

Central Power Supply System with Central Battery and Microprocessor-Based Function Control System

BZV 220 – DC (NLBZV220x) / MDC Type I+II



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1 Preface

Thank you very much for buying an MDC power supply system with central battery! This system complies with the standards DIN EN 50171, DIN VDE 0108-100 as well as DIN VDE 0100-718 (versions relevant on delivery) and guarantees the correct functioning of your emergency lighting system by means of a state-of-the-art micro-processor-controlled function control system. This documentation has been created for you to quickly commission and operate the system in an uncomplicated way.

We recommend the following course of action:

1. Observe the relevant danger signs and safety instructions (chapter 2)
2. Make yourself familiar with the design of the MDC system (chapter 4)
3. Mount the system and batteries and connect them (chapter 5)
4. Commission the system (chapter 6)
5. Program the system (chapter 7)

Chapter 10 provides a description of the central control unit and a menu – quick reference guide. Instructions for operation and maintenance of the batteries as well as the technical data of the system you can find in chapters 11 and 12. The exact circuit diagram along with other information on your system can be found in the separate document “Information on your MDC System”.

Note: The table in chapter 12 with the key data of the batteries used in the system has to be completed by the installer.

Note: For maintenance works and modifications the system has to be de-energised by a specialist. The necessary steps are described in chapter 9.

Note: Instructions regarding the programming of the system by means of the WebInterface can be found on the web homepage of the manufacturer.

1.1 Installation location and environmental conditions

The system and the batteries must be placed in an appropriate room satisfying the following environmental conditions:

- Air temperature: 0°C to 35 °C
- Humidity: up to 85% max. (non-condensing, refer to DIN EN 50171)









When selecting the operation room, make sure that sufficient ventilation according to DIN VDE 0510; EN 50272-2 and EitBauVO is assured. Also, please make sure that the room fulfills the conditions corresponding to the protection class of the system (see DIN EN 60529 and 60598).

Note: The power and capacity of the battery system depends on the temperature. The recommended temperature range is 10°C to 30°C, the ideal operating temperature is 20°C ± 5K. Technical data given is valid for a nominal operating temperature of 20°C.

Note: The system must be located in the building such that the allowed cable lengths allowed for emergency lighting circuits will not be exceeded.

2 Danger and information signs

Please strongly obey the safety instructions when installing and using your MDC-system.

	<ul style="list-style-type: none"> Observe instructions and keep them located near the battery system for future reference! Work on the battery system should only be carried out by qualified personnel! No guaranty in cases of non-observance of instruction manual, repair using non-original parts or unauthorised intervention!
	<ul style="list-style-type: none"> Do not smoke! Do not use any naked flame or other sources of ignition. There is the danger of explosion and fire hazards!
	<ul style="list-style-type: none"> While working on batteries wear protective eye-glasses and clothing! Observe the accident prevention rules as well as DIN VDE 0510, VDE 0105 part 1 (version relevant on delivery)!
	<ul style="list-style-type: none"> Any acid splashes on the skin or in the eyes must be flushed with plenty of water immediately. Then seek medical assistance. Spillages on clothing should be rinsed out with water!
	<ul style="list-style-type: none"> Explosion and fire hazard, avoid short circuits! Caution! Metal parts of the battery are always energised; therefore do not place items or tools on the battery!
	<ul style="list-style-type: none"> Electrolyte is strongly corrosive and acidic. In normal working conditions the contact with electrolyte is nearly impossible; electrolyte may leak from the vent valves in case of overcharging the battery or in case of mechanical damage to the container. In case of any contact with electrolyte please flush with water abundantly and seek medical assistance.
	<p>Batteries / cells are heavy! Ensure adequate mounting security and always use adequate handling equipment for transportation.</p>
	<p>Disposal of batteries Batteries marked with the recycling symbol should be processed via a recognised recycling agency. By agreement, they might be returned to the manufacturer. Batteries must not be mixed with domestic or industrial waste.</p>

3 Scope of delivery

Included in the delivery of the MDC system are:

- 1x system MDC in floor standing cabinet
- 18x battery type RPower 121200/121500 (standard), other types possible
- 1x battery connector cable set
RPower 121200 (MDC type I): 2x tier connectors 1,000mm x 25mm², 15x row connectors 450mm x 25mm²
RPower 121500 (MDC type II): 2x tier connectors 1,000mm x 35mm², 15x row connectors 450mm x 35mm²
- Option: No battery and no battery connector cable set in case of MDC type 0 (NLBZV2200) – in this case the batteries and battery connectors have to be supplied separately
- 1x brief instruction (this document)

Other tools and materials necessary for installation (brought by the installer):

- measuring device for voltage measurements of up to 500VAC or 300VDC
- slotted screw driver width 5.5mm
- hexagon socket wrench SW13 or slotted screw driver 10mm
- Phillips screw driver PZ2
- ¼"-tool with torque variable between 0 and 22Nm

4 System overview

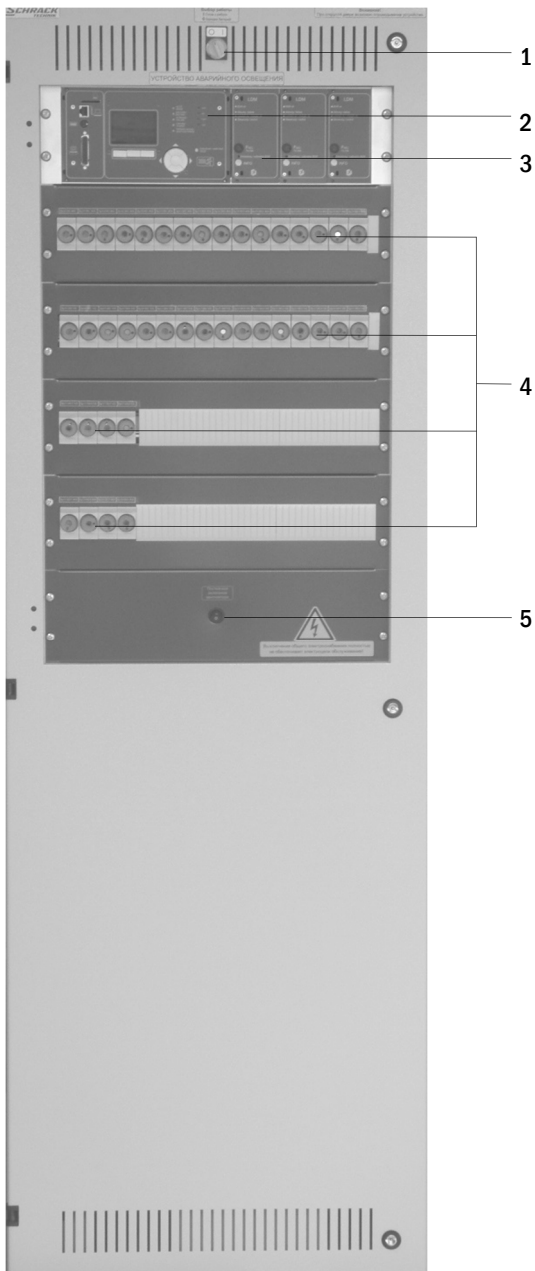


Figure 1(a): Front view

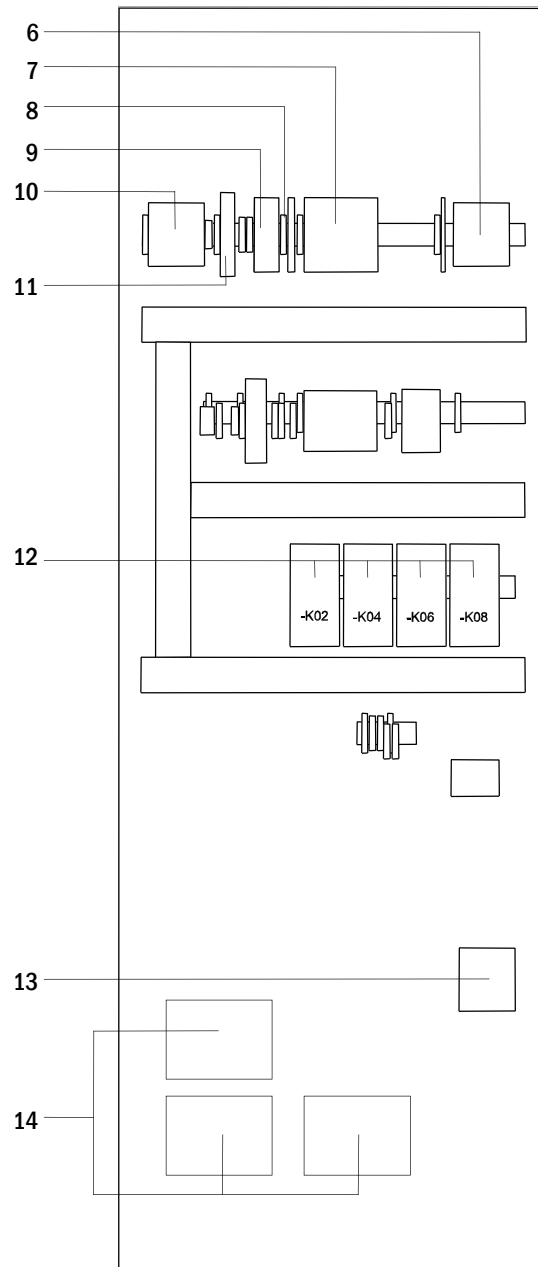


Figure 1(b): Inside view

- 1 Operation mode switch (BAS)
0 = Charging mode (Luminaire off/no emergency lighting function)
I = Ready-to-operate (emergency lighting function given)
- 2 Control centre
- 3 Charger units Type LDM25 á 2.5A
- 4 Fuses of the load circuits 1-20
- 5 Switch fan off / on
- 6 Connection sub-distribution SV21 fuse switch disconnector F200
- 7 Connection consumer terminals 1-20

- 8 Connection bus-compatible modules
- 9 Connection switch contacts
- 10 Fuse switch disconnector F1 for mains connection
- 11 Ethernet connection
- 12 Maintained light changeover switching
AC contactors K02/K06;
DC contactors K04/K08
- 13 Fuse switch disconnector F2 for battery connection
- 14 Isolating transformers 800VA per LDM25

5 Mounting and installation of the power supply system

5.1 Connection of the charger and switch unit

5.1.1 Mains connection (terminal block X01)

Make sure that the mains power line is de-energised and dimensioned according to the maximum connected load and the selective automatic cut-out. Connect the mains line to the mains terminals fig. 1(b), number 10 for which you have to remove the mains fuses. See also fig. 2(b).

Caution: The mains power line gets energised at a later time (see chapter 6).

system type	L1	L2	L3
MDC Type I	80A	20A	80A
MDC Type II	80A	20A	80A

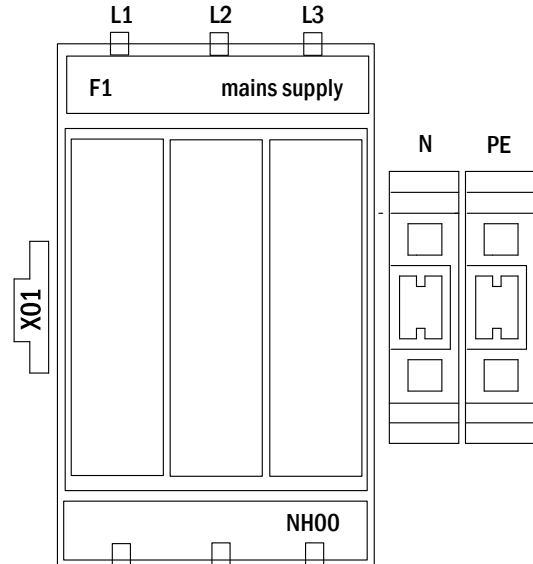


Figure 2(a): Mains connection

Figure 2(b) shows the design of an NH fuse switch disconnecter of the type MultiBlock NH00. The mains supply, battery supply as well as the sub-distributions of the MDC are fused with this type of fuse switch disconnecter (see also fig. 7 and 8). The fuses are positioned in the housing cover. It has to be removed together with the internal cable covers (clip fasteners) for connecting the supply lines.

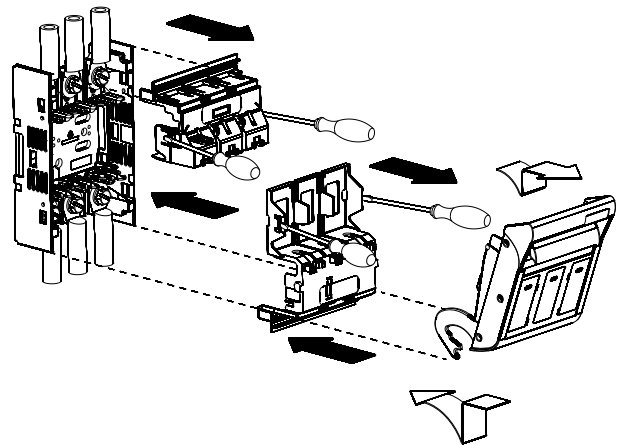


Figure 2(b): Design Multiblock NH00

5.1.2 Ethernet interface (terminal X10)

The MDC-system has an Ethernet interface by means of which it can be embedded in a network for remote monitoring. Figure 3 shows the network connection inside the cabinet. Please use standard network cable (RJ45) for connection.

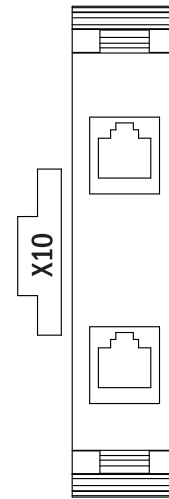


Figure 3: Ethernet connection

5.1.3 Switch contacts (terminal block X02)

voltage supply:

F5 GND
F6 -24V DC

de-energised contacts:

contact 1/2 closed: malfunction
contact 2/3 closed: system works properly
contact 4/5 closed: battery operation
contact 5/6 closed: mains operation
contact 7/8 closed: ready to operate
contact 8/9 closed: charging mode
contact 10/11: connectors for temperature sensor
contact 19/20 closed: fan switched off (status message)
contact 20/21 closed: fan switched on (status message)

contact 17/18 closed: fan actuation

energised contacts (GND):

contact 14/15 closed: system in charging mode*
contact 30/31 closed: system in test mode*

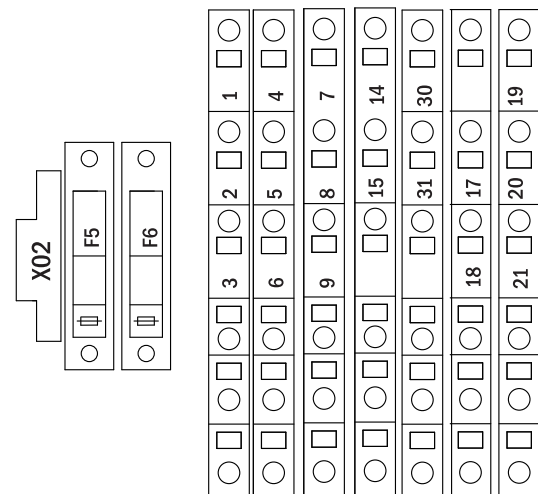


Figure 4: Connection switch contacts

***Caution:** In order to put the system to this operation mode, the energized contacts must be shorted externally by a relais contact. These contact must not be connected to any external voltage source!

5.1.4 Bus-compatible modules (terminal block X07)

Terminal block X07 serves as a connection to external, bus-compatible command and switch modules. Please use a screened 4-core bus cable (e.g. J-Y(St)-Y). The following modules can be connected:

- SAM24
- MC-LM
- MCT15 (S)

For further information see chapter 13 – module descriptions.

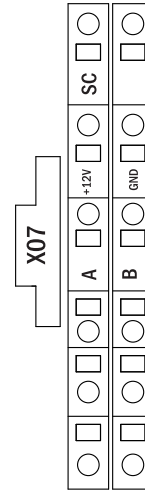


Figure 5: Connection bus-compatible modules

5.1.5 Output circuits (terminal block X03)

Figure 6 shows the terminal block X03 to which the consumer circuits (luminaires) can be connected. Pay attention to the correct polarity and use mains-compatible cables; comply with the standards MLAR, EltBauVo as well as DIN VDE 0100 (versions relevant on delivery). The terminal DS E/A is used for activating or deactivating the maintained light changeover switching (K02) and thus all consumer terminals illustrated in fig. 6.

Note: The circuits to be connected have to be checked for installation errors such as short circuit and earth fault prior to connection.

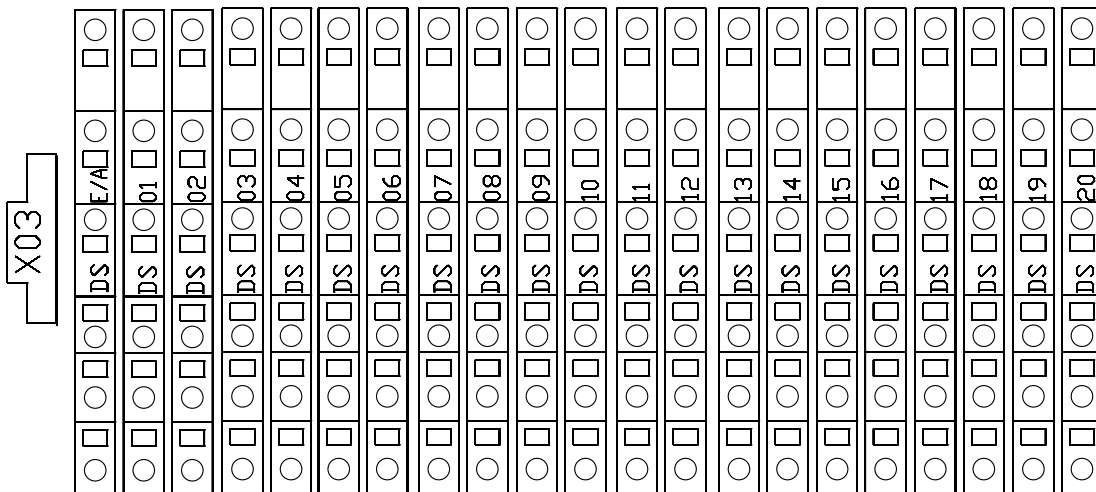


Figure 6: Connection electric circuit outputs

5.1.6 Sub-distribution SV21 (terminal block X04)

Figure 7 shows the connection of the external sub-distribution SV21. Terminal D E/A is energised (15V DC) and used for activating or deactivating the maintained light changeover switching (K06).

Note: Observe polarity!

system type	L/B+	%	N/B-
MDC Type I	63A	0A	63A
MDC Type II	63A	0A	63A

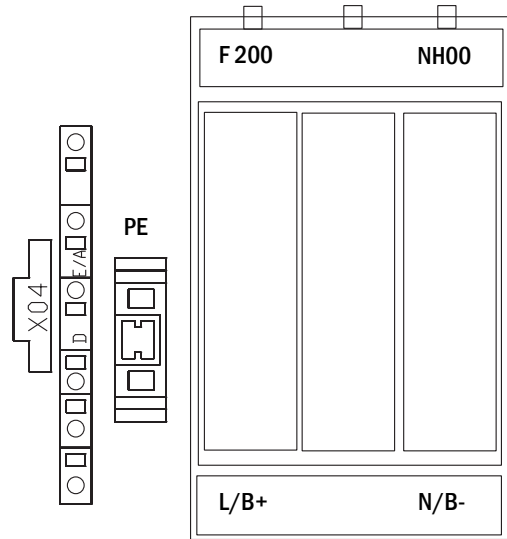


Figure 7: Connection SV21 (sub-distribution)

5.1.7 Battery fuse

Connect appropriately labelled cables to the three contacts (B+, B- and Sym) of the battery fuse as shown in fig. 8, which are then led to the battery system (see chapter 5.2). The following table shows the sizes of the battery fuses for the systems MDC type I and MDC type II in Ampere.

system type	B+	Sym	B-
MDC Type I	100A	6A	100A
MDC Type II	125A	6A	125A

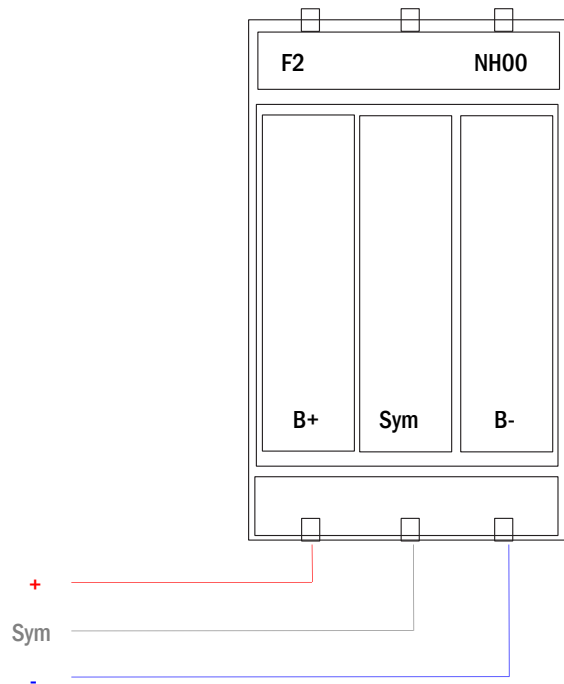


Figure 8: Battery fuse

5.2 Mounting and installation of the battery system

5.2.1 Mounting

Mount the battery rack and position it at the designated place. When choosing the battery room, pay attention to sufficient ventilation according to DIN VDE 0510; EN 50272-2 and EitBauVO (versions relevant on delivery). Now place the battery blocks on the respective level in the battery rack. The temperature difference between the individual battery blocks must not exceed 3°C.

Note: Before commissioning all blocks have to be checked for mechanical damage, correct polarity and that the cables are firmly connected.

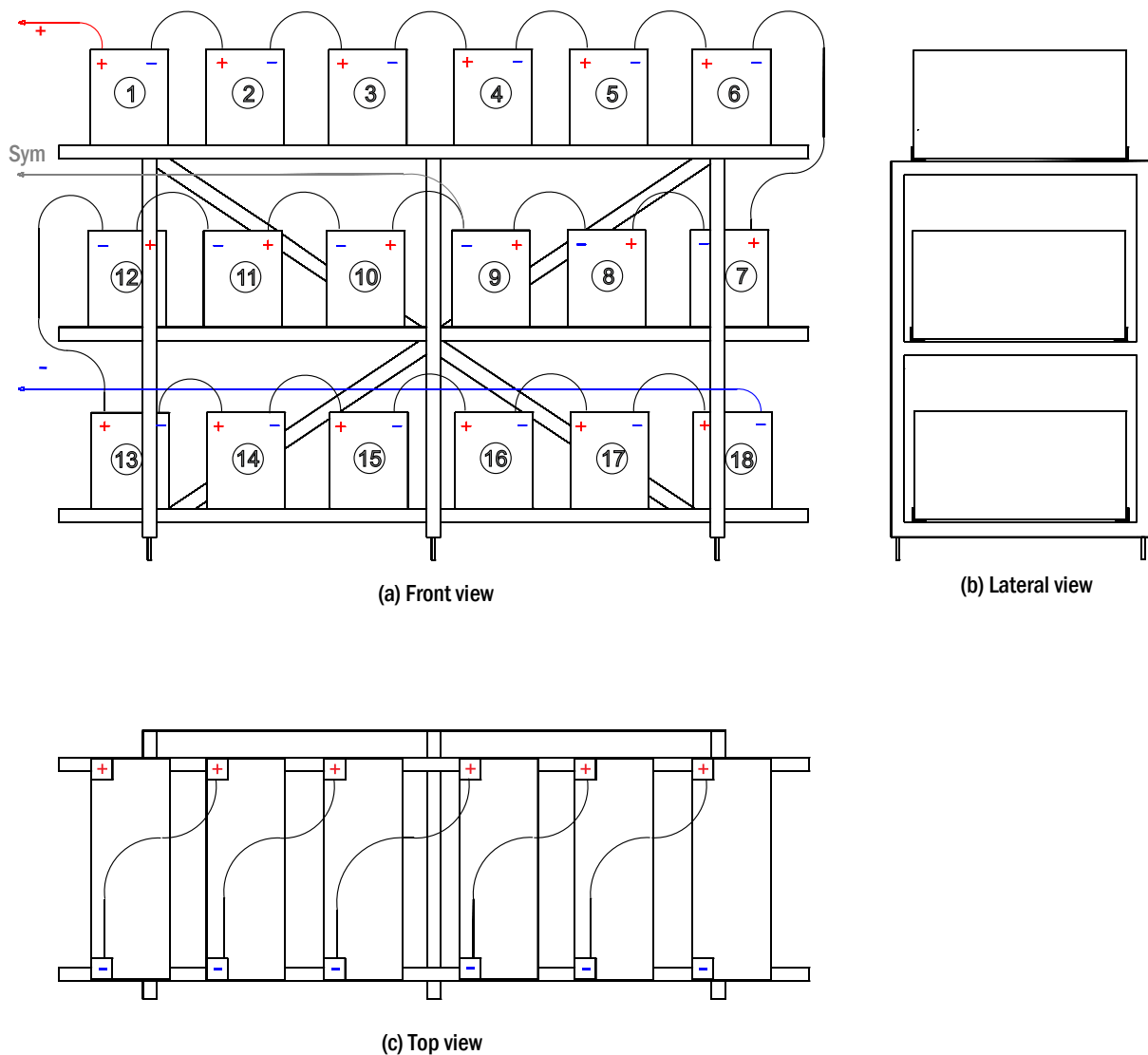


Figure 9: Mounting and connection of the battery blocks

5.2.2 Connection of the battery blocks

Disconnect the battery fuses by opening F2 and F4. Connect the battery blocks in series as shown in fig. 9(a-c). Afterwards connect the cables coming from F2 (fig. 1(b), number 13) as illustrated in fig. 9(a) (red = B+/positive pole to the positive pole of block 1, grey = symmetry to the negative pole of block 9 and blue = B-/negative pole to the negative pole of block 18). If necessary put on the pole covers.

Note: Observe polarity. A beep signalises wrong polarity.

The following torques apply to the screw joints:

Thread Diameter	Maximum Torque
M5	2 - 3Nm
M6	4 - 5.5Nm
M8	5 - 6Nm
M10	14 - 22Nm

6 Commissioning of the power supply system

Open the housing for commissioning the system. Fig. 1(b) schematically shows the view of an open system cabinet. Continue as follows (the numbers in brackets refer to fig. 1(a) and (b)):

1. Operation mode switch to charging mode. Turn the operation mode switch (1) to charging mode (position "0").

2. Connect battery fuses. Connect the battery fuses (13) again by closing F2.

3. Supply mains power. Supply mains power and check the power terminals for correct configuration (fig.2a) by conducting the below-listed measurements. In case of a misconfiguration (connection error) abort commissioning:

voltage between L1 and N
voltage between L2 and N
voltage between L3 and N
voltage between L1 and PE
voltage between L2 and PE
voltage between L3 and PE
voltage between PE and N

These voltages should range from ca. 220V to 240V (supplied mains power).
If they do not, this indicates a connection error.

This voltage should be zero. If it is not, this indicates a connection error.

4. Connect mains fuses. Connect the mains fuses (10) by closing F1. The system is now activated.

5. Await the end of the boot process. After switching on the system (acoustic signal) it starts booting. This process can last several minutes. During and after the boot process the LCD-Display should show the following (see fig. 10):

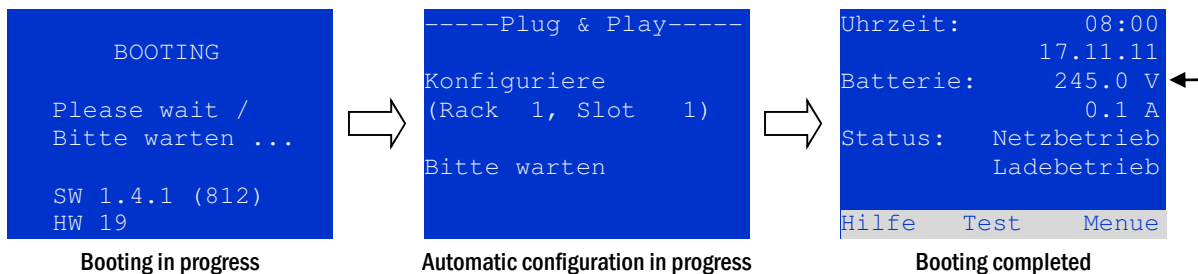


Figure 10: Booting routine (left, middle) and status (right).

6. Check battery voltage. Check the battery voltage by means of the status information in the LCD-display. It should range from 192V to 250V (fig. 10, right picture, arrow).

7. Operation mode switch to "ready-to-operate". Turn the operation mode switch (1) to "ready-to-operate" (position "1"). This activates the electric circuits (by default maintained lighting).



Caution: Make sure that nobody works on the electric circuits before switching the system on as circuits in maintained lighting mode get energised when activated. If there are still circuits that are worked on, remove the respective fuses before switching on the system.

8. Check voltage at circuit outputs. By default the two maintained light changeover switchings (contactors K02 and K06 (12)) are switched on by means of wire jumpers on terminal X03/X04: DS E/A, so that the internal circuit outputs 1-20 (7) and the connection of the sub-distribution SV21 (6) are energised. The respective maintained light changeover switching gets switched off by removing these wire jumpers. Insert the enclosed fuses Neozed D01/10A and NH00/80A and check the voltage on all circuit terminals (7) (see also fig. 6) and sub-distribution terminals SV21 (6) (see fig. 7). The measured voltage on each circuit and connection in maintained lighting should correspond to the mains voltage.

Now the installation process is completed and the system is ready to operate.

7 Setting up your system

7.1 General operating instructions

Your system can be operated and configured completely via the front control elements (fig. 11). For text input (e.g. circuit denomination) we recommend connecting an external keyboard to the PS2-interface (1).

The LCD-screen (2) displays **Menues** and **Information**. In the bottom line you can see – if active – the **softkey functions** which are reachable via the 3 softkeys (3) (example see fig. 12). For navigation and data input please use the arrow keys Δ , ∇ , \triangleleft and \triangleright (4) as well as the enter key \circ (5). The up Δ and down ∇ keys are mostly used for selecting menus and input fields. A selected menu item is indicated by **inverted colouring**. The right \triangleleft and left \triangleright keys are used to change values; in some cases you have to confirm your input with the enter key \circ . An arrowhead \blacktriangleright on the right indicates a submenu which can be selected with the right \triangleright or enter \circ key. You can return from there using the softkey **back** or **done**.

The following paragraphs give some basic instructions for configuring your system. The LCD-screen shows the necessary functions which can be navigated to and then selected. The line under the headline of each paragraph describes how to get to the required menu item:

Status \rightarrow INFO-pushbutton (DCM/ACM) \rightarrow Δ / ∇ (select circuit) \rightarrow enter \circ

Note: The arrow keys Δ , ∇ , \triangleleft and \triangleright (4) and the enter key \circ (5) on the control unit correspond to the arrow and enter keys of an external keyboard. The softkeys (3) correspond to the function keys F1, F2 and F3.

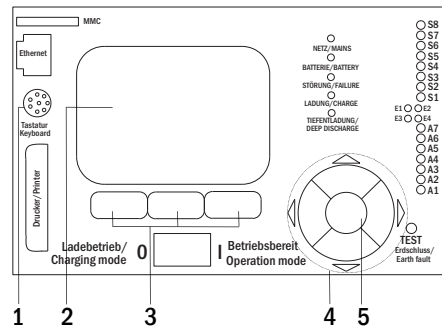


Figure 11: Control elements

7.2 System state

After commissioning the LC-display shows the state of the system (fig. 12) i.e. time (1) and date (2), current battery voltage (3) and battery charging current (in battery operation - discharging current) (4), system state (5, 6). Via the softkeys (8) you can select the [help](#)-function, conduct a [test](#) or reach the [menu](#).

Note: The system returns from each display to the status after ca. two minutes if no input is made.

```
time:           08:00  -1
                07/17/12 -2
battery:       245.0 V -3
                0.0 A   -4
state:         mains ok -5
                off (charging) -6
                -7
help   test   menu -8
```

Figure12: System state

Display-lines 5, 6 and 7 show the following status messages:

Status	Explanation
line 5	
mains ok	mains connected and OK
mains failure	mains voltage failed
line 6	
(off) charging	luminaires switched off, emergency operation blocked, battery is being charged
operational	maintained lighting luminaires (DS) switched on, emergency operation possible
off	mains failure, but no emergency operation possible
active (battery)	mains failure, emergency operation active
active (mains)	all luminaires with mains connection on
line 7 (if required, additional messages possible)	
(empty)	--
critical circuit	break of quiescent current loop
SAM 1 E 1 or similar	modified non-maintained lighting activated by SAM or MC-LM (text configurable)
RS485 fault	failure of RS485 bus interface
earth fault (B)	earth fault in battery operation
maintenance required	carry out maintenance (service)
deep discharge 1	battery deeply discharged
charger fault	charger module failed/fuse activated
Plug & Play error	wrong component used
RSM fault	RSM failed
IOM fault	IO-module failed
battery fuse	battery fuse defect
battery voltage	battery voltage out of tolerance
battery current	battery current out of tolerance
battery discharge	battery is being discharged in mains operation
sub-station fault	(communication) failure of sub-station
sub-station mb	sub-station in modified non-maintained operation
sub-station mains fail	mains failure of sub-station
fan failure	fan failed
bat. temp. sensor	battery temperature sensor does not respond
battery temperature	measured temperature in battery compartment is below 10°C/above 50°C
total current fault	The total current value is beyond the stored reference value

Central Power Supply System MDC

Setup & Commissioning

7.3 Viewing and changing of the circuit setup

State → F3 Menu → △▽Installation → Enter ○ → △▽Modules → Enter ○

Press F3 to enter the menu. Select Installation using △ and ▽, and after pressing ▷ or Enter ○, select Modules using △ and ▽. Pressing ▷ or Enter ○ now, you reach the setup for this circuit by pressing ▷ or Enter ○ (fig. 15). The following information is displayed:

- 1 – number of current changeover switching (fig. 15, point 1). If this is selected (i.e. invertedly coloured), you can change to the other circuits with ◀ and ▶.
- 2 – stop delay time* (explanation see below) (fig. 15, point 2). It can be set in steps between 1 min and 15 min using ◀ and ▶; alternatively you can select a manual** switch-back.
- 3 – operation mode (fig. 15, point 3). With ◀ and ▶ you can select the following operation modes:

```
----- modules -----
circuit(DCM42)          1  -1
stop delay:           15min -2
maintained mode                    -3
monitoring (L)                > -4
main building, hall          -5
ground floor
help      next      done
```

Figure 15: Circuit status

```
!"#$%&'()*+,-./01234
56789:;<=>?@ABCDEFGHI
JKLMNOPQRSTUVWXYZ[\]^
_`abcdefghijklmnopqrstuvwxyz{|}
```

Figure 16: Survey of all available characters

Operation mode	status when system is ready to operate
<code>maintained lighting</code>	Luminaires are on.
<code>non-maintained lighting</code>	Luminaires are off but get switched on when mains or sub-distributions fail.
<code>deactivated</code>	Luminaires are off (also when mains or sub-distributions fail, i.e. no emergency operation!).

- 4 – monitoring mode (sub-menu) (fig. 15, point 4). Not available for this system type.
- 5 – name (two lines) (fig. 15, point 5). You have 42 digits for naming each circuit. After selecting a line you can change to edit mode by pressing Enter ○. With ◀ and ▶ you choose the position to be changed; the character can be chosen with △ and ▽(available characters see fig. 16). You finish the input by pressing Enter ○ or done. Tip: Use an external keyboard for entering the names.

***stop delay:** When switching back from “modified non-maintained lighting” (failure of mains monitor) to “ready to operate”, all luminaires remain on for the programmed stop delay time. When switching back from battery operation, all luminaires keep being supplied with battery

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voltage for another minute; afterwards the programmed stop delay time starts running. After this time has elapsed, the changeover switchings are switched back to their programmed operation mode (see point 3 above).

****manual:** Turn the operation mode switch briefly to “charging mode” (0) and then back to “ready to operate” (I) for switching back from battery operation.

7.3.1 Programming the SAM-module

State → INFO-pushbutton DCM/ACM → △▽(select circuit) → Enter → next → SAM programming > → Enter

Pushing the softkey `next`/F2 takes you to the menu for programming the SAM and the supply time (battery operation) (Abb. 18). If you select the line `supply:` using the keys `△` or `▽` (fig. 18, point 2), you can set the supply time for the respective circuit in steps from 3 minutes (`3min`) to 8 hours (`8h 0min`) or unlimited (`unlimited`). Selecting `SAM programming >` (fig. 18, point 1) using `▷` or Enter `○` takes you to the table shown in fig. 19. For navigating within the table use `△`, `▽` or Enter `○`. In each line you can change the following settings using `<` or `>`:

- left column: selection of SAM/MC-LM (number `01` to `16`),
- middle column: selection of SAM-input (`E1...E8`, `MC-LM`, `TLS1`, `TLS2`),
- right column: selection of the operation mode (`ds`, `mb`), see table below.

The softkey `back`/F3 takes you back to the previous display (fig. 18). Now push the softkeys `done`/F3 and `back`/F3 in order to leave the programming. A confirmation prompt appears (fig. 20). Here you can save the changes with `yes` or cancel with `no`. After that you are in the circuit selection menu again.

```

----- circuit 1 -----
SAM programming > -1
supply: unlimited -2
help back
    
```

Figure 18: SAM-programming

```

- SAM-circuit 1 -
01 | E1 | ds
01 | E2 | mb
01 | E3 | gmb
02 | MC-LM |
01 | TLS 1 |
01 | TLS 2 |
help done
    
```

Figure 19: SAM-programming modules

```

-----
save changes?
yes no
    
```

Figure 20: SAM-programming

SAM-operation mode	Explanation
<code>ds</code> (maintained lighting)	When a voltage is applied to the input, the luminaires in maintained lighting mode get switched on, the luminaires in non-maintained lighting mode remain off.
<code>mb</code> (modified non-maintained lighting)	In case of a voltage failure on the input all luminaires in non-maintained and switched maintained lighting mode get switched on and the system shows modified non-maintained lighting, see chapter 7.2). In this state the test function is blocked. Upon return of the voltage the system switches back to regular operation after the set stop delay time.

8 Tests

8.1 Execution of a function test

State → `test`/F2

When the display shows the system state (see chapter 7.2), press `test`/F2 in order to start a function test. If the softkey `test` is not shown there, this indicates a mains failure or that the system is running in modified non-maintained lighting mode. The test function is blocked then. If you hear an acoustic signal on pushing `test`/F2, the test function is blocked by boost charge or a battery voltage below 230V (indication in the LCD: "`test locked`"). If there is no signal tone, a so-called manual test is carried out.

The LC-display shows the tested circuits (fig. 21, point 1). These circuits are "prepared" prior to the test, i.e. they are switched on with mains voltage and brought to working temperature for an exact current measurement (fig. 21, point 2). The duration of this process can be set between 5 and 30 minutes. The progress of the test is indicated by a line of dots behind the words "please wait" (fig. 21, point 3).

The test can be cancelled at any time using the softkey `cancel`/F3 (fig. 21 to 24, point 4).

At the beginning of the actual test the display shows the message "under test" (fig. 22, point 2). A detected error is shown in line 3 (fig. 23, point 3).

After finishing the test the display shows a summary for a few seconds (fig. 23) and the message "test finished" (fig. 24, point 2). Afterwards the display returns to showing the system state. The test results are saved in the log which can be selected and read (see chapter 8.3).

```
-----manual test-----
circuits: 001 - 007      -1
preparing test          -2
please wait ...         -3
cancel                  -4
```

Figure 21: Test programming

```
-----manual test---
circuits: 001 - 007      -1
under test              -2
please wait .....      -3
cancel                  -4
```

Figure 22: Setting schedule

```
-----manual test-----
circuits: 001 - 007      -1
under test              -2
circuit error           -3
cancel                  -4
```

Figure 23: Test programming

```
-----manual test-----
circuits: 001 - 007      -1
test finished           -2
circuit error           -3
cancel                  -4
```

Figure 24: Test programming

8.2 Programming automatic function tests

State → menu/F3 → Δ ∇ configuration → Enter \circ Δ ∇ → function test → Enter \circ

In the state display press menu/F3 and navigate with Δ and ∇ to configuration, press \triangleright or Enter \circ , and navigate with Δ and ∇ to function test. Then press \triangleright or Enter \circ again. Now you are in the function test display (fig. 25). Here you can

- 1 - set the schedule for automatic tests,
- 2 - edit the current monitor window during the test,
- 3 - configure the preheat function,
- 4 - see when the next automatic test is scheduled.

```
----function test----
schedule                > -1
current monitor        > -2
preheat                on -3

next schedule:         -4
help                   done
```

Figure 25: Test programming

You finish the test programming with the softkey done/F3. Then the confirmation prompt save changes? appears. If you confirm with yes/F1, the new settings are saved.

8.2.1 Setting the schedule

function test → Δ ∇ schedule → Enter \circ

Figure 26 shows the display after selecting Zeitplan with \triangleright or Enter \circ . The following settings are possible:

- 1 - the day on which automatic tests are to be executed. The settings are: off (no automatic tests), daily, bidaily up to once every/every other/every three/every four weeks. With the weekly intervals you can choose the weekday, examples:
Mo 7d = every week on Mondays; Su 21d = every three weeks on Sundays
- 2 - time when the tests are supposed to start (hours from 00 to 23)
- 3 - time when the tests are supposed to start (minutes from 00 to 59)

```
----function test----
interval:              Mo - 7d -1
start (hour):          06 -2
start (min):           30 -3
help                   done
```

Figure 26: Setting schedule

The softkey done/F3 finishes the input and takes you back to the function test display (see chapter 8.2).

8.2.2 Setting the current monitor window

function test → Δ ∇ current monitor → Enter \circ

Selecting current monitor with Δ and ∇ followed by \triangleright or Enter \circ takes you to the display shown in figure 27. Here you can find:

- 1 - the total current,
- 2 - the current window which can be set from 5%, over 10% and 20% up to 50%,
- 3 - the command "measure reference". After selecting this line with Δ or ∇ and pressing \triangleright or Enter \circ the reference value is set back and measured in the next test again.

```
----function test----
total current 0.0 A -1
current window: 20% -2
measure reference > -3
help                   done
```

Figure 27: Test programming

The softkey done/F3 finishes the input and takes you back to the display function test (see chapter 8.2). The confirmation prompt save changes? appears again (see fig. 20). If confirmed with yes/F1, the new values are saved.

8.2.3 Activating/deactivating the preheating phase and finishing the programming

`function test` → `△▽preheat`

After selecting this line you can activate or deactivate the preheating phase prior to a test using `◀` and `▶`. Afterwards you finish the test programming with the softkey `done`/F3. The confirmation prompt `save changes?` appears again (see fig. 20). If confirmed with `yes`/F1, the new settings are saved.

8.3 Test results

State → `menu`/F3 → `△▽test results` → Enter ○

Press `menu`/F3, navigate with `△` and `▽` to `test results` and press `▶` or Enter ○. You can now see a survey of the saved results of function or capacity tests:

- 1 - `last test`: the test carried out last on the system
- 2 - `function tests`: automatically executed function tests
- 3 - `capacity tests`: automatically executed capacity tests
- 4 - `manual tests`: manually initiated tests
- 5 - `print test log`: print of all test results

By pressing `▶` or Enter ○ after selecting a category with `△` and `▽` you can see information on the selected test (see fig. 29). The display shows the type of test (fig. 29, point 1), execution date and time (fig. 29, point 2), the number of tested lamps (fig. 32, point 3) as well as the battery characteristics (fig. 29, point 4). If there are results of several tests, you can browse them with `△` and `▽`. When circuit monitoring is activated, these circuits are displayed as well.

By pressing `details`/F2 you can see further details on the test; `back`/F3 takes you back to the previous display or the menu item `test results`.

The menu item `print test log` (fig. 28, point 5) lets you print the saved data of the test log or store in files. You can do this either via internal 19-inch printer (if available) or via Centronics-interface and thus an external printer.

8.4 Reset errors

State → `menu`/F3 → `△▽reset errors` → Enter ○

Press `menu`/F3, navigate with `△` and `▽` to `reset errors` and press `▶` or Enter ○. You can now see the display shown in fig. 30.

- 1 - `show errors` >: Selecting this line with `▶` or Enter ○ takes you to a list of current error messages, from where you can get back by pressing `back`/F3.
- 2 - You can answer the question “clear error messages?” using the softkeys `yes`/F2 or `no`/F3. Pressing `yes`/F2 clears ALL error messages. Both keys take you back to the main menu.

```

----test results-----
last test                -1
function tests           > -2
capacity tests           > -3
manual tests             > -4
print test log           > -5
help                     menu
    
```

Figure 28: Test results (survey)

```

----function test----- -1
--05/24/12 14:06:36--  -2
                        errors   ok
lamps:                 13      42 -3
bat: 226.9V -         5.3A -4
help details          back
    
```

Figure 29: Info function test

```

----reset errors-----
show errors             > -1
                        clear
                        error messages ? -2
help                   yes   no
    
```

Figure 30: Reset errors

8.5 Checking the state of the charger

State → INFO-pushbutton LDM

Press the INFO-pushbutton in order to check the state of a charging module. Now the following parameters of the LDM25 are shown (fig. 31): number of the LDM25 (1), rack and slot number (2), float charge and boost charge or possible failures (3), current (4), voltage (5) and temperature (6). Use the arrow keys ◀ and ▶ to change between information on different charger modules integrated in your system. Possible error messages (shown like fig. 31, point 3) are listed in the following table:

```
----- LDM 25 -----
charging unit          1  — 1
(rack 8, slot 7)      — 2
Float charge          — 3
I: ( 0.0)             0.0 A — 4
U: ( 319.7)           244.8 V — 5
T:                   34.0 C — 6
help                  back
```

Figure 31: State of the charger

State	Explanation	Measures
fuse tripped	overcurrent/short circuit	Check Fsec. on LDM25 or fuses of the respective isolating transformers.
overtemperature	overload or defect	Check secondary fuses. Contact your dealer or the service.
BSW tripped	BSW-output voltage higher than/the same as 260V for more than 20sec.	Contact your dealer or the service.
Charging off (T_BAT)	LDM was deactivated due to temperature in the battery compartment (>40°C)	Take measures to bring temperature in battery compartment back into the allowed range

Note: In case of a charger failure an error message is shown in the state display (see chapter 7.2).

Note: An indicated charger failure although all LEDs on the respective charger are green (red LEDs off) as well as an LDM25 not reacting to the INFO-pushbutton are signs for a communication fault.

9 De-energising the power supply system

Before conducting maintenance works or making changes to the system, it has to be de-energised by a specialist. For this the following instructions have to be observed (the numbers in brackets refer to fig. 1(a) and (b)):

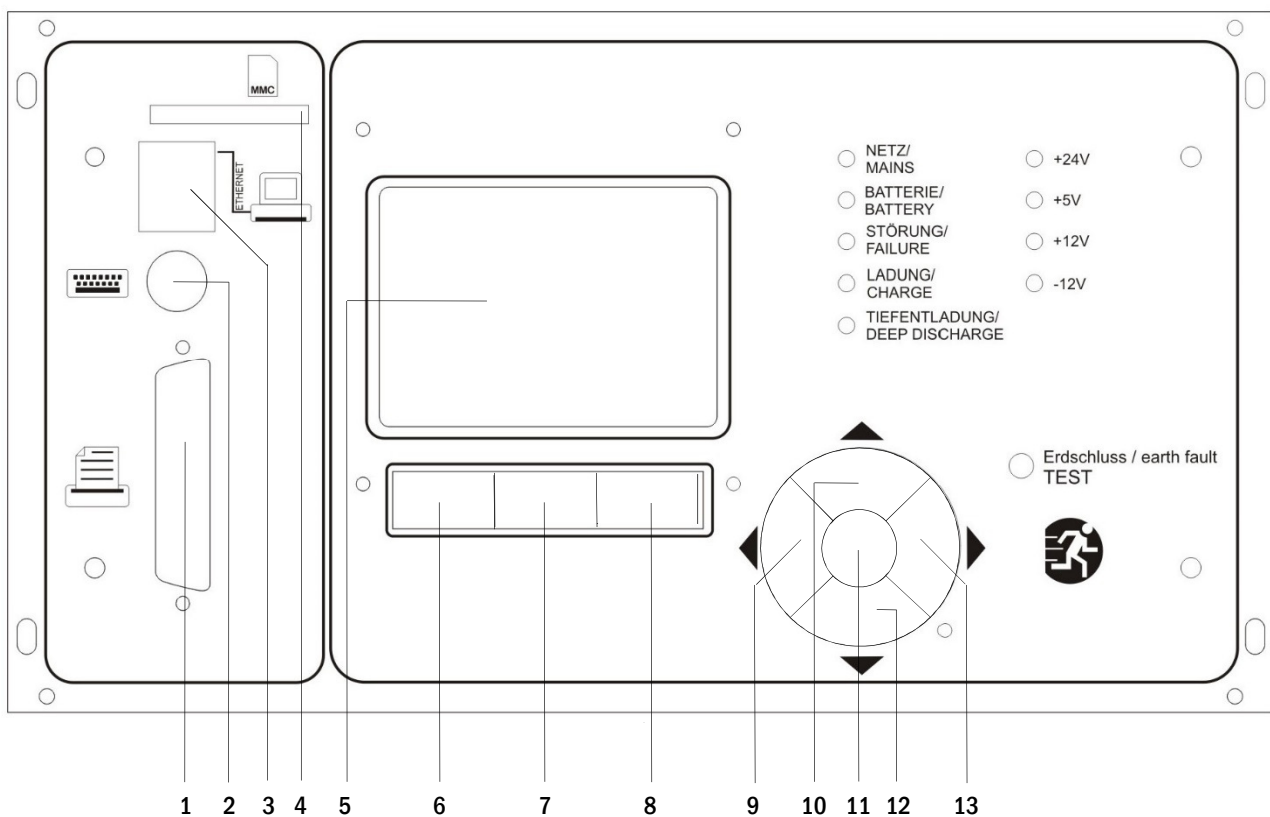
- 1. Operation mode switch to charging mode.** Turn the operation mode switch (1) to charging mode (position "0").
- 2. Disconnect mains fuses.** Disconnect the mains fuses by opening F1 (10).
- 3. Disconnect battery fuses.** Disconnect the battery fuses by opening F2 (13). The system is now shut down.

10 The central control and monitoring unit

The central control and monitoring unit (fig. 32) is the main control element of this emergency lighting system. It is used to monitor, program and control charging and switching processes. The system status is shown in the backlit LC-display as well as by five multicoloured LEDs. The central control and monitoring unit has the following front interfaces:

- Ethernet for service tasks
- Parallel interface (Centronics) for the connection of a printer with HP-emulation PCL5/6
- PS/2-interface for an external keyboard (included in delivery)

The system can be operated via key pad with four arrow keys and one enter key as well as three function keys (F1, F2, F3). The system can also be operated via external keyboard using the same keys (arrows, F1, F2, F3, and enter). The system firmware can be updated via front MMC slot.



- | | |
|------------------------|--------------------|
| 1 Centronics interface | 8 Function key F3 |
| 2 PS2 interface | 9 Arrow key left |
| 3 Ethernet interface | 10 Arrow key up |
| 4 MMC slot | 11 Enter key |
| 5 LC-display | 12 Arrow key down |
| 6 Function key F1 | 13 Arrow key right |
| 7 Function key F2 | |

Figure 32: Central control and monitoring unit

10.1 Menu – quick reference guide

Main Menu		
Diagnosis		
Battery		Show battery state and conduct capacity test
Mains		Check mains voltages
Modules		
Circuit modules		Show states of ACM / DCM / RSM - modules and conduct test
Charger modules		Show states of charger modules (LDM)
SAM/IOM inputs		Check states of SAM- and IOM- inputs
Sub-distribution		Check states of sub-distributions
Subsystems		Check states of subsystems
System information		
Key parameters		Number of circuits, battery capacity, supply time etc.
Show log	F4	Show internal system log
Test results		
		View last test
Last test		Show results of the last function or capacity test
Function test		Show function test results
Capacity test		Show capacity test results
Manual test		Show results of a manual test
Print log		Print test results over a certain period of time
Installation		
Modules		Setup modules (operation mode, follow-up time, monitoring...)
Calibrate c-monitor		Calibrate current of the circuit modules
Lamps		Check number of luminaires
Service		Service menu
Detect modules		Detect modules in the system
Operation mode		Define BAS / MCT / BMT - controlled, ready-to-operate, charging mode
Configuration		
Administration		
Network		
IP - addresses	F6	Set addresses for the network adapter (front + internal)
Communication		Configure status query (system communication)
LCD - Contrast		Set contrast of LC-display
Timer		Configure all timers (switch times, electric circuits)
IOM - inputs		Configure IOM - inputs
SAM - inputs		Configure SAM - inputs
Language selection		Change display language (German, English, French...)
Password		Change authorisation level
Date / Time		Set system time
Function test		
		Turn on/off pre-heating during function test
Schedule		Set time schedule for function test
Current monitor		Set parameters for circuit monitoring
Capacity test time		Set duration, time and date for capacity test
Reset errors		
		Reset error messages
Show errors		Show all error messages
Service address		
		Show contact address for maintenance service

Note: With a connected external PS2-keyboard (included in delivery) you can directly access the following menu items by pressing the function keys F4 and F6

- **Diagnosis** > **System information** > **Show log** (F4) and
- **Configuration** > **Administration** > **Network** > **IP-addresses** (F6).

11 Operation, maintenance and servicing of the batteries

The batteries used in this system are so-called maintenance-free, valve-regulated lead acid batteries. These are lead acid batteries with sealed cells, where no water re-filling is necessary over the whole service life (and which is thus prohibited). The cells are equipped with relief valves to protect them against overpressure. Diluted sulphuric acid absorbed in a glass mat is used as electrolyte.

Note: Opening the valves leads to their destruction and thus to the destruction of the battery.

11.1 Charging and discharging

The system uses an IUTQ-controlled charger unit with a maximum output current of 7.5A for charging. This unit consists of three charger modules (LDM25) with a maximum charging current of 2.5A connected in parallel. Batteries, which are later built in a battery assembly as replacement, do not need an equalisation charge with normal float charge voltage in order to adjust to the terminal voltage of other batteries.

The cut-off voltage of the battery, assigned to the discharge current, must not be underrun. For this purpose the power supply system is equipped with a deep discharge protection. The connected load must not exceed the nominal power of the system. Normal mains operation has to be restored as soon as possible after a discharge, also partial discharge, which leads to a re-charging of the batteries. A faulty charger unit has to be repaired.

11.2 Recommended working temperature

The recommended working temperature range for lead acid batteries is 10°C to 30°C. The ideal working temperature range is 20°C ± 5K. Higher temperatures shorten the service life. The technical data apply to the nominal temperature of 20°C. Lower temperatures reduce the available capacity. Do not exceed the limit temperature of 50°C. Avoid permanent working temperatures higher than 40°C (see also point 4.2.1).

Temperature (°C)	Charging voltage boost charge (V/Cell)	Float charge voltage (V/Cell)
-10	2.58	2.36
0	2.53	2.33
10	2.48	2.30
20	2.45	2.28
30	2.40	2.24
40	2.34	2.21

11.3 Servicing and inspection

Always keep the batteries clean and dry in order to avoid creeping currents. Cleaning the batteries should be carried out according to the ZVEI-leaflet "Cleaning of batteries". All plastic parts of the batteries must only be cleaned using water without cleansing additive. Do not use organic cleansers. At least every six months the following parameters should be measured and recorded:

- battery voltage
- voltage of some cells/ block battery
- surface temperature of some cells/ block battery
- battery room temperature

If the cell voltage deviates from the average float charge voltage by ± 0.1 V/cell or if the surface temperature of several cells/blocks deviates by more than 5°C, call a service technician immediately. The following parameters should be measured and recorded annually:

- voltage of all cells/block batteries
- surface temperature of all cells
- battery room temperature
- insulation resistance according to DIN 43539 T I (version relevant on delivery)

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Once a year you should also check (visual inspection):

- check naked screw joints (earthing, mains supply, battery cables) for tightness (see chapter 5.2.2 for torques)
- the battery rack and room
- ventilation

Check the batteries in compliance with DIN 43539 part I and 100 (draft); furthermore obey the special checking instructions e.g. DIN VDE 0107 and DIN VDE 0108 or also EN 50272-2 (most recent applicable versions). In order to guarantee a reliable power supply, change the entire battery set after the expected service life considering the operational conditions and temperatures.

11.4 Proceeding in case of malfunction

If you notice malfunctions of the battery set or the charger unit, call the customer service immediately. A service contract with your dealer enables an early recognition of failures.

11.5 Decommissioning, storage and transport

If batteries are stored for a longer time or decommissioned, store them fully charged in a dry frost-free room.

Storage time in relation to the production date	Charging voltage/cell at 20°C	Charging time
shorter than 9 months	2.28V/cell	longer than 72 hours
up to one year	2.35V/cell	48 to 144 hours
1 to 2 years	2.35V/cell	72 to 144 hours

Transport note: Batteries, which show no defects whatsoever, are not treated as dangerous goods according to Dangerous Goods Ordinance Road (GGVS) or Dangerous Goods Ordinance Railway (GGVE), if they are secured against short circuit, slipping, falling over and damage (GGVS, volume no. 2801 a). The batteries to be transported must not show signs of acid on the outside. The respective exception regulations apply to all sealed batteries and cells whose tanks are untight or damaged.

12 Technical data

System type: BZV 220 - DC / MDC Type I+II

Mains connection	E/Z/D 220/230V phase to N	
Mains frequency	50/60Hz	
Maximum connected load	DBU1 - SV20:	15000VA
	DBU2 - SV21:	15000VA
	Total:	Type 0: 10000VA (NLBZV2200)
		Type I: 15000VA (NLBZV2201)
		Type II: 19000VA (NLBZV2202)
Input current without loads	≤ 9A	
Battery voltage	216V DC	
Battery type	Lead acid battery (Pb)	
Make	OGiV RPower 121200 120Ah (for MDC Type I) – NLBZV2201 15kW for 1 hour OGiV RPower 121500 150Ah (for MDC Type II) – NLBZV2202 19kW for 1 hour Without batteries: MDC Type 0 – NLBZV2200 Max. 10kW → OGiV lead batteries have to be supplied and installed separately	
Charging current	7.5A	
Float voltage*	2.21V – 2.36V per cell for lead acid batteries	
Boost charge voltage*	2.34V – 2.58V per cell for lead acid batteries	
Charging curve	I/U	
Curve switching	Automatic	
Deep discharge 1	1.71V per cell for lead acid batteries	
Deep discharge 2	1.53V per cell for lead acid batteries	
Operation mode	Maintained lighting (off/on per switch contact) in changeover operation	
Mains monitoring	3 phases to N	
Activation	≤ 85% U _{Nenn}	
Function test	Manually	
Annual test / capacity test	Manually	
Surrounding temperature	0 - 35 °C	
Housing dimensions HxWxD	1,900mm x 600mm x 450mm	
Protection type	IP 20	
Protection level	I	
Cable entry	From above	
Cable cross-section		
	Mains cables	10 - 35mm ² rigid
	Potential-free signal cables	0.75 - 4mm ² rigid
	Electric circuits SV20 (SK 1-20)	1.5 - 4mm ² rigid
	Connection sub-distributions SV21	10 - 35mm ² rigid
	Battery cable	10 - 95mm ² rigid
	Symmetry	2.5 - 95mm ² rigid
Accessories	Measurements	Weight (empty)
Battery cabinet BATT 90	H900mm x W600mm x D450mm	40 kg
Battery cabinet BATT 11	H1,100mm x W600mm x D450mm	50 kg
Battery cabinet BATT 18	H1,800mm x W600mm x D450mm	70 kg
Battery cabinet BATT 20	H1,850mm x W800mm x D600mm	160 kg
Universal battery rack BGEU1 for OGiV 55 – 100 Ah	H880mm x W1.150mm x D470mm	27 kg
Universal battery rack BGEU2 for OGiV 120 – 260 Ah	H880mm x W1.650mm x D590mm	36 kg

(*) Values depend on working temperature.

13 General information on your system

Customer order number:	Fabrication number:
System type: <input type="checkbox"/> BZV 220 - DC / MDC Type 0 (NLBZV2200) <input type="checkbox"/> BZV 220 - DC / MDC Type I (NLBZV2201) <input type="checkbox"/> BZV 220 - DC / MDC Type II (NLBZV2202)	
Mounted by:	Date:
Commissioned by:	Date:
Safety signs fixed by:	Date:

13.1 Used battery type

Battery manufacturer: RP-Technik Notstromsysteme		Battery type: RPower Battery/OGiV 12 _ _ _ _ _ L	
Nominal voltage U_N : 216V	Number of cells (2V): 108	Number of blocks (6V): ---	Number of blocks (12V): 18
Nominal capacity C_{20} : 120Ah	20-hour discharge		
Nominal temperature T_N :	20° C		
Ventilation requirements:	According to EN 50 272-2, paragraph 8		
Nominal discharge current: $I_N = I_{20}$	$C_N / 20h$		

14 Module descriptions

Several modules which are integrated in your system or optionally available are briefly described in the following paragraphs. These data can also be downloaded from your dealer's homepage.

14.1 Charger module LDM25

characteristics at a glance:

- charger unit complies with EN 50171, ÖVE/ÖNORM E 8002
- IUTQ – curve family complies with EN 50272-2
- integrated battery voltage monitor (BSW)
- processor-controlled charging curve (no settings necessary)



Figure 33: LDM25

The 19" charger module LDM supplies a charging current of up to 2.5A. It is connected to the primary voltage of the respective isolating transformer via terminals on the rear bus plate. Additionally, the LDM25 has an integrated battery voltage monitor which protects the battery from overloading. The processor-controlled charging curve enables the LDM25 to load the batteries independent from the control computer.

14.2 Relay switch module RSM

characteristics at a glance:

- relay switch module for controlling up to two maintained light or non-maintained light changeover switchings
- individual operation mode (DS, MB, TLS) per changeover switching
- can be assigned SAM24 and MC-LM inputs
- connectivity for external dry contacts
- One critical circuit (CCIF) per changeover switching



Figure 34: RSM

The relay switch module RSM is used to control up to two changeover switchings for consumer circuits, switching between maintained lighting "DS" and non-maintained lighting "BS". Optionally, a total of 48 RSM modules can be used in for a total of 96 changeover switchings. The RSM modules are programmed from the emergency lighting control computer (address coding is carried out by DIP switches), which also enables control of the RSM modules by means of commands issued by SAM24 and MC-LM modules. A status LED indicates the switching status of the module (non-maintained mode, modified non-maintained, battery operation).

14.3 Input/Output-module IOM

characteristics at a glance:

- analysis of 7 system states according to EN 50171 (versions relevant on delivery)
- 7 potential-free switch contacts
- 4 galvanically isolated inputs
- up to 5 IO-modules can be integrated in a system



Figure 35: IOM

The IO-module has 7 relay outputs 230V/6A with potential-free changeover contacts. IO-module Nr. 1 is pre-programmed for the connection of a conventional message display and control unit. It is furthermore equipped with 4 galvanically isolated, reverse polarity tolerant switch inputs 18V – 250V DC or 184V – 276V AC 50 Hz. Individual message texts are programmable for each input.

14.4 Switch query module SAM24 (optional)

characteristics at a glance:

- 8 (7+1) inverse-polarity tolerant control inputs for detection of switch status in general lighting through AC mains and low voltages.
- Integrated mains monitoring function (activated by DIP switch)
- 2 COM ports for wiring in serial and star topology
- integrated repeater funktion for COM port 2 (COM_{boost})
- integrated terminating resistor (activated by DIP switch)
- integrated function monitoring of the BUS connection



Figure 36: SAM24

The switch query module SAM24 is a module to detect voltage levels in the general lighting in a building along with the emergency lighting. It is used to detect the switching status of the general lighting in order to switch emergency luminaires in sync with the general lighting during mains operation. Both normally-closed and normally-open switches can be detected; also, direct and indirect connection of single power mains phases is possible, thus allowing the system to switch on parts of the emergency lighting when the mains power fails. Up to 16 SAM24 modules can be connected to the emergency lighting system via a bus line, which gives the system a multitude of control inputs. The SAM24 can also be used to monitor fuses or automatic breakers of the general lighting. All switching voltage thresholds are in unison with applicable European and German standards.

The SAM24 is equipped with an integrated three-phase mains monitor (3 phases, 230 V relative to neutral line). This monitor can be activated by a DIP switch (switch-query input #8 is then deactivated).

The BUS voltage of the SAM24's COM1/2 ports can be reinforced by applying a 230V/50Hz voltage to terminals L3 and N of the mains monitor. This voltage cannot be used for switching the inputs E01 – E08.

When a voltage is applied to the control inputs E01 – E08, a switching command is issued to the emergency lighting system via the bus line, causing the emergency lighting circuits of the system to be switched on or off, according to their individual programming (configured inside the emergency lighting control unit).

Every pair of voltage inputs (E01-E02, E03-E04, E05-E06 and E07-E08) should be connected to control voltages with identical low-voltage potential.

14.5 MultiControl Line Monitor MC-LM (optional)

Characteristics at a glance:

- three-phase mains monitoring
- data transmission via bus system
- safe data protocol: no E30-line necessary
- possible connection of up to 16 MC-LM per system
- display of a programmed message text (where connected to the general lighting)
- integrated terminating resistor
- communication via RS-485 multi-bus



Figure 37: MC-LM

The MultiControl Line Monitor MC-LM mainly monitors the general mains installation (voltage supply of the general lighting). The MC-LMs are bus-compatible mains monitors for the connection to the multi-bus (RS485) of an MDC emergency lighting system and they are suitable for switching the integrated maintained and non-maintained light changeover switchings in the system. The MC-LM can monitor three phases of e.g. a mains distribution. 85% of the nominal mains voltage (230V AC), i.e. at ca. 195V AC, is the switch threshold for the recognition of a mains failure or an intense mains voltage fluctuation. The MC-LM can be addressed separately and are connected to the MDC-system in series (feed through wiring) via screened 4-core data line; up to 16 of these MC-LM can be connected via this line. J-Y(St)-Y or similar in compliance with DIN VDE 0815 and 0816 (versions relevant on delivery) have to be used as data line.

14.6 MultiControl Tableau MCT-15(S) (optional)

Characteristics at a glance:

- text display of system status
- optical (LED) and acoustic (beep) indication of the system status
- remote initiation of test function → function test
- allows switching of the system's operation mode
- allows on/off switching of the maintained light consumers
- MCT-15S variant comes with key switch for access protection



Figure 38: MCT-15(S)

The MCT-15 and MCT-15(S) control panels are decentralised status indication and control units for emergency lighting systems of type MDC. The modules show the status of the system optically and acoustically. Optical indication takes place by clear-text display and through and LED. Malfunctions are indicated by a beep tone which can be reset by pressing the “RESET” button. The optical error message, however, keeps being displayed. The panel also allows for switching the operation mode of the system and for starting a function test, and maintained-mode circuits can be activated/deactivated as well. A variant with key switch is available (MCT-15S).

14.7 PC230

characteristics at a glance:

- three-phase mains monitoring
- 2 potential-free changeover contacts with a rating of 2A at 230V/AC
- dimensions (L x W x H): 96 x 36 x 54



Figure 39: PC230

The Power-Control (PC230) monitors voltages in sub-distributions of the general lighting. Three phases can be monitored. If fewer phases are monitored, unused monitoring contacts have to be bridged with connected contacts. The upper switch threshold is limited to 195 V, i.e. 15% lower than mains voltage of 230V. The state of the changeover contacts can be queried from the module. Usually one of these contacts is integrated in a monitoring loop of an emergency lighting system. The NC-contact [18-15] or [28-25] has to be wired. If the contacts are used for other purposes, please strongly observe the power rating of 2A-30V/DC, 0.3A-110V/DC or maximal 0.5A-230 V/AC/50Hz. This module has a plastics housing designed for rail mounting (TS35).

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