

# Mounting and instruction manual

## DCC – DCF Clock Controller

### DCC/30V

### DCC/48V

### DCC/DALI

Please study these instructions carefully before installing the device.



## **Certification of the Producer**

### STANDARDS

The DCF Clock Controller (DCC) was developed and produced in accordance with the EU Guidelines:

2014 / 30 / EU EMC  
2014 / 35 / EU LVD  
2008 / 57 / EU Railway



## **References to the Instruction Manual**

1. The information in this Instruction Manual can be changed at any time without notice. The current version is available for download on [www.mobatime.com](http://www.mobatime.com).
2. This Instruction Manual has been composed with the utmost care, in order to explain all details in respect of the operation of the product. Should you, nevertheless, have questions or discover errors in this Manual, please contact us.
3. We do not answer for direct or indirect damages resulting from improper use of this manual.
4. Please read the instructions carefully and only start setting-up the product, after you have correctly understood all the information for the installation and operation.
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# 1 Safety

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Read this chapter and the entire instruction manual carefully and follow all instructions listed. This is your assurance for dependable operations and a long life of the device.

Keep this instruction manual in a safe place to have it handy every time you need it.

## 1.1 Symbols and Signal Words used in this Instruction Manual

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**Danger!**

Please observe this safety message to avoid electrical shock!

**There is danger to life!**



**Warning!**

Please observe this safety message to avoid bodily harm and injuries!



**Caution!**

Please observe this safety message to avoid damages to property and devices!



**Notice!**

Additional information for the use of the device.

## 1.2 Intended Use

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The **DCF Clock Controller** is a device used to control and illuminate clocks.

In the following chapters, the designation **DCC** is used for better readability.


The **DCC** is to be installed on the inside of the clock housing. The on-site assembly, wiring and commissioning must be carried out by **qualified personnel** only. For this, the following information on mounting (chap. 1.3), wiring (chap. 1.4) and commissioning (chap. 3) must be considered.

## 1.3 Mounting instructions

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**Caution!**

- The **DCC** must be mounted on an even mounting plate inside the clock housing. For measurements, see chap. 8.
- The 2 mounting holes with copper lamination for the functional earth  must be electrically connected to the mounting plate (clock housing) using metal bolts. See chap. 5.
- The **DCC** must be mounted in a way to be protected against damage, dirt and water. The clock housing must be built for IP 54 or higher.
- If the **DCC** cannot be placed inside the clock housing, in exceptional cases it may be mounted in the immediate vicinity of the clock. In this case, the cable length for the movement and illumination must not exceed 1m. Moreover, the **DCC** must be protected against touch, dirt and water. Because of operational warming, sufficient air circulation must be provided.



**Danger!**

Make sure to wait before using the device after any transport until the device has reached the ambient air temperature. Great fluctuations in temperature or humidity may lead to moisture within the device caused by condensation, which can cause a short.

## 1.4 Electric connections



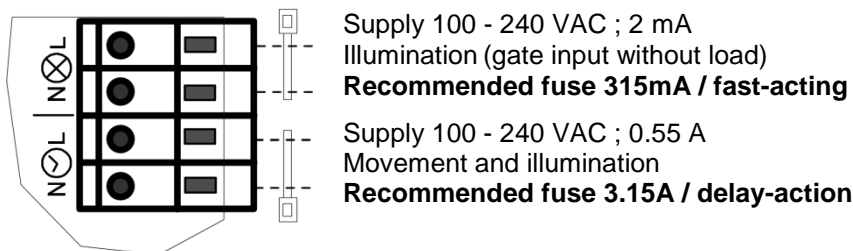
### Danger!

The power supply connection to the clock must be installed by a state-licensed electrician. The national installation regulations must be followed.

A bright grey push terminal serving as cut-off point is used for mains connection. In the supply line provided by the customer, a fuse must be provided for both the movement and the illumination according to the power data. The power data is right next to the terminal.

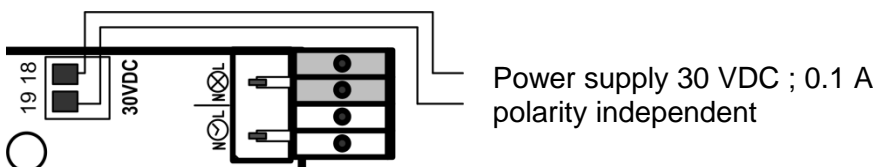
The same phase (nom. 230 VAC) is to be used for the movement and the illumination power supply. A supply wire with a cross section of max. 2.5mm<sup>2</sup> is to be used. The phase and neutral conductor for the illumination and movement are to be affixed near the plug terminal using a cable strap for each. The connecting wires must be stripped by 9-10mm.

### Mains power supply connection:



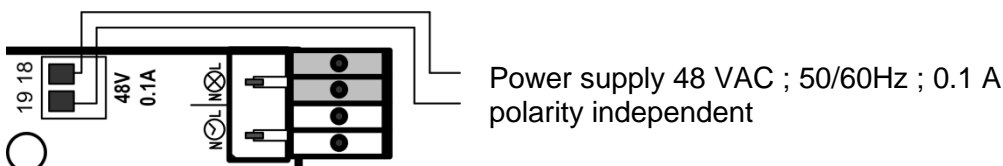
The clock housing and the mounting plate for the DCC must be connected to the protective earth of the mains supply (PE).

### Movement power supply 30VDC: when using a DCC/30V with OCD 4500



For the 30VDC movement power supply, a grey spring terminal (18, 19) is present. The connection wires must be stripped by 5 – 6mm. The 30VDC power supply from OCD 4500 is current-limited and short-circuit proof. Max. wire cross section 2.5mm<sup>2</sup>. The OCD 4500 contains a power separator.

### Movement power supply 48VAC: when using a DCC/48V



For the 48VAC movement power supply, a grey spring terminal (18, 19) is present. The connection wires must be stripped by 5 – 6mm. Max. wire cross section 2.5mm<sup>2</sup>.

In the supply line provided by the customer, a two-wire separator must be provided.

The 48VAC power supply must be fused according to power data. The power data is right next to the terminal.

## 2 General information – introduction

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### 2.1 Scope of Delivery

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Please check your delivery for completeness and notify your supplier within 14 days upon receipt of the shipment, if it is incomplete.

The package you received contains:

- 1 pc. DCC – DCF Clock Controller
- 1 pc. spring terminal 4-pole (for mains power supply)

### 2.2 Function description

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The **DCC** is an interface between DCF/GPS receivers or MOBALine or DCF active master clocks and the SEM100t/SAM100t movements (DCF active / MOBALine movements). Furthermore, the **DCC** can control the clock illumination.

The **DCC** features configuration switches. Using these, the illumination level and control type can be set.

With the DCC / DALI, the lighting is controlled via the specially designed DALI bus (Digital Addressable Light Interface), which is fed to the DCC via a 2-wire signal.

It is powered by 230VAC.

## 3 Mounting and commissioning

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To mount the DCC and put it into service, the following steps can be taken:

1. Mount the **DCC** at the destination.
2. Configure it using the DIP switches
3. Connect MOBALine or DCF active movements to the line outputs
4. Connect the LED illumination to the illumination output
5. Connect the time signal to the corresponding input
6. Connect the power supply:
  - DCC: 230VAC, connect permanent and illumination mains at the corresponding symbols (7-10)
  - DCC/30V: Connect 30VDC to grey clamp (18, 19) and illumination mains to "clock symbol" clamp (9, 10)
  - DCC/48V: Connect 48VAC to grey clamp (18, 19) and illumination mains to "clock symbol" clamp (9, 10)
  - DCC/DALI: Connect the 230VAC permanent power supply to the light gray plug-in terminal with the "clock symbol" (9, 10).

## 4 Configuration

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Configuration takes place over a quadruple DIP switch. With the first three switches, the illumination level can be adjusted.

current [mA]	1	2	3
240	OFF	OFF	OFF
350	OFF	OFF	ON
390	OFF	ON	OFF
440	ON	OFF	OFF
500	OFF	ON	ON
550	ON	OFF	ON
590	ON	ON	OFF
700	ON	ON	ON

With the fourth switch, the illumination control type can be selected.

Illumination control	4
230VAC switched	ON
Light always on	OFF

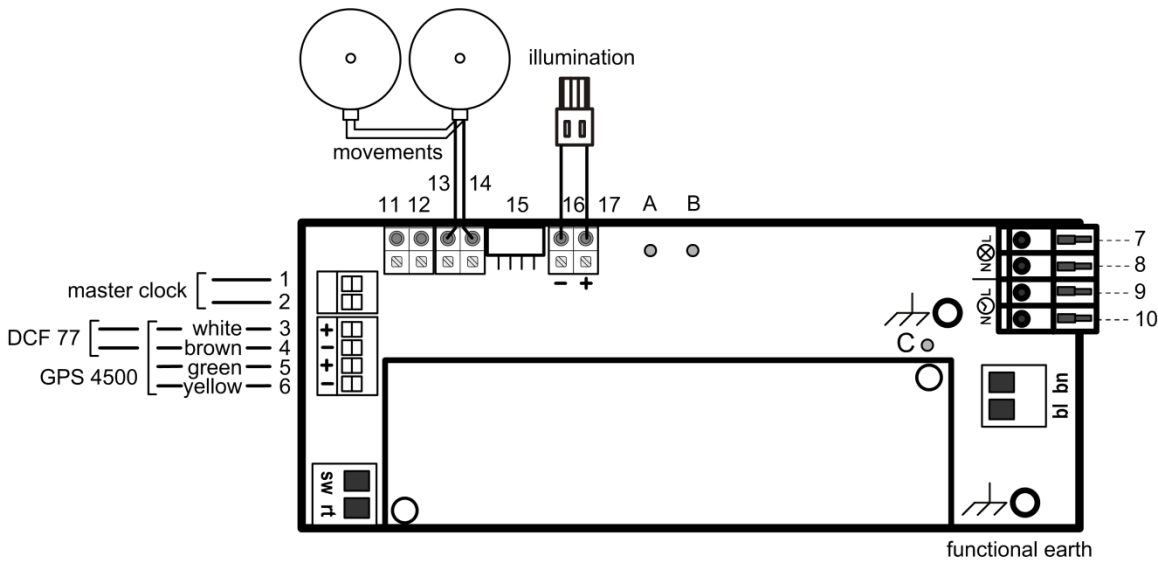


### Notice!

In the DCC / DALI version, the switches have no function or they are not equipped. The illumination is controlled via the DALI bus.

## 5 Connections and displays

### 5.1 DCC

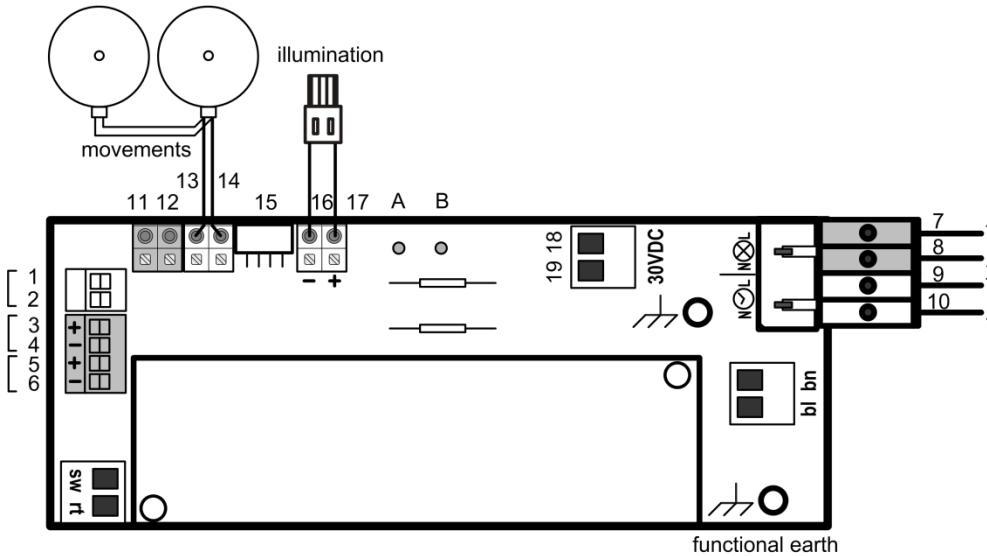


No.	Group	Meaning and function	
1	Time signal input	Connection a	MOBALine or DCF active bipolar
2		Connection b	
3	DCF input	DCF IN +	for connection a DCF or GPS receiver <b>(MET time zone only)</b>
4	Current loop	DCF IN -	
5	GPS power supply	GPS power supply + (30 VDC, 100 mA max.)	
6		GPS power supply -	
7	Power input for illumination control	Phase (100 – 240 VAC / 0.1 A)	
8		Neutral conductor	
9	Power input	Phase (100 – 240 VAC / 0.55 A)	
10		Neutral conductor	
11	Time signal - output 2	Connection b	MOBALine (with MOBALine input signal only) or DCF active bipolar (with DCF active bipolar (1, 2) input signal only)
12	Movement generates <b>direct</b> load for the clock line of the master clock.	Connection a	
13	Time signal - output 1	Connection b	MOBALine (with MOBALine input signal only) or DCF active bipolar (with DCF/ GPS current loop (3, 4) or DCF active (1, 2) input signal only)
14	Movement generates <b>no</b> load for the clock line of the master clock.	Connection a	
15	DIP switch for illumination control	Illumination level (1-3) see chapter 4 Configuration Illumination control (4) see chapter 4 Configuration	
16	Illumination output	- LED illumination	
17		+ LED illumination	
A	Signal LED (yellow)	Flashes with signal clocking (MOBALine: permanently ON, DCF active: blinks every second)	
B	Power LED (green)	Flashes if voltage is applied to power input (pins 9 and 10)	
C	Power supply LED illumination (red)	Flashes if voltage is applied to illum. control input (pins 7 and 8)	



## 5.2 DCC/30V

The DCC/30V is primarily used in conjunction with an OCD 4500.

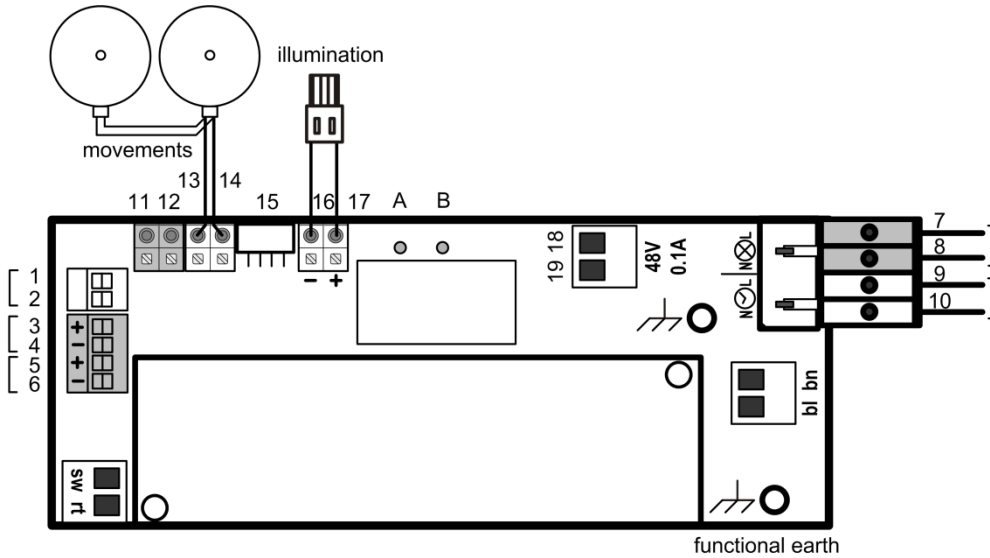


No.	Group	Meaning and function	
1	Time signal input	Connection a	MOBALine or DCF active bipolar
2		Connection b	
3	DCF input	DCF IN +	(for connection a DCF or GPS receiver)
4	Current loop	DCF IN -	
5	GPS power supply	GPS power supply + (30 VDC, 100 mA max.)	
6		GPS power supply -	
7	Power input for illumination control	Phase (100 – 240 VAC / 0.1 A)	If not in use, set the DIP switch 4 to "OFF"
8		Neutral conductor	
9	Power input for illum.	Phase (100 – 240 VAC / 0.55 A)	
10		Neutral conductor	
11	Time signal - output 2	Connection b	MOBALine (with MOBALine input signal only) or DCF active bipolar (with DCF active bipolar (1, 2) input signal only)
12	Movement generates <b>direct</b> load for the clock line of the master clock.	Connection a	
13	Time signal - output 1	Connection b	MOBALine (with MOBALine input signal only) or DCF active bipolar (with DCF/ GPS current loop (3, 4) or DCF active (1, 2) input signal only)
14	Movement generates <b>no</b> load for the clock line of the master clock.	Connection a	
15	DIP switch for illumination control	Illumination level (1-3) see chapter 4 Configuration Illumination control (4) see chapter 4 Configuration	
16	Illumination output	- LED illumination	
17		+ LED illumination	
18	30VDC input	30VDC, polarity independent, 0.7 A current limited by OCD 4500	
19	(SBB ver. w/ OCD 4500 only)		
A	Signal LED (yellow)	Flashes with signal clocking (MOBALine: permanently ON, DCF active: blinks every second)	
B	Power LED (green)	Flashes if voltage is applied to power input (pins 9 and 10)	
C	Power supply LED illumination (red)	Flashes if voltage is applied to illum. control input (pins 7 and 8)	

 unused connection

### 5.3 DCC/48V

The DCC/48V is intended for use with MOBALine only.

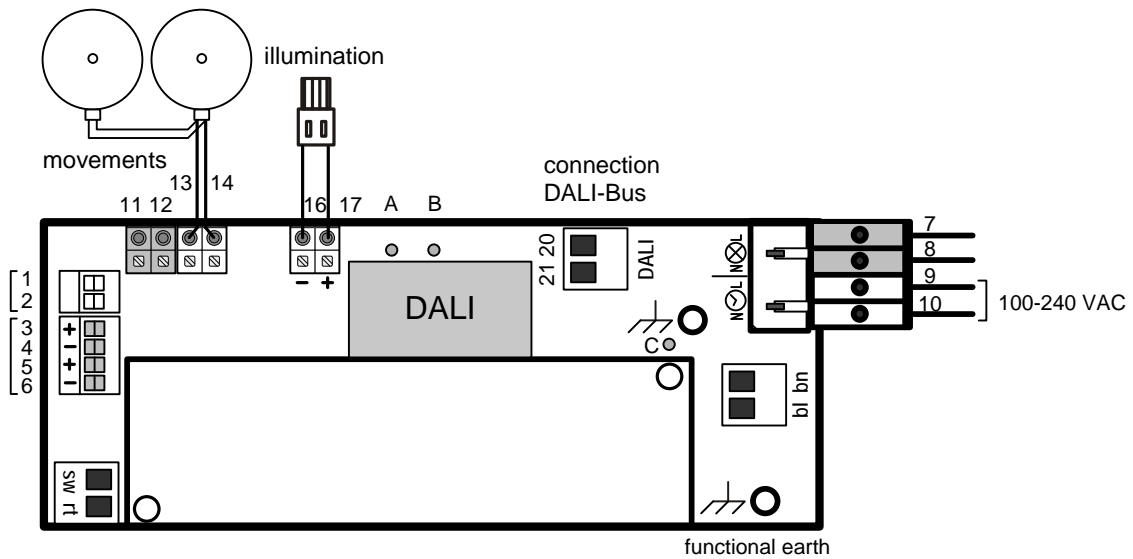


No.	Group	Meaning and function	
1	Time signal input	Connection a	MOBALine or DCF active bipolar
2		Connection b	
3	DCF input	DCF IN +	(for connection a DCF or GPS receiver)
4	Current loop	DCF IN -	
5	GPS power supply	GPS power supply + (30 VDC, 100 mA max.)	
6		GPS power supply -	
7	Power input for illumination control	Phase (100 – 240 VAC / 0.1 A	If not in use, set the DIP switch 4 to "OFF"
8		Neutral conductor	
9	Power input for illum.	Phase (100 – 240 VAC / 0.55 A	
10		Neutral conductor	
11	Time signal - output 2	Connection b	MOBALine (with MOBALine input signal only) or DCF active bipolar (with DCF active bipolar (1, 2 input signal only)
12	Movement generates <b>direct</b> load for the clock line of the master clock.	Connection a	
13	Time signal - output 1	Connection b	MOBALine (with MOBALine input signal only) or DCF active bipolar (with DCF/ GPS current loop (3, 4) or DCF active (1, 2) input signal only)
14	Movement generates <b>no</b> load for the clock line of the master clock.	Connection a	
15	DIP switch for illumination control	Illumination level (1-3) see chapter 4 Configuration Illumination control (4) see chapter 4 Configuration	
16	Illumination output	- LED illumination	
17		+ LED illumination	
18	48VAC movement supply	48 VAC, fuse provided by customer according to power data	
19			
A	Signal LED (yellow)	Flashes with signal clocking (MOBALine: permanently ON, DCF active: blinks every second)	
B	Power LED (green)	Flashes if voltage is applied to power input (pins 9 and 10)	
C	Power supply LED illumination (red)	Flashes if voltage is applied to illum. control input (pins 7 and 8)	

 unused connection

## 5.4 DCC/DALI

The DCC/DALI is intended for use with MOBALine or DCF.







No.	Group	Meaning and function	
1	Time signal input	Connection a	MOBALine or DCF active bipolar
2		Connection b	
3	DCF input	DCF IN +	for connection a DCF or GPS receiver <b>(MET time zone only)</b>
4	Current loop	DCF IN -	
5	GPS power supply	GPS power supply + (30 VDC, 100 mA max.)	
6		GPS power supply -	
7	Power input for illumination control	Phase (100 – 240 VAC / 0.1 A)	
8		Neutral conductor	
9	Power input for illum.	Phase (100 – 240 VAC / 0.55 A)	
10		Neutral conductor	
11	Time signal - output 2	Connection b	MOBALine (with MOBALine input signal only) or DCF active bipolar (with DCF active bipolar (1, 2 input signal only)
12	Movement generates <b>direct</b> load for the clock line of the master clock.	Connection a	
13	Time signal - output 1	Connection b	MOBALine (with MOBALine input signal only) or DCF active bipolar (with DCF/ GPS current loop (3, 4) or DCF active (1, 2) input signal only)
14	Movement generates <b>no</b> load for the clock line of the master clock.	Connection a	
15	DIP switch for illumination control	Illumination level (1-3) see chapter 4 Configuration Illumination control (4) see chapter 4 Configuration	
16	Illumination output	- LED illumination	
17		+ LED illumination	
20	Connection DALI bus	No polarity	
21			
A	Signal LED (yellow)	Flashes with signal clocking (MOBALine: permanently ON, DCF active: blinks every second)	
B	Power LED (green)	Flashes if voltage is applied to power input (pins 9 and 10)	
C	Power supply LED illumination (red)	Flashes if voltage is applied to illum. control input (pins 7 and 8)	

 unused connection

## 5.5 Time signal outputs

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The DCC features a time signal output which gives out either MOBALine or DCF active bipolar, depending on input signal.

a	b	Connections 11/12 or 13/14
		<b>11/12:</b> Direct continuation of the input clamp 1/2
		<b>13/14:</b> Decoupled and boosted output signal

### 5.5.1 MOBALine

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#### Notice!

MOBALine is only given out if MOBALine is connected to the input.

- Frequency-modulated MOBALine time signal for self-setting slave clocks.  
(MLU 190, SEM 40 / SAM 40, SAM 00, SEM 100(t) / SAM 100(t))
- Output format: local time
- Electrical properties: approx. 20V / 50Hz

### 5.5.2 DCF active bipolar

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DCF active bipolar is given out if a DCF or GPS antenna with current loop output or a DCF active bipolar signal from a master clock is connected to the input.

- Polarity-switching second-by-second time signal for self-setting slave clocks.  
(SEM 100(t) / SAM 100(t))
- Electrical properties: approx. 20V

## 6 Operating behavior

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### 6.1 Power supply

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The **DCC** is generally powered by 230 VAC. It has a maximum consumption of 20 Watt, of which up to 18W are allotted to the LED illumination.

### 6.2 DALI control (only for DCC/DALI)

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DALI stands for "Digital Addressable Light Interface". The DALI control is therefore only intended to control the dial backlighting. The DALI bus allows data traffic in both directions, which means that in addition to controlling the light intensity, the status of the interface can also be queried.

A maximum of 64 DALI operating devices can be controlled individually or together and in up to 16 groups via a two-wire control line.

## 6.3 Factory settings

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By default, DIP switches 1-3 are set to OFF, meaning the illumination level is set to minimum. Adjust the brightness of the LED illumination to the environmental lighting conditions after mounting the clock by increasing the brightness step-wise.

By default, DIP switch 4 is set to ON, meaning the illumination is controlled via the illumination control input. If no separate illumination mains is present, the clamp with the lamp symbol is not used; instead, the DIP switch 4 is set to "OFF" to permanently switch on the illumination.

Note: The DIP switch is not equipped with DCC / DALI or has no function.

## 7 Maintenance

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**Danger!**

For any kind of maintenance or wiring work, the clock is to be removed from the movement and illumination mains via separator.

### 7.1 Troubleshooting: Repairs

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If you cannot rectify the problems, contact your supplier from whom you have purchased the device.

Any repairs must be carried out at the manufacturer's plant.

Disconnect the power supply immediately and contact your supplier, if ...

- liquid has entered your device
- the device does not properly work and you cannot rectify this problem yourself.

### 7.2 Cleaning

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- Please make sure that the device remains clean especially in the area of the connections, the control elements, and the display elements.
- Do not use solvents, caustic, or gaseous cleaning substances.

### 7.3 Disposing

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#### **Device**

At the end of its lifecycle, do not dispose of your device in the regular household rubbish. Return your device to your supplier who will dispose of it correctly.

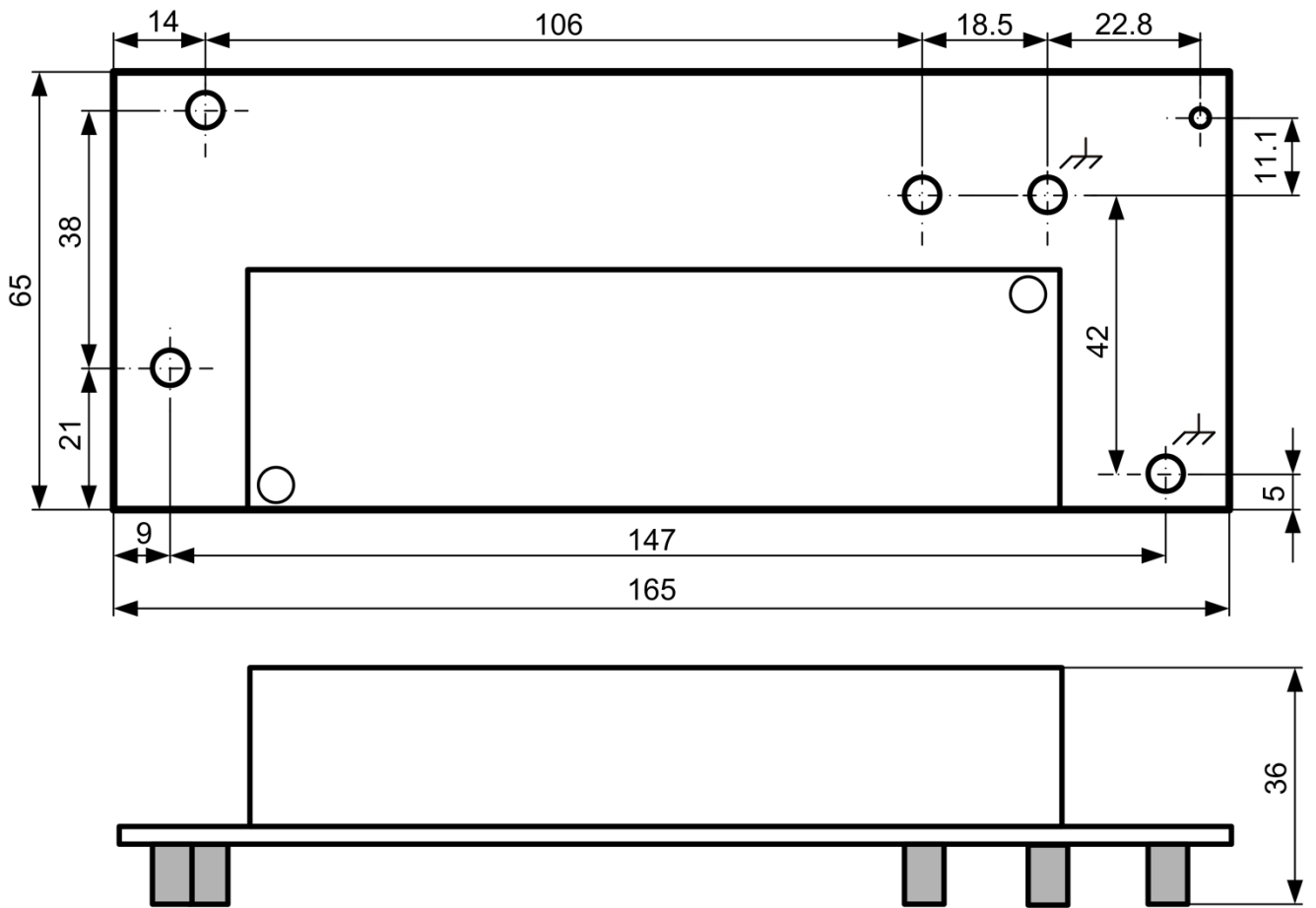


#### **Packaging**

Your device is packaged to protect it from damages during transport. Packaging is made of materials that can be disposed of in an environmentally friendly manner and properly recycled.

## 8 Dimensions

All measurements in mm



The contact points must be electrically connected to the mounting plate using metal bolts!

### Mounting locations



Ø2.5mm hole for spacer



Mounting hole for M3 screw

## 9 Technical data

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<b>Synchronization</b>	MOBALine, DCF active bipolar, DCF current loop										
<b>Power supply</b>	100 – 240 VAC, 0.55A, 50 / 60 Hz (max. 20 W)										
<b>Start-up current</b>	Cold start: 70A ( $t_{width} = 200 \mu S$ measured at 50% $I_{peak}$ ) (see safeguard table) <table border="1"><tr><td>Circuit breaker</td><td>B10</td><td>B16</td><td>C10</td><td>C16</td></tr><tr><td>Number of DCCs</td><td>4</td><td>7</td><td>7</td><td>11</td></tr></table>	Circuit breaker	B10	B16	C10	C16	Number of DCCs	4	7	7	11
Circuit breaker	B10	B16	C10	C16							
Number of DCCs	4	7	7	11							
<b>Loss of synchronization</b>	See movement. DCC gives out DC voltage if no time signal is present.										
<b>Time code outputs</b>	Depending on input: MOBALine: local time, 20V / 50Hz / max. 100mA DCF active: local time, 20V / max. 100mA										
<b>Illumination</b>	30V / max. 700mA										
<b>Control DIP switches</b>	1-3 illumination level (current) 4 illumination control										
<b>Displays (LEDs)</b>	Green: power supply available Yellow: signal available Red: illumination control, 230 VAC available										
<b>Temperature range</b>	-30 °C ... +70 °C										
<b>Dimensions</b>	(L x W x H): 165 x 65 x 36 mm (without mains connector plug)										
<b>Weight</b>	250 g										

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