | 6.4 | 8.9 | 6.4 | 8.9 |
| | double sided | 6.9 | 7.6 | 9.7 | 13.5 | 9.7 | 13.5 |
| Dimensions [mm] W x H x D | single sided | 553 193 65 | 753 193 65 | 833 253 65 | 1 213 253 65 | 833 253 65 | 1 213 253 65 |
| | double sided | 553 193 98 | 753 193 98 | 833 253 98 | 1 213 253 98 | 833 253 98 | 1 213 253 98 |

## 7.9.2 Dimensions and assembly diagram

wall mounting



ceiling suspension – except ECO-M-DSC 180x.6 / 190x.6
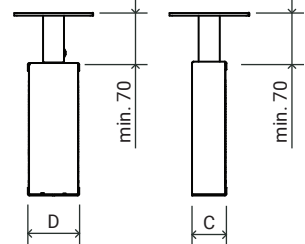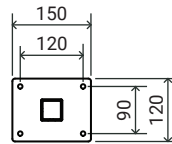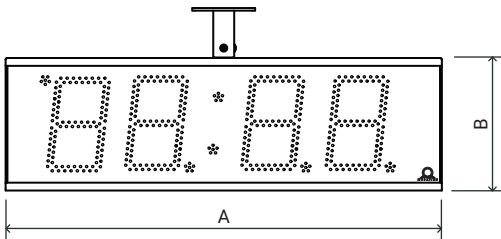


ceiling suspension – ECO-M-DSC. 180x.6 / 190x.6
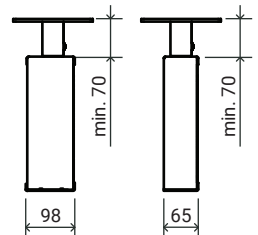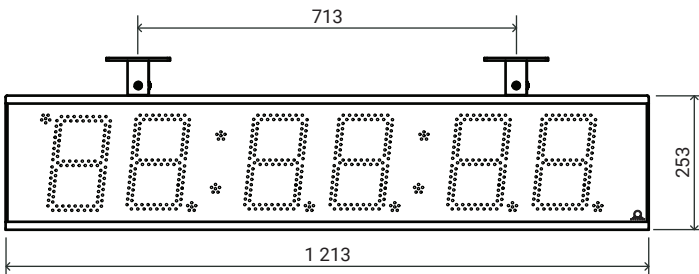
## Dimensions table [mm]

| ECO-M-DSC. | 100.4 | 100x.6 | 180.4 | 180x.6 | 190.4 | 190x.6 |
|---|---|---|---|---|---|---|
| A | 533 | 753 | 833 | 1 213 | 833 | 1 213 |
| B | 193 | 193 | 253 | 253 | 253 | 253 |
| C | 65 | 65 | 65 | 65 | 65 | 65 |
| D | 98 | 98 | 98 | 98 | 98 | 98 |
| E | 320 | 540 | 620 | 1 000 | 620 | 1 000 |
| F | 266.5 | 376.5 | 416.5 | 606.5 | 416.5 | 606.5 |
| G | 99 | 99 | 129 | 129 | 129 | 129 |

### 7.9.3  Mounting

### 7.9.3.1  Single sided

1  Prepare 2 holes in the wall by hinges pitch on the backside of clock.
2  Insert dowels to the prepared holes and screw the appropriate screws into them.
3  Remove the screws on the bottom of the clock. Remove the bottom cover and front glass.
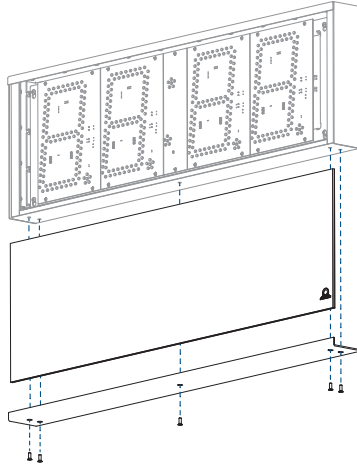


4  Loosen four screws that hold the display chassis with electronics. Move the chassis up so that the screws fit into the grooves.

   Note: Do not fully unscrew the screws!

   ECO-M-DSC.100
   Disconnect DC power cable from clock control PCB (except PoE / PoE+).

   ECO-M-DSC.180/190
   Disconnect DC power cable and flat data cable from most left digit.

5 Remove the small cover, which includes gap with sealing for passage of cables into the clock.

Gap for cables



6 Put the cable(s) through the opening and hang the clock on the prepared screws in the wall.

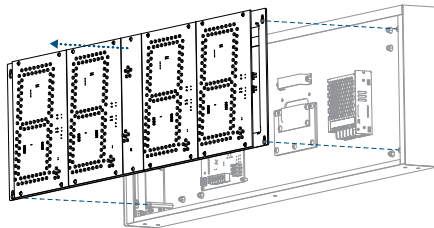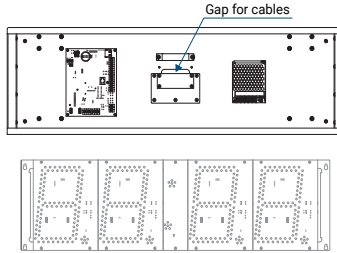7 Tight the securing screws which prevent unauthorized demounting of the clock.

8 Cut all cables to appropriate length and fix them with the holder in correct position in order to maintain regular spacing between the cables in the area of passing through sealing; use appropriate force to not to damage the cables insulation.

9 Mount back the small cover and tight its screws with appropriate force.

10 Connect the power cable to appropriate power supply terminals (except PoE / PoE+)

11 Configure the position of DIP switch according to used synchronization signal (only for LGC variant, leave the position be in case of DCF synchronization, otherwise switch the DIP switch).

12 Connect the synchronization / temperature / GPS cable to corresponding terminals on the control PCB and / or crimp the RJ45 jack to the Ethernet cable respectively.

13 Power connection:

**ECO-M-DSC.100**
Connect the DC power cable back to the control PCB (except PoE / PoE+).

**ECO-M-DSC.180/190**
Connect DC power cable and flat data cable back to most left digit.

14 Mount back the chassis with electronics, tight the fixing screws.

15 Mount back the front glass and bottom cover.

## 7.9.3.2 **Double sided**

- Prepare 4 holes for (each) suspension in appropriate pitch on the ceiling and insert the dowels.
- Put the cables through (one of) the suspension tube and mount the suspension to the ceiling.
- Remove the screws on the bottom of the clock, on the cover with triangle sign, which identifies the side with access to clock electronics. Remove the cover and front glass.
- Loosen the screws and remove the chassis with electronics:

  ECO-M-DSC.100
  Disconnect DC power cable and flat data cable for second side from the clock control PCB (except PoE / PoE+).

  ECO-M-DSC.180/190
  Disconnect DC power cable and flat data cable from most left digit.

- Put the cable(s) through the opening on top side and hang the clock on the prepared ceiling suspension.
- Cut all cables to appropriate length.
- Connect the power cable to appropriate power supply terminals (except PoE / PoE+).
- Configure the position of DIP switch according to used synchronization signal (only for LGC variant, leave the position be in case of DCF synchronization, otherwise switch the DIP switch).
- Connect the synchronization / temperature / GPS cable to corresponding terminals on the control PCB and / or crimp the RJ45 jack to the Ethernet cable respectively.
- Power connection:

  ECO-M-DSC.100
  Connect the DC power cable and flat data cable for second side back to the control PCB (except PoE / PoE+).

  ECO-M-DSC.180/190
  Connect DC power cable and flat data cable back to most left digit.

- Mount back the chassis with electronics, tight the fixing screws.
- Mount back the front glass and bottom cover.

## 7.9.4 Cable connection

Installation LINES / DC OUT wire connection



TEMP wire connection – 1 or 2 temperature sensors
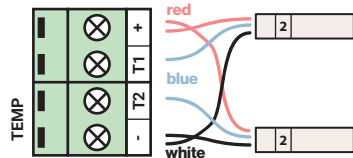


CTRL wire connection
(stopwatch control connects to TEMP connector)



RS 485 wire connection



RELAY wire connection
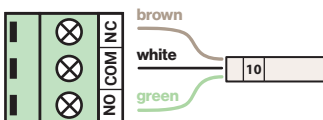


POWER connection
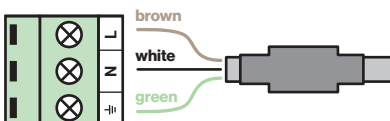
# 7.10  DSC

## Basic features

- digits of 100 / 180 / 190 / 250 / 320 / 500 mm height, which corresponds to readability distance of 40 / 70 / 75 / 100 / 130 / 200 m
- digits in red, pure green blue, yellow, and white color
- display composed of SMD LEDs
- manual or automatic adjustment of the luminosity of LED diodes
- altering time, date and temperature display with adjustable time period
- time display format in four digits (HH : MM) or six digits (HH : MM : SS), 12 or 24-hour cycle
- date display format in four digits (DD. MM.) or six digits (DD. MM. YY)
- AM/PM indication for 12-hour cycle
- temperature display in °C or °F (providing the temperature sensor is connected)
- TEMP connector is used to connect temperature sensors and stopwatch control

## Mechanic

- clock frame made of powder coated aluminium profiles in black or silver color, powder coated, any other RAL color on request
- front cover, made of mineral glass with anti-reflective foil
- single or double sided design
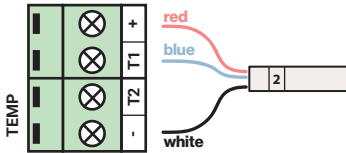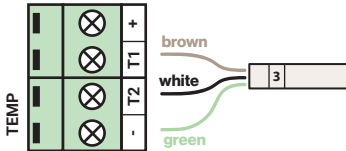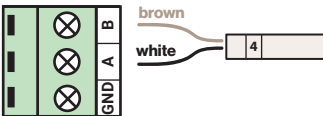- wall mounting (only for single sided design), ceiling suspension or wall bracket mounting
- push buttons are placed on inside of the clock (behind the cover)
- protection degree IP 65
- working temperature -25 to +65 °C

## Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.3 s/day
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- synchronization by means of GPS signal
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- RTC backup with supercapacitor (lithium battery on request)

## Configuration

- setting of the clock parameters and time / date by means of push buttons or IR remote control

## Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

## 7.10.1 Technical specifications

| DSC. | | 100.4 | 100x.6 | 180.4 | 180x.6 | 190.4 | 190x.6 |
|---|---|---|---|---|---|---|---|
| Display | digit height [mm] | 100 | 100 | 180 | 180 | 190 | 190 |
| | number of digits | 4 | 6 | 4 | 6 | 4 | 6 |
| Time and date display format | HH : MM | ✓ | | ✓ | | ✓ | |
| | HH : MM : SS | | ✓ | | ✓ | | ✓ |
| | DD. MM | ✓ | | ✓ | | ✓ | |
| | DD. MM. YY | | ✓ | | ✓ | | ✓ |
| Viewing distance [m] | | 40 | | 70 | | 75 | |
| Synchronization | NTP | NTP protocol, mains powered | | | | | |
| | PoE [1] | NTP protocol, PoE powered | | | | | |
| | PoE+ [1] | NTP protocol, PoE+ powered | | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | | |
| | GPS | GPS signal | | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | | |
| Power | mains powered | 100−240 VAC, 50−60 Hz | | | | | |
| | PoE single sided [2] | IEEE 802.3af Class3 | | | | | |
| | PoE+ single sided [3] | IEEE 802.3at | | | | | |
| | PoE+ double sided [4] | IEEE 802.3at | | | | | |
| | VDC | 18−55 V, see Voltage table, chpt. 8 | | | | | |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 | | | | | |
| Power consumption | single sided [VA] | 15 | 22 | 23 | 33 | 23 | 33 |
| | double sided [VA] | 29 | 42 | 44 | 66 | 44 | 66 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | | |
| | accuracy | ±0.3 s/day | | | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | | |
| Operating environment | temperature | -25 to +65 °C | | | | | |
| | humidity | 0 to 95 %, without condensing | | | | | |
| | protection degree | IP 65 | | | | | |
| Weight [kg] | single sided | 5.5 | 7.5 | 10 | 13.5 | 10 | 13.5 |
| | double sided | 15 | 18.5 | 24.5 | 32.5 | 24.5 | 32.5 |
| Dimensions [mm] W x H x D | single sided | 530 191 85 | 750 191 85 | 840 260 85 | 1 220 260 85 | 840 260 85 | 1 220 260 85 |
| | double sided | 530 191 165 | 750 191 165 | 840 260 165 | 1 220 260 165 | 840 260 165 | 1 220 260 165 |

| DSC. | | 250.4 | 250x.6 | 320.4 | 320x.6 | 500.4 | 500x.6 |
|---|---|---|---|---|---|---|---|
| Display | digit height [mm] | 250 | 250 | 320 | 320 | 500 | 500 |
| | number of digits | 4 | 6 | 4 | 6 | 4 | 6 |
| Time and date display format | HH : MM | ✓ | | ✓ | | ✓ | |
| | HH : MM : SS | | ✓ | | ✓ | | ✓ |
| | DD. MM | ✓ | | ✓ | | ✓ | |
| | DD. MM. YY | | ✓ | | ✓ | | ✓ |
| Viewing distance [m] | | 100 | | 130 | | 200 | |
| Synchronization | NTP | NTP protocol, mains powered | | | | | |
| | PoE | NTP protocol, PoE powered | | | | | |
| | PoE+ | NTP protocol, PoE+ powered | | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | | |
| | GPS | GPS signal | | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | | |
| Power | mains powered | 100–240 VAC, 50–60 Hz | | | | | |
| | VDC | 18–55 V, see Voltage table, chpt. 8 | | | | | |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 | | | | | |
| Power consumption | single sided [VA] | 37 | 55 | 45 | 67 | 54 | 80 |
| | double sided [VA] | 72 | 108 | 88 | 132 | 106 | 159 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | | |
| | accuracy | ±0.3 s/day | | | | | |
| Accuracy of temperature measurement (only for TP3/30) | range -25 to +85 °C | ±0.5 °C | | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | | |
| Operating environment | temperature | -25 to +65 °C | | | | | |
| | humidity | 0 to 95 %, without condensing | | | | | |
| | protection degree | IP 65 | | | | | |
| Weight [kg] | single sided | 17 | 24.5 | 23 | 32.5 | 53 | 75 |
| | double sided | 41 | 55.5 | 54 | 75 | on request | |
| Dimensions [mm] W x H x D | single sided | 1 250 350 85 | 1 740 350 85 | 1 500 430 85 | 2 200 430 85 | 2 200 640 122 | 3 250 640 122 |
| | double sided | 1 250 350 180 | 1 740 350 180 | 1 500 430 180 | 2 200 460 180 | on request | |

**Notes:**

1 PoE / PoE+ available only for models with red and yellow display only

2 only for model DSC.100.4 single sided

3 only for model DSC.100x.6 and DSC.180.4 single sided

4 only for model DSC.100.4 double sided

## 7.10.2 Dimensions and assembly diagram

wall mounting
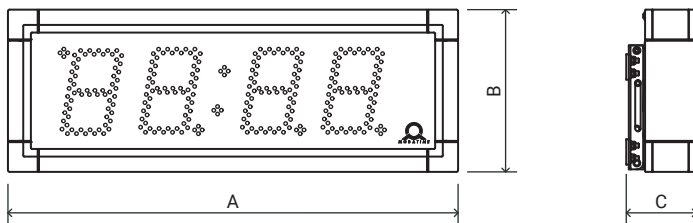


ceiling suspension
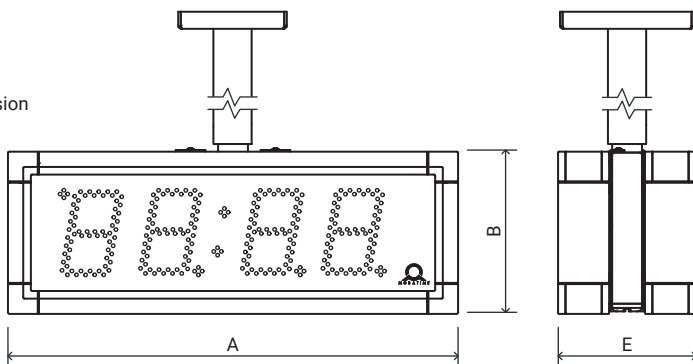


wall bracket
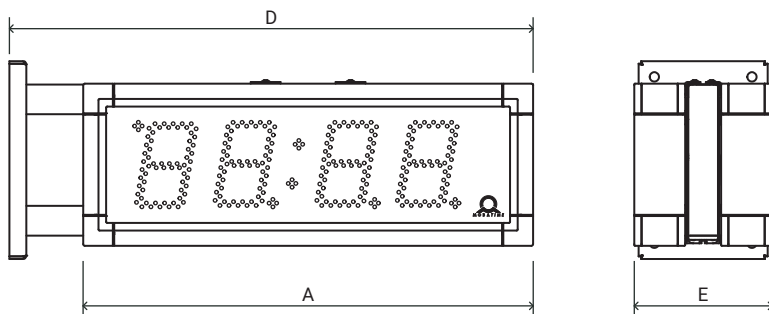
## Dimensions table [mm]

| DSC. | 100.4 | 100x.6 | 180.4 | 180x.6 | 190.4 | 190x.6 |
|------|-------|--------|-------|--------|-------|--------|
| A | 530 | 750 | 840 | 1 220 | 840 | 1 220 |
| B | 191 | 191 | 260 | 260 | 260 | 260 |
| C | 85 | 85 | 85 | 85 | 85 | 85 |
| D | 620 | 840 | 930 | 1 330 | 930 | 1 330 |
| E | 165 | 165 | 165 | 165 | 165 | 165 |

| DSC. | 250.4 | 250x.6 | 320.4 | 320x.6 | 500.4 | 500x.6 |
|------|-------|--------|-------|--------|-------|--------|
| A | 1 250 | 1 740 | 1 500 | 2 200 | 2 200 | 3 250 |
| B | 350 | 350 | 430 | 430 | 640 | 640 |
| C | 85 | 85 | 85 | 85 | 122 | 122 |
| D | 1 360 | 1 850 | 1 610 | 2 310 | on request | on request |
| E | 180 | 180 | 180 | 180 | on request | on request |

### 7.10.3  Mounting

## 7.10.3.1  Single sided DSC.100–DE.320

- Assemble the wall mounting console if delivered disassembled.
- Drill at least four anchoring holes into the wall of a diameter adequate to appropriate screws, use the mounting console as a template.
- Mount the console on the wall and put it into a fully tilted out position.
- Shift the clock body into the flipped out console arms and fix it by tightening the screws.
- Dismantle the back cover of connectors on the clock body. The cover incorporates gap with sealing for passage of cables in the inside of the clock.
- Arrange all cables to appropriate length and connect them to the appropriate terminals on the PCB. See the description of the connectors.

    ⚠ **Observe the correct polarity where necessary.**

- Fix the cables with the holder in correct positions in order to maintain regular spacing between the cables in the area of passing through sealing. Use appropriate force to not to damage the cables insulation.
- Configure the position of DIP switch according to used synchronization signal (only for LGC variant, leave the position be in case of DCF synchronization, otherwise switch the DIP switch).
- Mount back the connector cover.
- Tilt the clock into vertical position and fix the position of the console.

## 7.10.3.2  Single sided DSC.500

- Drill at least four anchoring holes into the wall of a diameter adequate to appropriate screws, as a template for marking the position of the holes use the wall bracket.
- Mount the console to the wall using appropriate screws and dowels with respect to the material.
- Loosen the hanging M10 Allen screws on console in order to be approx. 6 mm of thread visible.
- Prepare the cables and fix them on the wall in order to be placed behind the small rectangular cover equipped with sealed slot.
- Hang the display body onto the console in order to fit four hanging screws into the pear-shaped holes.
- Using special key unlock (turn by 90° clockwise) the two locks on the bottom of the frame and open the front window. Use the support to keep the front window opened.
- Tighten four hanging screws using the Allen key, the display is then fixed on the wall.
- Dismount the small rectangular cover on the bottom part of back panel, pull all cables through the opening and fix them by the metal bar. Mount the cover back. Make sure the cables are evenly distributed in the fixing bar and in the sealed slot.
- Arrange and cut the cables to the appropriate length. Strip the wires and connect them to corresponding board terminals.

    ⚠ **Observe the right polarity where necessary.**

- Configure the position of DIP switch according to used synchronization signal (applies only for DCF, MOBALine, polarized impulse line or IRIG-B)
- Apply the power and check if the display works correctly.
- Close the front window and secure it using two locks (turn by 90° anticlockwise) on the bottom of the display body frame.
- Dismount the mounting eyes and screw-in the delivered covering Allen screws.
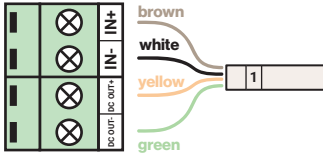
### 7.10.3.3  Double sided DSC.100–DSC.320

- The double sided clock consists of the displaying part (**SLAVE**), control part (**MASTER**) and the wall bracket mounting console, both parts are linked via one cable.
- The clock is delivered as a one unit (both parts are mounted on the console).
- If the console has the bottom cover, remove it (5x M4 screw) first, bottom cover is attached to the console by steel wire (captive cover).
- Unscrew locking screws and put clock parts into fully tilted out positions.
- Dismantle the back connector cover on the **MASTER** part, the cover incorporates gap with sealing for passage of cables into the clock.
- Disconnect the **MASTER**-**SLAVE** connecting cable.
- Release four Allen screws on back side of the clocks and take out the both clock parts from the console.
- Drill appropriate number of anchoring holes in the wall for wood-type screws of 10-12 mm diameter. Use the mounting console as a template.
- Push all incoming cables (power, temperature, synchronization) through the upper tube of the console and through the oval hole, then mount the console on the wall.
- Put both sides into a fully tilted out positions.
- Hang the **SLAVE** part on one side of the console and tighten the four screws on the back side of the clock part.
- Hang the **MASTER** part on opposite side of the console and tighten the four screws on the back side of the clock part.
- Connect the **MASTER**-**SLAVE** cable.
- Arrange all incoming cables to appropriate length and connect them to the appropriate terminals on the PCB. See the description of the connectors.

   ⚠  **Observe the right polarity where necessary.**

- Fix the cables with the holder in correct positions on order to maintain regular spacing between the cables in the area of passing through sealing. Use appropriate force to not to damage the cables insulation.
- Configure the position of DIP switch according to used synchronization signal (applies only for DCF, MOBALine, polarized impulse line or IRIG-B)
- Mount back the connector cover.
- Tilt the clock parts into vertical position and fix them by locking screws.
- Mount back the bottom cover if delivered.

## 7.10.4 Cable connection

Installation LINES / DC OUT wire connection



TEMP wire connection – 1 or 2 temperature sensors
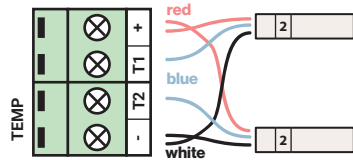


CTRL wire connection
(stopwatch control connects to TEMP connector)



RS 485 wire connection



RELAY wire connection



POWER connection
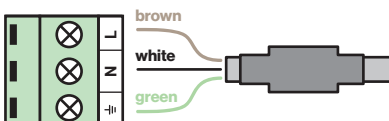
## 7.11  DT

### Basic features

- digits of 100/57 / 100 / 180 mm height, which corresponds to readability distance of 40/25 / 40 / 70 m
- digits in red, pure green blue, yellow, and white color
- possibility of different color for each row
- display composed of SMD LEDs
- manual or automatic adjustment of the luminosity of LED diodes
- altering time, date and temperature display with adjustable time period
- time display format in four digits (HH : MM), 12 or 24-hour cycle
- date display format in four digits (DD. MM.)
- AM/PM indication for 12-hour cycle
- temperature display in °C or °F, up to four (even different) sensors connectable

### Mechanic

- clock frame made of powder coated aluminium profiles in black or silver color, powder coated, any other RAL color on request
- front cover made of mineral glass with anti-reflective foil
- single or double sided design
- wall mounting (only for single sided design), or ceiling suspension
- push buttons are placed on inside of the clock (behind the cover)
- protection degree IP 65
- working temperature -25 to +65 °C
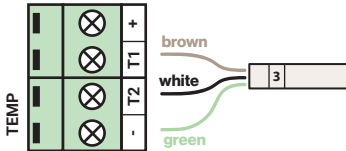
### Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.3 s/day
- NTP multicast or unicast synchronization, Ethernet or WiFi network, PoE or mains powered
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- synchronization by means of GPS signal
- RTC backup with supercapacitor (lithium battery on request)

### Configuration

- setting of the clock parameters and time / date by means of push buttons or IR remote control

### Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

# 7.11.1 Technical specifications

| DT. | | 100 .1C.1T | 100 .1C.2T | 100 .1C.3T | 100 .2C.1T | 100 .2C.2T |
|---|---|---|---|---|---|---|
| Display | digit height [mm] | 100 | | | | |
| | number of rows | 2 | 3 | 4 | 3 | 4 |
| | time / date display 1 | ✓ | ✓ | ✓ | ✓ | ✓ |
| | time / date display 2 | | | | ✓ | ✓ |
| | temperature display 1 | ✓ | ✓ | ✓ | ✓ | ✓ |
| | temperature display 2 | | ✓ | ✓ | | ✓ |
| | temperature display 3 | | | ✓ | | |
| Viewing distance [m] | | 40 | | | | |
| Synchronization | NTP | NTP protocol, mains powered | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | |
| | GPS | GPS signal | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | |
| Power | mains | 100–240 VAC, 50–60 Hz | | | | |
| | VDC | 18–55 V, see Voltage table, chpt. 8 | | | | |
| | VDISP | supply voltages depends on display color, see Voltage table, chpt. 8 | | | | |
| Power consumption [VA] | | 20–30 | 30–45 | 45–60 | 30–45 | 45–60 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | |
| | accuracy | ±0.3 s/day | | | | |
| Accuracy of temperature management (only for TP3/30) | range -55 to -10°C | ±2.0 °C | | | | |
| | range -25 to +85 °C | ±0.5 °C | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | |
| Operating environment | temperature | -25 to +65 °C | | | | |
| | humidity | 0 to 95 %, without condensing | | | | |
| | protection degree | IP 65 | | | | |
| Range of measured temperature | | -55 to +99.5 °C | | | | |
| Weight [kg] | | 9.5 | 13.5 | 17 | 13.5 | 17 |
| Dimensions [mm] W x H x D | | 530 360 60 | 530 515 60 | 530 670 60 | 530 515 60 | 530 670 60 |

| DT. | | 180 .1C.1T | 180 .1C.2T | 180 .1C.3T | 180 .2C.1T | 180 .2C.2T | 100/57 .1C.2T |
|---|---|---|---|---|---|---|---|
| Display | digit height [mm] | 180 | | | | | 100/57 |
| | number of rows | 2 | 3 | 4 | 3 | 4 | 3 |
| | time / date display 1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | time / date display 2 | | | | ✓ | ✓ | |
| | temperature display 1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | temperature display 2 | | ✓ | ✓ | | ✓ | ✓ |
| | temperature display 3 | | | ✓ | | | |
| Viewing distance [m] | | 70 | | | | | 40 |
| Synchronization | NTP | NTP protocol, mains powered | | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | | |
| | GPS | GPS signal | | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | | |
| Power | mains | 100–240 VAC, 50–60 Hz | | | | | |
| | VDC | 18–55 V, see Voltage table, chpt. 8 | | | | | |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 | | | | | |
| Power consumption [VA] | | 30–36 | 45–69 | 60–92 | 45–69 | 60–92 | 28 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | | |
| | accuracy | ±0.3 | | | | | |
| Accuracy of temperature management (only for TP3/30) | range -55 to -10°C | ±2.0 °C | | | | | |
| | range -25 to +85 °C | ±0.5 °C | | | | | |
| | range -50 to +125 °C | ±2.0 °C | | | | | |
| Operating environment | temperature | -25 to +65 °C | | | | | |
| | humidity | 0 to 95 %, without condensing | | | | | |
| | protection degree | IP 65 | | | | | |
| Range of measured temperature | | -55 to +99.5 °C | | | | | |
| Weight [kg] | | 24 | 35 | 44 | 35 | 44 | 8,5 |
| Dimensions [mm] W x H x D | | 940 560 60 | 940 830 60 | 940 1 090 60 | 940 830 60 | 940 1 090 60 | 500 446 60 |

## 7.11.3  Dimensions and assembly diagram



### Dimensions table [mm]

| DT. | 100. 1C.1T | 100. 1C.2T | 100 1C.3T | 100. 2C.1T | 100. 2C.2T | 180. 1C.1T | 180. 1C.2T | 180. 1C.3T | 180. 2C.1T | 180. 2C.2T | 100/57 1C.2T |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|
| A | 530 | 530 | 530 | 530 | 530 | 940 | 940 | 940 | 940 | 940 | 500 |
| B | 360 | 515 | 670 | 515 | 670 | 560 | 830 | 1 090 | 830 | 1 090 | 446 |
| C | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |

## 7.11.4  Mounting

### 7.11.4.1  Single sided

- Assemble the wall mounting if delivered disassembled.
- Drill appropriate number of anchoring holes in the wall for wood-type screws of 6 mm diameter.
  Use the mounting console as a template.
- Mount the console on the wall and put it into a fully tilted out position.
- Shift the clock body into the flipped out console arms and fix it by tightening the Allen screws.
- Dismantle the back connector cover on the clock body; the cover incorporates gap with sealing for passage of cables in the inside of the clock.
- Arrange all cables to appropriate length and connect them to appropriate terminals on the PCB; see the description of the connectors and observe the correct polarity where necessary.
- Fix the cables with the holder in correct positions in order to maintain regular spacing between the cables in the area of passing through sealing; use appropriate force to not to damage the cables insulation.
- Configure the position of DIP switch according to used synchronization signal (applies only for DCF, MOBALine, polarized impulse line or IRIG-B)
- Mount back the connector cover.
- Tilt the clock into vertical position and fix the position of the console.

### 7.11.4.2  Double sided

- The double side display consists of **MASTER** (control part) and **SLAVE** (display part),
- The display is delivered as a one unit (both parts mounted on the console), **MASTER** and **SLAVE** parts are marked by labels.
- Remove the bottom cover from the console (M4 screws) first, bottom cover is attached to the console by steel wire (captive cover).
- Unscrew four locking screws placed on top of the console and put both parts into fully tilted out positions.
- Dismantle the back connector cover on the **MASTER** part; the cover incorporates gap with sealing for passage of cables into the clock.
- Loosen the cable fixing bar and disconnect the **MASTER**-**SLAVE** connecting cables – power cable marked by 230 VAC, etc.
- Release four  Allen screws on back side of both clocks and take out the both clock parts from the console.
- Drill appropriate number of anchoring holes in the wall for wood-type screws of 10 mm diameter.
  Use the mounting console as a template.
- Push all incoming cables (power, temperature, synchronization) through the upper tube of the console and through the oval hole, then mount the console on the wall.
- Put both sides into a fully tilted out positions.
- Hang the **SLAVE** part on one side of the console and tighten four screws on the back side.
- Hang the **MASTER** part on second side of the console and tighten four screws on the back side.
- Connect the **MASTER**-**SLAVE** power cable, use brown wire for L, white wire for N and green wire for PE terminals.
- Be careful not to swap the terminals.
- Connect the **MASTER**-**SLAVE** data cable, use green wire for GND and brown wire for TxD terminals on JP4 connector.

     ⚠  **Be careful not to swap the terminals.**

- Arrange all incoming cables to appropriate length and connect them to the appropriate terminals on the PCB or to powering terminal block; see the description of the connectors and observe the correct polarity where necessary.

- Fix the cables with the holder in correct positions in order to maintain regular spacing between the cables in the area of passing through sealing; use appropriate force to not to damage the cables insulation.
- Configure the position of DIP switch according to used synchronization signal (applies only for DCF, MOBALine, polarized impulse line or IRIG-B)
- Mount back the connector cover.
- Tilt the display parts into vertical position and fix them by locking screws.

🗨 **Note:**

Smaller models can have only one **MASTER**-**SLAVE** connecting cable with cannon connectors.

## 7.11.5  Cable connection
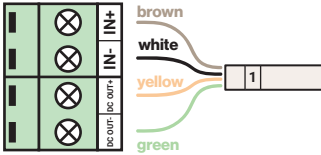
Installation LINES / DC OUT wire connection



TEMP wire connection – 1 or 2 temperature sensors
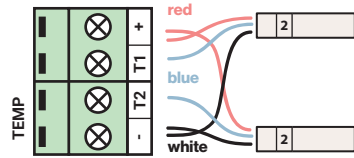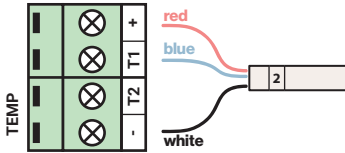


CTRL wire connection
(stopwatch control connects to TEMP connector)
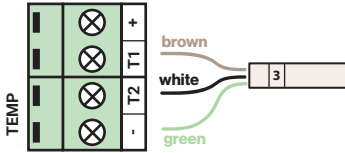


RS 485 wire connection
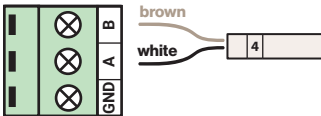


POWER connection
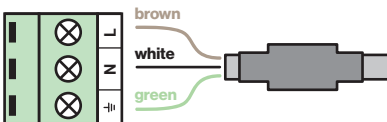
# 7.12  TZI

## Basic features

- digits of 45 (only for TZI.C) / 57 / 100 mm height, which corresponds to readability distance of 20 / 25 / 40 m
- digits in red, pure green blue, yellow, and white color
- possibility of different color for each row
- display composed of 7-segment LEDs
- manual or automatic adjustment of the luminosity of LED diodes
- customer choice of time zone location and legend style (max. number of time zones is 8)
- LNx option for configurable location name – character size 45/71 mm
- time display format in four digits (HH : MM) or six digits format (HH : MM : SS), 12 or 24-hour cycle
- AM/PM indication for 12-hour cycle
- for model TZI.C display of seconds can be switched off

## Mechanic

- clock frame made of anodized aluminium profiles in black or silver color, powder coated, any other RAL color on request
- anti-reflection front cover made of plexiglass
- horizontal or vertical (not for TZI.C) layout
- single sided design
- wall mounting or ceiling suspension
- protection degree IP 40
- working temperature -5 to +55 °C

## Synchronization

- autonomous operation with internal quartz time base
- accuracy ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature)
- MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF) or IRIG-B; mains powered
- NTP multicast or unicast synchronization, Ethernet or WiFi network, mains powered
- RTC backup with supercapacitor (lithium battery on request)

## Configuration

- setting of the clock parameters and time by means of IR remote control

## Network connection options

- IPv4 and IPv6 support
- DHCPv4, DHCPv6 / manual configuration of the clock parameters or configuration via web interface
- DHCPv4, DHCPv6 private strings allow easy configuration of the clock parameters when connected to LAN

## 7.12.1  Technical specifications

| TZI. | | 57.4 | 57.6 | 100.4 | C.45 | C.57 |
|---|---|---|---|---|---|---|
| Display | digit height [mm] | 57 | 57/38 | 100 | 45/32 | 57/38 |
| | number of digits | 4 | 4 + 2 | 4 | 4 + 2 | 4 + 2 |
| Time display format | HH:MM | ✓ | | ✓ | | |
| | HH:MM SS | | ✓ | | ✓ | ✓ |
| Max. number of time zones | horizontal | 8 | 8 | 6 | – | – |
| | vertical | 7 | 5 | 3 | 7 | 5 |
| Viewing distance [m] | | 25 | | 40 | 20 | 25 |
| Synchronization | NTP | NTP protocol, mains powered | | | | |
| | WiFi | WiFi 2.4 GHz, NTP protocol | | | | |
| | WiFi5 | WiFi 2.4/5 GHz, NTP protocol | | | | |
| | LGC | MOBALine, MOBATIME serial code, impulse line, DCF, DCF-IMP (Timecode, Active DCF), IRIG-B | | | | |
| Power | mains | 100–240 VAC, 50–60 Hz | | | | |
| | VDC | 18–55 V, see Voltage table, chpt. 8 | | | | |
| | VDISP | supply voltages depends on display color,see Voltage table, chpt. 8 | | | | |
| Power consumption [VA] | | 7 | 8 | 8 | 6 | 6 |
| Quartz base and running reserve | running reserve | 96 hours with supercapacitor / 2 years with lithium battery (on request) | | | | |
| | accuracy | ±0.1 s/day without synchronization (after 24 hours of synchronization at constant temperature) | | | | |
| Operating environment | temperature | -5 to +55 °C | | | | |
| | humidity | 0 to 95 %, without condensing | | | | |
| | protection degree | IP 40 | | | | |

## 7.12.2 Weight and dimensions table

| | TZI. | 57.4 | | | 57.6 | | | 100.4 | | | C.45 | C.57 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | print | LN8 | LN16 | print | LN8 | LN16 | print | LN8 | LN16 | | |
| Weight [kg] | 2.V | 5.5 | 6 | 7.6 | 6 | 7 | 8.3 | 10.1 | 10.9 | 14.3 | – | – |
| | 3.V | 7 | 8 | 10 | 8 | 9 | 11 | 13.6 | 14.8 | 19.5 | – | – |
| | 4.V | 8.5 | 9.5 | 12.5 | 10 | 11 | 13.7 | 17.1 | 18.8 | 24.7 | – | – |
| | 5.V | 10.5 | 11.5 | 15 | 12 | 13.5 | 16.4 | 20.6 | 22.7 | 30 | – | – |
| | 6.V | 12 | 13.5 | 17.5 | 14 | 15.5 | 19.1 | 22.5 | 26.6 | 35 | – | – |
| | 7.V | 14 | 15.5 | 20 | 16 | 17.5 | 21.8 | – | – | – | – | – |
| | 8.V | 15.5 | 17.5 | 22.5 | 18 | 20 | 24.5 | – | – | – | – | – |
| | 2.H | 4.5 | 5 | 7 | 5.5 | 6 | 7.1 | 9.7 | 10.6 | 13.8 | 5.7 | 7 |
| | 3.H | 6 | 7 | 9.8 | 7.5 | 8.5 | 10 | 13.5 | 14.6 | – | 8 | 10 |
| | 4.H | 8 | 8.5 | 12.7 | 9.5 | 10.5 | 13 | – | – | – | 10.3 | 13.2 |
| | 5.H | 9.5 | 10.5 | – | 12 | 13 | – | – | – | – | 12.7 | 16.3 |
| | 6.H | 11 | 12.5 | – | – | – | – | – | – | – | 15 | – |
| | 7.H | 14 | 15.5 | – | – | – | – | – | – | – | 17.3 | – |
| Dimensions [mm] W x H x D | 2.V | 700 300 39 | 700 300 39 | 900 300 39 | 800 300 39 | 800 300 39 | 1 000 300 39 | 1 000 390 39 | 1 000 390 39 | 1 350 390 39 | – | – |
| | 3.V | 700 420 39 | 700 420 39 | 900 420 39 | 800 420 39 | 800 420 39 | 1 000 420 39 | 1 000 550 39 | 1 000 550 39 | 1 350 550 39 | – | – |
| | 4.V | 700 540 39 | 700 540 39 | 900 540 39 | 800 540 39 | 800 540 39 | 1 000 540 39 | 1 000 710 39 | 1 000 710 39 | 1 350 710 39 | – | – |
| | 5.V | 700 660 39 | 700 660 39 | 900 660 39 | 800 660 39 | 800 660 39 | 1 000 660 39 | 1 000 870 39 | 1 000 870 39 | 1 350 870 39 | – | – |
| | 6.V | 700 780 39 | 700 780 39 | 900 780 39 | 800 780 39 | 800 780 39 | 1 000 780 39 | 1 000 1 030 39 | 1 000 1 030 39 | 1 350 1 030 39 | – | – |
| | 7.V | 700 900 39 | 700 900 39 | 900 900 39 | 800 900 39 | 800 900 39 | 1 000 900 39 | – | – | – | – | – |
| | 8.V | 700 1 020 39 | 700 1 020 39 | 900 1 020 39 | 800 1 020 39 | 800 1 020 39 | 1 000 1 020 39 | – | – | – | – | – |

| | TZI. | 57.4 | | | 57.6 | | | 100.4 | | | C.45 | C.57 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | print | LN8 | LN16 | print | LN8 | LN16 | print | LN8 | LN16 | | |
| Dimensions [mm] W x H x D | 2.H | 700 220 39 | 700 220 39 | 1 020 220 39 | 900 220 39 | 900 220 39 | 1 020 220 39 | 1 200 300 39 | 1 200 300 39 | 1 600 300 39 | 570 400 39 | 700 450 39 |
| | 3.H | 1 010 220 39 | 1 010 220 39 | 1 500 220 39 | 1 300 220 39 | 1 300 220 39 | 1 500 220 39 | 1 700 300 39 | 1 700 300 39 | – | 840 400 39 | 1 040 450 39 |
| | 4.H | 1 330 220 39 | 1 330 220 39 | 1 920 220 39 | 1 700 220 39 | 1 700 220 39 | 1 980 220 | – | – | – | 1 110 400 39 | 1 380 450 39 |
| | 5.H | 1 640 220 39 | 1 640 220 39 | – | 2 100 220 39 | 2 100 220 39 | – | – | – | – | 1 380 400 39 | 1 720 450 39 |
| | 6.H | 1 960 220 39 | 1 960 220 39 | – | – | – | – | – | – | – | 1 650 400 39 | – |
| | 7.H | 2 275 220 39 | 2 275 220 39 | – | – | – | – | – | – | – | 1 920 400 39 | – |

## 7.12.4  Mounting

### 7.12.4.1  Single sided

- The frame is fixed using suspensions (above) and sliding springs (bottom). Lift-off the anchoring plate using a screwdriver inserted in between the sheet and the frame at the sliding spring point on the clock bottom side.
- Drill anchoring holes into the wall of a diameter adequate to accommodate wood-type screws of 4 to 5 mm diameter. As a template for marking the position of the holes, the anchoring plate can be used.
- Interlace the incoming conductors through the opening in the anchoring plate and fix the plate to the wall.
- Connect the incoming conductors in accordance with the descriptive sheet on the terminal board, placed on the anchoring plate. Give the conductors an appropriate shape or cut them off to a length that will not obstruct the placement of the clock frame onto the anchoring plate.
- For NTP variant mount the connector to the Ethernet cable and plug it into the Ethernet socket mounted on the anchoring plate.
- Put the clock frame opposite to the anchoring plate and suspend it onto the upper springs. Snap the clock in onto the springs by pushing on the lower part of the frame. Take care to not nip any of the cables between the anchoring plate and clock frame.
- Check whether the anchoring plate on the sides fits exactly into the groove in the clock frame.
- Remove the blind cap from the openings on the clock bottom side.
- Insert Allen key into the openings on the bottom side of the clock. Turn the key softly in anticlockwise direction. The frame catch will snap in.
- Replace the blind cap on the openings.

#### Note:
To loosen the frame catch, use the reverse procedure (turn clockwise).

## 7.12.5  Cable connection
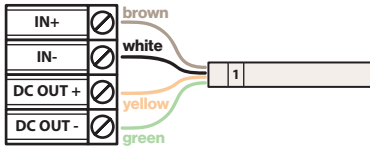
Installation LINES / DC OUT wire connection

| | |
|---|---|
| IN+ | brown |
| IN- | white |
| DC OUT + | yellow |
| DC OUT - | green |

TEMP wire connection – 1 or 2 temperature sensors

| | |
|---|---|
| + | red |
| T1 | blue |
| T2 | |
| - | white |

| | |
|---|---|
| + | red |
| T1 | blue |
| T2 | |
| - | white |

RS 485 wire connection

| | |
|---|---|
| A+ | brown |
| B- | white |
| GND | |
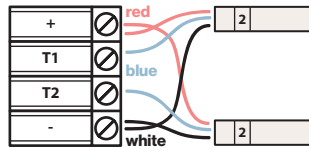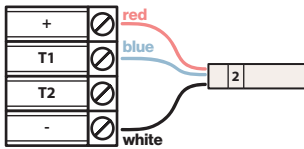
POWER connection
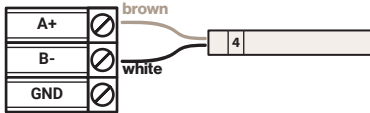
| | |
|---|---|
| L | brown |
| | white |
| N | |
| ⏚ | green |
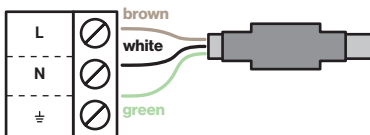
# 8 Voltage table

## VDC variant

| Display color | | | size | 57.4 | 57.6 | 57x.6 | 75.4 | 75.6 | 75x.6 | 100.4 |
|---|---|---|---|---|---|---|---|---|---|---|
| Display color | red | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | pure green | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | blue | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | white | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | yellow | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | green | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | red.SL | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | pure green.SL | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | blue.SL | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | white.SL | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | yellow.SL | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | green.SL | `10:08` | | – | – | – | – | – | – | – |

| Display color | | | size | 100.6 | 100x.6 | 180.4 | 180.6 | 180x.6 | 250.4 | 250x.6 |
|---|---|---|---|---|---|---|---|---|---|---|
| Display color | red | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | – | – |
| | pure green | `10:08` | | 18–55 V | 18–55 V | 25–55 V | 25–55 V | 25–55 V | – | – |
| | blue | `10:08` | | 18–55 V | 18–55 V | 26–55 V | 26–55 V | 26–55 V | – | – |
| | white | `10:08` | | 18–55 V | 18–55 V | 25–55 V | 25–55 V | 25–55 V | – | – |
| | yellow | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | – | – |
| | green | `10:08` | | 18–55 V | 18–55 V | – | – | – | – | – |
| | red.SL | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | pure green.SL | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 26–55 V | 26–55 V |
| | blue.SL | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 26–55 V | 26–55 V |
| | white.SL | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 26–55 V | 26–55 V |
| | yellow.SL | `10:08` | | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V | 18–55 V |
| | green.SL | `10:08` | | – | – | – | – | – | – | – |

## VDISP variant

| Display color | | | size 57.4 | 57.6 | 57x.6 | 75.4 | 75.6 | 75x.6 | 100.4 |
|---|---|---|---|---|---|---|---|---|---|
| Display color | red | 10:08 | 12 V | 12 V | 12 V | 12 V | 12 V | 12 V | 12 V |
| | pure green | 10:08 | 14 V | 14 V | 14 V | 14 V | 14 V | 14 V | 14 V |
| | blue | 10:08 | 14 V | 14 V | 14 V | 14 V | 14 V | 14 V | 14 V |
| | white | 10:08 | 14 V | 14 V | 14 V | 14 V | 14 V | 14 V | 14 V |
| | yellow | 10:08 | 12 V | 12 V | 12 V | 12 V | 12 V | 12 V | 12 V |
| | green | 10:08 | 12 V | 12 V | 12 V | 12 V | 12 V | 12 V | 12 V |
| | red.SL | 10:08 | 15 V | 15 V | 15 V | 15 V | 15 V | 15 V | 15 V |
| | pure green.SL | 10:08 | 18 V | 18 V | 18 V | 18 V | 18 V | 18 V | 18 V |
| | blue.SL | 10:08 | 18 V | 18 V | 18 V | 18 V | 18 V | 18 V | 18 V |
| | white.SL | 10:08 | 18 V | 18 V | 18 V | 18 V | 18 V | 18 V | 18 V |
| | yellow.SL | 10:08 | 15 V | 15 V | 15 V | 15 V | 15 V | 15 V | 15 V |
| | green.SL | 10:08 | – | – | – | – | – | – | – |

| Display color | | | size 100.6 | 100x.6 | 180.4 | 180.6 | 180x.6 | 250.4 | 250x.6 |
|---|---|---|---|---|---|---|---|---|---|
| Display color | red | 10:08 | 12 V | 12 V | 18 V | 18 V | 18 V | – | – |
| | pure green | 10:08 | 14 V | 14 V | 24 V | 24 V | 24 V | – | – |
| | blue | 10:08 | 14 V | 14 V | 25 V | 25 V | 25 V | – | – |
| | white | 10:08 | 14 V | 14 V | 24 V | 24 V | 24 V | – | – |
| | yellow | 10:08 | 12 V | 12 V | 18 V | 18 V | 18 V | – | – |
| | green | 10:08 | 12 V | 12 V | – | – | – | – | – |
| | red.SL | 10:08 | 15 V | 15 V | 15 V | 15 V | 15 V | 18 V | 18 V |
| | pure green.SL | 10:08 | 18 V | 18 V | 18 V | 18 V | 18 V | 26 V | 26 V |
| | blue.SL | 10:08 | 18 V | 18 V | 18 V | 18 V | 18 V | 26 V | 26 V |
| | white.SL | 10:08 | 18 V | 18 V | 18 V | 18 V | 18 V | 26 V | 26 V |
| | yellow.SL | 10:08 | 15 V | 15 V | 15 V | 15 V | 15 V | 18 V | 18 V |
| | green.SL | 10:08 | – | – | – | – | – | – | – |

# 9  Time zone table v11

| 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 Sunday March (01:00) | last Sunday October (02:00) |
| 02 | Brussels, Amsterdam, Berlin, Bern, Copenhagen, Madrid, Oslo, Paris, Rome, Stockholm, Vienna, Belgrade, Bratislava, Budapest, Liubliana, Prague, Sarajevo, Sofia, Vilnius, Warsaw, Zagreb | +1 | Yes | last Sunday March (02:00) | last Sunday October (03:00) |
| 03 | Athens, Helsinki, Riga, Tallinn | +2 | Yes | last Sunday March (03:00) | last Sunday October (04:00) |
| 04 | Bucharest | +2 | Yes | last Sunday March (03:00) | last Sunday October (04:00) |
| 05 | Pretoria, Harare, Kaliningrad | +2 | No | | |
| 06 | Amman | +2 | Yes | last Thursday March (23:59) | last Friday October (01:00) |
| 07 | UTC (GMT) | 0 | No | | |
| 08 | Istanbul, Kuwait City, Minsk, Moscow, Saint. 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, Kolkata, Chennai, New Delhi, Colombo | +5,5 | No | | |
| 16 | Astana, Thimphu, Dhaka, Novosibirsk | +6 | No | | |
| 17 | Bangkok, Hanoi, Jakarta, Krasnoyarsk | +7 | No | | |
| 18 | Beijing, Hong Kong, Singapore, Taiper, Irkutsk | +8 | No | | |
| 19 | Tokyo, Seoul, Yakutsk | +9 | No | | |
| 20 | Gambier Island | -9 | No | | |
| 21 | South Australia: Adelaide | +9,5 | Yes | 1st Sunday October (02:00) | 1st Sunday April (03:00) |
| 22 | Northern Territory: Darwin | +9,5 | No | | |
| 23 | Brisbane, Guam, Port Moresby, Vladivostok | +10 | No | | |

| Time zone | City / state | UTC Offset | DST Change | Standard → DST ❄ → ☀ | DST → Standard ☀ → ❄ |
|---|---|---|---|---|---|
| 24 | Sydney, Canberra, Melbourne, Tasmania: Hobart | +10 | Yes | 1st Sunday October (02:00) | 1st Sunday April (03:00) |
| 25 | UTC (GMT) | 0 | No | | |
| 26 | UTC (GMT) | 0 | No | | |
| 27 | Honiara (Solomon Is.), Magadan, Noumea (New Caledonia) | +11 | No | | |
| 28 | Auckland, Wellington | +12 | Yes | last Sunday September (02:00) | 1st Sunday April (03:00) |
| 29 | Majuro (Marshall Is.), Anadyr | +12 | No | | |
| 30 | Azores | -1 | Yes | last Sunday March (00:00) | last Sunday October (01:00) |
| 31 | Middle Atlantic | -2 | No | | |
| 32 | Brasilia | -3 | Yes | 3rd Sunday October (00:00) | 3rd Sunday February (00:00) |
| 33 | Buenos Aires | -3 | No | | |
| 34 | Newfoundland | -3,5 | Yes | 2nd Sunday March (02:00) | 1st Sunday November (02:00) |
| 35 | Atlantic Time (Canada) | -4 | Yes | 2nd Sunday March (02:00) | 1st Sunday November (02:00) |
| 36 | La Paz | -4 | No | | |
| 37 | Bogota, Lima, Quito | -5 | No | | |
| 38 | New York, Eastern Time (US & Canada) | -5 | Yes | 2nd Sunday March (02:00) | 1st Sunday November (02:00) |
| 39 | Chicago, Central Time (US & Canada) | -6 | Yes | 2nd Sunday March (02:00) | 1st Sunday November (02:00) |
| 40 | Tegucigalpa, Honduras | -6 | No | | |
| 41 | Phoenix, Arizona | -7 | No | | |
| 42 | Denver, Mountain Time | -7 | Yes | 2nd Sunday March (02:00) | 1st Sunday November (02:00) |
| 43 | Los Angeles, Pacific Time | -8 | Yes | 2nd Sunday March (02:00) | 1st Sunday November (02:00) |
| 44 | Anchorage, Alaska (US) | -9 | Yes | 2nd Sunday March (02:00) | 1st Sunday November (02:00) |
| 45 | Honolulu, Hawaii (US) | -10 | No | | |
| 46 | Midway Islands (US) | -11 | No | | |
| 47 | Mexico City, Mexico | -6 | Yes | 1st Sunday April (02:00) | last Sunday October (02:00) |
| 48 | Adak (Aleutian Is.) | -10 | Yes | 2nd Sunday March (02:00) | 1st Sunday November (02:00) |
| 49 | UTC (GMT) | 0 | No | | |
| 50 | UTC (GMT) | 0 | No | | |

| Time zone | City / state | UTC Offset | DST Change | Standard → DST ❄ → ☀ | DST → Standard ☀ → ❄ |
|---|---|---|---|---|---|
| 51 | UTC (GMT) | 0 | No | | |
| 52 | UTC (GMT) | 0 | No | | |
| 53 | UTC (GMT) | 0 | No | | |
| 54 | Ittoqqortoormiit, Greenland | -1 | Yes | last Sunday March (00:00) | last Sunday October (01:00) |
| 55 | Nuuk, Qaanaaq, Greenland | -3 | Yes | last Saturday March (22:00) | last Saturday October (23:00) |
| 56 | Myanmar | +6,5 | No | | |
| 57 | Western Australia: Perth | +8 | No | | |
| 58 | Caracas | -4,5 | No | | |
| 59 | CET standard time | +1 | No | | |
| 60 | not used | | | | |
| 61 | not used | | | | |
| 62 | Baku | +4 | Yes | last Sunday March (04:00) | last Sunday October (05:00) |
| 63 | UTC (GMT) | 0 | No | | |
| 64 | UTC (GMT) | 0 | No | | |

## 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 Sunday March (02:00)      →      switch over on the penultimate
Sunday in March at 02:00 hours local time

# 10  Maintenance

## 10.1  Cleaning

Clean surface of clock only.

⚠  Use soft rags and antistatic detergents.

⊗  **Do not use synthetics, alcohol or other solvents, which may damage the digital clock's body and casing.**

## 10.2  Disposal of used batteries

The user is lawfully obligated to return unusable batteries. Disposal of used batteries through household waste is prohibited! Batteries which contain dangerous substances are labelled with a picture of a crossed out trash bin. The symbol means that this product may not be disposed through household waste.

Below the symbol, the dangerous substance is indicated with an abbreviation: Cd = cadmium, Hg = quicksilver, Pb = lead.

Unusable batteries can be returned free of charge at appropriate collection points of your waste disposal company or at shops that sell batteries. By doing so, you fulfil your legal responsibilities and help protect the environment.

# 11 Guarantee

The device is intended for a normal operational environment according to the corresponding norm.

The following circumstances are excluded from the guarantee:
– inappropriate handling or interventions
– chemical influences
– mechanical defects
– external environmental influences (natural catastrophes, etc.)

Repairs during and after guarantee period are assured by the manufacturer.

## 11.1 Conformity  C€

The device fulfils the requirements of the following norms:
***Electrical safety:***
EN 62368-1

***EMC:***
EN 55032
EN 55024
EN 50121-4

The device has been developed and manufactured in accordance with government regulations:

2014/35/EU (LVD)

2014/30/EU (EMC)

2014/53/EU (RED)

2011/65/EU (RoHS)

2012/19/EU (WEEE)