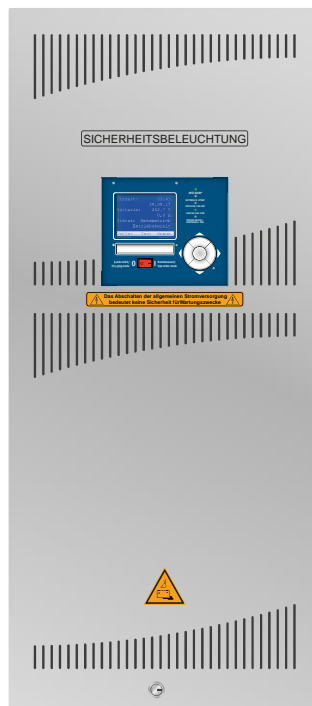


Power Supply System

myControl plus



Customer Order No.:

Manufacturing No.:

Commission/Object:

Device No.:

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1 General

This instruction manual is aimed at electrically skilled people according to DIN VDE 0105 or authorised technical staff and explains the safe and professional handling of the power supply system. The general safety regulations and the local accident prevention regulations which are valid for the area of use as well as safety instructions have to be observed. The instruction manual, especially the chapter safety, has to be read completely prior to any works on the system.

1.1 Further applicable documents

Components from other manufacturers are mounted in the systems. The manufacturers of these components carried out a hazard assessment and declared their compliance with existing European and national regulations.

1.2 Liability and warranty

This instruction manual was created considering existing standards. It has to be kept near the system and easily accessible for all staff working on and with the system.

Additionally, all laws, standards and regulations of the country, in which the system is mounted and operated, have to be observed.

The manufacturer does not assume liability or warranty for damages or consequential damages occurring through:

- non-intended use
- non-authorised or non-professional changes of the connections, settings or programming of the system
- non-observance of rules and regulations for safe operation
- Operation of unauthorised or unsuitable devices on the Low Power System

1.3 Copyright protection

All content, drawings, images, and other illustrations are copyrighted.

1.4 Spare parts

Only original spare parts of the manufacturer must be used. Wrong or defective spare parts can lead to damages, malfunctions or total failure of the system. Furthermore, the use of unauthorised spare parts voids all guarantee, warranty, service, compensation, and liability claims.

1.5 Disposal

Packaging materials are no waste but reusable materials which have to be recycled.

Batteries and electronic components contain materials which can lead to damages to health and the environment when inappropriately disposed. National rules and regulations for the appropriate disposal of used batteries and electronic components have to be observed!

2 Safety

The power supply system is safe to operate and complies with valid and recognised rules of engineering at the time of its development and production. There is, however, the risk of danger when the system is used by non-professional staff or when it is used in a non-professional or non-intended way.

The system and the connected parts must only be operated in perfect condition. The following have to be observed:

- safety instructions and hazard notes in the instruction manual
- specified work and safety instructions of the operator

Errors which influence the function or safety of the system have to be reported to the responsible person and cleared immediately.

2.1 Content of the instruction manual

Each person working on or with the system has to read and understand the instruction manual completely prior to any work on the system or battery, even when this person has already worked with this system or a similar one or has been trained by the manufacturer.

2.2 Changes and modifications of the system

Any changes or extensions to the system, which are not authorised by the manufacturer, are prohibited in order to avoid hazards and to guarantee an optimal performance of the system. Extensions, modifications or maintenance works, which are not described in the instruction manual, have to be carried out by trained service personnel only!

2.3 Responsibility of the operator

As described in point 1.2, this instruction manual has to be kept near the system and easily accessible for all staff working on and with the system.

The system must only be operated in technically perfect and operationally reliable condition. Additionally, prior to its commissioning, the system has to be checked for intactness.

2.4 Staff requirements

Only skilled technicians or authorised qualified personnel are permitted to work on or with the system after being briefed about possible hazards.

Staff are considered qualified if they are able to judge the work to be done and recognise possible hazards based on their training, expertise and experiences as well as their knowledge of the respective regulations.

If the staff lacks the necessary knowledge, they need to get a professional instruction. You also have to make sure that the tasks are clearly defined and understood and the works are carried out under supervision of skilled technicians.

2.5 Safety at work

Observance of safety notes and instructions is the basis of safe working and thus damage to persons and property while working on and with the system can be avoided.

The following organisational measures have to be defined in writing and observed:

- safety measures during the work e.g. disconnecting the power supply and securing it against reconnection, standby lighting
- protection and safety devices against hazards from neighbouring parts of the system
- protection and safety devices for personnel working on the system
- obligation to inform and report on beginning, duration and ending of the works

Observe ESD-protection while working on the system!

2.6 Personal protection equipment

Always wear protection gear while working on and with the system:

protective clothing (tight-fitting, low tensile strength, no wide sleeves, no rings or other jewellery)

safety shoes (ESD-shoes according to standard EN 345)

3 Preface

Thank you very much for buying a power supply system of type myControl *plus*! 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 4)
2. Make yourself familiar with the system design of the myControl *plus* system (chapter 5.1)
3. Mount the system and batteries and connect them (chapter 5.2)
4. Commission the system (chapter 7)
5. Program the system (chapter 8)

Chapters 6.1.1 and 6.3 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 12 and 13.

Note: The system has to be shut down by a specialist for maintenance works and modifications. The necessary steps are described in chapter 11.

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

3.1 Installation location and environmental conditions

The system and the battery system can be operated at an altitude of up to 2000m above standard elevation zero, without any power reduction, and must be placed in an appropriate room satisfying the following environmental condition:

- Air temperature: 10°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 13.1 “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.

4 Danger and information signs

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

	<ul style="list-style-type: none"> • Observe instructions and keep them located near the battery system for future reference! • Work on the battery system should only be carried out by qualified personnel! • No guaranty in cases of non-observance of instruction manual, repair using non-original parts or unauthorised intervention!
	<ul style="list-style-type: none"> • Sharp edges – risk of injury! • Cables may be damaged if touched by or rubbed against sharp edges.
	<ul style="list-style-type: none"> • Dangerous voltage
	<ul style="list-style-type: none"> • Do not smoke! Do not use any naked flame or other sources of ignition. There is the danger of explosion and fire hazards!
	<ul style="list-style-type: none"> • While working on batteries wear protective eye-glasses and clothing! • Observe the accident prevention rules as well as EN 50 272-2 paragraph 8 (version relevant on delivery)!
	<ul style="list-style-type: none"> • Any acid splashes on the skin or in the eyes must be flushed with plenty of water immediately. Then seek medical assistance. Spillages on clothing should be rinsed out with water!
	<ul style="list-style-type: none"> • Explosion and fire hazard, avoid short circuits! Caution! Metal parts of the battery are always energised; therefore do not place items or tools on the battery!
	<ul style="list-style-type: none"> • Electrolyte is strongly corrosive and acidic. In normal working conditions the contact with electrolyte is nearly impossible; electrolyte may leak from the vent valves in case of overcharging the battery or in case of mechanical damage to the container. In case of any contact with electrolyte please flush with water abundantly and seek medical assistance.
	<ul style="list-style-type: none"> • Batteries / cells are heavy! Ensure adequate mounting security and always use adequate handling equipment for transportation.
	<ul style="list-style-type: none"> • 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.

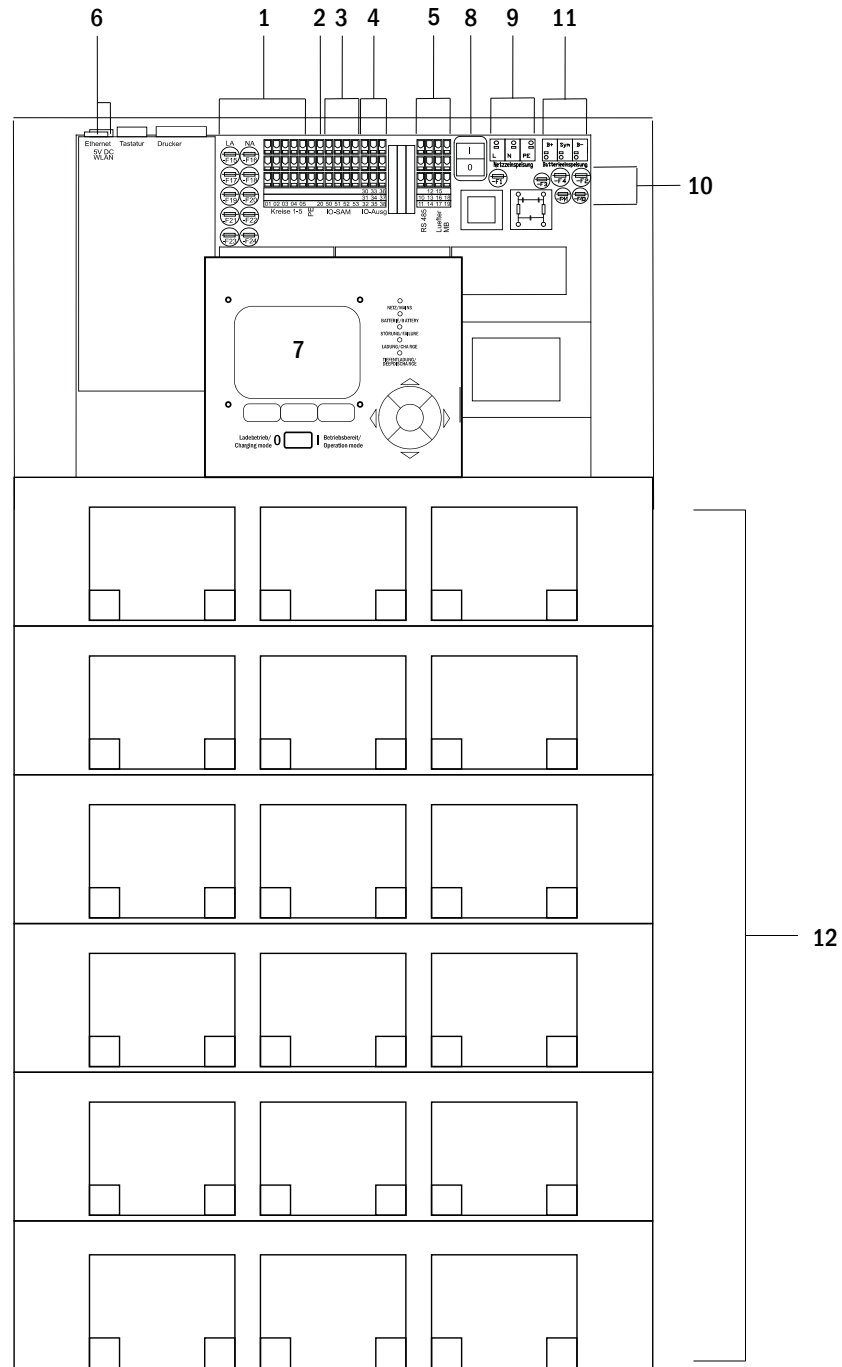
5 Scope of delivery

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

- 1x myControl *plus* system in a compact cabinet
- 18x battery type RPower 1236L/1252L
- 1x operating tool angled 2.5mm, partially insulated
- 1x connector cable set, comprising:
 - 5x tier connectors 680mm x 2.5mm²
 - 12x row connectors 150mm x 2.5mm²
- 1x brief instruction (this document)

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

- calibrated measuring device for voltage measurements for up to 500VAC or 300VDC
- slot screw driver width 5.5mm



- | | |
|---|----------------------------------|
| 1 electric circuits | 7 control unit |
| 2 IOM-input (Input/Output-module) | 8 mains switch |
| 3 SAM-inputs (Switch query module) | 9 mains supply |
| 4 IOM-outputs (Input/Output-module) | 10 fuses for mains and batteries |
| 5 communication bus (RS 485) / quiescent current loop / fan | 11 battery connection |
| 6 ethernet interface / 5V DC WLAN | 12 battery blocks |

Figure 1: Inside view

5.1 Connection of the charger and switch unit

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

5.1.1 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 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 amplification. The network cable must comply with the standard EN 50173.

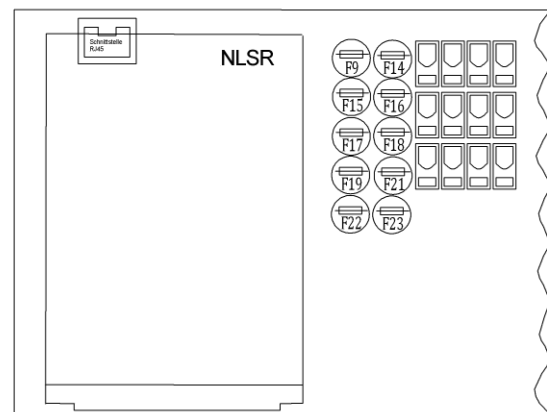


Figure 2: Ethernet interface

5.1.2 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. The following connections can be realised via these terminals:

- RS485 for SAM24, MC-LM and MCT15 (S)
- internal 24V cooler fan mit Überwachung
- quiescent current loop with CCIF

Important: For the connections of the RS485 bus, a screened 4-wire data cable must be used (e.g. J-Y(St)-Y).

For further information see the table below or chapter 14 "Module descriptions".

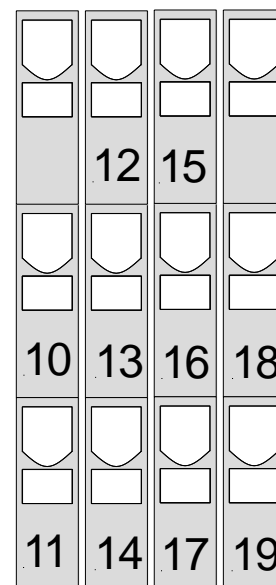


Figure 3: Communication terminals

port name	terminal	contact allocation	port for
RS485	10	B	SAM24, MC-LM, MCT15 (S)
	11	A	
	12	Schirm	
	13	GND	
	14	+18V	
internal cooler fan	15	monitoring	Internal cooler fan with monitoring line for E30 cabinets
	16	GND	
	17	+24V	
quiescent current loop with CCIF (diode)	18	AC-low voltage	external mains monitor (PC230) using potential-free relais contacts
	19	AC- low voltage	

5.1.3 Connection of opto-/relay interface modules (IOM)

The integrated input/output module (IOM) allows the system to transmit error and status messages of the power supply system to external checking and monitoring devices. It has three outputs and one reverse polarity tolerant multi-range voltage input (20V... 255V DC or 200V...255V AC/50Hz).

Fig. 4 shows the respective terminals.

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

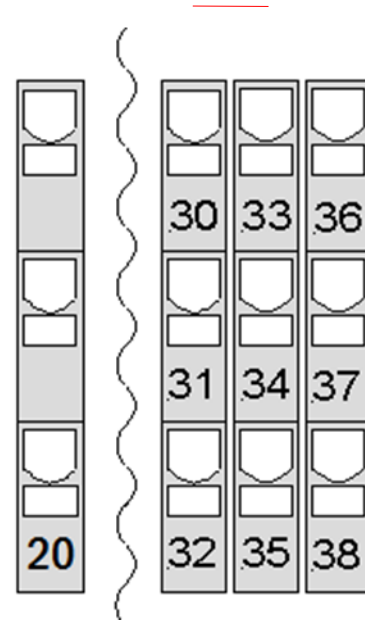


Figure 4: Inputs and outputs IO-module

IO-outputs

terminals	system state	closed contacts	message
30, 31, 32	system operating mode	31 - 30	mains operation
		31 - 32	battery operation
33, 34, 35	system operating status	34 - 33	charging mode (emergency lighting blocked)
		34 - 35	operational
36, 37, 38	system status	37 - 36	normal operation
		37 - 38	Cumulative fault

IO-inputs

terminal	function	voltage on	no voltage
20	external operating mode selection/ lighting circuit deactivation*	configurable	configurable

* The function of this input be configured (see section 8.11.4).

5.1.4 Connection of switch inputs (SAM)

The switch query module allows the transmission of external switch commands of the general power supply. Fig. 5 shows the corresponding terminals which accommodate wire cross sections (solid-core) from 0.5mm² to 2.5mm².

There are 4 reverse-polarity tolerant inputs (50-53) accepting various voltages (20V...255V DC or 200V...255V AC/50Hz switch voltage). For the connection please use mains voltage compatible cables which comply with DIN 57250-1 VDE 0250-1 as well as MLAR, EitBauVo and DIN VDE 0100.

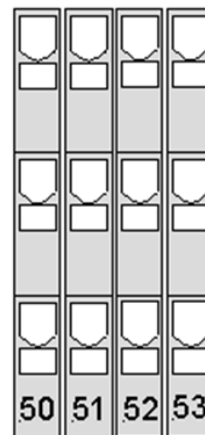


Figure 5: SAM-inputs

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

5.1.5 Connection of electric circuits

The four electric circuits are connected via 3-level spring-loaded terminals (see fig. 6, terminals 01...04), which are located on the back plane (see fig. 1, point 1). The terminals are designed for wire cross sections (solid-core) from 1.5mm² to 2.5mm². Correct polarity is essential. For the connection please use mains-voltage compatible cables according DIN 57250-1 VDE 0250-1 as well as MLAR, EltBauVo and DIN VDE 0100. Terminal 05 provides an auxiliary circuit (see next section).

Note: Prior to connecting to the system, the circuits must be checked for installation faults (short circuit and earth fault).

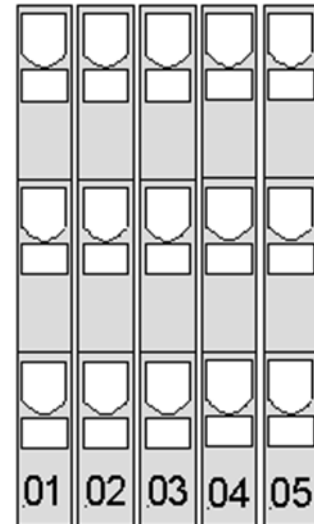


Figure 6: Electric circuits

5.1.6 Auxiliary circuit

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 250VA. The auxiliary circuit does not provide single-luminaire and circuit monitoring but can be programmed as maintained or non-maintained light circuit. Also, it can be assigned external switch commands via switch query modules or bus-compatible mains monitors.

5.1.7 Mains switch

Fig. 7 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.

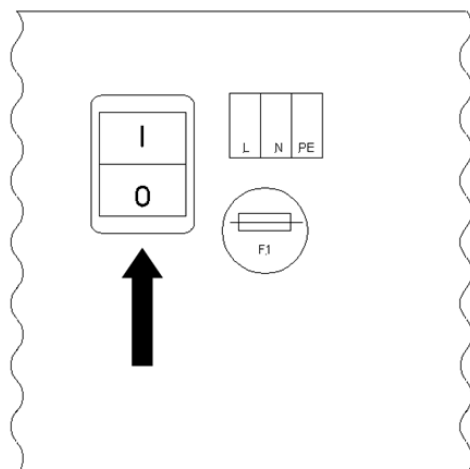


Figure 7: mains switch

5.1.8 Fuses mains/battery supply

Fig. Figure 8 shows the main fuses for mains and battery voltage, which are located on the back plane inside the cabinet:

- F1 mains fuse
- F2 battery fuse (B+)
- F3 battery fuse (symmetry)
- F4 battery fuse (B-)
- F10 fuse of battery fuse monitoring (B+)
- F11 fuse of battery fuse monitoring (B-)

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!

Fuse size:	F1	F2	F3	F4	F10	F11
5x20	T6,3A	T4A	T1A	T4A	T1A	T1A

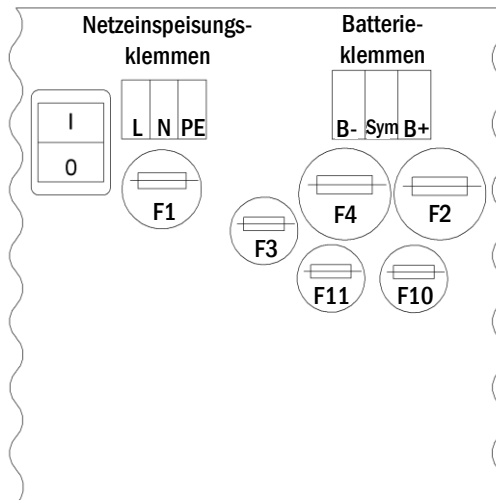


Figure 8: Fuses for mains and battery supply, and fuses of the battery fuse monitoring

5.1.9 Mains supply

The terminals shown in fig. 9 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 4mm².

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

Note: The mains connection must be equipped with two-fold selective fuses (i.e. fuse size 20A). An FI-switch must not be used.

Recommendation: For mains supply, please use three-core NYM-J cable with a cross section of min. 3x1.5mm² up to max. 3x4mm². When choosing the cable cross section, make sure to consider the cable length in order to keep the voltage losses inside the allowed limits.

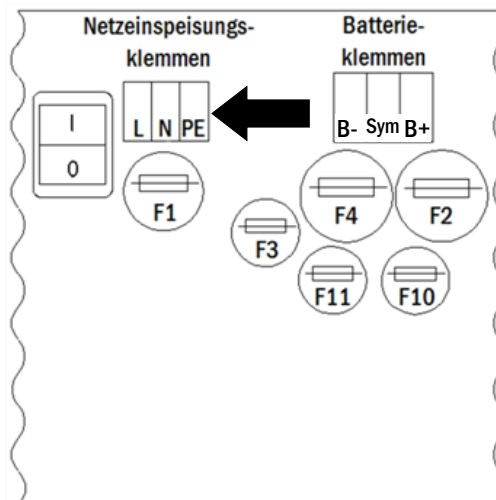
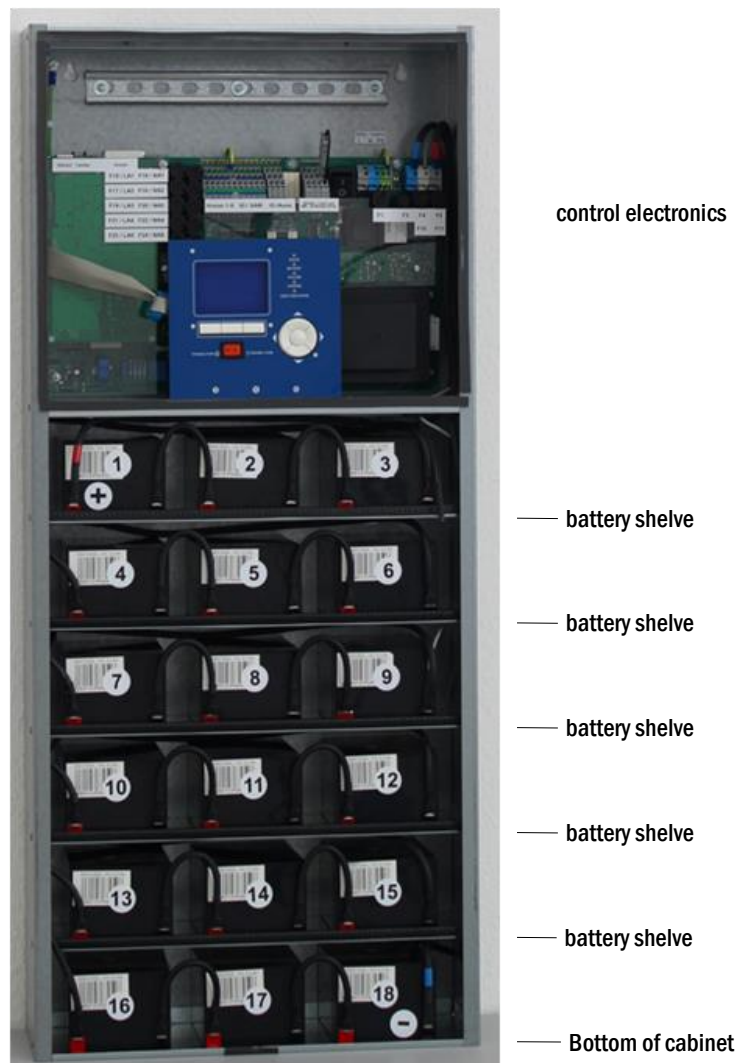


Figure 9: Mains supply terminals

5.2 Mounting and connection of the battery system

5.2.1 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 EltBauVO. Make sure that the battery fuses (see fig. 8) have been removed. Mount the batteries on the respective shelves of the cabinet according to fig. 10 and fig. 11 with the faston connectors pointing downwards. The temperature difference between the battery blocks must not exceed 3°C. The distance between the battery blocks should be at least 5 mm.



front view

Figure 10: Mounting and connection of the battery blocks 12V 4.5Ah

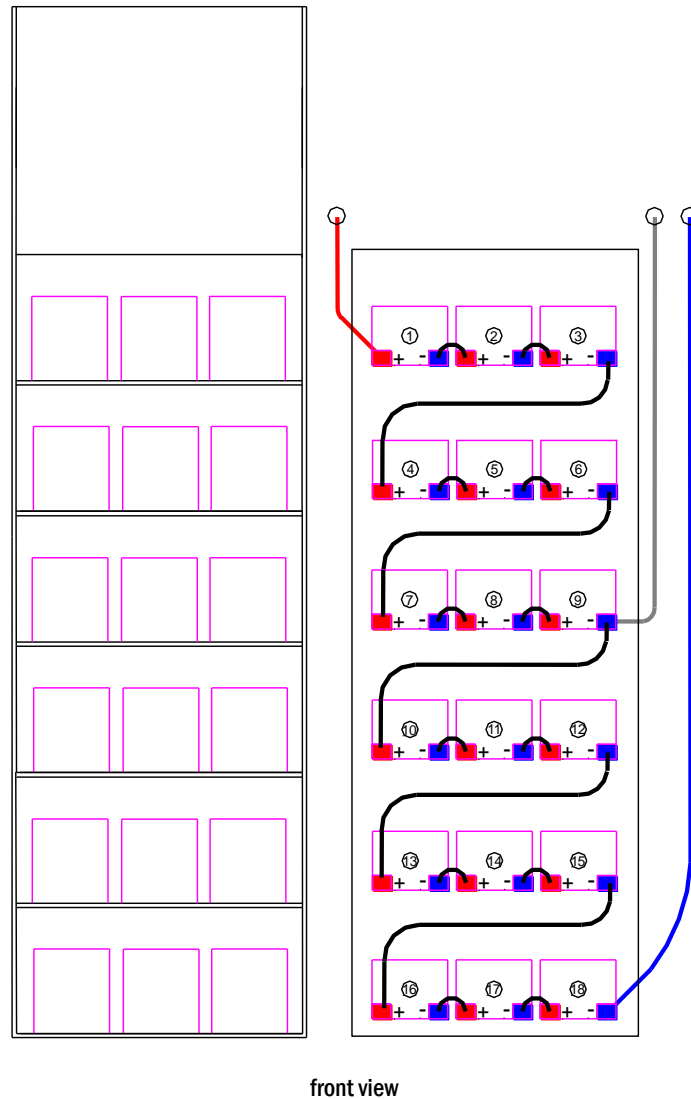


Figure 11: Mounting and connection of the battery blocks 12V 5Ah

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

5.2.2 Connection of battery blocks

Remove the battery fuses F2 and F4. Connect the battery blocks in row as illustrated in fig. 10(b) or fig. 11(b). After that connect the cables coming from the battery terminal (fig. 1, point 15) according to fig. 10(b) or fig. 11(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).

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

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.

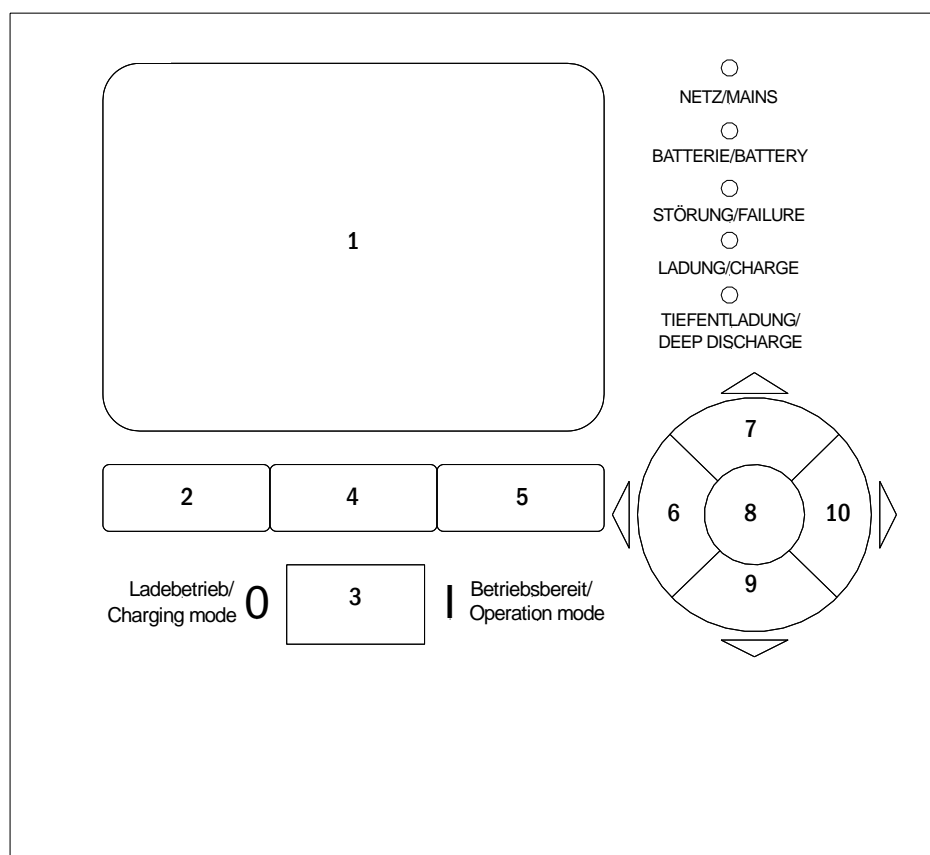
6 Operating your system

6.1 Control elements

6.1.1 The central control and monitoring unit

The central control and monitoring unit is the main control element of this emergency lighting system (fig. 12) 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 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.



- | | | | |
|---|---------------------------|----|-----------------|
| 1 | LC-display | 6 | arrow key left |
| 2 | function key F1 | 7 | arrow key up |
| 3 | operation mode switch BAS | 8 | enter key |
| 4 | function key F2 | 9 | arrow key down |
| 5 | function key F3 | 10 | arrow key right |

Figure 12: Central control and monitoring unit

6.1.2 Electric circuit modules

The four circuits and the auxiliary circuit are driven by integrated circuit modules located on the backplane.

6.1.3 Charger unit LDM25

The charger module LDM25 used for charging the integrated batteries has an own processor and can work completely self-sufficiently if mains voltage is supplied. This module has an output current limited to 0.5A (in case of 5.2Ah batteries) or 0.325A (in case of 3.6Ah batteries) 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 (2,5AT, 5x20mm) protects the unit from short circuit in case of a defect and prevents a battery overcurrent.

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

Note: The charger unit can be adjusted to different system designs (output current, battery type) by means of jumpers.

6.2 General operating instructions

Your system can be operated and configured completely via the front control elements (fig. 13). For text input (e.g. circuit denomination) we recommend connecting an external keyboard to the PS2-interface of the control electronics inside the cabinet.

The LCD-screen (1) displays **Menu**s and **Information**. In the bottom line you can see - if active - the **Softkey-Functions** which are reachable via the 3 keys (2). For navigation and data input please use the arrow keys \triangle , ∇ , \triangleleft and \triangleright (3) as well as the enter key \circ (4). The up \triangle and down ∇ keys are mostly used for selecting menus and input fields. A selected menu item is indicated by **inverted colouring**. The right \triangleleft and left \triangleright keys are used to change values; in some cases you have to confirm your input with the enter key \circ . An arrowhead \blacktriangleright on the right indicates a submenu which can be selected with the right \triangleright or enter \circ key. You can return from there using the softkey **back** or **done**.

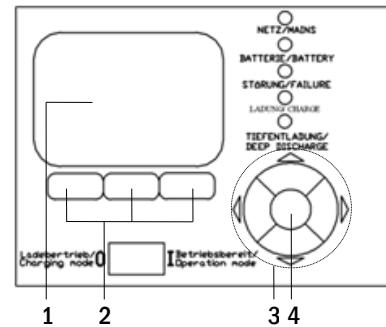


Figure 13: Control elements

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.

Note: The arrow keys \triangle , ∇ , \triangleleft and \triangleright (3) and the enter key \circ (4) on the control unit correspond to the arrow and enter keys of an external keyboard. The softkeys (2) 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 10.11.7 "Authorisation, login with password, logout". 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 10.12 "Show contact address".

6.3 Menu – quick reference guide

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

* not functional with this system type

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).

7 Commissioning of the power supply system

After you have mounted the system observing chapters 5.1 and 5.2, connected the batteries and connected the de-energised mains cables, follow these instructions:

Caution! The internal circuit terminals are energised. That is why all fuses of the integrated modules (fig. 1, point 1) 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. 12, point 3) to charging mode (position "0").
- 2. Insert battery fuses F2/F4.** Insert the battery fuses (fig. 8) again.
- 3. Supply mains power.** Supply mains power and check the power terminals for correct configuration (fig. 9) 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. 8). Switch on the mains switch (fig. 7).

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. 12, point 1) should look like this:

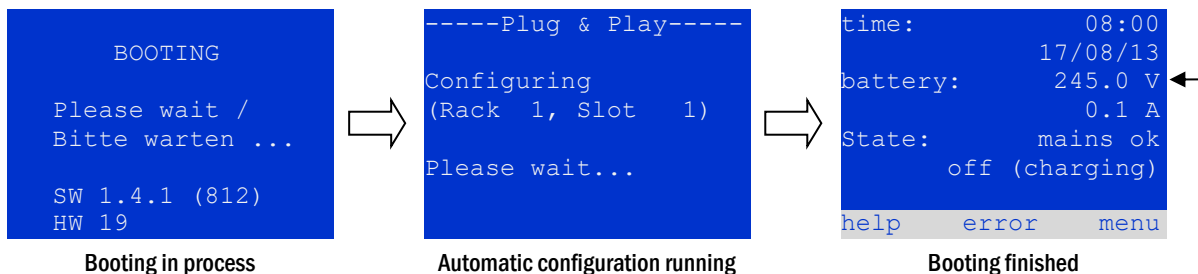


Figure 14: Boot process (left, middle) and status message (right).

- 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. 14, right image, arrow).

- 7. Insert circuit fuses.** However, obey the following "Caution" item first.



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. Operation mode switch to "ready to operate".** Turn the operation mode switch (fig. 12, point 3) to "ready to operate" (position "1"). This activates the electric circuits.

- 9. Check voltage at circuit outputs.** Circuits programmed for maintained mode should have a voltage corresponding to the AC mains voltage. Check the voltage on each circuit terminal (fig. 1, point 1). The measured voltage of each circuit should correspond to the mains AC voltage.

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

8 Checking the system state and basic settings

8.1 System state

After commissioning the LC-display shows the state of the system (fig. 15) 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          error  menu -8
```

Figure 15: 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 10.5.3)
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	Failure during communication with integrated circuit or charger modules
DCM fault	DCM failed
IOM fault	IO-module failed
battery fuse	battery fuse defect
battery temperature	battery temperature out of tolerance
bat.temp.sensor	battery temperature sensor error
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 fault	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.)
fan failure	fan failed
BMS gateway comm.	communication failure between central control unit and BMS gateway
Overload	Overload during test or battery operation; circuits were disabled

8.2 Selecting circuits and checking their status

In order to have the status of a circuit displayed, press the right-hand soft key **menu** (fig. 15, point 8) , select **diagnosis** using the up Δ and down ∇ keys, press \triangleright , select **modules** using the up Δ and down ∇ keys, and press \triangleright , then select **circuit modules** using the up Δ and down ∇ keys and press \triangleright .

The display now shows the following information regarding circuits 1 and 2 (fig. 16):

- 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. 16 for circuit A with number **1**). With the up Δ 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 circuits (3, 4, and 5). Pressing \triangleright or Enter \circ 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. 16, point 3):

```

---DCM 32-H06-S026---
A: circuit      1 > -1
P =    0W (    0W) -2
ok              -3
B: circuit      2 > -1
P =    0W (    0W) -2
ok              -3
                    test  back
    
```

Figure 16: Circuit status

Status	Explanation	Measure
OK	The circuit works correctly.	-
fuse defect	The circuit fuse 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.	none
error	other failures	select module again

8.3 Viewing and changing of further circuit settings

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

In order to have the status of a circuit displayed, press the right-hand soft key **menu** (fig. 15, point 8), select **installation** using the up △ and down ▽ keys, press ▷, select **modules** using the up △ and down ▽ keys, and press ▷. This takes you to the circuit status display (fig. 17) with the following information:

- 1 – number of circuit (fig. 17, 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. 17, 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. 17, point 3). With ◀ and ▶ you can select the following operation modes:

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

- 4 – monitoring mode (sub-menu) (fig. 17, point 4). You can reach the setup screen for the monitoring mode with ▷ or Enter ○ (see next chapter 6.3.1).
- 5 – name (two lines) (fig. 17, 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. 18). You finish the input by pressing Enter ○ or done. Tip: Use an external keyboard for entering the names.

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

Figure 17: Circuit status

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

Figure 18: List of all available characters

***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” (1) for switching back from battery operation.

8.3.1 Setting the circuit monitoring mode

Starting from the screen described in the previous section, press ∇ to select **monitoring** and then press \triangleright to switch to the monitoring setup screen (fig. 19). This screen shows the number of the circuit in the top line (fig. 19, point 1). Using the keys \triangle and ∇ you can reach the following setup options:

- 1 - Number of luminaires with single luminaire monitoring existing in the circuit, settable from **01** to **20**. This number corresponds with the total 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, default setting/recommended), **5%**, **10%**, **20%**, **50%** (fig. 19, point 2).
- 3 - measuring of the reference current (fig. 19, 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
back
    
```

Figure 19: Setting of the circuit monitoring

8.3.2 Programming the SAM-module

Pushing the softkey **next**/F2 takes you to the menu for programming the SAM and the supply time (in battery operation) (Figure 20). If you select the line **supply:** using the keys \triangle or ∇ (Figure 20, 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 >** (Figure 20, point 1) using \triangleright or Enter \circ takes you to the table shown in Figure 21. For navigating within the table use \triangle , ∇ or Enter \circ . In each line you can change the following settings using \triangleleft or \triangleright :

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

The softkey **back** takes you back to the previous display (Figure 20). Now push the softkeys **done** and **back** in order to leave the programming. A confirmation prompt appears (Figure 22). 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
back
    
```

Figure 20: SAM-programming

```

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

Figure 21: SAM-programming

```

-----modules-----

save
changes?

yes no
    
```

Figure 22: 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. 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.

8.4 Checking the state of the charger unit

Press the right-hand soft key **menu** (fig. 15, point 8), select **diagnosis** using the up Δ and down ∇ keys, press \triangleright , select **modules** using the up Δ and down ∇ keys, and press \triangleright , then select **charger unit** using the up Δ and down ∇ keys and press \triangleright . Now the following parameters of the charger unit are shown (see fig. 23): number of the LDM-MY (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 display screens \triangleleft and \triangleright . The following table explains possible error messages (fig. 23, point 3):

```

---LDM MY-H07-S035---
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
  details      back
    
```

Figure 23: state of charger unit

State	Explanation	Measure
fuse tripped	overcurrent/short circuit	Check fuse Fsec. on the LDM-MY.
over temperature	charger unit overheated	Check cabinet ventilation. Contact your dealer or service.
operation mode switch activated	output voltage of operation mode switch is 260V or higher	Contact your dealer or service.
Charger off	The charging module was switched off because the temperature in the battery compartment was > 40°C	Bring temperature down to 20-25°C by venting or air conditioning.

Note: In case of a charger failure an error message is shown in the status display (see chapter 8.1).

9 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.

9.1 Execution of a function test

State → test/F2

When the display shows the system state (see chapter 8.1), press test/F2 in order to start a function test. If the softkey test is not shown, 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. 24, 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. 24, 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. 24, point 3).

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

At the beginning of the actual test the display shows the message “under test” (fig. 25, point 2). A detected error is shown in line 3 (fig. 25, point 3).

After finishing the test the display shows a summary for a few seconds (fig. 27, 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 9.3).

```
-----manual test-----
circuits: 001 - 005      -1
preparing test          -2
please wait ...         -3
cancel                  -4
```

Figure 24

```
-----manual test---
circuits: 001 - 005      -1
under test              -2
please wait .....      -3
cancel                  -4
```

Figure 25

```
-----manual test-----
circuits: 001 - 005      -1
under test              -2
circuit error           -3
cancel                  -4
```

Figure 26

```
circuits: 001 - 005      -1
test finished           -2
circuit error           -3
cancel                  -4
```

Figure 27

9.2 Programming automatic function tests

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

In the state display press menu/F3 and navigate with Δ and ∇ to configuration, press \triangleright or Enter \circ , and navigate with Δ and ∇ to function test. Then press \triangleright or Enter \circ again. Now you are in the function test display (fig. 28). 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
                        -
done
```

Figure 28: Test programming

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

9.2.1 Setting the schedule

function test → Δ / ∇ schedule → Enter \circ

Fig. 29 shows the display after selecting schedule with \triangleright or Enter \circ . The following settings are possible:

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

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

done
```

Figure 29: Setting schedule

The softkey done/F3 finishes the input and takes you back to the function test display (see chapter 9.2).

9.2.2 Activating/deactivating the preheating phase and finishing the programming

function test → Δ / ∇ preheat

After selecting this line you can set the preheating phase to off, 5 minutes or 30 minutes prior to a test using \triangleleft and \triangleright . Afterwards you finish the test programming with the softkey done/F3. The confirmation prompt save changes? appears if any changes were made. If confirmed with yes/F1, the new settings are saved.

9.3 Displaying 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 an overview of the saved results of function or capacity tests (see Figure 30: Test results (survey)):

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

By pressing ▷ or Enter ○ after selecting a category with △ and ▽ you can see information on the selected test (see Figure 31). The display shows the type of test (Figure 31, point 1), execution date and time (Figure 31, point 2), the number of tested lamps (Figure 31, point 3) as well as the battery characteristics (Figure 31, point 4). If there are results of several tests, you can browse them with △ and ▽. When circuit monitoring is activated, these circuits are displayed as well.

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

The menu item print test log (Figure 30, point 5) lets you print the saved data of the test log using an external printer connected to the Centronics interface.

```

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

Figure 30: Test results (survey)

```

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

Figure 31: Info function test

9.4 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 Figure 32.

- 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
                        clear    -2
                        error messages ?
                        yes      no
    
```

Figure 32: Reset errors

10 Menu reference

10.1 Main menu

State → `menu`/F3

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

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

Figure 33: Main menu

10.2 Diagnosis

State → `menu`/F3 → $\triangle\nabla$ `diagnosis` → Enter \circ

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 >
menu
```

Figure 34: Diagnosis menu

10.3 State of battery and manual activation of a capacity test

State → `menu`/F3 → $\triangle\nabla$ `diagnosis` → Enter \circ → $\triangle\nabla$ `battery` → Enter \circ

This sub-menu informs about the connected battery (capacity, voltage, current and battery room temperature). The softkey `cap-test`/F2 starts the pre-scribed 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
cap-test  back
```

Figure 35: State of battery

10.4 State of mains supply

State → `menu`/F3 → $\triangle\nabla$ `diagnosis` → Enter \circ → $\triangle\nabla$ `mains` → Enter \circ

Display with all voltage values of all phases of the connected power supply. The left column shows the instantaneous value and the right column shows the minimal and maximal values measured so far. A value bigger than 3V 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
back
```

Figure 36: State of mains supply

10.5 State of the modules (circuits/charger/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 >
menu
```

Figure 37: Menu for module diagnosis

10.5.1 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).

```
---DCM 32-H06-S026---
A: circuit 1
P = 0W ( 3W)
failure
B: circuit 2
P = 0W ( 8W)
failure
test back
```

Figure 38: State of DCM/ACM-modules

10.5.2 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 can be found in chapter 8.4.

```
---LDM 25-H07-S035---
charging unit 1
(rack 1, slot 6)
float charge
I: ( 0,0) -, -A
P: ( ---,-) ---,-V
T: -, -C
back
```

Figure 39: State of charger modules

10.5.3 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) internal input-output module (IOM). Displayed states:

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

Figure 40: State of SAM/IOM modules

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

Above the softkeys (Figure 40) a description of the selected (Δ and ∇) input is shown; the message **not installed** indicates that the detection of SAM modules failed or was not carried out.

10.6 State of the sub-distributions

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

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

10.7 State of the subsystems

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

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

10.8 System information & system log

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 (Figure 41). 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 41: System information

The key parameters page (Figure 42) 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
done
```

Figure 42: System key parameters

In the log (Figure 43) you can select (△ and ▽) a year; pushing ▷ or Enter ○ takes you to the entries made in the selected year. The table on the next page shows an overview of the possible messages the system log may contain.

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

Figure 43: System log

Table 1: System Log Messages

Message	Description
ACM fault <slot>	ACM failure in slot <slot>
act fail	Activation of system failed
act ok	Activation of system was successful
activation	Activation of system required
BAS BB	System operation mode changed to „ready to operate“
BAS LB	System operation mode changed to „charging mode“
BAS MB	System operation mode changed to „modified / ready to operate“
bat. center volt. (<value >)	Invalid symmetry voltage (voltage value)
bat. current (<value >)	Invalid battery current (current value)
bat. discharge (<value >)	Invalid battery discharge (current value)
bat. fuse	Battery fuse blown
bat. temp. < value >	Invalid battery temperature (below +10°C or above 50°C)
bat. temp. sensor	External battery temperature sensor does not respond
bat. voltage (<value >)	Invalid battery voltage (voltage value)
bus scan	Modules were detected
cc	Critical circuit was opened
cc ok	Critical circuit was closed again
cir init	Circuits were initialized
circuit current fault	Current monitoring detected an invalid current
circuit fault	Circuit error detected
ctest	A capacity test was initiated
DCM fault <slot>	DCM failure in slot <slot>
deep discharge 1	Deep discharge, level 1
deep discharge 2	Deep discharge, level 2
defrag	File system was defragmented
earth (<value>;<flag>)	Earth fault in circuit module detected (internal measurement values)
earth-b (<value >;<flag>)	Earth fault in NLSR detected (internal measurement values)
e-mail	Email was sent
e-mail fault	An error occurred when sending an email
format fs	File system was formatted
ftest	A function test was initiated
glt <revision>	BMS gateway detected (revision)
glt gateway	BMS gateway fault
IOM fault <nr>	IOM fault in module #<nr>
L1/L2/L3/N fault	Faulty mains connection, detected non-zero voltage on N-line
lamps <circuit>/<luminaire>	Luminaire fault summary
LDM fault <slot>	Charger failure in slot #<slot>
LDM jumper fault	LDM jumper setting for charging current does not match the detected configuration
LDM revisions	Incompatible versions detected between multiple charging modules. The version must be either smaller than SW 35 or bigger or equal SW 35 in all modules at the same time.
login master	Master-login was carried out
login service	Service-login was carried out
luminaire fault	Luminaire fault detected
mains <L1>V <L2>V <L3>V <N>V <duration>m	Mains failure and return, with voltage values and duration of the power failure
mains fault	Mains failure (configured as error)
mains mb '<sam input>'	System entered into modified non-maintained mode (SAM input)
mains mb ok	System ended the modified non-maintained mode
mains ok	Mains return
maintenance	Maintenance successful
mb fault	System entered into modified non-maintained mode (configured as error)
new firmware	A firmware update was carried out
no TCP/IP sockets	No more TCP/IP sockets available. The WebInterface cannot be accessed.
overload fault <n>	Circuits module is operated with a current above the maximum allowed limit. (Range determined by fuse size)
PCM fault <slot>	PCM failure in slot <slot>
PnP err. <slot>	Plug&Play error in slot <slot> (can occur while configuring the circuit modules or reading from the charging modules)
reset errors	Errors were acknowledged
RS485 fault	RS485 BUS error (SAM, MC-LM)

RSM fault <slot>	RSM error in slot <slot>
RTC error <n>	Real-time clock error (error code)
SAM fault <nr>	SAM error in module #<nr>
subsystem <nr> fault	Substation failure #<nr>
subsystem <nr> mains	Mains failure #<nr> in substation
subsystem <nr> mb	Substation #<nr> entered modified non-maintained mode
system rebooting	System was re-bootet (warm start)
system started <SW version> <HW version> <serial no.>	System was switched on (cold start or warm start)
TCB <cmin> <cmax> <bmin> <bmax>	Measured temperatures: Daily minimum and maximum temperature for cabinet (<cmin> <cmax>) and battery (<bmin> <bmax>)
test <a> cf: ok:<c> lf:<d> ok:<e>	Test result summary with errors a: earth-fault detected b: count of defect circuits c: count of circuits with test result "OK" d: count of defect luminaires e: count of luminaires with test result "OK"
test locked	Function and capacity tests are blocked because the preconditions are not met.
total current fault <wert>	Total current monitoring
uv-c fault <nr>	Sub-distribution fault
uv-c mains <nr>	Mains failrue in sub-distribution

10.9 Detecting all modules

State → menu/F3 → $\Delta \nabla$ installation → Enter ○ → $\Delta \nabla$ detect modules → Enter ○

Internal and external modules have to be detected such that the central control and monitoring unit can recognise and monitor them. For this, select **detect modules** in the menu **installation** and press Enter. The module detection is carried out if you now press the softkey **scan**/F2 (login required). 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.

```

-----installation-----
modules >
calibrate c-monitor >
lamps >
service >
detect modules >
operation mode >
menu
    
```

Figure 44: Detect modules

Note: When the system is delivered, all modules have already been detected so that a new detection is only necessary after external modules (SAM, MC-LM) have been added.

10.10 Select operation mode

State → menu/F3 → $\Delta \nabla$ installation → Enter ○ → $\Delta \nabla$ 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.

```

-----operation mode-----
present mode:
BAS/MCT/BMT control
menu
    
```

Figure 45: Select operation mode

In the menu shown in Figure 45 you can select the following settings with \triangleleft and \triangleright :

Setting	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.

10.11 Configuration and administration

State → menu/F3 → Δ ∇ configuration → Enter \circ (→ Δ ∇ administration → Enter \circ)

In the menu configuration (Figure 46) as well as the submenu administration > (Figure 47) 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 46: Configuration menu

```

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

Figure 47: submenu "administration"

10.11.1 Network settings and master-slave-monitoring

State → menu/F3 → Δ ∇ configuration → Enter \circ → Δ ∇ administration → Enter \circ → Δ ∇ network → Enter \circ

The network menu (Figure 48) 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 (Figure 49)

The network connector (RJ45) of this system is located on the control unit board (see section 5.1.1).

In the menu ip addresses (Figure 49) under the menu item "adapter" (Figure 49, point 1) the interface is pre-configured as front and cannot be changed. Now the buttons Δ and ∇ let you make the following settings: You can set the IP-address (ip), subnet mask (Mask), Gateway and DNS. Use the buttons \triangleleft and \triangleright to select the different characters and change them with Δ and ∇ . With Enter \circ you finish the input, so that you can use the keys Δ and ∇ for selecting the other lines 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.

```

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

Figure 48: 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
done
    
```

Figure 49: submenu for setting ip-addresses

Note: New settings become effective after rebooting the system.

Submenu communication (Figure 50)

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 (master) monitors all other systems (slaves). To achieve this in master and slave systems the status query in the menu communication (Figure 50) has to be set to on (Figure 50, point 1). Additionally, the IP-addresses of all slave systems have to be entered in the master system (Figure 50, 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.

```

----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
done
    
```

Figure 50: IP-addresses of monitored systems

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

10.11.2 Setting the LCD contrast

State → menu/F3 → Δ ∇ configuration → Enter ○ → Δ ∇ administration → Enter → Δ ∇ 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 by pressing **yes**/F1.

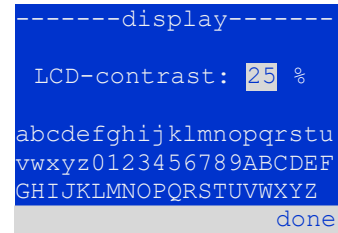


Figure 51: Setting the LCD-contrast

10.11.3 Timer settings

State → menu/F3 → Δ ∇ configuration → Enter ○ → Δ ∇ administration → Enter ○ → Δ ∇ 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.). The top line of the time screen (Figure 52, point 1) shows the number of the selected timer (right-hand side) as well as its current state (**timer inactive**/**timer active**, middle).

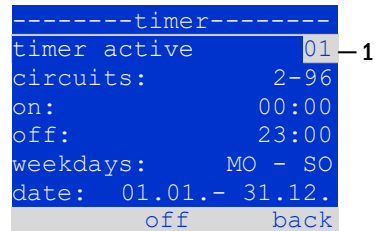


Figure 52: Timer programming

Every timer allows for the following settings:

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

The setting to be changes is selected using the Δ and ∇ 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.

10.11.4 Programming the IOM inputs

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

The IO-module of the myControl *plus* system has two voltage inputs. Inputs IOM1.E1 is hard-wired to terminal 20 (see section 5.1.3), while input IOM1.E2 is only available on the backplane; it is intended for the connection to an external cooling fan. The following table lists the available functions for both inputs.

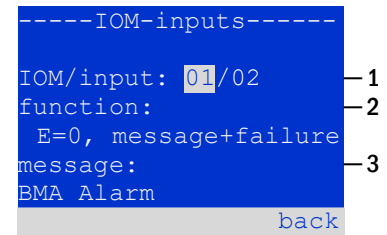


Figure 53: Programming of the IOM-inputs

Input/Setting	Function/Description
Input IOM1.E1	
-	The input has no function.
BAS	External operation mode selector (BAS) (input without voltage: operational; voltage applied to input: charging mode).
circuits off	Switches off all circuits (input without voltage: all circuits off; voltage applied to input: circuits in normal operation).



Caution: This function is security-relevant. When this function is used, the installer must provide sufficient means assuring that the control voltage applied to the input will be maintained even during mains power failure, because otherwise the emergency lighting function is not assured.

Input IOM1.E2	
-	The input has no function.
E=0, Meldung	If the input is without voltage, a configurable message is displayed (Figure 53, number 3).
E=0, Meldung+Störung	If the input is without voltage, an error message and a configurable message is displayed (Figure 53, number 3).

After selecting the IOM input to be programmed (Figure 53, number 1) the desired function can be selected (Figure 53, number 2). Also a message text can be set (Figure 53, number 3).

Choose the setting you want to change using Δ and ∇ ; values can be changed using \triangleleft and \triangleright . To enter a message text, press enter ○ after selecting the message line; do so also to conclude the text input. The message text can be keyed in using an external keyboard, or character-by-character using the arrow keys Δ , ∇ , \triangleleft and \triangleright . The new settings become effective after leaving the menu by pressing `done`/F3 and confirming with `yes`/F1.

10.11.5 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 MY) or external switch query modules (type SAM24, or MC-LM) 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 can be connected. All SAM-MY-inputs can be provided with a clear text message via the SAM-MY-inputs menu (Figure 54).

The message text is entered after the selection of the SAM-module (Figure 54, point 1, sequential number `01` to `16`) and the input (Figure 54, point 2, numbers `01` to `08`) as described in the above paragraph. The new settings become effective after leaving the menu by pressing `done`/F3 and confirming with `yes`/F1.

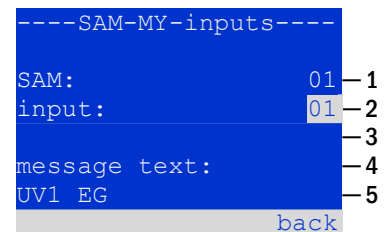


Figure 54: Programming of the SAM-inputs

10.11.6 Setting the menu language

State → menu/F3 → configuration → Enter ○ → language selection → Enter ○

This menu lets you – after authorisation – select the language for the LCD-menu control using < and >. The new settings become effective after leaving the menu by pressing done/F3 and confirming with yes/F1.

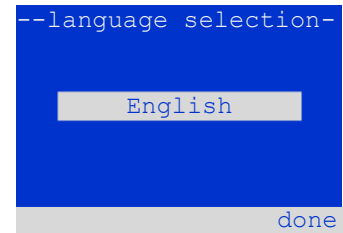


Figure 55: Language selection

10.11.7 Authorisation, login with password, logout

State → menu/F3 → configuration → Enter ○ → 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 < and > (Figure 56, 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 < and > (Figure 56, point 1). Then press Enter ○.

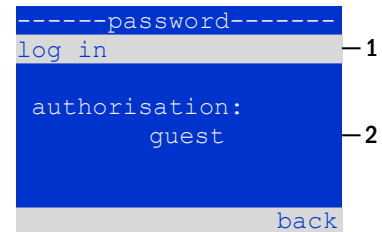


Figure 56: Login and logout

The current user status (authorisation) is shown in the centre of the screen (Figure 56, 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.

10.11.8 Setting the system date and time

State → menu/F3 → configuration → Enter ○ → date/time → Enter ○

This menu lets you enter the current time and date. The setting to be changed is selected using < and >; then you change the values using < and >. 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 (Figure 57, point 1), the system switches automatically between DST and Standard Time. The time is not changed if you select off.

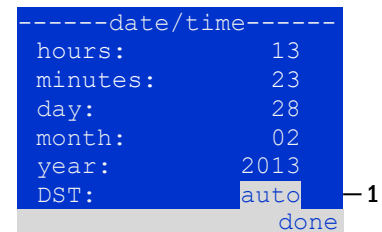


Figure 57: Setting the system time

10.11.9 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, Figure 58, point 1), its duration can be set duration (Figure 58, 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
done
    
```

Figure 58: settings for automatic capacity tests

10.11.10 Configuration of the automatic Email notification

The myControl 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 myControl 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

Note: The data exchange with the mail server is not encrypted. Make sure that the mail provider allows un-encrypted connections.

Step 1: Check network settings of the station

A PC is necessary for configuring the Email function. First check the network connection to the myControl 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.

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 (Figure 59). Click on the menu item “Administration” and choose “E-Mail” (login required). This takes you to the Email-configuration page (Figure 60).

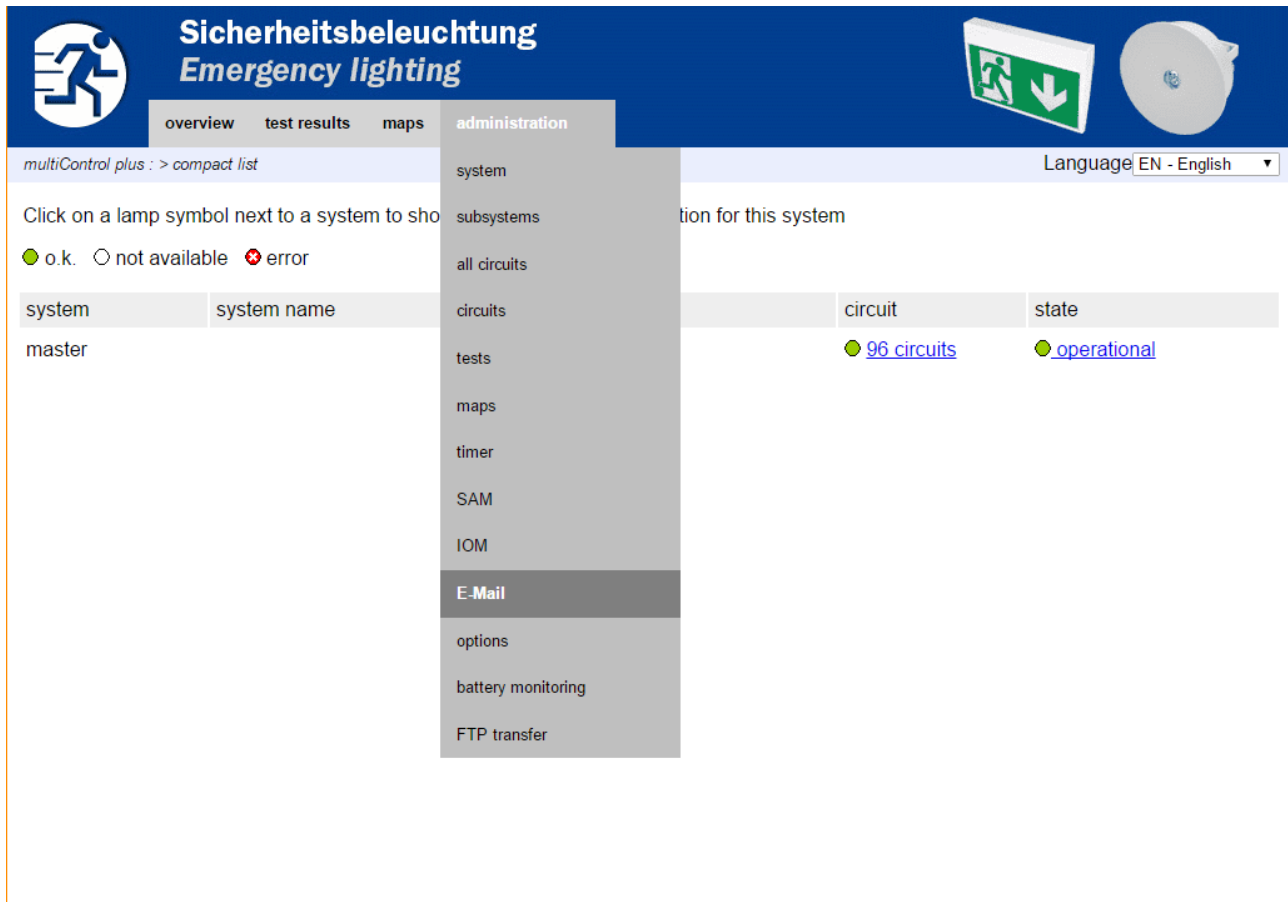


Figure 59: WebInterface main page and access to the email configuration page.

The screenshot shows the 'Sicherheitsbeleuchtung Emergency lighting' administration interface. At the top, there is a navigation menu with 'overview', 'test results', 'maps', and 'administration'. Below the menu, the breadcrumb path is 'multiControl plus : > administration > E-Mail'. The main content area contains several sections for configuring email settings:

- SMTP Server:** Includes fields for 'Server address' (smtp.mailserver.com), 'Server port' (25), and 'SMTP Authentication' (method: LOGIN, user: postfach@mailserver.com, password: masked).
- SMTP Server (second instance):** Includes fields for 'Sender' (noreply@mailserver.com), 'Recipients' (service@beispiel.de), 'Subject' (sample plant), and 'Send interval' (1 h).
- E-Mail status:** A table showing system status:

E-Mail system	inactive
Last mail status	not supported on WIN32
Netmask	0.0.0.0
DNS	0.0.0.0
Gateway	0.0.0.0

Figure 60: Email configuration page

Enter the following information in the input boxes on the Email configuration page (Figure 60):

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 name 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. noreply@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. noreply@G4711.kunde.de), but you should consider the following recommendations: <ol style="list-style-type: none"> 1. Use "noreply" as user name, because the receiver is not supposed to reply. 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 (noreply@G4711.kunde.de). 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. noreply@kunde.de).

receiver	Address of a single receiver (e.g. benutzer@beispiel.de) or a list of several receivers (separated by commas, e.g. benutzer1@beispiel.de , benutzer2@beispiel.de , benutzer3@beispiel.de). The input box is limited to 128 characters.
subject	Defines the subject to be used with every 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). Note: 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). Note: 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.	
benutzer@beispiel.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
www.clustermail.de		fee-based
www.freenet.de	mx.freenet.de	free registration

10.12 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
back
    
```

Figure 61: Service-contact details

11 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. 12, point 7) to charging mode (position "0"). **Important:** Make sure that the LC-display (fig. 12, 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. 8).
- 4. Remove battery fuses F2/F4.** Remove the battery fuses (fig. 8). The system is now shut down and disconnected.

Note: Between shutdown and restart of the emergency lighting system observe a waiting time of at least 30 seconds.

12 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.

12.1 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 (LDMmy) 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)
10	2,48	2,34
20	2,45	2,31
30	2,40	2,28
40	2,34	2,25

12.2 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 ± 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 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.

12.1 First inspection

The first inspection has to be carried out according to E DIN EN 50171 (VDE 0558-508):2013-07 by the installation technician when commissioning the system.

First inspections have to be carried out in compliance with the local, national regulations and comprise the following points:

- check the correct selection of modules. Observe the selectivity of the distribution network of the emergency power supply
- check the correct selection and setting of the automatic transfer and switching device (ATSD)
- visual check of the settings of the protection devices
- check the batteries for sufficient capacity. The system has to be operated with the actual load over the defined time when discharging the batteries. The results have to be logged. When systems do not pass these tests, they have to be tested again. If the system fails again, it must not be commissioned. (**see measurement protocol battery**)
- check the function by disconnecting from mains
- check the ventilation of the mounting room and the battery according to EN 50272-2
- check the mounting rooms in terms of fire protection, equipment and facilities.

Inspections must only be carried out by electrically skilled technicians, who are trained and qualified.

12.2 Repeating inspection

The repeating inspection has to be carried out in compliance with the local/national regulations. If there are no local/national regulations, the following intervals are recommended:

automatic transfer and switching device (ATSD):

- function test with load transfer: **weekly**
An automatic function test must be programmed by the installation technician/operator upon installation/commissioning (instruction manual chapter 10.2)
- test through imitation of a mains failure: **half-yearly**
disconnection from mains supply through disconnecting the pre-fuse of the system or pushing the mains switch (chapter 6.1.7 (fig. 8)). The switch has to be switched on again after the function test.

protection devices:

- visual inspection of the settings: **yearly**
1. check the battery voltage as well as the symmetry voltage (chapter 11.3, fig. 43) with a measuring device (see chapter 5)

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2. check the battery current (status screen or chapter 11.3, fig. 43) by imitating a mains failure (see "testing through imitation of a mains failure") with a measuring device (see chapter 5) or a suitable and calibrated clamp-on ammeter

batteries:

- function test over a sufficient time period with the full consumer load: **monthly**
This is done through weekly function tests.
- capacity test over the rated operating time with the full consumer load: **yearly**
see maintenance schedule

earth fault monitor: **weekly**

- *push the earth fault test button, see chapter 7.1.1 fig. 16 point 15*

protection against electric shock

- measured at mains input: every 3 years
- in output circuits with residual current-operated protective device (RCD) through function test, proof of triggering with rated residual operating current: **half-yearly**
Only with installed service socket (SSD)

Beyond the requirements of EN 50272-2, paragraph 14*, the battery has to be charged according to the manufacturer's instructions and then, after 24h trickle charging, undergo a discharge test. During the discharging process the central emergency power supply system has to be operated with the full consumer load and it must reach the rated operating time.

*Batteries and their operating conditions must be checked regularly for correct functioning and safety.

In compliance with the manufacturer's requirements, the following has to be checked in an inspection: voltage setting of the charger, voltages of the cells or the block batteries, electrolyte density and electrolyte level (if applicable), cleanliness, leak tightness, tightness of the connectors (if necessary), ventilation, plugs and valves, battery temperature.

12.3 Inspection before commissioning

After mounting the central power supply system, the installation technician must carry out the inspections according to HD 60364-6 chapter 61.

Part of them is the visual inspection of the stationary electrical system before the central emergency power supply system is commissioned as well as testing and measuring, preferably in this order:

- conductivity of the cables
- insulation resistance of the electrical system
- protection through SELV, PELV or protective separation
- protection through automatic switch-off of the power supply
- additional protection
- voltage polarity
- phase sequence of the external conductors
- function and operation test
- voltage drop

If an error is detected during the testing and measuring, this and each previous test, which might have been influenced by this error, have to be repeated after clearing the error.

If the installation technician of the central emergency power supply system is not the installation technician of the stationary electrical system, he must be provided with the test log of the first inspection of the stationary electrical system, which the emergency power supply system is meant for, before he can carry out the first inspection of the emergency power supply system.

The observance of the requirements as defined in the instruction manual of the manufacturer has to be proven and confirmed prior to testing and measuring by visual inspection. Particularly the following has to be inspected:

- the condition of the mounting location, marking and equipment according to standards (operating devices, means of body protection, tools, utilities)
- protection against intrusion of solid foreign objects and liquids
- protection against external mechanical impact
- observance of the surrounding temperature (lower and upper limit)
- observance of the maximal humidity
- ensuring the necessary ventilation
- EMV-environment (A or B)

- checking if special operating conditions can disturb the operational safety and functionality of the central emergency power supply system such as vibrations, extraordinary shocks, corrosive atmosphere, strong electric or magnetic fields, explosion hazard
- the existence of necessary operation and maintenance areas for the central emergency power supply system
- the correct selection of modules of the emergency power supply system and check if the requirements of the user according to 5.2 have been met by the manufacturer
- checking the settings of the protection devices

If a system fails an inspection according to E DIN EN 50171 (VDE 0558-508):2013-07 paragraph 8.2.4 sub-paragraph g)*, it **must not** be commissioned!

*checking the battery concerning sufficient capacity, the emergency power supply system must be operated during the battery discharge with the rated output current over the rated operating time. Systems, which do fail this test, have to be tested again. If the requirements are not met in this test either, the system must not be commissioned.

12.4 Procedure in case of failure

If errors on the battery set or the charger unit are detected, the customer service must be called immediately. A service contract with your dealer makes error detection easier.

12.5 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.

12.6 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.

13 Technical data

performance characteristics

system type / serial number	myControl <i>plus</i> / serial number see front page power converter E 230 / G220
-----------------------------	--

mains input data

nominal voltage U_{Nom}	230V AC +/- 10%
nominal current	1.5A (without connected consumers)
nominal frequency	50/60Hz +/-4%
number of phases	1

rating of the mains fuse

nominal current of the mains fuse (F1)	6,3AT
--	-------

output data

nominal voltage (AC-operation)	230V
nominal output (AC-operation)	800VA (consumers incl. charger unit)
nominal voltage (DC-operation)	216V

Power characteristics with Battery OGIV RPower 1236L

nominal current at	} 1h / 3h / 8h DC-Betriebsdauer	1,62A / 0,67A / 0,3A (sum of all final circuits)
nominal output at		350W / 145W / 65 W (sum of all final circuits)
min. voltage after		185V / 185V / 185V

Power characteristics with Battery OGIV RPower 1252L

nominal current at	} 1h / 3h / 8h DC-Betriebsdauer	2,3A / 0,93A / 0,37A (sum of all final circuits)
nominal output at		500W / 210W / 90 W (sum of all final circuits)
min. voltage after		185V / 185V / 185V

operation time for above-mentioned data	1h / 3h / 8h
nominal temperature of the battery	25°C

battery type and number of cells

battery type	Pb
number of cells	108
make	18 x OGIV RPower 1236L or OGIV RPower 1252L
charging current	0.325A or 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	4 + auxiliary circuit
operation mode	maintained or non-maintained lighting in changeover operation
number of SAM-modules	1 internal
number of switch inputs 230V AC	4
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 (with battery inserted)	0 - 35°C (10 - 35°C)
housing dimensions HxWxD	900mm x 450mm x 125mm
protection type	IP 20
protection level	I
cable entry	from above

(*) Values depend on working temperature.

recommended cable cross sections

mains cables	1.5 - 4mm ² rigid
potential-free signal cables	0.5 - 2.5mm ² rigid
electric circuits	1.5 - 2.5mm ² rigid
battery cables NSGAFÖU +/-	1.5 - 4mm ²
Symmetry	1.5 - 4mm ²

relevant fuses/connection cross section

mains fuse F1	ceramics fuse 5 x 20mm 6,3AT
battery fuses F2, F4 (B+, B-)	ceramics fuse 5 x 20mm 4AT
battery fuse F3 (Sym)	ceramics fuse 5 x 20mm 1AT
internal fuses L/B+ (F10/F11)	ceramics fuse 5 x 20mm 1AT
circuits L(+) and N(-)	ceramics fuse 5 x 20mm 2,5AT
charger module LDMmy	ceramics fuse 5 x 20mm 2,5AT

13.1 Available battery types and mounting conditions

Cut-off values in Amperes (A) with different discharging times (Tn), up to the given cut-off voltage (US) at a battery temperature of 25°C:

Type RPower	Tn	1h	3h	5h	8h	10h	20h	Q*	A*	d*
	US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c	m ³ /h	cm ²	cm
OGIV 1236 L	2,30	0,92	0,63	0,41	0,35	0,19	0,1	3	22	
OGIV 1252 L	2,87	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 25°C:

Type RPower	Tn	1h	3h	5h	8h	10h	20h
	US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c	US=1.80V/c
OGIV 1236 L	26,00	11,00	7,50	4,89	4,20	2,23	
OGIV 1252 L	33,05	14,84	9,89	6,90	5,63	3,02	

14 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.

14.1 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_{boost})
- communication via RS-485 multi-bus; integrated terminating resistor



Figure 62: 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 myControl *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 myControl *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.

14.2 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 63: 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 myControl *plus* emergency lighting system and they are suitable for switching the internal circuits. 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 myControl *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 SAM24. A J-Y(St)-Y cable or similar in compliance with DIN VDE 0815 and 0816 have to be used as data line.

14.3 MultiControl Tableau MCT-15(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 64: MCT-15(S)

The MCT-15 and MCT-15(S) are used as decentralised status indication units for emergency lighting systems of type myControl *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 muted by pressing the “RESET” button. The optical error message, however, keeps being displayed. The MCT-15(S) module and the myControl *plus* system are connected in series (feed through wiring) via screened 4-core data line; up to 3 of these MCT-15(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.

14.4 PC230 (optional)

characteristics at a glance:

- three-phase mains monitoring
- 2 potential-free changeover contacts
- dimensions (L x W x H): 96 x 36 x 54

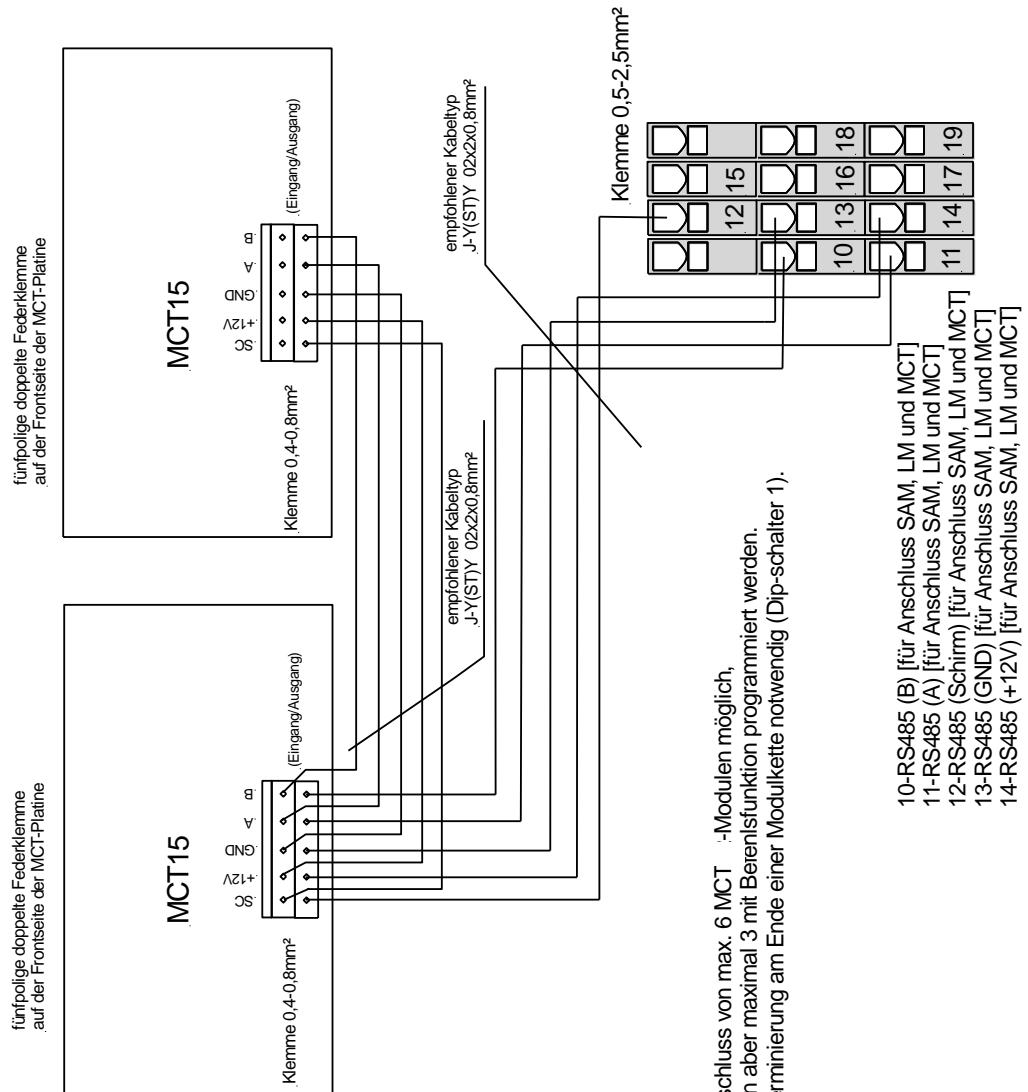
The Power-Control (PC230) monitors voltages in sub-distributions of the general lighting. Three phases can be monitored. If fewer phases are monitored, unused monitoring contacts have to be bridged with connected contacts. The upper switch threshold is set to 195 V, i.e. 15% lower than mains voltage 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 65: PC230

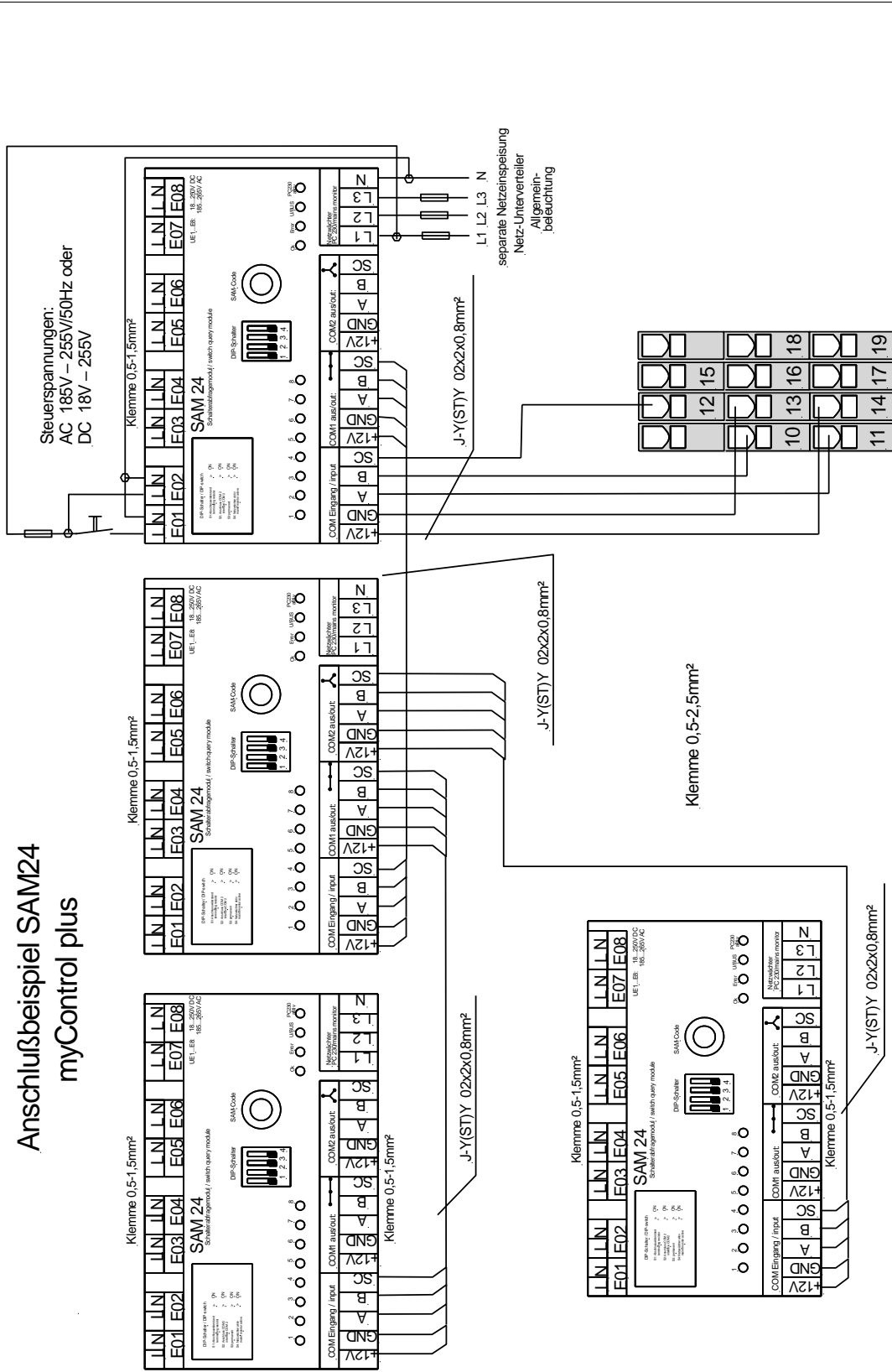
15 Connection examples

Anschlußbeispiel MCT15 myControl plus



Es ist ein Anschluss von max. 6 MCT -Modulen möglich, davon können aber maximal 3 mit Berenistfunktion programmiert werden. Es ist eine Terminierung am Ende einer Modulkette notwendig (Dip-schalter 1).

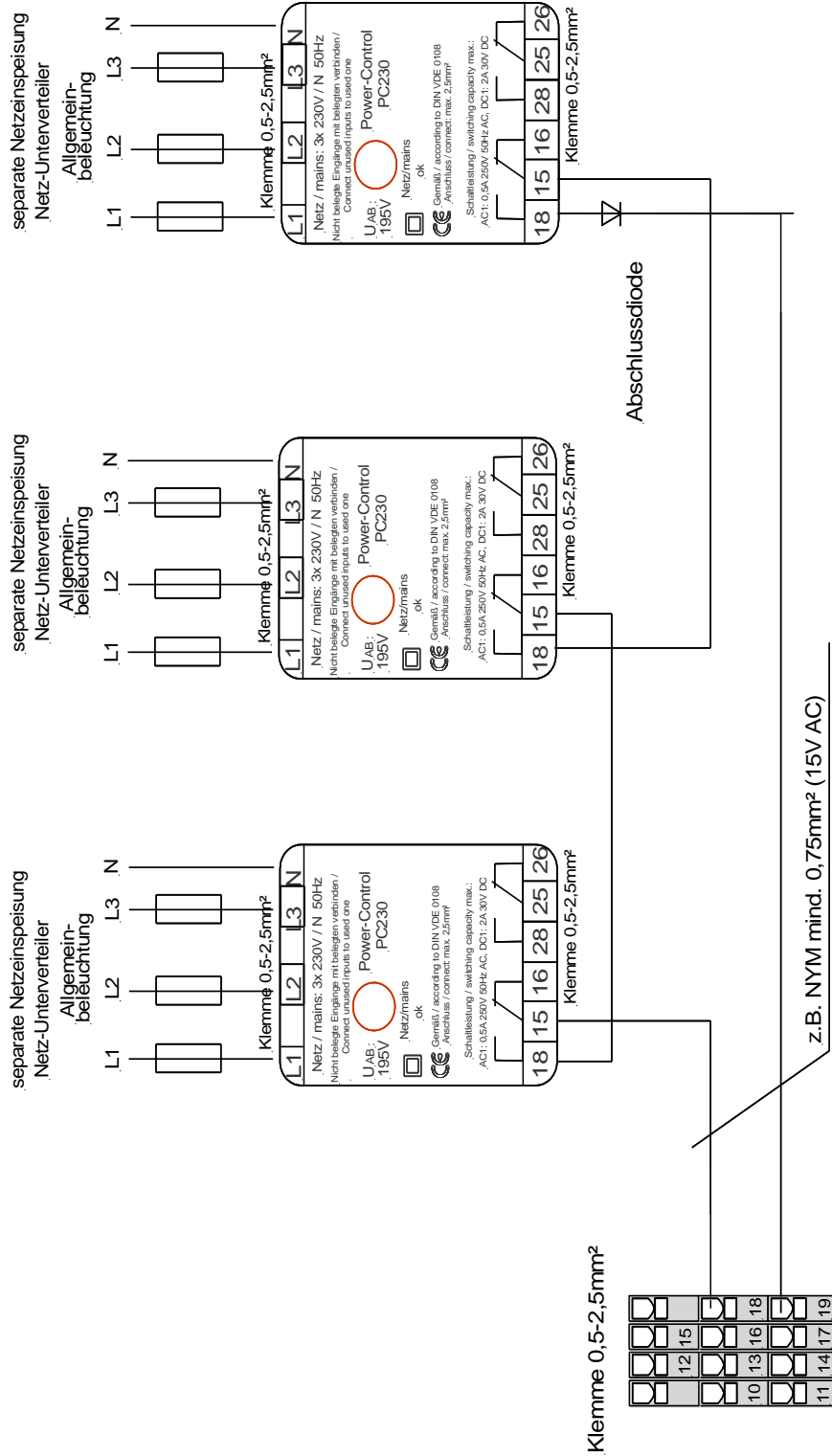
Anschlussbeispiel SAM24 myControl plus



- 10-RS485 (B) [für Anschluss SAM, LM und MCT]
- 11-RS485 (A) [für Anschluss SAM, LM und MCT]
- 12-RS485 (Schirm) [für Anschluss SAM, LM und MCT]
- 13-RS485 (GND) [für Anschluss SAM, LM und MCT]
- 14-RS485 (+12V) [für Anschluss SAM, LM und MCT]

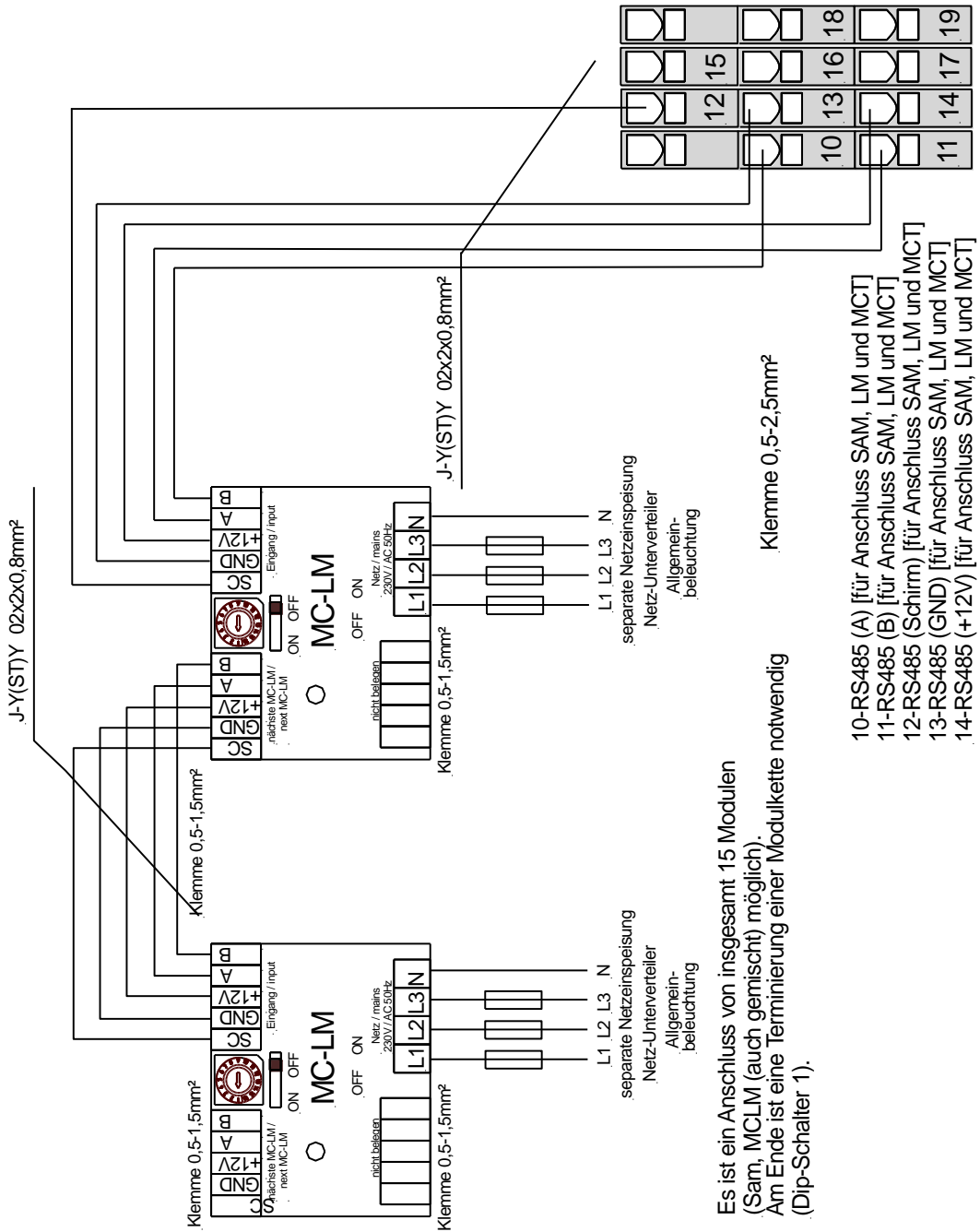
Es ist ein Anschluss von insgesamt 15 Modulen (SAM, MC-LM (auch gemischt) möglich). Am Ende ist eine Terminierung einer Modulkette notwendig (Dip-Schalter 1). Werden die Module sternförmig vernetzt (Com2), ist auch ein Anfangswiderstand vorzusehen.

Anschlussbeispiel sichere Ruhestromschleife mit internen CCIF-Modul myControl plus



16-MB-Ruhestromschleife Ausgang
24-MB-Ruhestromschleife Eingang
ACHTUNG: ~15V

Anschlussbeispiel MC-LM myControl plus



Es ist ein Anschluss von insgesamt 15 Modulen (Sam, MCLM (auch gemischt) möglich). Am Ende ist eine Terminierung einer Modulkette notwendig (Dip-Schalter 1).

16 Revision history

myControl <i>plus</i> – setup and commissioning		
version	date of issue	most important changes compared to previous version
1.0	2015-11-17	-
1.5	2016-08-09	Additions to LCD/software description; versions 1.1..1.4 skipped
1.7	2017-03-21	added chapter: first inspection, repeating inspection, inspection before commissioning, procedure in case of failure
1.7.1	2017-05-16	Cross-references updated, surrounding temperature with battery inserted 10 – 35°C
1.7.2	2017-12-07	Changed clamp description in point 5.1.8
1.7.3	2018-11-01	Added waiting time between shutdown and restart

17 Appendix: system specification, commissioning, notes

General information on your system	
Device type	<input type="checkbox"/> myControl <i>plus</i> / Typ MY3 <input type="checkbox"/> myControl <i>plus</i> / Typ MY3N <input type="checkbox"/> myControl <i>plus</i> / Typ MY5 <input type="checkbox"/> myControl <i>plus</i> / Typ MY5N
Device number	
Manufacturing number	
Customer order number	
Commission/Object	

System specification	
Number of circuits	4 + 1 auxiliary circuit
Housing protection class	IP20
Battery type	Pb - AGM OGiV
Housing dimensions (HxWxD) in mm	900 x 450 x 125

Used battery type	
Battery manufacturer	RP-Technik Notstromsysteme
Battery type	RPower Battery- OGiV1236L / OGiV 1252L
Nominal voltage U_N	216V
Number of cells (2V)	108
Number of blocks (12V)	18
Nominal capacity C_{20}	<input type="checkbox"/> 3,6Ah <input type="checkbox"/> 5,2Ah
Nominal temperature T_N	20°C
Ventilation requirements	According to EN 50 272-2, paragraph 8
Nominal discharge current I_N	1h - 2,31A; 3h - 0,93A; 8h - 0,37A (5,2Ah) 1h - 1,62A; 3h - 0,67A; 8h - 0,30A (3,6Ah)

Modules	Check sum / Software
NLSR	
my-control centre 2 / SAM / IO	
my-circuits	
my-LDM	
my-PowerControl	
my-BSUE	
MCT15 / 15S	
MC-LM	

Measurement protocols battery

Date:				Time:			
Block 01		Block 02		Block 03		Block 04	
Block 05		Block 06		Block 07		Block 08	
Block 09		Block 10		Block 11		Block 12	
Block 13		Block 14		Block 15		Block 16	
Block 17		Block 18		Symmetry		Total	

Date:				Time:			
Block 01		Block 02		Block 03		Block 04	
Block 05		Block 06		Block 07		Block 08	
Block 09		Block 10		Block 11		Block 12	
Block 13		Block 14		Block 15		Block 16	
Block 17		Block 18		Symmetry		Total	

Date:				Time:			
Block 01		Block 02		Block 03		Block 04	
Block 05		Block 06		Block 07		Block 08	
Block 09		Block 10		Block 11		Block 12	
Block 13		Block 14		Block 15		Block 16	
Block 17		Block 18		Symmetry		Total	

Date:				Time:			
Block 01		Block 02		Block 03		Block 04	
Block 05		Block 06		Block 07		Block 08	
Block 09		Block 10		Block 11		Block 12	
Block 13		Block 14		Block 15		Block 16	
Block 17		Block 18		Symmetry		Total	

Date:				Time:			
Block 01		Block 02		Block 03		Block 04	
Block 05		Block 06		Block 07		Block 08	
Block 09		Block 10		Block 11		Block 12	
Block 13		Block 14		Block 15		Block 16	
Block 17		Block 18		Symmetry		Total	

Date:				Time:			
Block 01		Block 02		Block 03		Block 04	
Block 05		Block 06		Block 07		Block 08	
Block 09		Block 10		Block 11		Block 12	
Block 13		Block 14		Block 15		Block 16	
Block 17		Block 18		Symmetry		Total	

Date:				Time:			
Block 01		Block 02		Block 03		Block 04	
Block 05		Block 06		Block 07		Block 08	
Block 09		Block 10		Block 11		Block 12	
Block 13		Block 14		Block 15		Block 16	
Block 17		Block 18		Symmetry		Total	

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