

# Power Supply System

## *microControl plus*



Customer Order No.:

Manufacturing No.:

Commission/ Object:

Device No.:



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### 1 Preface

Thank you very much for buying a microControl *plus* group battery system! This system complies with the national and international standards DIN EN 50171, DIN VDE 0108-100, DIN VDE 0100-560, DIN VDE 0100-718 as well as ÖVE/ÖNORM E 8002, and ÖVE/ÖNORM EN2 (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 monitoring and 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 microControl *plus* system (chapter 4.1)
3. Mount the system and batteries and connect them (chapter 4.2)
4. Commission the system (chapter 6)
5. Program the system (chapter 7)

Chapters 5.1.1 and 5.3 provide 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.

**Note:** The system has to be shut down by a specialist for maintenance works and modifications. The necessary steps are described in chapter 10.

**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)










When selecting the operation room, make sure that it has sufficient ventilation. The necessary ventilation cross sections according to EN 50272-2 can be found in chapter 12.1 “Available battery types and mounting conditions”. Also, please make sure that the room meets the environmental requirements corresponding to the protection type IP20 of the system.

**Note:** The power and capacity of the battery system depend on the temperature. Higher temperatures shorten the service life, whereas lower temperatures reduce the available capacity. The technical data given in this document is valid for a nominal operating temperature of 20 °C.

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

### 2 Danger and information signs

Please strongly observe the safety instructions when installing and using your microControl *plus* system.

	<ul style="list-style-type: none"> <li>Observe instructions and keep them located near the battery system for future reference!</li> <li>Work on the battery system should only be carried out by qualified personnel!</li> <li>No guaranty in cases of non-observance of instruction manual, repair using non-original parts or unauthorised intervention!</li> </ul>
	<ul style="list-style-type: none"> <li>Dangerous voltage</li> </ul>
	<ul style="list-style-type: none"> <li>Do not smoke! Do not use any naked flame or other sources of ignition. There is the danger of explosion and fire hazards!</li> </ul>
	<ul style="list-style-type: none"> <li>While working on batteries wear protective eye-glasses and clothing!</li> <li>Observe the accident prevention rules as well as EN 50 272-2 paragraph 8 (version relevant on delivery)!</li> </ul>
	<ul style="list-style-type: none"> <li>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!</li> </ul>
	<ul style="list-style-type: none"> <li>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!</li> </ul>
	<ul style="list-style-type: none"> <li>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.</li> </ul>
	<ul style="list-style-type: none"> <li>Batteries / cells are heavy! Ensure adequate mounting security and always use adequate handling equipment for transportation.</li> </ul>
	<ul style="list-style-type: none"> <li>Back to the manufacturer! Batteries marked with the recycling symbol must be processed by a recognised recycling agency. Old batteries which are not recycled must be disposed of as special waste.</li> </ul>

### 3 Scope of delivery

Included in the delivery of the microControl *plus* system are:

- 1x microControl *plus* system in a compact cabinet
- 18x battery type RPower 1245/1250 (standard), other types are possible
- 1x operating tool angled 2.5mm, partially insulated
- 1x ¼" - hexagonal bit 3 x 25mm with centre bore hole
- 1x connector cable set  
RPower 1250: 5x tier connectors 680mm x 2.5mm<sup>2</sup>, 12x row connectors 150mm x 2.5mm<sup>2</sup>  
RPower 1245: 2x tier connectors 680mm x 2.5mm<sup>2</sup>, 15x row connectors 150mm x 2.5mm<sup>2</sup>
- 1x brief instruction (this document)

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

- calibrated measuring device for voltage measurements of up to 500VAC or 300VDC
- hexagon screw driver (for inserting the above-mentioned hexagonal bit)
- slot screw driver width 5.5mm



### 4 System overview

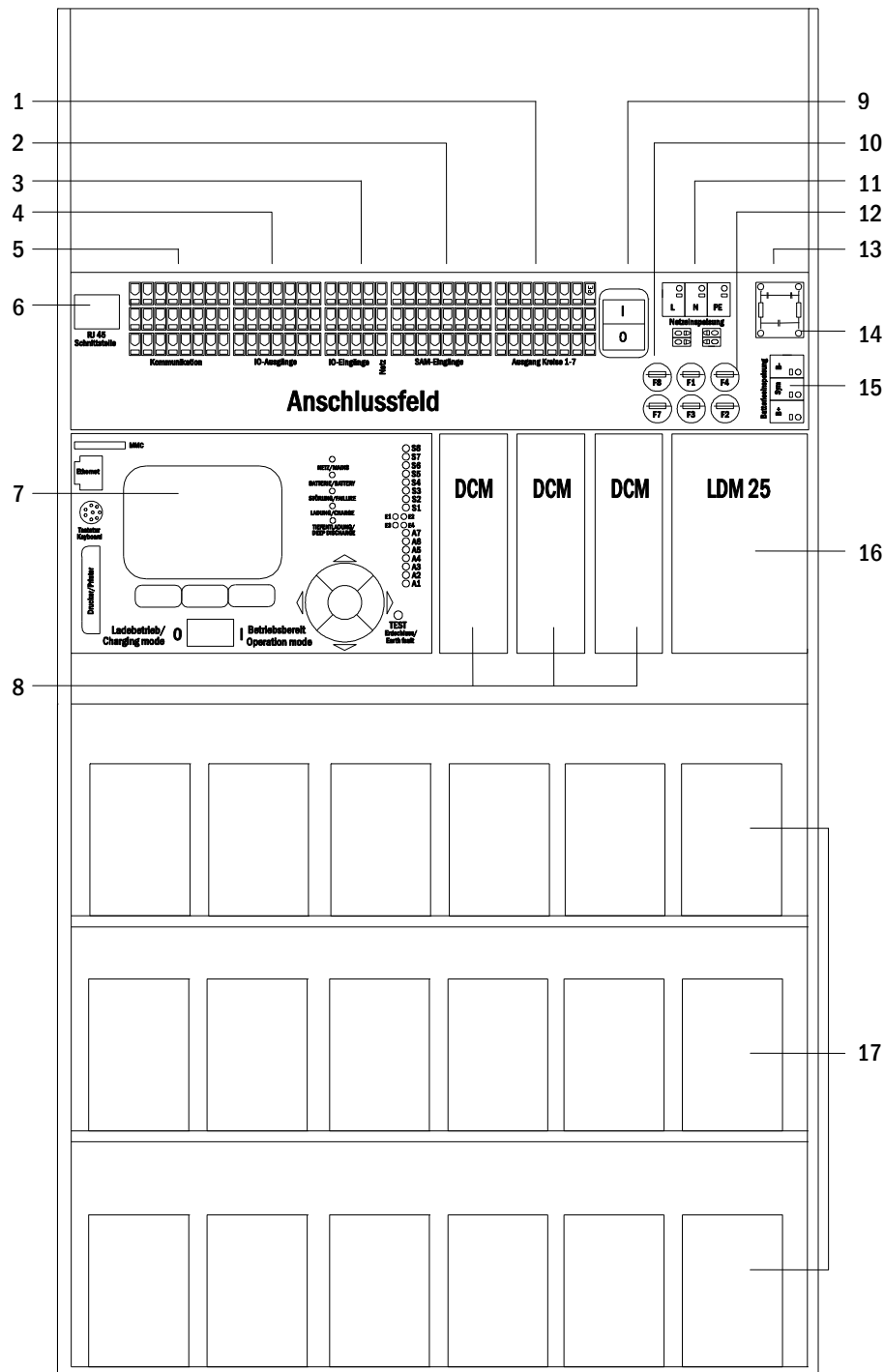


Figure 1: Inside view

- |                                     |                            |                                    |
|-------------------------------------|----------------------------|------------------------------------|
| 1 electric circuits                 | 7 control centre           | 13 mains supply                    |
| 2 SAM-inputs (Switch query module)  | 8 electric circuit modules | 14 connection toroidal transformer |
| 3 IOM-inputs (Input/Output-module)  | 9 mains switch             | 15 battery connection              |
| 4 IOM-outputs (Input/Output-module) | 10 fuses auxiliary circuit | 16 charger unit                    |
| 5 communication                     | 11 mains filter            | 17 battery blocks                  |
| 6 ethernet interface                | 12 fuses mains/battery     |                                    |

### 4.1 Connection of the charger and switch unit

The power supply system is connected via print terminals on the rear main board. These terminals are divided into blocks consisting of several 3-level PCB terminals, which are described in the following chapters.

#### 4.1.1 Ethernet connection

Like all other systems of the MultiControl family also this system has an ethernet interface, by which it can be integrated in a network for remote monitoring. Fig. 2 shows the network interface on the rear main board inside the cabinet. For connection please use standard network cable according to the standard EN 50173 (Cat5 patch cable with RJ45 plug).

**Note:** When exceeding the maximal length of the network cable (80m) a repeater must be used for signal regeneration. The network cable must comply with the standard EN 50173.

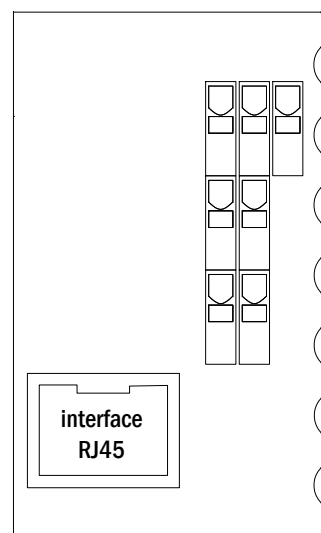


Figure 2: Ethernet interface

#### 4.1.2 Connection of bus-compatible modules

By means of the terminal block "communication", shown in fig. 3, you can connect further external, bus-compatible command, communication and switch modules. Please use a screened 4-wire data cable for connections (e.g. J-Y(St)-Y). The following connections can be realised via these terminals:

- ModBus/building control (COM 1)
- external printer (COM 2)
- radio clock
- voltage outputs (only for service!)
- RS485-1 } for SAM08, SAM24,
- RS485-2 } MC-LM, MCT12 (S)
- quiescent current loop with integrated CCIF

For further information see the table below or chapter 13 "Module descriptions".

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24

Figure 3: Communication terminals

port name	terminal	contact allocation	port for
COM1	1	TXD	ModBus/GLT
	9	RXD	
	17	DCD	
COM2	2	TXD	external printer (19 inch)
	10	RXD	
	18	GND	
radio clock	3	GND	radio clock
	11	+3.3VDC	
	19	Dat	
service voltages	4	-24VDC	All these low voltages must be used for service purposes only!
	12	+5VDC	
	20	GND	
RS485-1	5	screen	SAM08, SAM24, MC-LM, MCT12(S)
	6	GND	
	13	B	
	21	A	
RS485-2	22	+12VDC	SAM08, SAM24, MC-LM, MCT12(S)
	7	GND	
	8	screen	
	14	+12VDC	
	15	B	
quiescent current loop with integrated CCIF (diode)	23	A	external mains monitors (PC230) via potential-free relay contacts
	16	~15VAC	
	24	~15VAC	

### 4.1.3 Connection of opto-/relay interface modules (IOM)

An opto-/relay interface module (IOM) was integrated in order to be able to transmit error and status messages of the power supply system to external checking and monitoring devices (in compliance with existing standards). It has 7 potential-free relay switch contacts (outputs) and 4 reverse polarity tolerant multi-range voltage inputs (18V - 255V DC or 185V - 255V AC/50Hz) as well as a further terminal (L) for the power supply (230V/50Hz) of potential-free switch contacts. Fig. 4 shows the respective terminals.

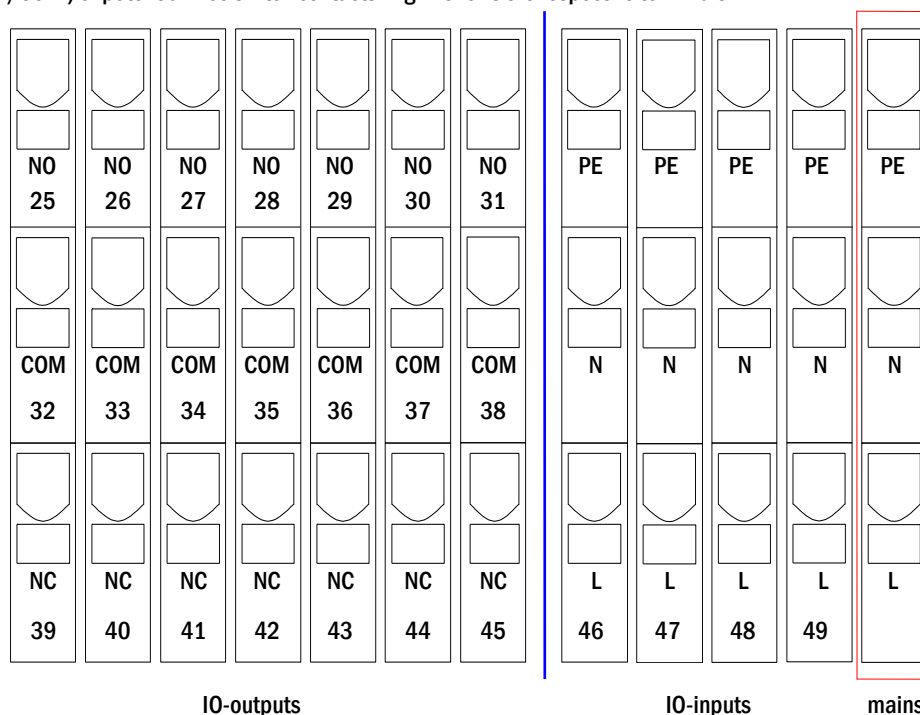


Figure 4: Inputs and outputs IO-module

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**Note:** Signals connected to IOM inputs and outputs must be functional extra-low voltage (FELV), not protective or safety extra-low voltage (PELV, SELV).

### IO-outputs

terminals	system state	closed contacts	message
25, 32, 39	system state	39 – 32	ready to operate
		32 – 25	emergency lighting blocked
26, 33, 40	charger unit	40 – 33	failure
		33 – 26	OK
27, 34, 41	external mains monitor	41 – 34	normal operation
		34 – 27	modified non-maintained lighting
28, 35, 42	system	42 – 35	failure
		35 – 28	OKI
29, 36, 43	battery deep discharge	43 – 36	initiated
		36 – 29	OK
30, 37, 44	fan operation	44 – 37	off
		37 – 30	on
31, 38, 45	system operation	45 – 38	battery
		38 – 31	mains

### IO-inputs

terminal	function	voltage on	no voltage
46	external BAS	charging operation/emergency lighting blocked	system ready to operate
47	internal fan monitor	configurable	configurable
48	external fan monitor	configurable	configurable
49	external function test	test activated (deactivatable via web)	no test
L	free potential terminal 230V/50Hz	for IOM-inputs	

\* The function of the inputs for fan monitoring (IOM1, input 2/3) is configurable (error message in case of voltage failure at input 2/3 or error message when input 2/3 is energised, see chapter 9.11.4).

### 4.1.4 Connection of switch inputs (SAM)

A switch query module was integrated in this power supply system for the transmission of external switch commands of the general power supply. As shown in fig. 5 (or fig. 1, point 2), the switch inputs are also realised as 3-level spring-loaded terminals, which are fixed on the back plane. They are designed for wire cross sections (solid-core) from 0.5mm<sup>2</sup> to 2.5mm<sup>2</sup>. Each of these power supply systems provides 8 3-level spring-loaded terminals (50-57) as switch inputs (230V AC, 50Hz switch voltage) as well as one more terminal (L) for the power supply (230V/50Hz) of potential-free switch contacts. For the connection please use mains voltage compatible cables which comply with DIN 57250-1 VDE 0250-1 as well as MLAR, EltBauVo and DIN VDE 0100.

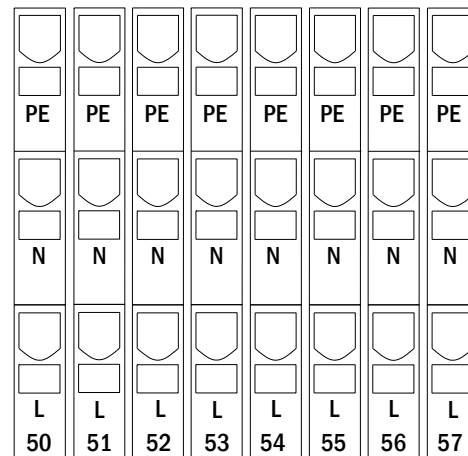


Figure 5: SAM-inputs

circuit setup	switch mode SAM	switch contact	maintained lights	non-maintained lights	note
maintained lighting	DS	open closed	OFF ON	OFF OFF	maintained light activated non-maintained light remains off
maintained lighting	MB	open closed	ON ON	ON OFF	non-maintained light activated maintained light remains on
maintained lighting	gMB	open closed	ON ON	OFF ON	maintained light remains on non-maintained light activated
non-maintained lighting	DS	open closed	--- ---	--- ---	not allowed -> no reaction
non-maintained lighting	MB	open closed	ON OFF	ON OFF	as with phase monitoring, but follow-up time activated only for one circuit
non-maintained lighting	gMB	open closed	OFF ON	OFF ON	maintained and non-maintained light are switched on/off together

### 4.1.5 Connection of electric circuits

The electric circuits are connected via 3-level spring-loaded terminals, which are fixed on the back plane (see fig. 1, point 1). They are designed for wire cross sections (solid-core) from 1.5mm<sup>2</sup> to 2.5mm<sup>2</sup>. Correct polarity is essential. For the connection please use mains voltage compatible cables which comply with DIN 57250-1 VDE 0250-1 as well as MLAR, EltBauVo and DIN VDE 0100.

**Note:** Prior to that the circuits to be connected have to be checked for installation faults (short circuit and earth fault).

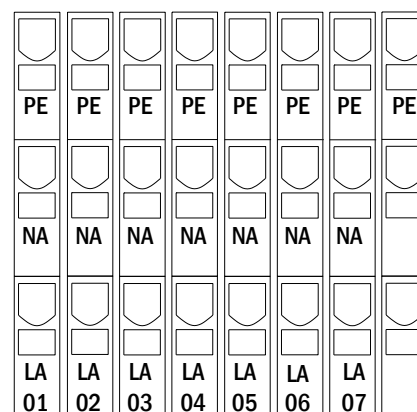


Figure 6: Electric circuits

### 4.1.6 Fuses auxiliary circuits

This system has an auxiliary circuit with an output voltage of 230VAC/216VDC for the connection of external power supplies. The maximum load for this auxiliary circuit must not exceed 150VA. It does not have the same characteristics as single luminaire and circuit monitoring but can be programmed as maintained or non-maintained light circuit. Mixed mode circuits are not possible either. External switch commands via switch query modules or bus-compatible mains monitors can be programmed or allocated to this circuit. The fuses F7/F8 (see fig. 7) protect this auxiliary circuit.

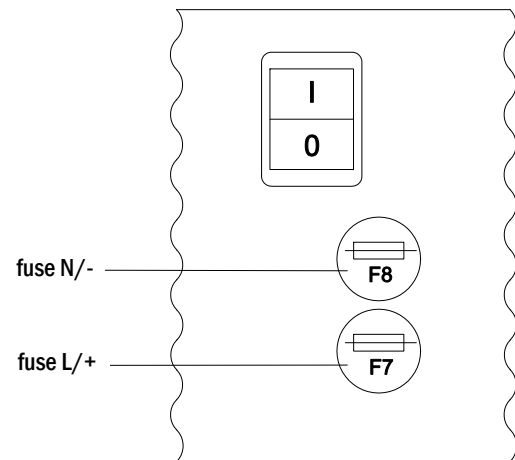


Figure 7: Fuses auxiliary circuit

### 4.1.7 Mains switch

Fig. 8 shows the mains switch of the power supply system which is used to switch the system on. This mains switch is a double-pole switch.

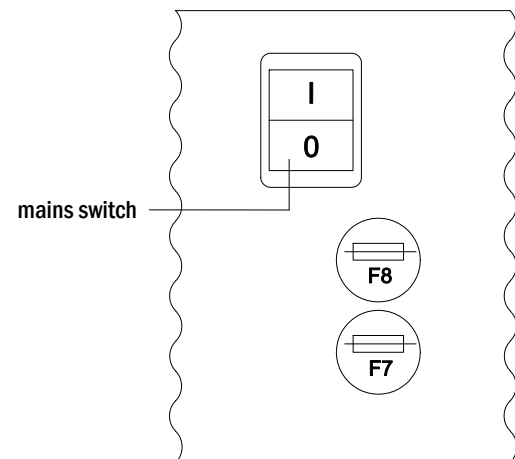


Figure 8: mains switch

### 4.1.8 Fuses mains/battery supply

Fig. 9 shows the main fuses for mains and battery voltage, which are located on the back plane inside the cabinet.

**Note:**

Removing and inserting these fuses should be done using a slot screw driver (width 5.5mm)!

Insert the fuses correctly – they have a bayonet lock!

Sicherung	F1	F2	F3	F4
Größe	10A	10A	1A	10A

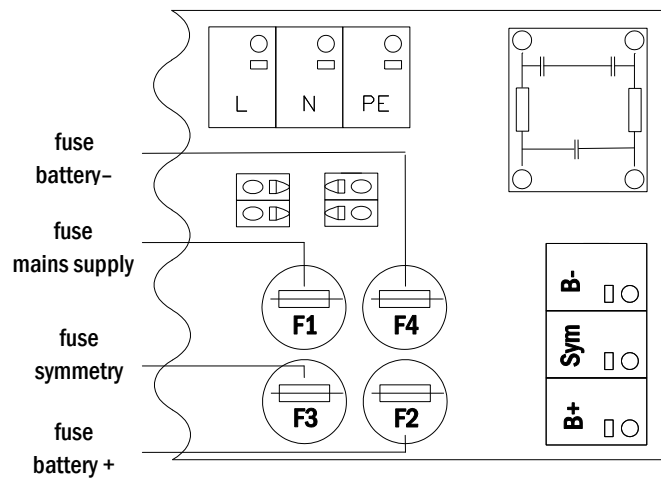


Figure 9: Fuses mains and battery supply

### 4.1.9 Mains supply

The terminals shown in fig. 10 serve the single-phase mains connection (230V/50Hz) of the system. Please observe correct polarity. These terminals are designed for a solid-core cable cross section of up to 4mm<sup>2</sup>.

**Note:** The cross section of the mains and battery cable depends on the real connection power of the system, the fuse protection and the cable length.

**Recommendation:** For mains supply, please use three-core NYM-J cable with a cross section of min. 3x1.5mm<sup>2</sup> up to max. 3x4mm<sup>2</sup>.

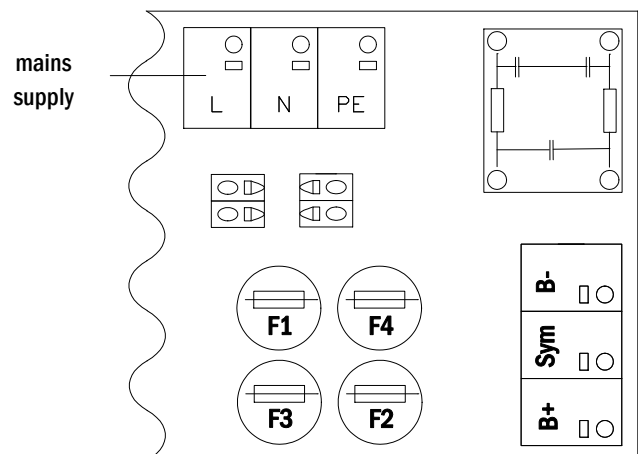


Figure 10: Mains supply

### 4.1.10 Connection of an internal fan (when built in an E30-housing)

Fig. 12 illustrates the connection of an internal fan when the system is built in an optional E30-housing. The following terminals are used: terminal 4 (-24V service voltage), terminal 20 (GND), terminal 47 N+L (IOM-input 2 for fan monitoring, which has to be programmed via LC-display or web afterwards). For detailed information on the terminals see chapters 4.1.2 and 4.1.3.



Figure 11: microControl *plus* in E30-housing

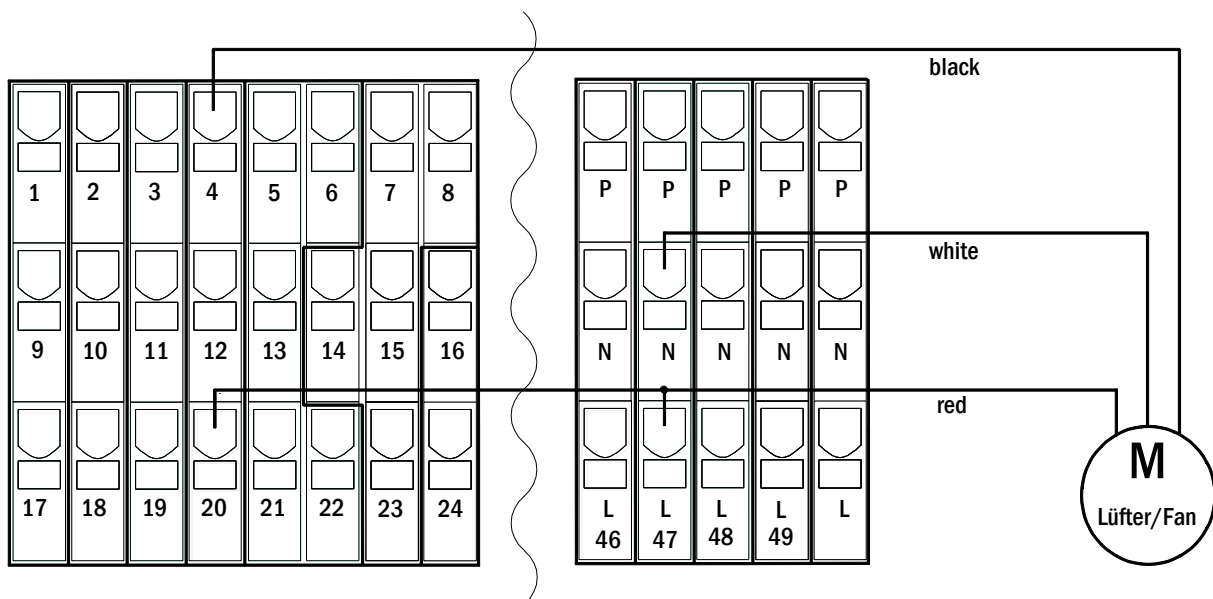


Figure 12: Connection terminals for an internal fan



### 4.2 Mounting and connection of the battery system

#### 4.2.1 Mounting

Position the system in the designated place. When selecting the battery room pay attention to sufficient ventilation according to DIN VDE 0510; EN 50272-2 and EltBauV0. Make sure that the battery fuses F2/F3/F4 (fig. 9) have been removed. Mount the batteries on the respective shelves of the cabinet according to fig. 13 or fig. 14. The temperature difference between the battery blocks must not exceed 3°C. The distance between the battery blocks should be at least 5 mm.

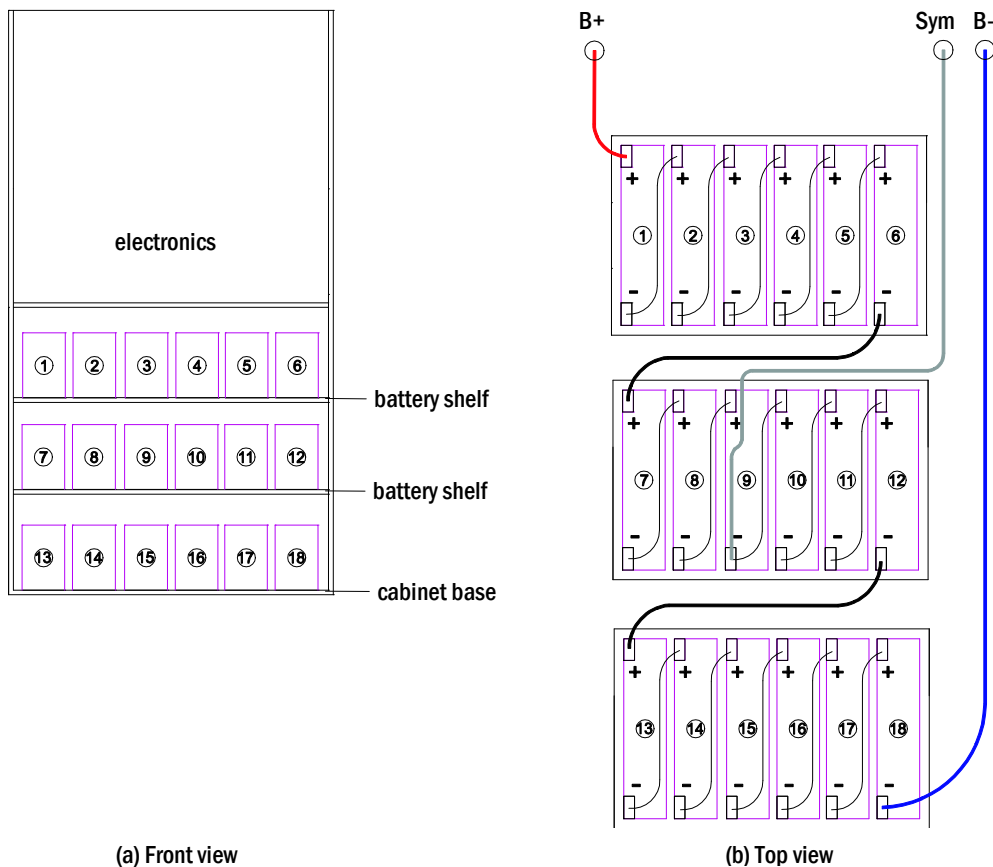


Figure 13: Mounting and connection of the battery blocks 12V 4.5Ah

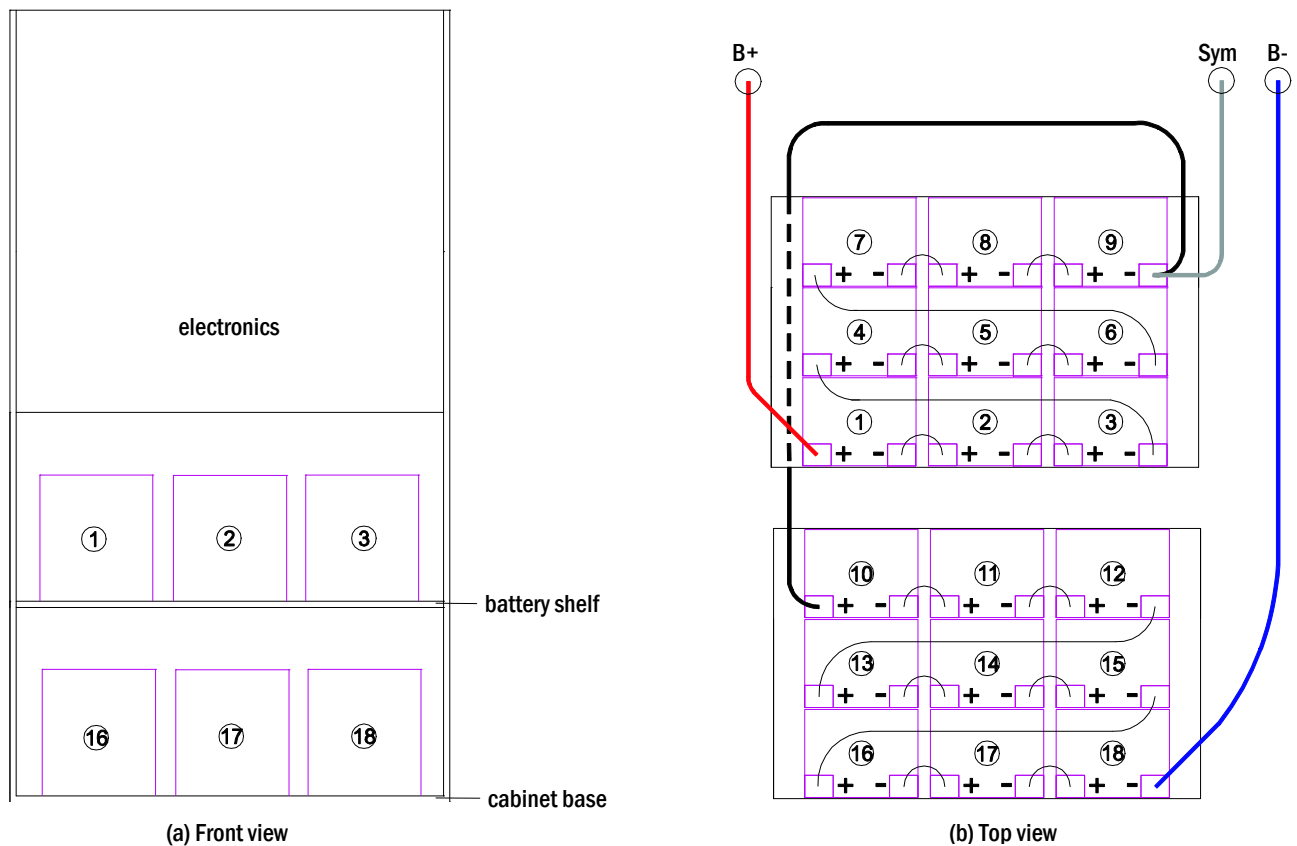


Figure 14: Mounting and connection of the battery blocks 12V 5Ah

**Note:** Prior to commissioning all blocks have to be checked for mechanical damage, correct polarity and tightness of the connector cables.

### 4.2.2 Connection of battery blocks

Remove the battery fuses F2 and F4. Connect the battery blocks in row as illustrated in fig. 13(b) or fig. 14(b). After that connect the cables coming from the battery terminal (fig. 1, point 15) according to fig. 13(b) or fig. 14(b) - (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). Depending on the used battery type you must fix the pole covers before connecting.

After connecting the batteries as shown, please measure the battery voltage and check for correct polarity at the following poles (incorrect polarity is indicated by a beep):

1. battery pole (B+) on battery block 1 to battery pole (B-) on battery block 18; U ca. 185VDC - 240VDC total voltage
2. battery pole (B+) on battery block 1 to battery pole (B-) on battery block 9; U ca. 92.5VDC - 120VDC symmetry voltage

**Note:** Please use only the supplied cables for connecting the batteries.

### 5 Operating your system

#### 5.1 Control elements

##### 5.1.1 The central control and monitoring unit

The central control and monitoring unit is the main control element of this emergency lighting system (fig. 15) and realises the monitoring, programming and control of charging and switching processes. The system state is indicated by a back-lit LC-display as well as five multi-coloured LED. The central control and monitoring unit has the following interfaces on the front:

- ethernet access for service tasks
- parallel interface (Centronics) for the connection of a printer with HP-emulation PCL5/6
- PS/2 interface for external keyboard

The system is operated by means of four direction keys, one enter key and three function keys (F1, F2, F3). If an external keyboard is connected, the system can be operated via the function keys F1, F2, F3, the four arrow keys and the enter key on the keyboard. The MMC-slot at the front can be used for firmware updates.

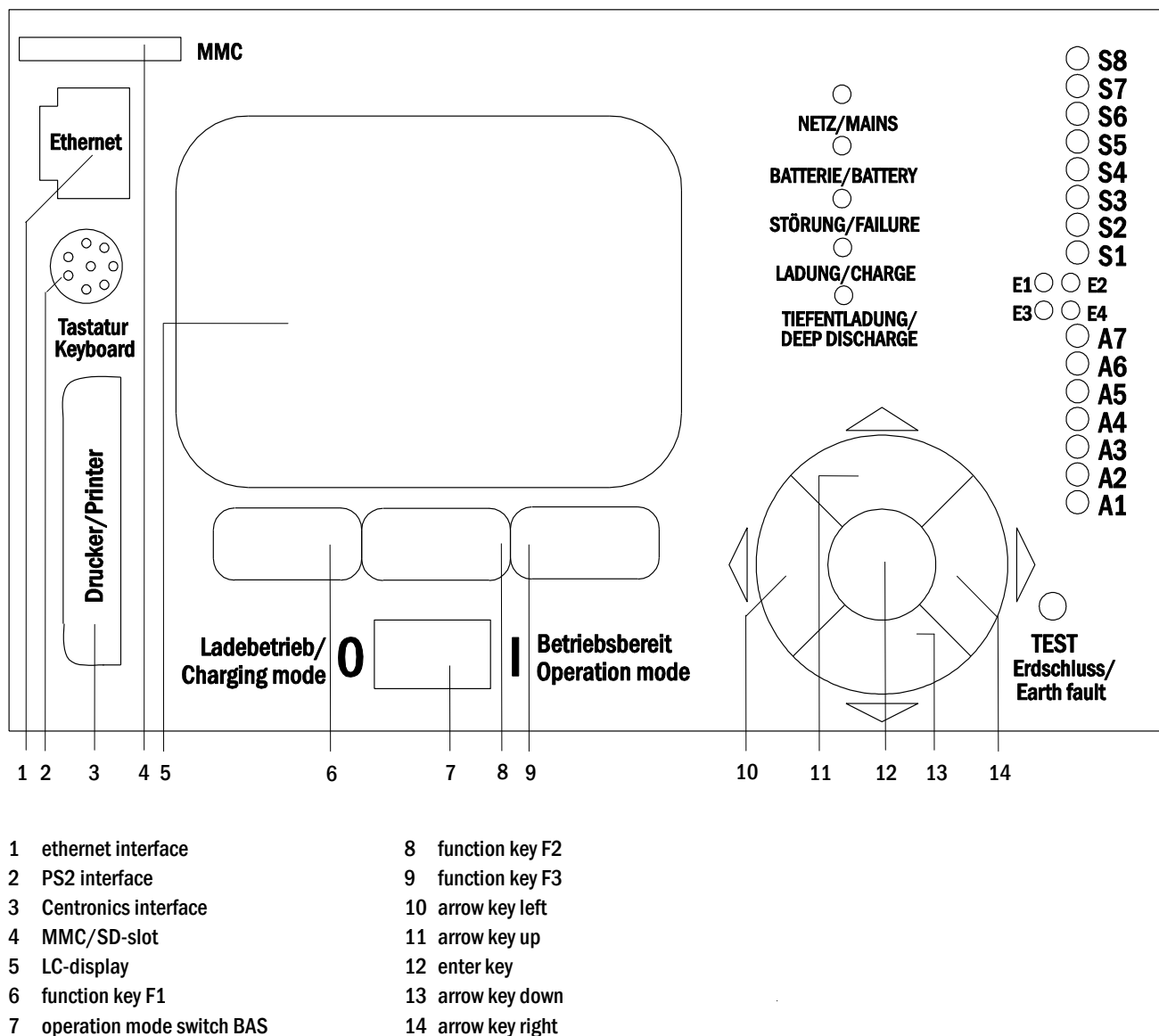


Figure 15: Central control and monitoring unit

### 5.1.2 Electric circuit modules

The electric circuits of the system are supplied by DCMs. They can feature 2 circuits at the same time and realise the automatic switching between maintained and non-maintained operation mode as well as between mains and battery operation. For monitoring the functioning of the luminaires a total current monitoring is possible as well as a single luminaire monitoring.

The LC-display of the central control and monitoring unit shows the state of the modules after pressing the INFO-pushbutton.

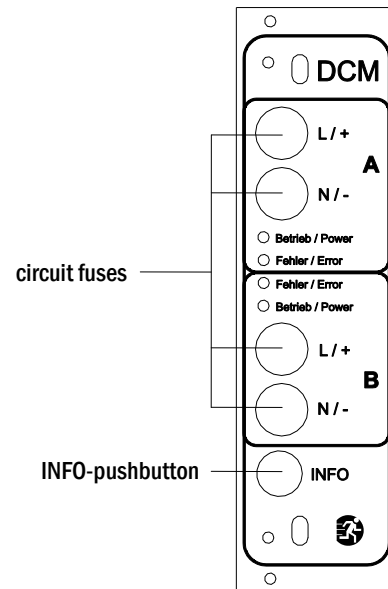


Figure 16: DCM-circuit module

LEDs explained (see fig. 16):

LED	Meaning
LED "Betrieb/Power" on	respective circuit is activated (battery operation, DS, DS-switchable, circuit on)
LED "Betrieb/Power" flashing (1x per second)	respective circuit in modified non-maintained operation (quiescent current loop of the circuit is open)
LED "Betrieb/Power" flashing (2x per second)	respective circuit in follow-up time after modified non-maintained operation (quiescent current loop closed)
LED "Fehler/Error"	error in the respective circuit or insulation fault

### 5.1.3 Charger unit LDM25

The charger module LDM25 used for charging the integrated batteries has an own processor and can, if mains voltage is supplied, work completely self-sufficiently. This module has an output current limited to 0.5A and optimises the charging process according to an IUP(TS)-curve matching the surrounding temperature of the batteries. The batteries are not charged for protection reasons if the surrounding temperature exceeds 40°C. A delay fuse (3.15AT, 5x20mm) protects the unit from short circuit in case of a defect and prevents a battery overcurrent. Additionally, a battery voltage symmetry monitor and an integrated, redundant battery voltage monitor (BSW) prevent a battery overload. It is calibrated ex-works and its settings must not be changed!

The LC-display of the central control and monitoring unit shows the state of the charger module after pressing the INFO-pushbutton.

**Note:** The fuse is a special DC-capable type. Your supplier or the manufacturer can provide you with spare fuses.

**Note:** The LDM25 can be adjusted to different system designs (output current, battery type) by means of jumpers. In case of replacement please see the provided data sheet.

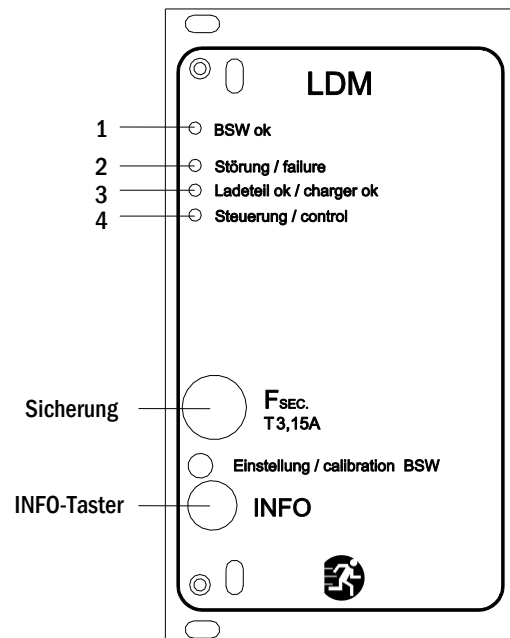


Figure 17: Charger module

LEDs explained (see fig. 17):

LED	Meaning
1	Continuous light indicates no failure of the battery voltage monitor and that the battery voltage is less than 260V. When this voltage is exceeded, the LED goes off. If this state lasts longer than 20sec., this failure is indicated by LED 2.
2	This LED indicates a failure. Possible failures are an activation of the battery voltage monitor (see above), a defect charger fuse and over temperature.
3	This LED is on if there is no failure.
4	It shows the state of the charger. LED on = batteries are being charged (charger in operation). LED off = no charging (charger not in operation).

### 5.2 General operating instructions

Your system can be operated and configured completely via the front control elements (fig. 18). For text input (e.g. circuit denomination) we recommend connecting an external keyboard to the PS2-interface (1).

The LCD-screen (2) displays **Menus** and **Information**. In the bottom line you can see – if active – the **Softkey-Functions** which are reachable via the 3 keys (3) (example see fig. 20, point 8). For navigation and data input please use the arrow keys  $\triangle$ ,  $\nabla$ ,  $\triangleleft$  and  $\triangleright$  (4) as well as the enter key  $\bigcirc$  (5). The up  $\triangle$  and down  $\nabla$  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  $\bigcirc$ . An arrowhead  $\blacktriangleright$  on the right indicates a submenu which can be selected with the right  $\triangleright$  or enter  $\bigcirc$  key. You can return from there using the softkey **back** or **done**.

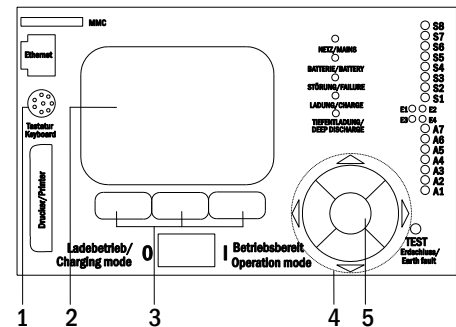


Figure 18: Control elements

The following chapters 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 chapter describes how to get to the required menu item. Example:

State  $\rightarrow$  INFO-pushbutton (DCM/ACM)  $\rightarrow$   $\triangle$  $\nabla$ (select circuit)  $\rightarrow$  Enter  $\bigcirc$

**Note:** The arrow keys  $\triangle$ ,  $\nabla$ ,  $\triangleleft$  and  $\triangleright$  (4) and the enter key  $\bigcirc$  (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.

#### Password login

A number of settings can only be changed with the necessary authorisation which requires a prior system login with a password. More detailed information you can find in chapter 9.11.7 “Authorisation, login with password, logout” on page 40. For saving the changed settings the system requires a confirmation (**Yes/No**). If you have not logged in with password yet, you can do this at this point and then continue with the confirmation. In any case the authorisation expires ca. two hours after the last setting and the system returns to the default user status “Guest”.

#### Service address

The contact address of the service technician who is responsible for your system is entered during the installation process. To reach this information follow the instructions in chapter 9.12 “Show contact address” on page 44.

### 5.3 Menu – quick reference guide

Main Menu			
<b>Diagnosis</b>			
	Battery		Show battery state and conduct capacity test
	Mains		Check mains voltages
	<b>Modules</b>		
		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
	<b>System information</b>		
		Key parameters	Number of circuits, battery capacity, supply time etc.
		Show log	F4 Show internal system log
<b>Test results</b>			
			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
<b>Installation</b>			
	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
<b>Configuration</b>			
	<b>Administration</b>		
		<b>Network</b>	
		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
	<b>Function test</b>		
			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
<b>Reset errors</b>			
			Reset error messages
	Show errors		Show all error messages
<b>Service address</b>			
			Show contact address for maintenance service

**Note:** With a connected external PS2-keyboard 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).

### 6 Commissioning of the power supply system

After you have mounted the system observing chapters 4.1 and 4.2, connected the batteries and the de-energised mains cables and removed the fuses of the circuit modules, follow these instructions:

**Caution!** The internal circuit terminals are energised. That is why all fuses of the direct circuit modules (fig. 1, point 8) have to be removed before switching the system on.

1. **Mains switch off and operation mode switch to charging mode.** Turn the operation mode switch (fig. 15, point 7) to charging mode (position "0").
2. **Insert battery fuses F2/F4.** Insert the battery fuses (fig. 9) again.
3. **Supply mains power.** Supply mains power and check the power terminals for correct configuration (fig. 10) by conducting the below-listed measurements. In case of a misconfiguration (connection error) abort commissioning:

voltage between L1 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.
voltage between L1 and PE		
voltage between PE and N		

4. **Insert mains fuse F1.** Insert the mains fuse (fig. 9). Switch on the mains switch (fig. 8).

The system is now activated.

5. **Wait for the boot process.** After switching on the system you can hear an acoustic signal and the system starts booting. This process can take several minutes. **Caution:** Wait for the boot process to end and never switch the system off during this time! During the boot process or after, the LC-display (see fig. 15, point 5) should look like this:

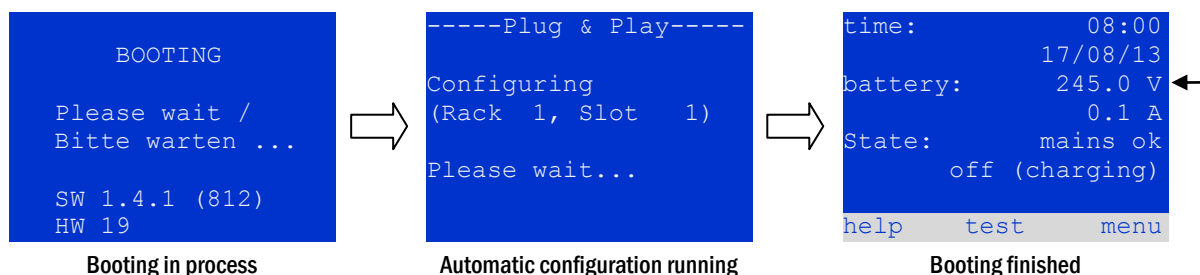


Figure 19: Boot process (left, middle) and status message (right).

6. **Check battery voltage as well as circuit and charger modules.** Check the battery voltage by means of the LC-display. It should be between 192V and 250V (fig. 19, right image, arrow). Also check the LEDs of the DCM- and LDM-modules. Steady or flashing green light indicates a correct functioning.

7. **Operation mode switch to "ready to operate".** Turn the operation mode switch (fig. 15, point 7) to "ready to operate" (position "1"). This activates the electric circuits.



**Caution:** Make sure that nobody works on the electric circuits before switching the system on as they get energised when activated. If there are still circuits that are worked on, remove the respective fuses before switching on the system. Insert them again only after checking the circuits for short circuit and insulation faults.

8. **Check voltage at circuit outputs.** Circuits programmed for maintained mode should have a voltage corresponding to the AC mains voltage. For this reason, all circuit module fuses should be removed prior to switching on the system. Insert them again only after checking the circuits for short circuit and insulation faults and after checking the voltage on each circuit terminal (fig. 1, point 1 (see also fig. 6)). The measured voltage of each circuit should correspond with the mains AC voltage.

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



### 7 Checking the system state and basic settings

#### 7.1 System state

After commissioning the LC-display shows the state of the system (fig. 20) 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
help test menu —7
```

Figure 20: 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, battery is being charged
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 (no connection to external modules; see chapter 9.5.3)
earth fault	earth fault in mains operation
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
DCM fault	DCM failed
ACM fault	ACM 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
luminaire fault	luminaire failure after testing
luminare current faul	current value of one circuit out of set tolerance after testing
total current fault	total current value out of set tolerance after testing
circuit fault	error in electric circuit (fuse activated etc.)
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

### 7.2 Selecting circuits and checking their status

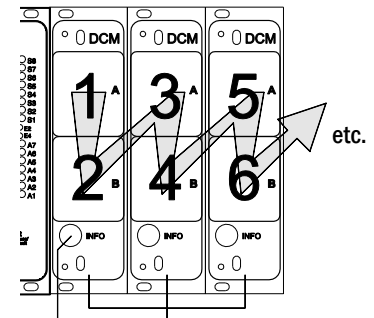
State → INFO-pushbutton DCM/ACM → △▽(select circuit)

The electric circuits are numbered beginning with 1; each DCM-module has two circuits named A and B, whereas an ACM-module has only one circuit named A. The circuits are numbered according to their slot position from left to right, so that the A-circuits have an uneven and the B-circuits an even number (see fig. 21). If a slot is not used, the respective circuit numbers do not exist either. This means you can add circuits to the system without changing the numbers of existing circuits.

After pressing the INFO-pushbutton on the DCM- or ACM-module (fig. 21), the display shows the status of the respective circuits. Now it shows the following information for circuits A and B (fig. 22):

- 1 – circuit number
- 2 – current output (in brackets: reference value for the circuit monitoring)
- 3 – status of the circuit

The number of the selected circuit is marked by inverted colouring (see fig. 22 for circuit A with number 1). With the up △ and down ▽ keys you can change between circuits A and B. Repeated pressing of these keys takes you to the circuit status display of the other modules. Pressing ▷ or Enter ○ takes you to the setup of the selected circuit (see next paragraph). For each circuit the following status messages can be displayed in line 3 (fig. 22, point 3):



INFO-pushbutton DCM-modules

Figure 21: Numbering of the circuits

```

----- DCM 32 -----
A: circuit      1 >  - 1
P =    0W (    0W) - 2
ok              - 3
B: circuit      2 >  - 1
P =    0W (    0W) - 2
ok              - 3
help    test    back
    
```

Figure 22: Circuit status

Status	Explanation	Measure
OK	The circuit works correctly.	-
fuse defect	The circuit fuse in the DCM/ACM is defect.	change fuse
current failure	The current is out of the set tolerance.	check luminaires and tolerance
earth fault	Short circuit to earth.	find and correct
earth fault(B)	Short circuit of the battery to earth.	find and correct
overload	Measured current is too high.	keep values within tolerance
not existing	The circuit does not exist (empty slot or circuit B does not exist).	none (ACM has only circuit A)
error	other failures	select module again

### 7.3 Viewing and changing of further circuit settings

State → INFO-pushbutton DCM/ACM → △▽(select circuit) → Enter ○

After pressing the INFO-pushbutton and selecting the required circuit with △ and ▽ (see previous chapter), you reach the setup for this circuit by pressing ▷ or Enter ○ (fig. 23). The following information is displayed:

- 1 – number of circuit (fig. 23, 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. 23, 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. 23, point 3). With ◀ and ▶ you can select the following operation modes:

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

- 4 – monitoring mode (sub-menu) (fig. 23, point 4). You can reach the setup screen for the monitoring mode with ▷ or Enter ○ (see next chapter 7.3.1).
- 5 – name (two lines) (fig. 23, 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. 24). 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 voltage for another minute; afterwards the programmed stop delay time starts running. After this time has elapsed, the circuits 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.

```

----- modules -----
circuit(DCM32)          1 — 1
stop delay:            15min — 2
maintained mode         — 3
monitoring (L)         > — 4
main building, hall    — 5
ground floor           —
help next done
    
```

Figure 23: Circuit status

```

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

Figure 24: Survey of all available characters

### 7.3.1 Setting the circuit monitoring mode

State → INFO-pushbutton DCM/ACM → △▽(select circuit) → Enter ○ → △▽monitoring → Enter ○

The monitoring setup screen (fig. 25) shows the number of the circuit in the top line (fig. 25, point 1). Using the keys △ and ▽ you can reach the following setup options:

- 1 - highest address of luminaires with single luminaire monitoring existing in the circuit, settable from 01 to 20. This number mostly corresponds with the number of luminaires existing in this circuit. The setting 00 deactivates the single luminaire monitoring.
- 2 - tolerance for the current monitoring. Possible settings: off (no current monitoring), 5%, 10%, 20% (recommended), 50% (fig. 25, point 2).
- 3 - measuring of the reference current (fig. 25, point 3). The current value is reset and newly defined with the next test and saved as a reference for the current monitoring.

```

----- circuit 1 -----
lamp monitoring
lamp count: 00 — 1

circuit monitoring
current window: off — 2
measure reference > — 3
help back
    
```

Figure 25: Setting of the circuit monitoring

### 7.3.2 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) (fig. 26). If you select the line supply: using the keys △ or ▽ (fig. 26, 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. 26, point 1) using ▷ or Enter ○ takes you to the table shown in fig. 27. 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, gmb), see table below.

The softkey back/F3 takes you back to the previous display (fig. 26). Now push the softkeys done/F3 and back/F3 in order to leave the programming. A confirmation prompt appears (fig. 28). 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 26: SAM-programming

```

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

Figure 27: SAM-programming

```

-----modules-----

save
changes?

yes no
    
```

Figure 28: SAM-programming

SAM-operation mode	Explanation
ds (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.
mb (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 7.1). 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.
gmb (switched modified non-maintained lighting)	The luminaires in non-maintained and switched maintained lighting mode get switched on when a voltage is applied to the input. In the event of a voltage failure the system switches back to regular operation immediately.

### 7.4 Checking the state of the charger module

State → INFO-pushbutton LDM

Push the INFO-pushbutton in order to check the state of the charger module. After that the following parameters of the LDM are shown (see fig. 29): number of the LDM25 (1), rack and slot number (2), float charge/boost charge or possible failures (3), current (4), voltage (5) and temperature (6). You can change between the data of several connected charger modules using ◀ and ▶. The following table explains possible error messages (fig. 29, point 3):

```
----- LDM 25 -----
charger 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 29: state of charger unit

State	Explanation	Measure
fuse tripped	overcurrent/short circuit	Check Fsec. on LDM25 or fuses of respective isolating transformer (TR...).
over temperature	charger unit overheated	Check cabinet ventilation. Contact your dealer or service.
operation mode	output voltage of operation mode	Contact your dealer or service.
switch activated	switch 260V or higher for more than 20 sec.	

**Note:** In case of a charger failure an error message is shown in the status display (see chapter 7.1).

**Note:** An indicated charger failure although all green LEDs of the LDM25 are on (red LEDs off) is a clear sign of a communication fault. This is also the case if the LDM25 does not react to pushing the INFO-pushbutton.

### 8 Function tests and electronic log

National and international standards require a regular function test of emergency lighting systems. Besides the daily visual checks of the system for operational readiness (displays) they especially require:

- A weekly function test of the power supply system including the connected safety and rescue luminaires;
- the monthly simulation of a failure of the general lighting for a period of time that allows a check of all safety and rescue luminaires for correct function, damages (and cleanliness);
- the annual check of the battery capacity by means of a function test (see above) of the system, but over the whole autonomous time given by the manufacturer including a subsequent function test of the charger modules after restoring mains supply.

The results of the above mentioned function and capacity tests are stored in the system and can be retrieved at any time.

#### 8.1 Execution of a function test

State → **test**/F2

When the display shows the system state (see chapter 7.1), 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. If there is no signal tone, a so-called manual test is carried out.

The LC-display shows the tested circuits (fig. 30, 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. 30, point 2). The duration of this process can be set to off, 5 minutes or 30 minutes. The progress is indicated by a line of dots behind the words “please wait” (fig. 30, point 3).

The test can be cancelled at any time using the softkey **cancel**/F3 (fig. 30 to fig. 33, point 4).

At the beginning of the actual test the display shows the message “under test” (fig. 31, point 2). A detected error is shown in line 3 (fig. 31, point 3).

After finishing the test the display shows a summary for a few seconds (fig. 33) and the message “test finished” (fig. 33, 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 30: Test programming

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

Figure 31: Setting schedule

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

Figure 32: Test programming

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

Figure 33: Test programming

### 8.2 Programming automatic function tests

State → **menu**/F3 → **configuration** → Enter ○ **function test** → Enter ○

In the state display press **menu**/F3 and navigate with **△** and **▽** to **configuration**, press **▷** or Enter ○, and navigate with **△** and **▽** to **function test**. Then press **▷** or Enter ○ again. Now you are in the **function test** display (fig. 34). 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 off -3

next schedule: -4
-
help done
```

Figure 34: 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** → **△▽** **schedule** → Enter ○

Fig. 35 shows the display after selecting **schedule** with **▷** or Enter ○. 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 35: 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** → **△▽** **current monitor** → Enter ○

Selecting **current monitor** with **△** and **▽** followed by **▷** or Enter ○ takes you to the display shown in fig. 36. 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 **△** or **▽** and pressing **▷** or Enter ○ 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 36: 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. 28). 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 set the preheating phase to off, 5 minutes or 30 minutes prior to a test using ◀ and ▶. Afterwards you finish the test programming with the softkey **done**/F3. The confirmation prompt **save changes?** appears again. 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 (see fig. 37):

- 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

```

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

Figure 37: Test results (survey)

By pressing ▶ or Enter ○ after selecting a category with △ and ▽ you can see information on the selected test (see fig. 38). The display shows the type of test (fig. 38, point 1), execution date and time (fig. 38, point 2), the number of tested lamps (fig. 38, point 3) as well as the battery characteristics (fig. 38, 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.

```

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

Figure 38: Info function test

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. 37, 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. 39.

- 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.

```

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

Figure 39: Reset errors



### 9 Menu reference

#### 9.1 Main menu

State → **menu**/F3

The main menu offers 6 sub-menus, between which you can navigate using  $\triangle$  and  $\nabla$ . By pressing  $\triangleright$  or Enter  $\bigcirc$  you select the respective sub-menu and with the softkey **status**/F3 you reach the status display.

```
-----main menu-----  
diagnosis >  
test results >  
installation >  
configuration >  
reset errors >  
service address >  
status
```

Figure 40: Main menu

#### 9.2 Diagnosis

State → **menu**/F3 →  $\triangle \nabla$  **diagnosis** → Enter  $\bigcirc$

In this sub-menu you can select the diagnosis functions as described below:

- battery: state of the battery, current temperature, voltage current etc.
- state of the mains supply
- state of the individual modules (DCM/LDM/IOM/SAM)
- sub-distribution
- sub-systems
- system information

```
-----diagnosis-----  
battery >  
mains >  
modules >  
sub-distributions >  
sybsystems >  
system information >  
help menu
```

Figure 41: Diagnosis menu

Via softkey **help**/F1 a help text for the active display can be called up.

#### 9.3 State of battery and manual activation of a capacity test

State → **menu**/F3 →  $\triangle \nabla$  **diagnosis** → Enter  $\bigcirc$  →  $\triangle \nabla$  **battery** → Enter  $\bigcirc$

This sub-menu informs about the connected battery (capacity, voltage, current and battery room temperature). The softkey **cap-test**/F2 activates the annual capacity test as required by EN 50171.

```
-----battery-----  
capacity: 28 Ah  
voltage: 232.7 V  
current: 0.0 A  
temperature: 20.0 C  
symmetry: 116.3 V  
help cap-test back
```

Figure 42: State of battery

#### 9.4 State of mains supply

State → **menu**/F3 →  $\triangle \nabla$  **diagnosis** → Enter  $\bigcirc$  →  $\triangle \nabla$  **mains** → Enter  $\bigcirc$

Display with all voltage values of all phases of the connected power supply. The left column shows the instantaneous values and the right column shows the minimal and maximal values measured so far. A value different from zero for the neutral line U(N) indicates a faulty mains connection.

**Note:** According to EN 50171 the power supply is switched from mains to battery if the supply voltage falls to less than 85% of the rated supply voltage of 230V, i.e. at 195.5V.

```
-----mains-----  
Max  
U(L1): 230.0V 230.0V  
U(L2): 230.0V 230.0V  
U(L3): 230.0V 230.0V  
U(N): 0.0V 0.0V  
help back
```

Figure 43: State of mains supply

### 9.5 State of the modules (DCM/LDM/IOM/SAM)

State → **menu**/F3 →  $\Delta \nabla$  **diagnosis** → Enter ○ →  $\Delta \nabla$  **modules** → Enter ○

Menu for the selection of diagnosis pages of the individual shown module groups.

```
---module diagnosis--
circuit modules      >
charger modules      >
SAM/IOM inputs       >

help                 menu
```

Figure 44: Menu for module diagnosis

#### 9.5.1 State of the electric circuit modules (DCM/ACM)

State → **menu**/F3 →  $\Delta \nabla$  **diagnosis** → Enter ○ →  $\Delta \nabla$  **modules** → Enter →  $\Delta \nabla$  **circuit modules** → Enter

This display informs about the type of the respective circuit module as well as the last measured power consumption of all connected consumers (0W) per circuit. Furthermore the current state of the circuit is shown (e.g. failure). Pushing the softkey **test**/F2 starts a test (battery operation only) of the selected circuit. You can find detailed information in chapter 7.2.

**Note:** This display can be called up by pushing the INFO-pushbutton of a DCM or ACM-module (see chapter 7.2):

State → INFO-pushbutton DCM/ACM →  $\Delta \nabla$  (select circuit)

```
----- DCM 32 -----
A: circuit           1
P =    0W (    3W)
failure
B: circuit           2
P =    0W (    8W)
failure
test                 back
```

Figure 45: State of DCM/ACM-modules

#### 9.5.2 State of the charger modules (LDM)

State → **menu**/F3 →  $\Delta \nabla$  **diagnosis** → Enter ○ →  $\Delta \nabla$  **modules** → Enter →  $\Delta \nabla$  **charger modules** → Enter

Display with the state of the charger module(s). More information in chapter 0.

**Note:** This screen can also be reached via INFO-pushbutton on every LDM (More information in chapter 0):

State → INFO-pushbutton LDM

```
----- LDM 25 -----
charging unit        1
(rack  7, slot  7)
float charge
I: (    0,0)         -,-A
P: ( ---,-)         ---,-V
T:                  -,-C
help                 back
```

Figure 46: State of charger modules

#### 9.5.3 State of the SAM and IOM inputs

State → **menu**/F3 →  $\Delta \nabla$  **diagnosis** → Enter ○ →  $\Delta \nabla$  **modules** → Enter →  $\Delta \nabla$  **SAM/IOM inputs** → Enter

This screen informs about the current states of the voltage inputs of the connected switch query modules (SAM) and the opto-/relay interface modules (IOM). Displayed states:

1	input energised ("active")
MB	programmed input deenergised ("active")
-	input deenergised ("inactive")

```
--SAM/IOM diagnosis--
SAM/LM      IOM
1:          ----
2:
3:
4:
SAM 1 E1
update      back
```

Figure 47: State of SAM/IOM modules

Above the softkeys (fig. 47) a description of the selected ( $\Delta$  and  $\nabla$ ) input is shown; the message **not installed** indicates a communication error between central unit and module. The message **RS485 fault** indicates a connection or allocation error with the external modules (SAM, MC-LM or MCT12) and automatically switches the circuits to modified non-maintained operation, which is then shown in the display **MB**. This way the system realises the "safe operation" in case of a communication failure according to existing standards.

### 9.6 State of the sub-distributions

State → menu/F3 → ▴ ▽ diagnosis → Enter ○ → ▴ ▽ sub-distribution → Enter ○

Sub-distributions cannot be connected to microControl *plus* systems, so this menu item is without function.

### 9.7 State of the subsystems

State → menu/F3 → ▴ ▽ diagnosis → Enter ○ → ▴ ▽ subsystems → Enter ○

Subsystems are power supply systems of the same type which are administered and monitored by this system. This requires a connection of the systems via ethernet (incl. TCP/IP-address allocation. The diagnosis screen (fig. 48) for subsystems shows the state of one subsystem only; the subsystems are selected with ◀ and ▶. Via softkey `details`/F2 you can select another page with additional information (fig. 49).

```
-----subsystem-----
000.000.000.000      01
BAT:  -. -V          -. -A

details      back
```

Figure 48: State of subsystems

```
----subsystem--02---
error memory empty

done
```

Figure 49: Detailed information

### 9.8 System information

State → menu/F3 → ▴ ▽ diagnosis → Enter ○ → ▴ ▽ system information → Enter ○

This screen shows the serial number (S/N), firmware and hardware version of the central unit as well as the MAC-address (fig. 50). Furthermore you can select (▴ and ▽) other pages with key parameters and the log (access with ▶ or Enter ○).

```
--system information-
key parameters      >
show log            >
S/N:                0
firmware: 1.5.2   862
hardware: 19
MAC:00:1f:3e:00:1f:a1
back
```

Figure 50: System information

The key parameters page (fig. 51) shows the number of installed circuits, the nominal capacity of the battery, the set supply time, the set cut-off voltage, the number of connected charger modules, and the programmed duration of the capacity test.

```
---key parameters---
circuit:             13
battery:             017Ah
supply time:         001h
cut off voltage: 185V
charger:             001
capacity test:       off
help                 done
```

Figure 51: System key parameters

In the log (fig. 52) you can select (▴ and ▽) a year; pushing ▶ or Enter ○ takes you to the entries made in the selected year.

```
-----system log-----
2013                 >
2012                 >
2011                 >
2010                 >
2009                 >
2008                 >
back
```

Figure 52: System log

9.9 Detecting all modules

State → menu/F3 → ▴ ▾ installation → Enter ○ → ▴ ▾ detect modules → Enter ○

Internal and external modules have to be detected after installation so that the central control and monitoring unit can recognise and monitor them. Therefore select **detect modules >** in the menu **installation** and press Enter. When the module detection is finished, all identified modules are listed. In order to save the results of the detection in the system settings press **done/F3** and confirm the security prompt with **yes/F1**.

**Note:** When delivered all installed modules have already been detected so that a new detection is only necessary when the system is extended in situ.

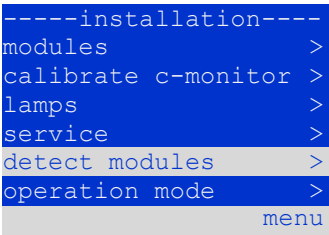


Figure 53: Detect modules

9.10 Select operation mode

State → menu/F3 → ▴ ▾ installation → Enter ○ → ▴ ▾ operation mode → Enter ○

Setting the operation mode prevents an undesired activation of the emergency lighting during company shutdown times. Selecting the operation mode can be done either via internal or external operation mode switch (BAS) or directly via menu depending on the system configuration. In the menu shown in fig. 54 you can select the following settings with **◀** and **▶**:

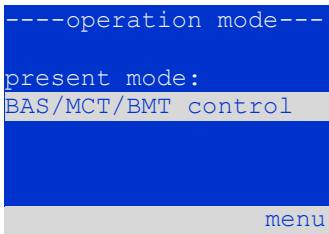


Figure 54: Select operation mode

BAS/MCT/BMT control	system setting to charging /operational via external mimic panel or operation mode switch BAS
activated	emergency lighting active, maintained and non-maintained lights active, BAS ineffective
charging	emergency lighting blocked, maintained and non-maintained lights not active, BAS ineffective

**Note:** The operation mode switch (BAS) at the front is only active if the operation mode is set to "**BAS/MCT/BMT control**" (default setting). In all other cases the operation mode which is set here in the menu is effective no matter which position the BAS is in.

### 9.11 Configuration and administration

State → menu/F3 → ▴ ▾ configuration → Enter ○ ( → ▴ ▾ administration → Enter ○)

In the menu configuration (fig. 55) as well as the submenu **administration** > (fig. 56) all basic settings of the system are administered, which are described in the following chapters.

```
----configuration----
administration >
language selection >
password >
date/time >
function test >
capacity test time >
menu
```

Figure 55: Configuration menu

```
----administration---
network >
LCD contrast >
timer >
IOM inputs >
SAM inputs >
menu
```

Figure 56: submenu "administration"

#### 9.11.1 Network settings and master-slave-monitoring

State → menu/F3 → ▴ ▾ configuration → Enter ○ → ▴ ▾ administration → Enter ○ → ▴ ▾ network → Enter ○

The **network**-menu (fig. 57) enables the configuration of the network interfaces by which a connection of several such power supply systems with each other is possible. Additionally, an access via network allows a remote control of the system by means of the internet browser of an external PC.

##### Submenu ip-addresses (fig. 58)

Each system has two network connections (RJ45) which are named **Intern** (inside the cabinet) and **Front** (at the front). Only one of them can be used at a time.

Thus in the menu **ip addresses** (fig. 58) under the menu item "adapter" (fig. 58, point 1) you can select the respective connection with ◀ and ▶ (**Intern** or **Front**). Now the buttons ▴ and ▾ let you make settings for the active adapter. You can set the ip-address (**ip**), subnet mask (**Mask**), **Gateway** and **DNS**. Use the buttons ◀ and ▶ to select the different characters and change them with ▴ and ▾. With Enter ○ you finish the input, so that you can use the keys ▴ and ▾ for selecting another line in the menu. By pushing the softkey **done**/F3 you leave the ip-addresses input page; settings changes have to be confirmed with **yes**/F1.

**Note:** New settings become effective after a reboot of the system.

##### Submenu communication (fig. 59)

Each power supply system can be linked to other systems which have a similar central control unit. This requires a clear allocation of an own IP-address to each system (see above). When they are networked, one system (called master) monitors all others (slaves). To achieve this in master and slave systems the status query in the menu communication (fig. 59) has to be set to **on** (fig. 59, point 1). Additionally, the IP-addresses of all slave systems have to be entered in the master system (fig. 59, point 2). The selection and change of addresses can be done as described in the above submenu **ip addresses**. The new settings become effective after leaving the submenu by pushing **done**/F3 and confirming with **yes**/F1.

**Note:** For safety reasons the system has to be restarted after changing IP-addresses.

```
-----network-----
ip addresses >
communication >
menu
```

Figure 57: Network menu

```
-----network-----
adapter: intern — 1
ip: 010.000.020.031
mask: 255.000.000.000
gateway:
010.000.000.001
dns: 010.000.000.003
help done
```

Figure 58: submenu for setting ip-addresses

```
----communication----
status query: on — 1
US 1: 000.000.000.000 — 2
US 2: 000.000.000.000 — 2
US 3: 000.000.000.000 — 2
US 4: 000.000.000.000 — 2
US 5: 000.000.000.000 — 2
help done
```

Figure 59: IP-addresses of monitored systems

### 9.11.2 Setting the LCD contrast

State → menu/F3 →  $\Delta$   $\nabla$  configuration → Enter ○ →  $\Delta$   $\nabla$  administration → Enter →  $\Delta$   $\nabla$  LCD-contrast → Enter

After selecting this menu item you can set the contrast of the display using  $\triangleleft$  and  $\triangleright$ . The new setting becomes effective after leaving the submenu by pushing **done**/F3 and confirming with **yes**/F1.

```

-----display-----
LCD-contrast: 25 %
abcdefghijklmnopqrstuvwxyz
vwxyz0123456789ABCDEF
GHIJKLMNOPQRSTUVWXYZ
help                               done
    
```

Figure 60: Setting the LCD-contrast

### 9.11.3 Timer settings

State → menu/F3 →  $\Delta$   $\nabla$  configuration → Enter ○ →  $\Delta$   $\nabla$  administration → Enter ○ →  $\Delta$   $\nabla$  timer → Enter ○

In the menu “timer” you can programme up to 32 different switch times for individual circuits or for combined circuit groups. These switch programmes only and exclusively deactivate maintained lighting circuits during shut-off times (e.g. school holidays, shop closing times etc.). At the top of the timer menu (fig. 61, point 1) the number of the selected timer is shown (right) as well as its current state (**inactive** / **active**, middle). With every timer the following settings are possible:

```

-----timer-----
timer active          01 — 1
circuits:             2-96
on:                   00:00
off:                  23:00
weekdays:            MO - SO
date: 01.01.- 31.12.
                     off   back
    
```

Figure 61: Timer programming

<b>circuits</b>	number of the first and last circuit to be switched by the timer.
<b>on</b>	time at which the circuits are to be switched on.
<b>off</b>	time at which the circuits are to be switched off.
<b>weekdays</b>	first and last weekday for the timer to be effective.
<b>date</b>	first and last day in the year for the timer to be effective.

The setting to be changes is selected using the  $\Delta$  and  $\nabla$  keys; the values are changed using the  $\triangleleft$  and  $\triangleright$  keys. The highlighted timer can be set to active or inactive using **on**/F2 or **off**/F2. The new settings become effective after leaving the menu by pushing **done**/F3 and confirming with **yes**/F1.

### 9.11.4 Programming the IOM-inputs

State → menu/F3 →  $\Delta \nabla$  configuration → Enter ○ →  $\Delta \nabla$  administration → Enter →  $\Delta \nabla$  IOM-inputs → Enter

Each IO-module has four voltage inputs. Inputs IOM1.E1 (BAS) and IOM1.E4 (test pushbutton) are pre-programmed and not changeable. Inputs IOM1.E2/E3 can cause a message being displayed or additionally put the system in a state of failure either in the de-energised (E=0) or energised state (E=1).

At the top of the IOM-input menu (fig. 62, point 1) you select the number of the IO-module (01 to 05) as well as the input (01 to 04) to be configured; under function one of the following settings can be selected:

```

-----IOM-inputs-----
IOM/input: 01/02      1
function:
  E=0, message+failure
message:
BMA Alarm             2
back
    
```

Figure 62: Programming of the IOM-inputs

none	input status has no effect
E=0	function is executed when input is de-energised
E=1	function is executed when input is energised
message	a configurable message is displayed (fig. 62, point 2)
message+failure	the system changes to state of failure
fan failure	the system shows a fan failure
fan failure K6	the system shows a fan failure (depending on the fan control via K6)

The setting to be changed can be selected using  $\Delta$  and  $\nabla$ ; the values are changed with  $\triangleleft$  and  $\triangleright$ . For entering a message text press Enter ○, which also finishes the input. The message text can be entered directly via a connected external keyboard or character by character using the arrow keys  $\Delta$ ,  $\nabla$ ,  $\triangleleft$  and  $\triangleright$ . The new settings become effective after leaving the menu by pushing done/F3 and confirming with yes/F1.

**Note:** The inputs and outputs of a first factory-fitted IOM are preprogrammed.

### 9.11.5 Programming the SAM-inputs

State → menu/F3 →  $\Delta \nabla$  configuration → Enter ○ →  $\Delta \nabla$  administration → Enter →  $\Delta \nabla$  SAM-inputs → Enter

The built-in switch query module (SAM) or external switch query modules (type SAM08, MC-LM or SAM24) can be used in order to switch maintained lighting circuits of the system on and off in mains operation together with the general lighting. Up to 15 switch query modules (SAM08/SAM24) can be connected to each BUS of your system. All SAM-inputs can be provided with a clear text message via the menu SAM-inputs (fig. 63).

The message text is entered after the selection of the SAM-module (fig. 63, point 1, sequential number 01 to 16) and the input (fig. 63, point 2, numbers 01 to 08) as described in the above paragraph. The new settings become effective after leaving the menu by pushing done/F3 and confirming with yes/F1.

```

-----SAM-inputs-----
SAM:                                01 1
input:                             01 2
                                   3
message text:                       4
UV1 EG                             5
back
    
```

Figure 63: Programming of the SAM-inputs

### 9.11.6 Setting the menu language

State → menu/F3 →  $\Delta \nabla$  configuration → Enter ○ →  $\Delta \nabla$  language selection → Enter ○

This menu lets you select the language for the LCD-menu control using  $\Delta$  and  $\nabla$ . The new settings become effective after leaving the menu by pushing done/F3 and confirming with yes/F1.

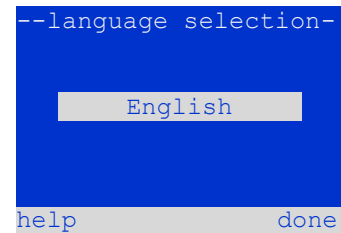


Figure 64: Language selection

### 9.11.7 Authorisation, login with password, logout

State → menu/F3 →  $\Delta \nabla$  configuration → Enter ○ →  $\Delta \nabla$  password → Enter ○

Before you can change settings in the installation and configuration menus, you have to log in with a password. In the menu password you can enter a password for a certain authorisation level. The user status is changed to this level on login. On logout the user status changes to the lowest level "guest".

- This is how you login: Select "log in" and the requested action using the keys  $\Delta$  and  $\nabla$  (fig. 65, point 1). Then press Enter ○. Enter the password and press Enter ○ again.
- This is how you logout: Select "log off" and the requested action using the keys  $\Delta$  and  $\nabla$  (fig. 65, point 1). Then press Enter ○.

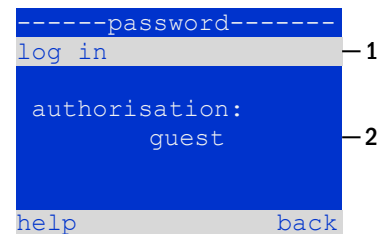


Figure 65: Login and logout

The current user status (authorisation) is shown in the centre of the screen (fig. 65, point 2) as soon as you enter the "password" menu.

**Note:** If the current user does not logout, the system changes automatically to the authorisation level "guest" 2 hours after the last operation.

### 9.11.8 Setting the system date and time

State → menu/F3 →  $\Delta \nabla$  configuration → Enter ○ →  $\Delta \nabla$  date/time → Enter ○

This menu lets you enter the current time and date. The setting to be changed is selected using  $\Delta$  and  $\nabla$ ; then you change the values using  $\Delta$  and  $\nabla$ . The new settings become effective after leaving the menu by pushing done/F3 and confirming with yes/F1.

**Automatic change to DST:** If you select auto (fig. 66, point 1), the system switches automatically between DST and Standard Time. The time is not changed if you select off.

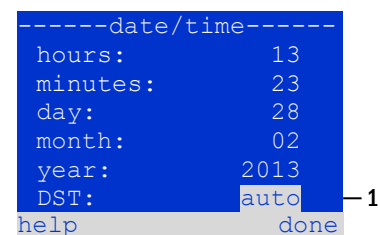


Figure 66: Setting the system time



### 9.11.9 Programming an automatic capacity test

State → menu/F3 → configuration → Enter → capacity test time → Enter

An annual capacity test of the system is compulsory for checking the circuits and luminaires as well as the state of the battery: Despite its ageing the battery should have a capacity which is sufficient to supply the system in case of an emergency over the full autonomous time. Your system can execute such a test automatically at four different times a year.

**Note:** Depending on existing regional laws a capacity test may only be executed in the presence of a competent service technician. In such a case the automatic execution as described above is not permissible.

After selecting the number of the test to be programmed (**1** of **4**, fig. 67, point 1), its duration can be set **duration** (fig. 67, point 2) between (**5min** to **8h**) or deactivated (**off**). A date (day, month) have to be set for the beginning of the test.

```
----capacity test----
test 1 of 4:
duration:    off
time (hour): 08
time (min):  00
day:         01
month:       04
help         done
```

1  
2

Figure 67: settings for automatic capacity tests

### 9.11.10 Configuration of the automatic Email notification

The microControl *plus* system has an Email notification function, with which an Email can be sent to one or more addresses in case of a failure. This Email informs about the current content of the failure memory and shows all failures at the time of sending which have not been reset yet. The Email function is exclusively configured via WebInterface. All the following network settings have to be made on the microControl *plus*, which is to send Emails:

- IP-address (unambiguous for each station, no double or multiple allocation)
- net mask (matching the network part of the IP-address)
- gateway address (address of the router, which connects to an intranet (LAN) or the internet)
- DNS (Domain Name Server)-address (IP-address of the DNS Servers for the coding of computer names in IP-addresses)

**Note:** An SMTP-capable mail server is necessary for Email transmission to which the system must be connected via ethernet by means TCP/IP. For this the following information about the SMTP mail server is needed:

- IP-address or name (e.g. 192.168.1.1 or mail.example.de)
- supported authentication methods
- an existing and active Email account on the server
- login data for this Email account must be known

#### Step 1: Check network settings of the station

A PC is necessary for configuring the Email function. First check the network connection to the microControl *plus* and the mail server. Connect the PC via network cable to a switch in the MultiControl network. Open the prompt and run a ping command. Example:

```
C:\>ping mail.example.de <RETURN> (or ping 192.168.1.1 <RETURN>)
Pinging mail.example.de [192.168.1.1] with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time=13ms TTL=54
Reply from 192.168.1.1: bytes=32 time=13ms TTL=54
Reply from 192.168.1.1: bytes=32 time=13ms TTL=54
Reply from 192.168.1.1: bytes=32 time=13ms TTL=54
Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 13ms, Maximum = 13ms, Average = 13ms
```

If the Ping statistics does not show lost packets (see example above, "Lost = 0"), the connection is reliable.

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### Step 2: Configuration of the Email function in the WebInterface

Open a web browser on the PC and enter the IP-address of your system as address. The WebInterface main page of the system opens (fig. 68). Here you open the page “administration” (login information necessary) and click on “E-Mail” (fig. 69). This takes you to the Email-configuration page (fig. 70).

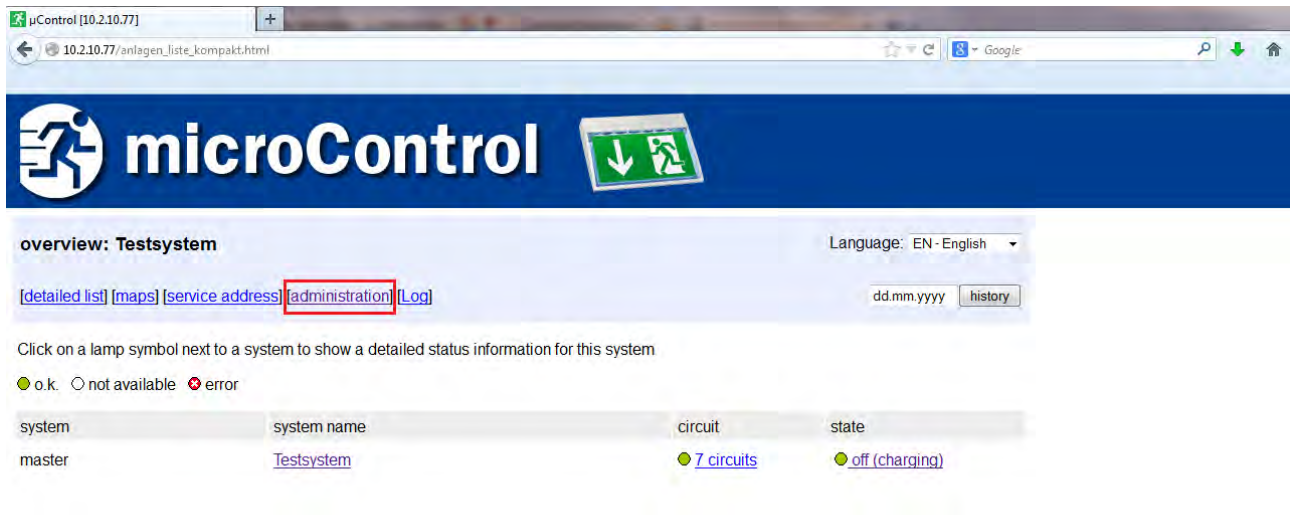


Figure 68: Web-interface main page

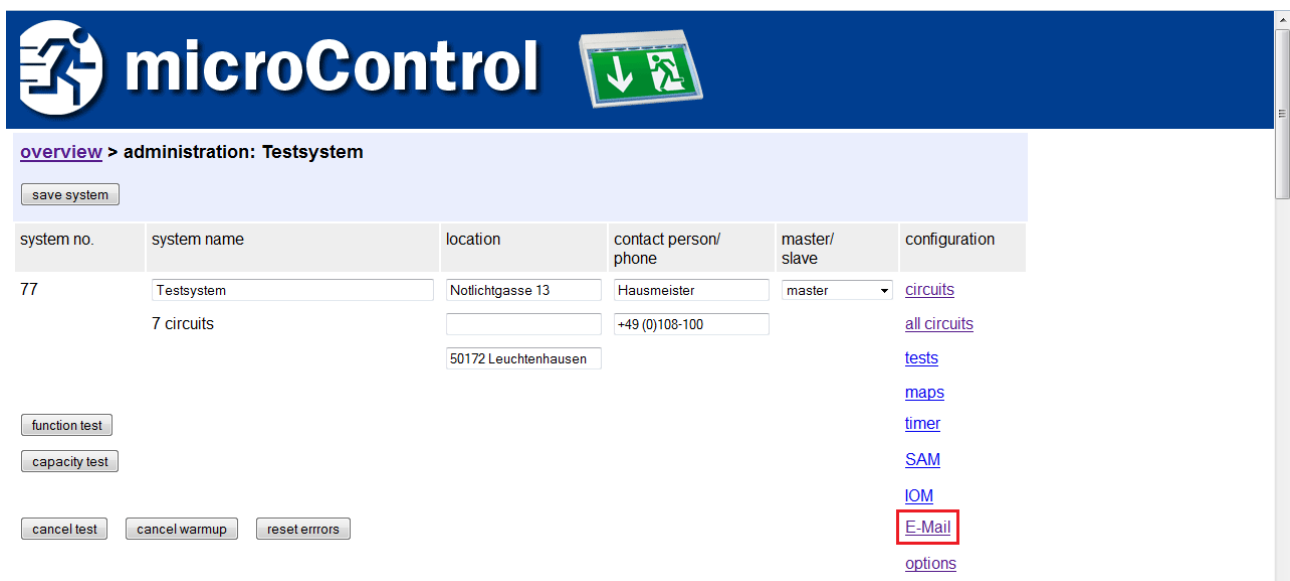


Figure 69: Administration page, access to Email-configuration

overview > administration > E-Mail: Testsystem

save reload Test settings

**SMTP Server**

Server address:  IP address or name resolved by DNS

Server port:  TCP/IP port (SMTP default 25)

**SMTP Authentication**

User name:  User name for SMTP authentication (or empty)

Password:  Password for username (or empty)

Authentication method:  SMTP Server authentication method

**SMTP Server**

Sender:  Sender address using format user@example.com

Recipients:  Recipient list using format user@example.com  
[.user2@example.com ...]

SMTP Server:  Fixed message subject

Send interval:  Minimum interval between messages

**E-Mail status**

E-Mail system: configured and active

Figure 70: Email configuration page

Enter the following information in the input boxes on the Email configuration page (fig. 70):

field	input
server address	Name of the Email server (e.g. smtp.email-server.de); alternatively an IP-address can be entered (e.g. 192.168.1.1). Due to the fact that the IP-address of a mail server can change without prior notice, the <b>name</b> of the mail server should always be used (if possible). So, a changed IP-address has no influence on the Email notification. Please note that if you use a name, a reachable DNS-server must be entered.
server port	TCP/UDP-port, via which the connection to the mail server is realised. The default value is 25.
user name	User name which the system is to use for logging into the mail account on the mail server (e.g. noreplay@G4711.kunde.de).
password	Password which the system is to use for logging into the mail account on the mail server.
authorisation method	Can be set to "None" or "CRAM-MD5" (see also table 2). If "None" is used, the input boxes for user name and password can be left empty. Instead of existing mail servers on the internet you can also use ones on the intranet (e.g. Microsoft Exchange).
sender	Email address which is given as sender address with all Emails sent. This address can be chosen freely (e.g. <a href="mailto:noreplay@G4711.kunde.de">noreplay@G4711.kunde.de</a> ), but you should consider the following recommendations: <ol style="list-style-type: none"> <li>1. Use "noreplay" as user name, because the receiver is not supposed to reply.</li> <li>2. Allocating the Email to the system is easier for the receiver if the system number (e.g. G4711) is part of the Email address (<a href="mailto:noreplay@G4711.kunde.de">noreplay@G4711.kunde.de</a>). This also makes it easier to create filter rules in the Email-client. It has to be tested during the Email configuration if the mail server allows a subdomain (e.g. "G4711.", as demonstrated in the example). In case of doubt, check the configuration without subdomain first (e.g. <a href="mailto:noreplay@kunde.de">noreplay@kunde.de</a>).</li> </ol>
receiver	Address of a single receiver (e.g. <a href="mailto:benutzer@beispiel.de">benutzer@beispiel.de</a> ) or a list of several receivers (separated by commas, e.g. <a href="mailto:benutzer1@beispiel.de">benutzer1@beispiel.de</a> , <a href="mailto:benutzer2@beispiel.de">benutzer2@beispiel.de</a> , <a href="mailto:benutzer3@beispiel.de">benutzer3@beispiel.de</a> ). The input box is limited to 128 characters.
subject	Defines the subject to be used with <b>every</b> Email sent by this system.
sending interval	Defines the shortest interval between two Emails: All error messages generated within this interval which have not been reset yet are collected and sent via Email after the set interval. The setting "off" deactivates the notification.
Email system	Shows the current state of the mail system (inactive/active). <b>Note:</b> The information refers to the time when the page was loaded last.
last mail sent	Shows the messages that were sent with the last Email. These messages can also be found in the system log (see also table 1). <b>Note:</b> The information refers to the time when the page was loaded last.

### Step 3: Saving and checking the configuration

Press the button “save”, which saves and activates the configuration. Additionally the settings are checked by creating and sending a test message. Now press the button “reload” in order to update the current state of the Email system (shown under “Email Status”) and see the results of the test. Once the page has been reloaded, the results of sending the Email are shown in “last mail sent. The button “test settings” enables you to check a previously saved configuration. Also here you must press the button “reload” afterwards.

table 1: The following messages are shown under “Last mail sent” as result:

Message	Meaning	Troubleshooting
benutzer@beispiel.de: ok	Email successfully sent.	
benutzerbeispiel.de: Recipient de is an invalid Email address - no @ character	Invalid Email address without “@”-sign.	Check Email address and add “@”-sign.
benutzer@beispiel.de: connect() failed	System cannot connect to mail server.	Check gateway in network settings. Check server address in Email configuration.
benutzer@beispiel.de: Unable to resolve system name <i>mail.beispiel.de</i>	Mail server address cannot be resolved into IP-address by the DNS-server.	Check DNS in network settings.
benutzer@beispiel.de: Authentication rejected , reply: 535 Incorrect authentication data	Mail server has rejected the login to the mail account.	Check user name, password and Authentication method.
benutzer@beispiel.de: RCPT command failed, reply: 550 Submission from dynamic IP 172.16.5.26 requires authentication	Mail server has rejected login to the mail account due to missing login data.	Enter user name, password and authentication method.

table 2: Email provider with CRAM-MD5 authorisation (as at 08 October 2013):

provider	mail server	notes
<a href="http://www.clustermail.de">www.clustermail.de</a>		fee-based
<a href="http://www.freenet.de">www.freenet.de</a>	mx.freenet.de	free registration

### 9.12 Show service address

State → menu/F3 → service address → Enter

If you want to contact the service, this screen gives you the the necessary information.

**Note:** The service address is entered by the service technician when installing the system and can only be changed via WebInterface.

```

---service address---
Jim Lightbeam
Emergency Light Ltd.
1 Lux Drive
50172 Dinenburgh
Tel:+xx xxxx xxx-xxx
Fax:+xx xxxx xxx-xxx
help back
    
```

Figure 71: Service-contact details

### 10 Complete shutdown (disconnection) of the power supply system

Before conducting maintenance works or making changes to the system, it has to be shut down (disconnected) by a specialist. For this the following instructions have to be observed:

- 1. Operation mode switch to charging mode.** Turn the operation mode switch (fig. 15, point 7) to charging mode (position "0"). **Important:** Make sure that the LC-display (fig. 15, point 5) shows "charging".
- 2. Disconnect system from mains.** Switch the mains switch (fig. 1, point 9) to position "0".
- 3. Remove mains fuse F1.** Remove the mains fuse (fig. 9).
- 4. Remove battery fuses F2/F4.** Remove the battery fuses (fig. 9). The system is now shut down and disconnected.

### 11 Battery operation and maintenance

In compliance with the national and international standards ÖVE/ÖNORM E 8002 and ÖVE/ÖNORM EN 50272-2 the system has to be checked annually. 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.



**Caution:** The series connection of the battery blocks creates a potentially lethal voltage.

#### 11.1 Charging and discharging

The system uses an IUTQ-controlled charger unit with a maximum output current of 0.5A for charging. This unit consists of a charger module (LDM25) with a maximum charging current of 0.5A whose output is connected in parallel to the battery. 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. 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.

Charging the batteries is carried out in compliance with EN 50272 according to the following table:

Temperature (°C)	Charging voltage boost/quick charging (V/cell)	Float charge voltage (V/cell)
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

### 11.2 Maintenance and checks

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 be cleaned using only water without cleansing additive. Do not use organic cleansers. The system automatically records battery voltage and surrounding temperature. The following parameters should additionally be checked, measured and recorded:

- battery voltage of every single block during the float charging process (block voltage)
- surface temperature of all battery blocks
- battery room temperature

If the block voltage of one block differs from the voltage of the other blocks by  $\pm 0.5$  V/cell or if the surface temperature differs by more than 5°C, call a service technician immediately. The following visual checks have to be carried out annually:

- check all screwed and/or plug contacts of the cabling between the batteries as well as between the batteries and the system for tightness,
- passability and function of the ventilation

Please find further tips for maintaining your batteries in the corresponding documentation.

### 11.3 Proceeding in case of malfunctions

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.

### 11.4 Decommissioning, storing 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

performance characteristics	
system type / serial number	microControl <i>plus</i> / serial number see front page power converter E 230 / G220
mains input data	
nominal voltage $U_{Nom}$	230V AC
nominal current	1.5A (without connected consumers)
nominal frequency	50Hz
number of phases	1
rating of the mains fuse	
nominal current of the mains fuse (F1)	10A
output data	
nominal voltage (AC-operation)	230V
nominal output (AC-operation)	2000VA (consumers incl. charger unit)
nominal voltage (DC-operation)	216V
nominal current at	2.31A / 0.92A / 0.37A (total of all circuits)
nominal output at	500W / 200W / 80 W (total of all circuits)
min. voltage after	185V / 185V / 185V
operation time for above-mentioned data	1h / 3h / 8h
nominal temperature of the battery	20°C
battery type and number of cells	
battery type	Pb
number of cells	108
make	18 x OGIV RPower 1245 or OGIV RPower 1252
charging current	0.5A
float charge voltage	2.275V per cell *
boost charge voltage	2.35V per cell *
deep discharge 1	1.71V per cell *
deep discharge 2	1.53V per cell *
other system characteristics	
number of electric circuits/DCMs	max. 6/ max. 3x DCM32
operation mode	maintained or non-maintained lighting in changeover operation
number of SAM-modules	1 internal
number of switch inputs 230V AC	8
charging curve	IUP(TS)
curve switching	automatically
mains monitoring	phase to N
activation	< 85% $U_{Nom}$
function test	programmable (daily, weekly) or manually
capacity test	programmable (annually) or manually
radio shielding	according to VDE 0875, class N
surrounding temperature	0 - 35°C
housing dimensions HxWxD	660mm x 350mm x 230mm
protection type	IP 20
protection level	I
cable entry	from above
recommended cable cross sections	
mains cables	1.5 - 4mm <sup>2</sup> rigid
potential-free signal cables	0.5 - 2.5mm <sup>2</sup> rigid
electric circuits	1.5 - 2.5mm <sup>2</sup> rigid
battery cables NSGAFOU +/-	1.5 - 4mm <sup>2</sup>
Symmetry	1.5 - 4mm <sup>2</sup>

(\*) Values depend on working temperature.

relevant fuses/connection cross section	
mains fuse F1	Fuse ceramics 6.3 x 32mm 10AT
battery fuses F2, F4 (B+, B-)	Fuse ceramics 6.3 x 32mm 10AT
battery fuse F3 (Sym)	Fuse ceramics 5 x 20mm 1AT
internal fuses L/B+ (F5/F6)	Fuse ceramics 5 x 20mm 3,15AT
fuses F7/F8 – circuit 7	Fuse ceramics 5 x 20mm 1AT
charger module LDM25	Fuse ceramics 5 x 20mm 3,15AT
circuit modules DCM32 L(+) and N (-)	Fuse ceramics 5 x 20mm 5AT

### 12.1 Available battery types and mounting conditions

Cut-off values in Ampère (A) with different discharging times (Tn), up to the given cut-off voltage (US) at a battery temperature of 20°C:

	Tn	1h	3h	5h	8h	10h	20h	Q*	A*	d*
Type RPower		US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c	m³/h	cm²	cm
OGIV 1245 L		2.67	1.08	0.73	0.48	0.41	0.225	0.1	3	24
OGIV 1252 L		1.28	1.28	0.84	0.58	0.47	0.26	0.1	3	25

\* Q: Minimum necessary air volume flow in case of technical ventilation, A: Minimum opening cross section in case of natural ventilation, d: safety zone which must be free of open flames, sparks, electric arcs or incandescent bodies. All values comply with DIN EN 50272-2.

Cut-off values in Watt per 12V-block (W/block) with different discharging times (Tn), up to the given cut-off voltage (US) at a battery temperature of 20°C:

Type RPower	Tn	1h	3h	5h	8h	10h	20h
	US=1.80V/c						
OGIV 1245 L		5.15	2.14	1.46	0.96	0.83	0.45
OGIV 1252 L		5.51	2.47	1.65	1.15	0.94	0.50



### 13 Module descriptions

Several modules which are integrated in your system or optionally available are briefly described in the following chapters. You can download detailed information on the individual modules from your dealer's homepage.

#### 13.1 Electric circuit module DCM

Eigenschaften auf einen Blick:

- 216V DC output voltage in battery operation
- 2 electric circuits per module
- 2x3A output current per module
- mixed mode in the circuit
- single luminaire or circuit monitoring in the circuit
- protection with 5A fuses (type DCM32)



Figure 72: DCM

The electric circuits of this system are slot-in cards (DCM) in the Euro card format (100x160mm). These cards can contain up to two electric circuits at the same time. When the general power supply fails, they realise the automatic transfer-switching so that the emergency power supply is switched to the electric circuit(s) of the emergency lighting or the power supply of the consumers is switched from general to battery supply. The number of electric circuits depends on the number of circuit cards. 6 circuits can be integrated. Each circuit works separately in changeover mode and can be switched separately. The electric circuits can be programmed either for maintained or non-maintained lighting. A combination of both in one circuit is also possible. Each circuit has an integrated monitoring unit for monitoring earth fault, overload, electric circuits and single luminaires. These circuits have a double pole overcurrent protection device (system protection fuses), which are also monitored in operation (fuse type: 5x20mm, ceramic tube, delay fuse, 1.500A breaking capacity). After pressing the INFO-pushbutton, the LC-display of the central control and monitoring unit (fig. 15, point 5) shows the state of the two electric circuits (A/B) of the module. By means of this display in combination with the direction, enter and function keys you can program operation mode, follow-up time, luminaire monitoring and supply time for each electric circuit.

#### 13.2 Switch query module SAM08 (optional)

Characteristics at a glance:

- query of up to 8 light switch circuits
- also usable as staircase lighting (upon request), simultaneous switch query (max. 6 switch inputs) and staircase lighting (max. 2 pushbutton circuits)
- communication via RS-485 multi-bus
- integrated terminating resistor



Figure 73: SAM08

The switch query module SAM08 is a bus-compatible light switch query module which can be used for a joint switching of emergency and general lighting. When connected to the multi-bus RS485 of the microControl *plus* emergency lighting system, it transmits the switch commands to the control computer by which the switch commands can be allocated to the respective circuits. For this purpose it has 8 galvanically isolated inputs, which are designed for a voltage of 230V AC +/- 15% and so can be connected to the light switches and circuits of the general lighting. The SAM08 module and the microControl *plus* system are connected in series (feed through wiring) via screened 4-core data line; up to 15 of these SAM08 modules can be connected via this line as one of these lines is already connected to the internal SAM08. A J-Y(St)-Y cable or similar in compliance with DIN VDE 0815 and 0816 have to be used as data line.

### 13.3 Switch query module SAM24 (optional)

characteristics at a glance:

- (7+1) reverse polarity tolerant control inputs for the query of switch positions of the general lighting by means of low and/or mean voltage
- integrated 3-phase mains monitor (active via DIP-switch)
- 2 COM-Port-interfaces for feed-through and/or star wiring
- integrated repeater function for COM-Port2 (COM<sub>boost</sub>)
- communication via RS-485 multi-bus; integrated terminating resistor



Figure 74: SAM24

The switch query module SAM24 is a bus-compatible light switch query module which can be used for a joint switching of emergency and general lighting as well as for 1-, 2- or 3-phase mains monitoring (195V AC activation voltage). When connected to the multi-bus RS485 of the microControl *plus* emergency lighting system, it transmits switch commands to the respective circuits. For this purpose it has 8 galvanically isolated inputs, which are designed for a voltage of AC 185V – 255V/50Hz or DC 18V – 255V and so can be connected to the light switches and circuits of the general lighting. The SAM24 module and the microControl *plus* system are connected in series and/or star-wired via screened 4-core data line; up to 15 of these SAM24 modules can be connected via this line as one of the available addresses is already allocated to the internal SAM08. A J-Y(St)-Y cable or similar in compliance with DIN VDE 0815 and 0816 have to be used as data line.

### 13.4 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 15 MC-LM per system (see text)
- display of a programmed message text (position in the general lighting system)
- integrated terminating resistor
- communication via RS-485 multi-bus



Figure 75: 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 a microControl *plus* emergency lighting system and they are suitable for switching the circuits in the respective DCMs. The MC-LM can monitor three phases of e.g. a mains distribution. 85% of the nominal mains voltage (230V AC), i.e. 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 microControl *plus* system in series (feed through wiring) via screened 4-core data line; up to 15 of these MC-LM can be connected via this line as one of the available addresses is already allocated to the internal SAM08. A J-Y(St)-Y cable or similar in compliance with DIN VDE 0815 and 0816 have to be used as data line.

### 13.5 MultiControl Tableau MCT-12(S) (optional)

Characteristics at a glance:

- acoustic (beep) and optical indication of the system status (LED + clear text)
- remote initiation of function tests
- communication via RS-485 multi-bus
- operation mode of the system can be changed
- maintained light consumers can be switched on/off



Figure 76: MCT-12(S)

The MCT-12 and MCT-12(S) are used as decentralised status indication units for emergency lighting systems of type microControl *plus*. The status of the system is indicated optically through LED and clear text as well as acoustically. Malfunctions are indicated by a beep which can be reset by pressing the "RESET" button. The optical error message, however, keeps being displayed. The MCT-12(S) module and the microControl *plus* system are connected in series (feed through wiring) via screened 4-core data line; up to 3 of these MCT-12(S) functional modules as well as further display modules can be connected via this line. A J-Y(St)-Y cable or similar in compliance with DIN VDE 0815 and 0816 have to be used as data line.

### 13.6 PC230 (optional)

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

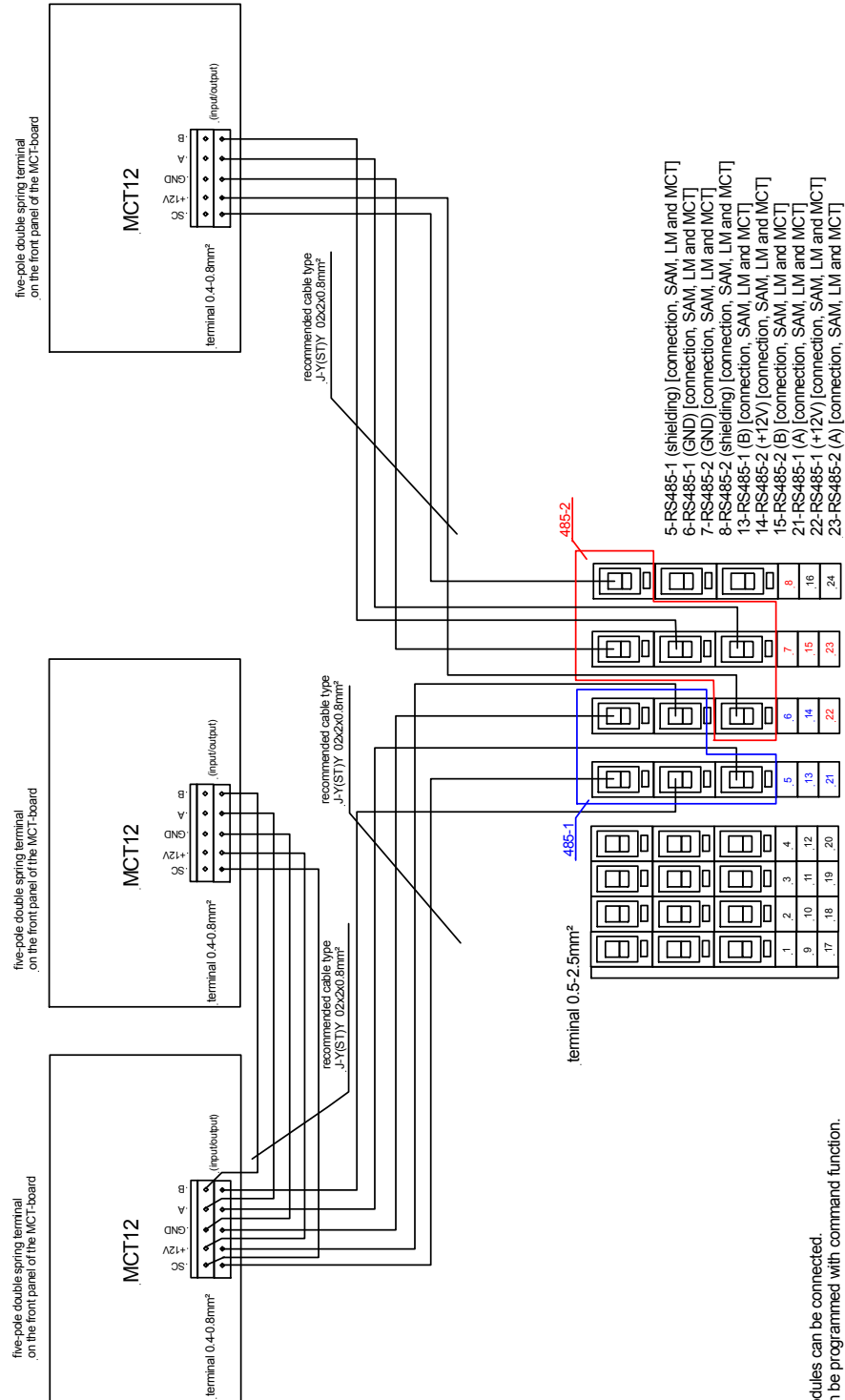
The Power-Control (PC230) monitors voltages in sub-distributions of the general lighting. Three phases can be monitored. If fewer phases are monitored, unused monitoring contacts have to be bridged with connected contacts. The upper switch threshold is set to 195 V, i.e. 15% lower than mains voltage of 230V. The status can be queried via two changeover contacts on 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).



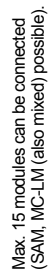
Figure 77: PC230

### 14 Connection examples

#### connection example MCT12 microControl plus, miniControl plus, midiControl plus,

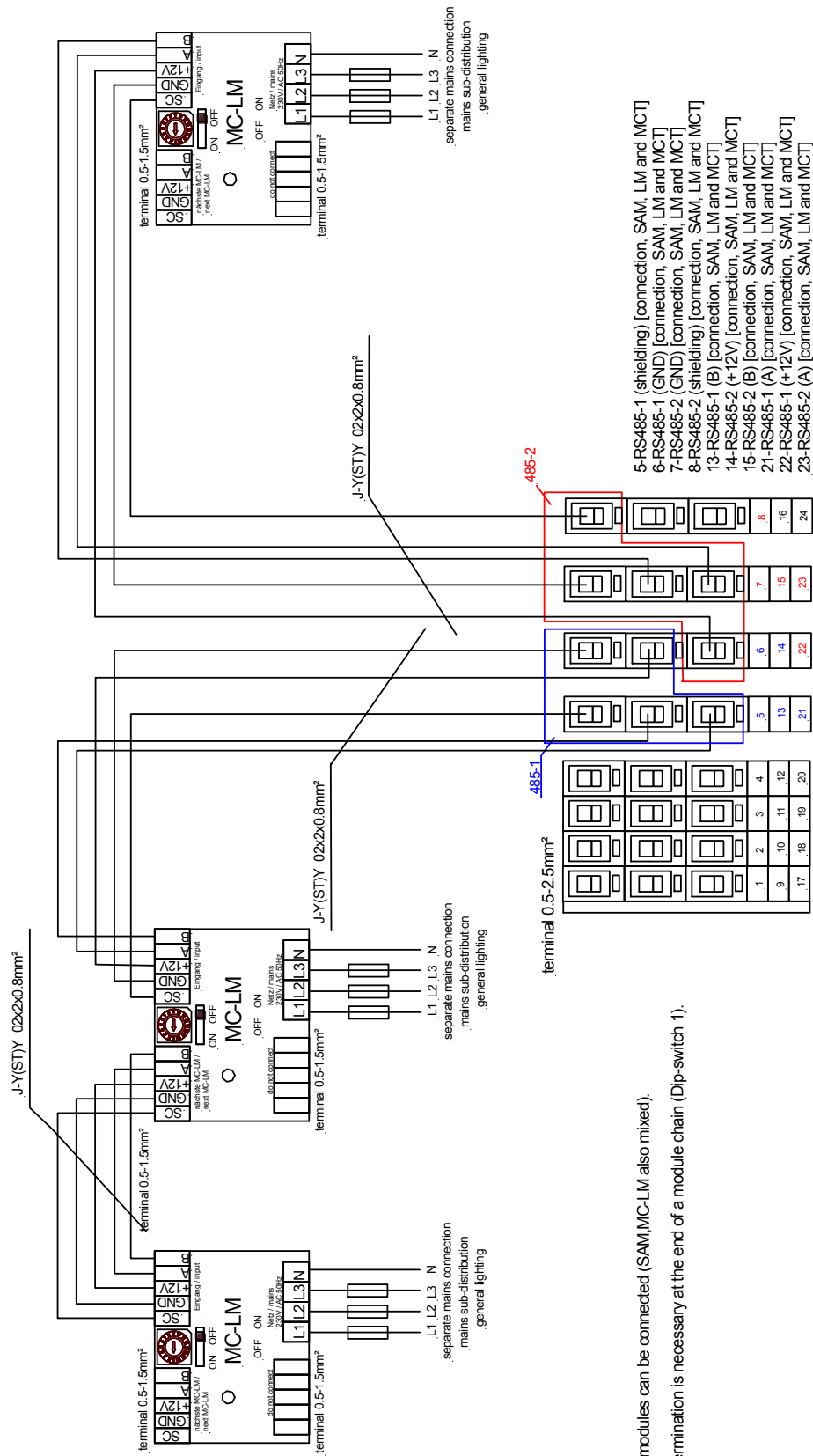


Max. 6 MCT12-modules can be connected.  
Max. 3 of them can be programmed with command function.  
A termination is necessary at the end of a module chain (Dip-switch 1).



A termination is necessary at the end of a module chain (Dip-switch 1).

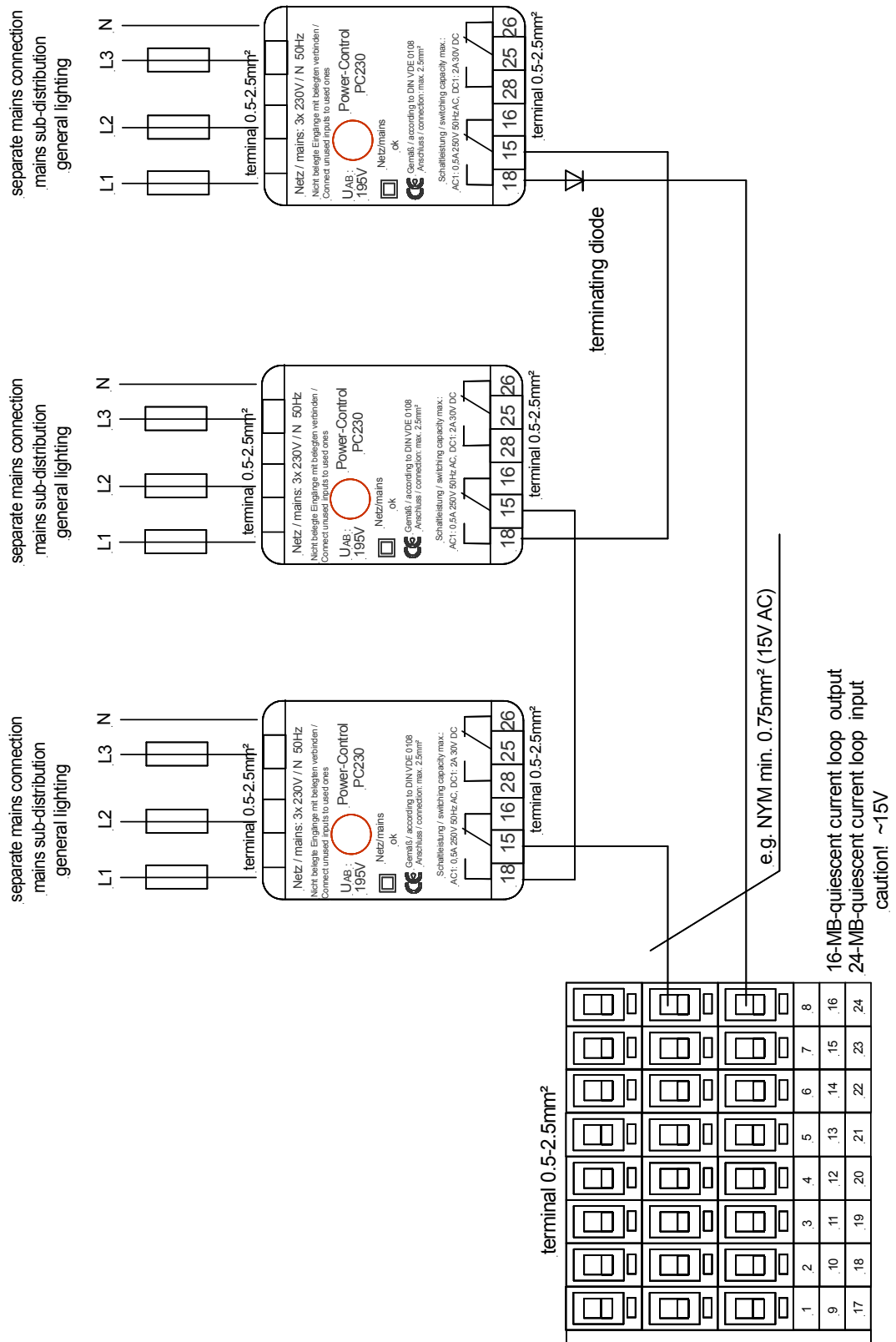
connection example MC-LM  
microControl plus, miniControl plus, midiControl plus,



15 modules can be connected (SAM, MC-LM also mixed).

A termination is necessary at the end of a module chain (Dip-switch 1).

connection example safe quiescent current loop with  
microControl plus, miniControl plus, midiControl plus,



### 15 Revision history

microControl <i>plus</i> – setup and commissioning		
version	date of issue	most important changes compared to previous version
1.0	09 May 2012	-
1.1	24 September 2012	chapter on operating, setup and carrying out tests added
1.2	07 May 2013	menu-reference added 1.6.0 (Build 895)
1.3	22 October 2013	integration of new modules (SAM24) and LDM-Update



### 13 Appendix: system specification, commissioning, notes

General Information on your system	
Device type	MI104
Device number	
Manufacturing number	
Customer order number	
Commission/Object	

System specification	
Number DCM32-modules	2
Number circuits	4+1
Protection rating	IP20
Battery type	Pb - AGM OGiV
Housing dimensions (HxWxD) in mm	660x350x230

Used battery type	
Battery manufacturer	RP-Technik Notstromsysteme
Battery type	RPower Battery- OGiV1245 / OGiV 1252
Nominal voltage $U_N$	216V
Number of cells (2V)	108
Number of blocks (12V)	18
Nominal capacity $C_{20}$	4,5Ah / 5,2Ah
Nominal temperature $T_N$	20°C
Ventilation requirements	gemäß EN 50 272-2, Abschnitt 8
Nominal discharge current $I_N$	1h - 2,31A; 3h - 0,93A; 8h - 0,37A

Modules	version number / Software
NLSR	
control centre 2	
Z2 SAM / IO	
LDM25	
DCM32	
MCT15 / 15S	
MC-LM	
BusCan Temp	

### Accessories / Options

- ☐ log printer
- ☐ glazed door
- ☐ E 30 fire protection wall mount

Commissioning	
Mounted by:	Date:
Commissioning by:	Date:
Safety signs installed by:	Date:

Notes

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