Power Supply System

miniControl XL *plus*

KOMPETENZ VERBINDET. **SCHRACK** TECHNIK

Customer Order No.:

Manufacturing No.:

Commission/Object:

Device No.:

Contents

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 maintainance 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 miniControl XL *plus*! This system complies with the national and international standards DIN EN 50171, DIN V VDE V 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 function control system. This documentation has been created for you to quickly commission and operate the system in an uncomplicated way.

We recommend the following course of action:

1.   Observe the relevant danger signs and safety instructions (chapter 2)
2.   Make yourself familiar with the design of the miniControl XL *plus* system (chapter 4.1)
3.   Mount the system and batteries and connect them (chapter 4.2)
4.   Commission the system (chapter 6)
5.   Program the system (chapter 7)

Chapters 5.1.1 and 5.3 provide a description of the central control unit and a menu – quick reference guide. Instructions for operation and maintenance of the batteries as well as the technical data of the system you can find in chapters 11 and 12.

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

Note: Instructions regarding the programming of the system using 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, refer to DIN EN 50171)

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

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

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

4   Danger and information signs

Please strongly obey the safety instructions when installing and using your miniControl XL *plus* system.

	• 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!
	• Dangerous voltage
	• Do not smoke! Do not use any naked flame or other sources of ignition. There is the danger of explosion and fire hazards!
	• While working on batteries wear protective eye-glasses and clothing! • Observe the accident prevention rules as well as DIN VDE 0510, VDE 0105 part 1 (version relevant on delivery)!
	• 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!
	• 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!
	• 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.
	• Batteries / cells are heavy! Ensure adequate mounting security and always use adequate handling equipment for transportation.
	• 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 miniControl XL *plus* system are:

- 1x miniControl XL *plus* system in a compact cabinet H = 1472,5mm, W= 570mm, D= 230mm
- 1x battery cabinet including 2 battery shelves
- 18x battery type RPower (according to customer's order), other types are possible (max. 17Ah)
- 1x operating tool angled 2.5mm, partially insulated
- 1x ¼"- hexagonal bit 3 x 25mm with centre bore hole
- 1x brief instruction (this document)
- 1x connector cable set (2x tier connectors 680mm x 6mm², 15x row connectors 300mm x 6mm², hole diameter of the cable shoes either M5 (standard 17Ah))

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

- calibrated measuring device for voltage measurements of up to 500VAC or 300VDC
- hexagon screw driver (for inserting the above-mentioned hexagonal bit)
- torque wrench and screw driver for connecting the power cables
- 8mm jaw or socket wrench (torque wrench), see battery handling instructions

6   System design
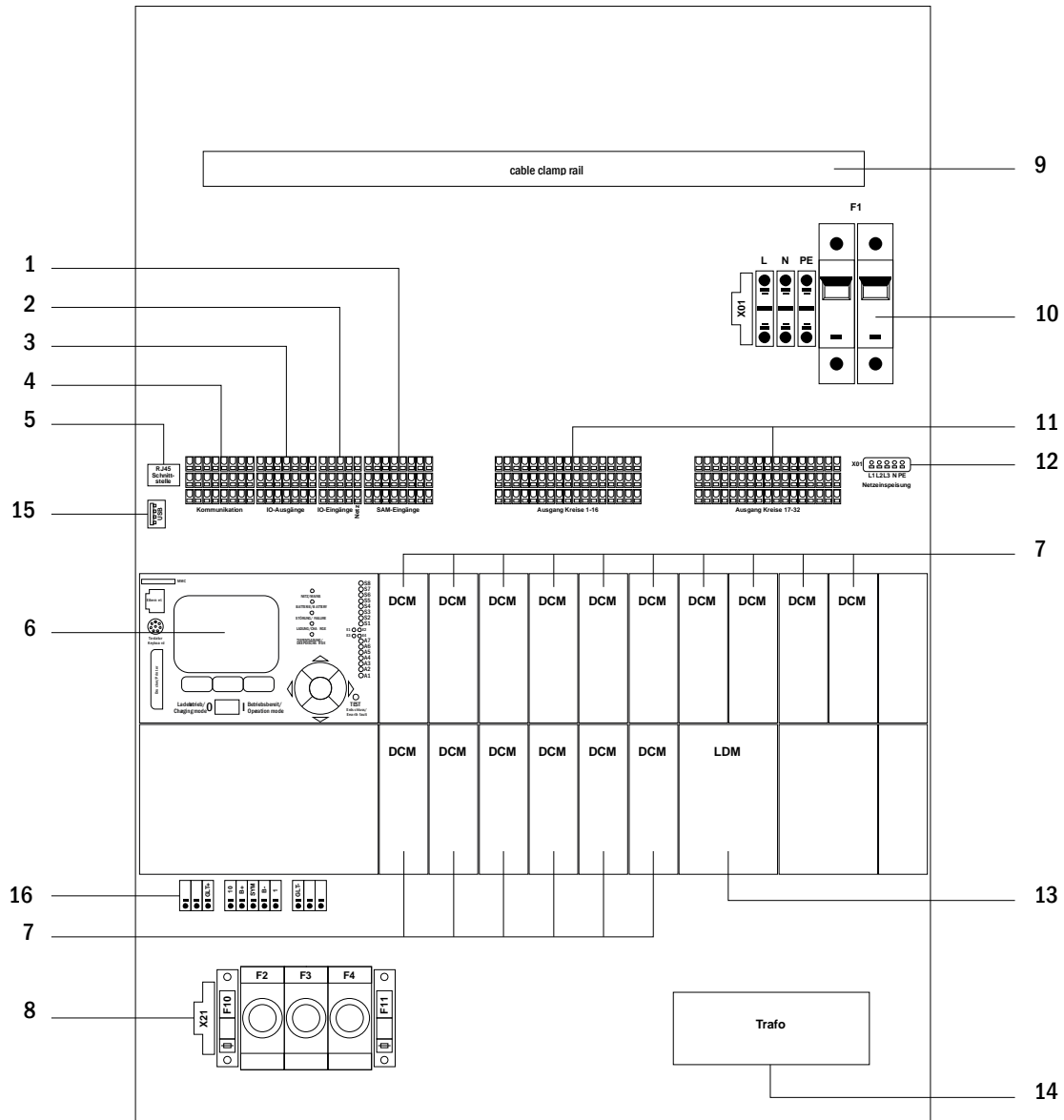
Figure 1: inside view

1 SAM-inputs (switch query module)	7 electric circuit modules	13 charger module (1x)
2 IOM-inputs (Input/Output-module)	8 battery connections & fuses	14 transformer
3 IOM-outputs (Input/Output-module)	9 cable clamp rail	15 USB-port for 5V-WLAN-module
4 communication	10 mains connections & fuses	16 connection BAT-LOGG®/GLT
5 ethernet connection	11 final circuits	
6 control unit	12 mains supply (internal)	

6.1 Connection of the charger and switch unit

The power supply system is connected via print terminals on the rear main board and the mains connection on X01. These terminals are divided into blocks consisting of several 3-level PCB terminals, which are described in the following chapters.

6.1.1 Ethernet interface

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 backplane inside the cabinet. For connection please use standard network cable (patch cable RJ45).

Note: When exceeding the maximal length of the network cable (80m) a repeater must be used for signal regeneration. The network cable must comply with the standard EN 50173.
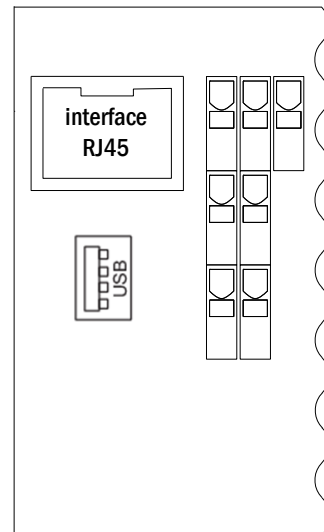
Figure 1: Ethernet interface

6.1.2 Connection of bus-compatible modules

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

- ModBus/building control (COM 1)
- external printer (COM 2)
- voltage outputs (only for service!)
- RS485-1   for SAM08, SAM24,
- RS485-2   MC-LM, MCT15 (S)
- quiescent current loop with integrated CCIF

For further information see the table below or chapter 13 "Module descriptions".
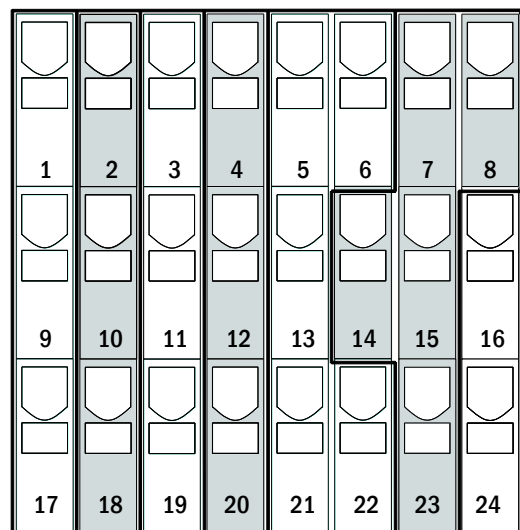
Figure 2: Communication terminals

| port name	terminal	contact allocation	port for
COM1	1 9 17	TXD RXD DCD	ModBus/GLT
internal power supply	3 4	+ -	for internal purposes only (e.g. cooler fan); max. output current: 300mA
switching voltages	11 12 19 20	+ - + -	24 V DC for internal IO module; max. output current: 3mA
RS485-1	5 6 13 21 22	shield GND B A +12VDC	SAM08, SAM24, MC-LM, MCT15(S)
RS485-2	7 8 14 15 23	GND shield +12VDC B A	SAM08, SAM24, MC-LM, MCT15(S)
quiescent current loop with integrated CCIF (diode)	16 24	~15VAC ~15VAC	external mains monitors (PC230) via potential-free relay contacts

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

An opto-/relay interface module (IOM) was integrated as a slot-in card in order to be able to transmit error and status messages of the power supply system to external checking and monitoring devices (as required by national and international standards). It has 7 potential-free relay switch contacts (outputs) and 4 reverse polarity tolerant multi-range voltage inputs as well as another terminal (L) for the power supply (230V/50Hz) of potential-free switch contacts. Fig. 4 shows the respective 3-level PCB terminals.


Figure 3: Inputs and outputs IO-module

Note: The galvanically isolated inputs accept the following voltages: 24V-255V DC or 200V-255V AC (50Hz). The potential-free relais contacts are designed for max. 1, 6A / 30V DC or max. 6A / 250V AC.

IO-outputs

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

IO-inputs

terminal	function	voltage on	no voltage
46 input 1	external BAS	charging operation/emergency lighting blocked	system ready to operate
47 input 2	internal fan monitor	configurable *	configurable *
48 input 3	external fan monitor	configurable *	configurable *
49 input 4	start function test/deactivate circuits**	configurable **	configurable **
L	free potential terminal 230V/50Hz	for IOM- and SAM08-inputs	

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

** Input 4 deactivated by default, but may be configured for one of the following functions:
- Initiate function test: no voltage = no action; voltage applied = function test will be initiated
- Deactivate circuits: no voltage = all circuits are unpowered and tests are blocked; voltage applied = all circuits in normal operation

Note: The inputs and outputs of the IOM may only be used with functional low voltage (FELV), not protective or safety low voltage (PELV, SELV)!

6.1.4 Connection of switch inputs (SAM)

A switch query module was integrated in this power supply system for the transmission of external switch commands of the general power supply. As shown in fig. 1, point 1), the switch inputs are also realised as 3-level spring-loaded terminals, which are fixed on the backplane. They are designed for wire cross sections (solid-core) from 0.5mm² bis 2.5mm². Each of these power supply systems provides 8 3-level spring-loaded terminals (50-57) as switch inputs as well as one more terminal (L) for the power supply (220/230V AC, 50/60Hz; 24-250V DC switching voltage) of potential-free switch contacts. For the connection please use mains voltage compatible cables with a cross section from 1.5 to 2.5mm² which comply with DIN 57250-1 VDE 0250-1 as well as MLAR, EltBauVo and DIN VDE 0100.
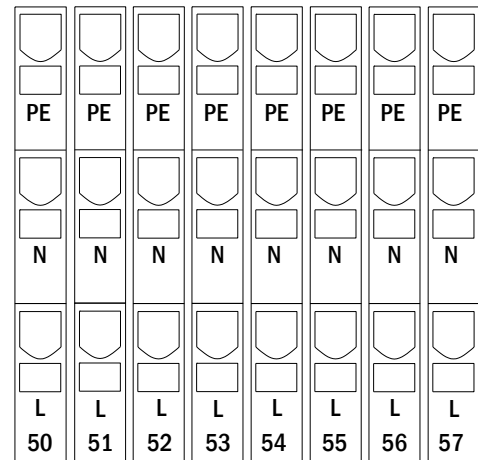

Figure 4: SAM-inputs

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

6.1.5   Connection of electric circuits

The electric circuits are connected via 3-level spring-loaded terminals, which are fixed on the back plane (see fig. 1, point 11). They 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 which comply with DIN 57250-1 VDE 0250-1 as well as MLAR, EltBauVo and DIN VDE 0100 typically with functional integrity in case of fire (E30).

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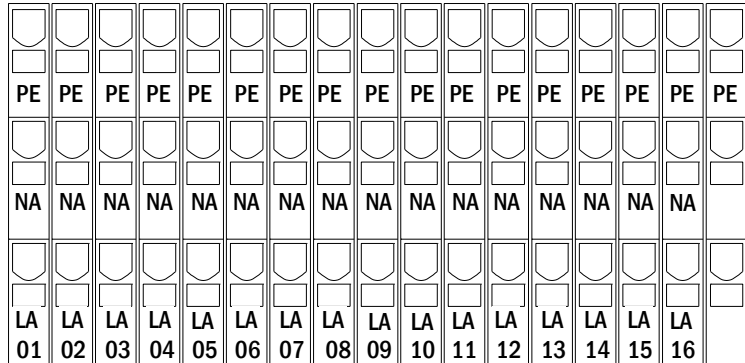

Figure 5: Electric circuits 1-16
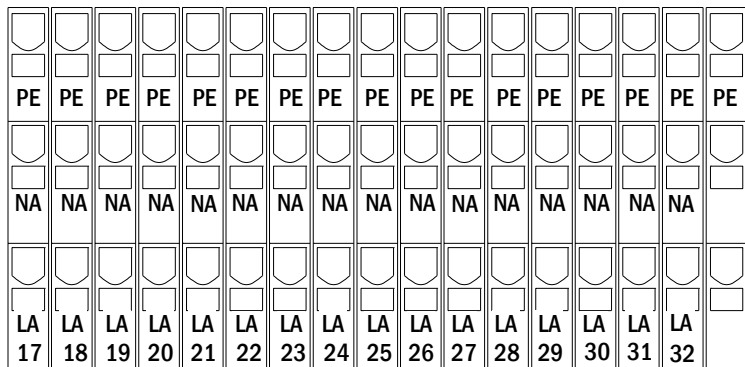
Figure 6: Electric circuits 17-32

6.1.6   Mains connection PCB (filter)

Fig. 8 shows the terminals which are used to realise the connection from the mains supply on the mounting plate (see next chapter) to the main circuit board of the miniControl XL *plus*. L1 bis L3 are closed.
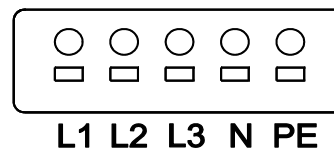
Figure 7: Mains connection

6.1.7   Mains supply

Mains is supplied via the terminals of the fuse switch disconnector shown in fig. 9 (230V/50Hz to N). Correct polarity is essential. The terminals are designed for cable cross sections of up to 6mm² (solid-core).

Note: The screw nuts have to be tightened with a torque of 3,5Nm. Checking this torque is part of the regular obligatory system maintennance works.
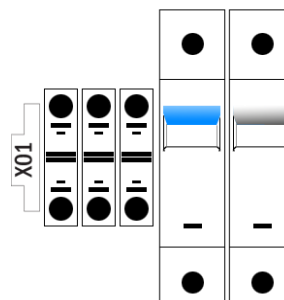

Figure 8: Mains supply

6.1.8 Connection of a fan

Fig. 10 illustrates the connection of an internal or external fan. The following terminals are used: terminal 4 (fan -), terminal 3 (fan +), terminal 47 N+L (IOM-input 2 for fan monitoring which has to be programmed via LC-display or web afterwards). For detailed information on the terminals see chapters 4.1.2 and 4.1.3.
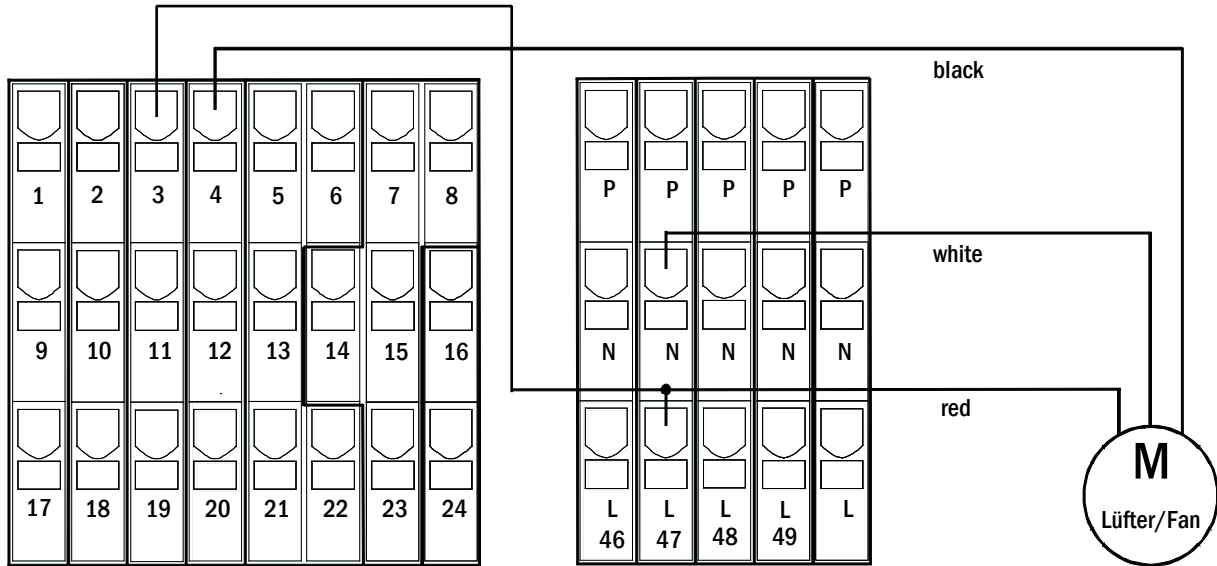

Figure 9: Connection of a fan

6.1.9 Fuses for 24V-switching voltage

To protect the 24V switching voltage available on terminals 11/12 and 19/20, fuses F22 and F23 are installed behind the control center on the backplane of the system.

	voltage divider
F22+F23	5 x 20mm 250mA F
maximum current	2mA

6.1.10   USB Power Supply for WLAN Module

The USB jack at the left-hand side of the backplane acts as a pure power supply to an optional WLAN module.

Note: This jack does not provide any interfacing functionality

**Note:** The WLAN-NT is not installed as standard.
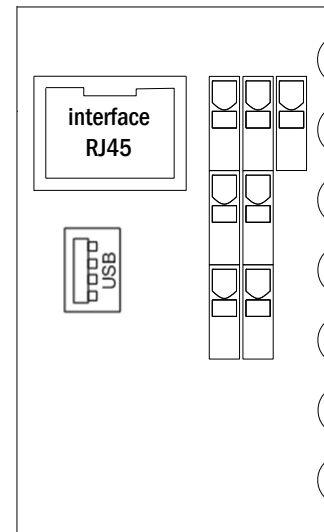
Figure 10: USB Port

6.2   Mounting and connection of the battery system

6.2.1   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 have been removed. Mount the batteries on the respective shelves of the cabinet according to fig. 12 (depending on the used battery type). The temperature difference between the battery blocks must not exceed 3°C. The distance between the battery blocks should be at least 5 mm.


(a) Front view

(b) Top view
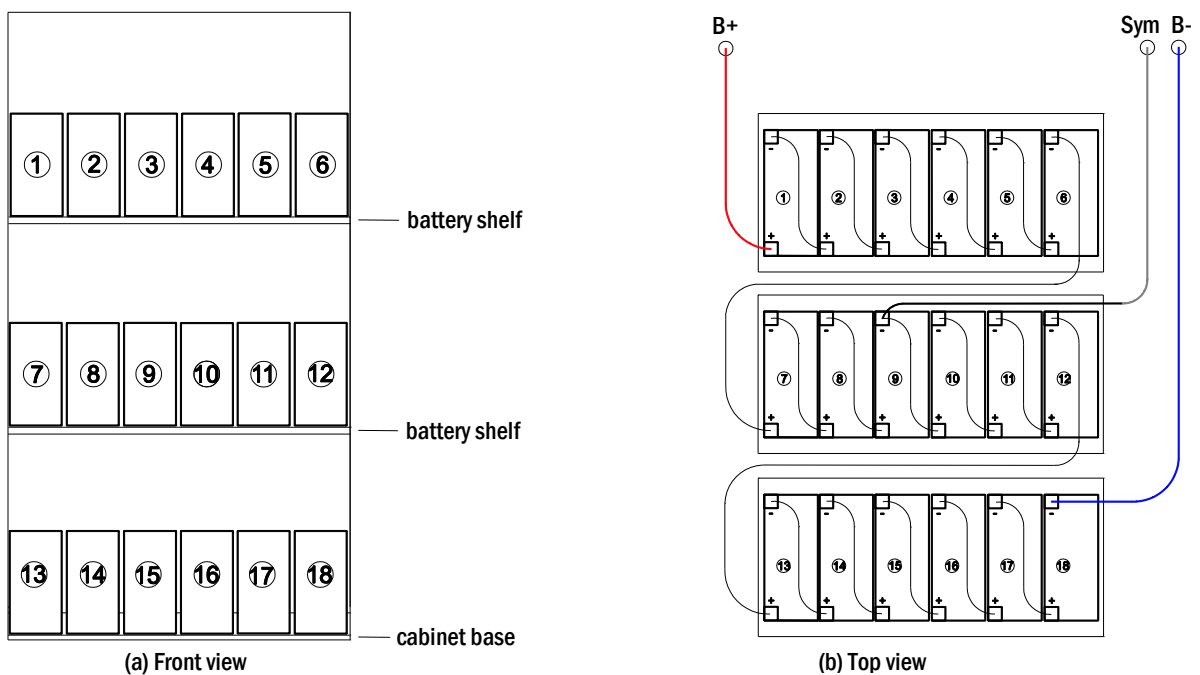
Figure 11: Mounting and connection of the battery blocks of OGiV 12170 L

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

6.2.2   Connection of battery blocks

Remove the battery fuses F2, F3 and F4. Check the batteries for mechanical damage and connect them in row as illustrated in fig. 12. After that connect the cables coming from the battery terminal (fig. 1, point 8) according to fig. 12 (red = B+/positive pole to the positive pole of block 1, grey = symmetry to the negative pole of block 9 and blue = B-/negative pole to the negative pole of block 18). Depending on the used battery type you must fix the pole covers before connecting.

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

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

If the measured voltages exceed the tolerances, one or more batteries are defect or there is an error in installation (e.g. symmetry cable on battery 10 -).

The following torques apply to screw joints:

thread diameter	maximum torque
M5	2 - 3Nm
M6	4 - 5,5Nm

Note: The clamp screws for the battery cables connected to the battery fuses (fig. 1, point 8) have to be tightened with a torque of 2,0Nm. Checking this torque is part of the regular obligatory system maintennance works.

7 Operating your system
7.1 Control elements

7.1.1 The central control and monitoring unit

The central control and monitoring unit is the main control element of this emergency lighting system (fig. 14) and realises system tests as well as the monitoring, programming and control of charging and switching processes. The system state is indicated by a back-lit LC-display as well as five multi-coloured LED. The central control and monitoring unit has the following interfaces at the front:

- MMC/SD – Slot for loading firmware updates
- Ethernet access for service tasks
- parallel interface (Centronics) for the connection of a printer with HP-emulation PCL5/6
- PS/2 interface for external keyboard

The system is operated by means of four direction keys, one enter key and three function keys (F1, F2, F3). If an external keyboard is connected, the system can be operated via the function keys F1, F2, F3, the four arrow keys and the enter key on the keyboard. The MMC-slot at the front can be used for firmware updates.
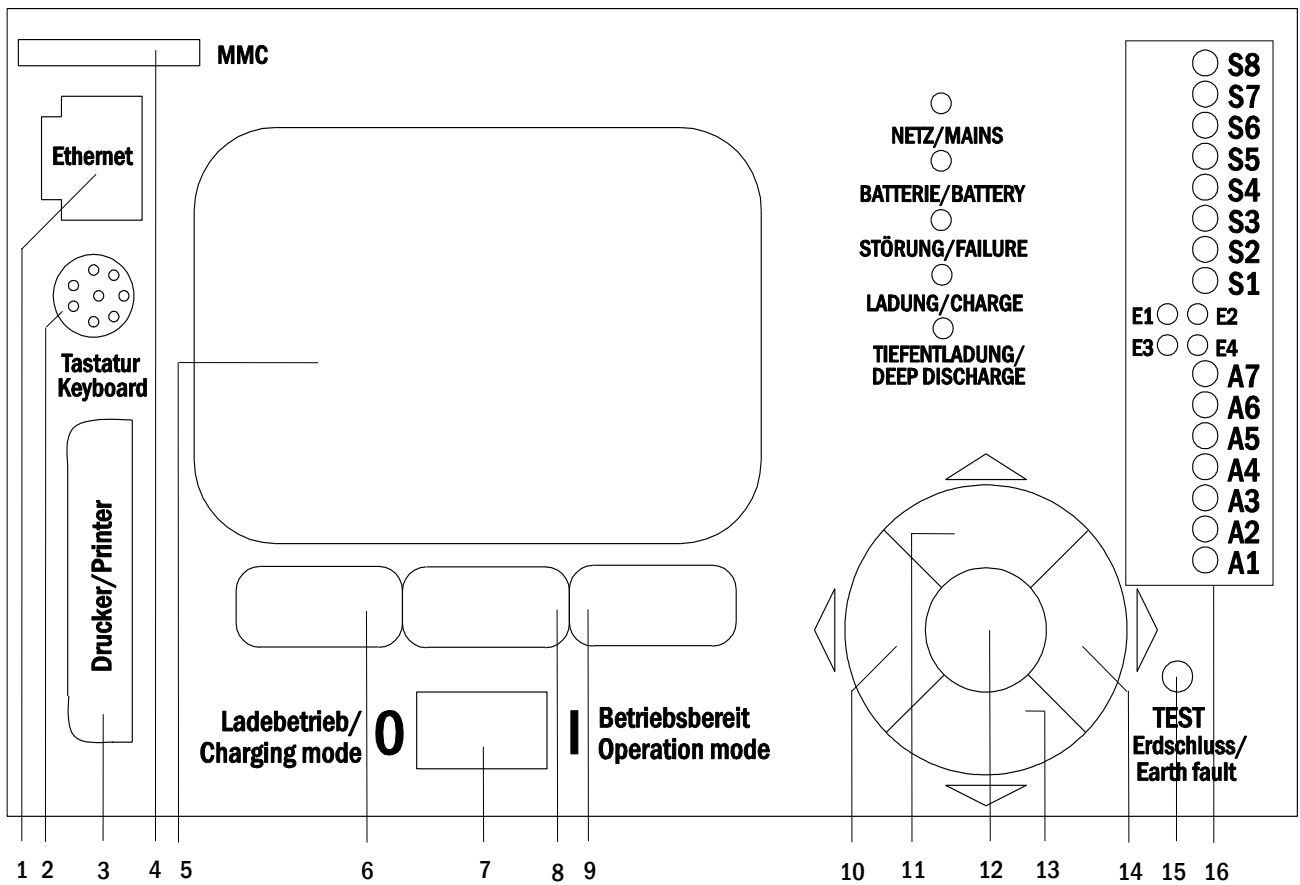
1 ethernet interface	8 function key F2	15 simulation earth fault
2 PS2 interface	9 function key F3	16 Status LEDs (see next page)
3 Centronics interface	10 arrow key left	
4 MMC/SD-slot	11 arrow key up	
5 LC-display	12 enter key	
6 function key F1	13 arrow key down	
7 operation mode switch BAS	14 arrow key right	

Figure 12: Central control and monitoring unit

Status LEDs explained:

LED	LED is on	LED is off
S1/S2/S3/S4/ S5/S6/S7/S8	input #1/2/3/4/5/6/7/8 of the integrated SAM module has a voltage of 230V/50Hz	input #1/2/3/4/5/6/7/8 of the integrated SAM module does not have voltage
E1	input #1 of the internal IOM module has voltage ➔ in case of external BAS: Emergency lighting blocked	input #1 of the internal IOM module has no voltage ➔ in case of external BAS: System operational
E2	input #1 of the internal IOM module has voltage ➔ configurable 4.1.3	input #1 of the internal IOM module has no voltage ➔ configurable 4.1.3
E3	input #1 of the internal IOM module has voltage ➔ configurable 4.1.3	input #1 of the internal IOM module has no voltage ➔ configurable 4.1.3
E4	input #1 of the internal IOM module has voltage ➔ configurable 4.1.3	input #1 of the internal IOM module has no voltage ➔ configurable 4.1.3
A7	system in power mains operation	system in battery operation
A6	fan relais powered	fan relais unpowered
A5	battery voltage OK	battery is in deep discharge
A4	system is OK	system failure
A3	modified non-maintained mode active	modified non-maintained mode inactive
A2	charging unit is OK	charging unit failure
A1	emergency lighting blocked	system is operational

7.1.2   Electric circuit module DCM32 / DCM12E

A DCM can supply up to two circuits simultaneously. They realise the automatic switching of the connected circuits to battery operation in case of a mains failure. Each circuit then works in changeover operation and can be activated separately. The circuits can be programmed either to maintained or non-maintained operation. A combination of both operation modes in one circuit is also possible. Additionally, each circuit has an integrated earth fault, circuit, single luminaire and overload monitoring unit. These circuits are equipped with 2-pole overcurrent protection devices (system protection fuses), which can also be monitored (fuse type: 6,3x32mm, 5A, ceramic, delayed, 1,500A breaking capacity). The LC-display of the central control and monitoring unit (fig. 14, number 5) shows the state of the two circuits (A/B) after pressing the INFO-pushbutton. Here you can program operation mode, follow-up time, luminaire monitoring and supply time for each circuit by means of the direction, enter and function keys.
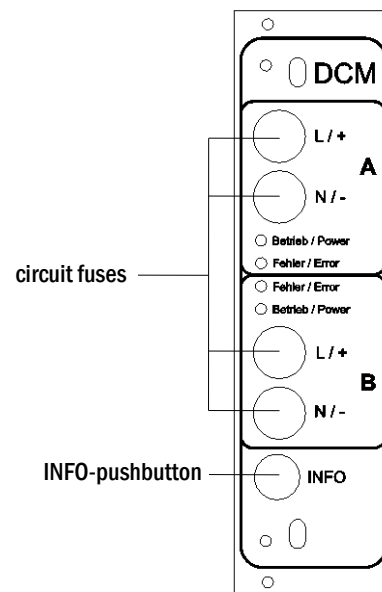

Figure 13: DCM circuit module

LEDs explained (see fig. 15):

LED	Meaning
LED „Betrieb/Power" on	respective circuit is activated (battery operation, DS, DS-switchable, circuit on)
LED „Betrieb/Power" flashing (1x per second)	respective circuit in modified non-maintained operation (quiescent current loop of the circuit is open)
LED „Betrieb/Power" flashing (2x per second)	respective circuit in follow-up time after modified non-maintained operation (quiescent current loop closed)
LED „Betrieb/Power" flashing (4x per second)	Respective circuit in follow-up time after completion of the battery operation
LED „Fehler/Error"	error in the respective circuit or insulation fault

7.1.3   Charger unit LDM25

The charger module LDM25 used for charging the integrated batteries has an own processor and can, if mains voltage is supplied, work completely self-sufficiently. This module has an output current limited to 2.5A and optimises the charging process according to an IUP(TS)-curve matching the surrounding temperature of the batteries. The batteries are not charged for protection reasons if the surounding temperature exceeds 40°C.
A delay fuse (3.15AT, 5x20mm) protects the unit from short circuit in case of a defect and prevents a battery overcurrent. Additionally, a battery voltage symmetry monitor and an integrated, redundant battery voltage monitor (BSW) prevent a battery overload. It is calibrated ex-works and its settings must not be changed!
The LC-display of the central control and monitoring unit shows the state of the charger module after pressing the INFO-pushbutton.

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

Note: The LDM25 can be adjusted to different system designs (output current, battery type) by means of jumpers. In case of replacement please see the provided data sheet.
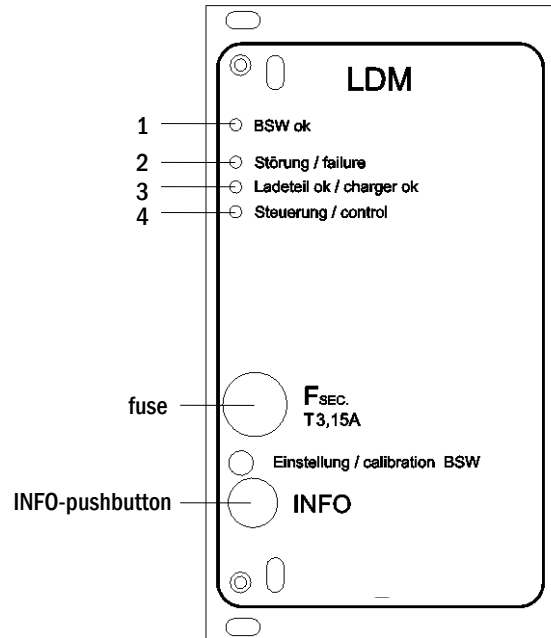
Figure 14: charger module

LEDs explained (see fig. 16):

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

7.2   General operating instructions

Your system can be operated and configured completely via the front control elements (fig. 17). For text input (e.g. circuit denomination) we recommend connecting an external keyboard to the PS2-interface (1).

The LCD-screen (2) displays `Menus` and `Information`. In the bottom line you can see – if active – the `Softkey-Functions` which are reachable via the 3 keys (3) (example see fig. 19). For navigation and data input please use the arrow keys △, ▽, ◁ and ▷ (4) as well as the enter key ○ (5). The up △ and down ▽ keys are mostly used for selecting menus and input fields. A selected menu item is indicated by `inverted colouring`. The right ◁ and left ▷ keys are used to change values; in some cases you have to confirm your input with the enter key ○. An arrowhead `>` on the right indicates a submenu which can be selected with the right ▷ or enter ○ key. You can return from there using the softkey `back` or `done`.

Figure 15: Control elements

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

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

Note: The arrow keys △, ▽, ◁ and ▷ (4) and the enter key ○ (5) on the control unit correspond to the arrow and enter keys of an external keyboard. The softkeys (3) correspond to the function keys F1, F2 and F3.

Password login

A number of settings can only be changed with the necessary authorisation which requires a prior system login with a password. More detailed information you can find in chapter 9.11.7 "Authorisation, login with password, logout" on page 43. For saving the changed settings the system requires a confirmation (`Yes/No`). If you have not logged in with password yet, you can do this at this point and then continue with the confirmation. In any case the authorisation expires ca. two hours after the last setting and the system returns to the default user status "Guest".

Service address

The contact address of the service technician who is responsible for your system is entered during the installation process. To reach this information follow the instructions in chapter 9.12 "Show service address" on page 47.

7.3 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 ACM / DCM / RSM – modules and conduct test
		Charger modules	Show states of charger modules (LDM)
		SAM/IOM inputs	Check states of SAM– and IOM– inputs
	Sub-distribution		Check states of sub-distributions
	Subsystems		Check states of subsystems
	System information		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 / BMT – controlled, ready-to-operate, charging mode
Configuration			
	Administration		
		Network	
			IP – addresses F6	Set addresses for the network adapter (front + internal)
			Communication	Configure status query (system communication)
		LCD – Contrast	Set contrast of LC-display
		Timer	Configure all timers (switch times, electric circuits)
		IOM – inputs	Configure IOM – inputs
		SAM – inputs	Configure SAM – inputs
	Language selection		Change display language (German, English, French...)
	Password		Change authorisation level
	Date / Time		Set system time
	Function test		Turn on/off pre-heating during function test
		Schedule	Set time schedule for function test
		Current monitor	Set parameters for circuit monitoring
	Capacity test time		Set duration, time and date for capacity test
Reset errors		Reset error messages	
	Show errors		Show all error messages
Service address		Show contact address for maintenance service	

Note: With a connected external PS2-keyboard 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).

8   Commissioning of the power supply system

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

Caution! The internal circuit terminals are energised. That is why all fuses of the direct circuit modules (fig. 1, point 7) have to be removed before switching the system on.

1. **Operation mode switch to charging mode.** Turn the operation mode switch (fig. 14, point 7) to charging mode (position "0").
2. **Insert battery fuses F2 / F4 .** Insert the battery fuses again.
3. **Supply mains power.** Supply mains power and check the power terminals for correct configuration by conducting the below-listed measurements. In case of a misconfiguration (connection error) abort commissioning:

voltage between L1 (F1) and N
voltage between L2 (F1) and N
voltage between L3 (F1) and N   These voltages should range from ca. 230V +/- 10% (supplied mains power).
voltage between L1 (F1) and PE   If they do not, this indicates a connection error.
voltage between L2 (F1) and PE
voltage between L3 (F1) and PE

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

4. **Close mains fuse F1.** Close the mains fuse F1.

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. 14, point 5) should look like this:

| Booting in progress | Automatic configuration running | Booting finished |
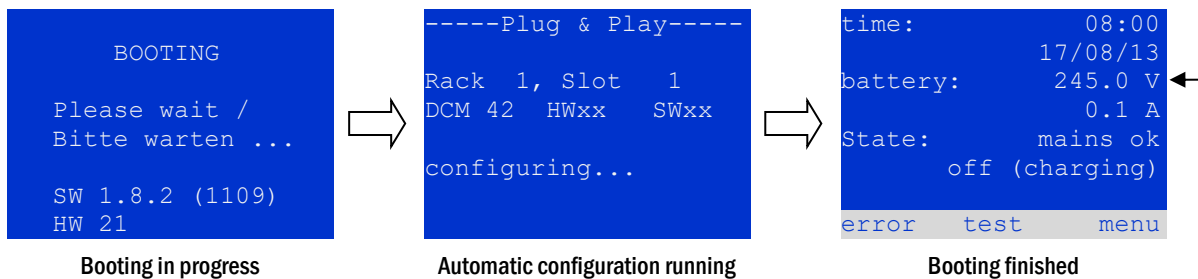
Figure 16: Boot process (left, middle) and status message (right).

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. 18, right image, arrow). Also check the LEDs of the DCM- and LDM-modules. Steady or flashing green light indicates a correct functioning.

7. **Operation mode switch to "ready to operate".** Turn the operation mode switch (fig. 14, point 7) to "ready to operate" (position "1"). This activates the electric circuits.

Caution: Make sure that nobody works on the electric circuits before switching the system on as circuits in maintained lighting mode get energised when activated. If there are still circuits that are worked on, remove the respective fuses before switching on the system. Insert them only after having checked the circuits for short-circuits and insulation faults.

8. **Check voltage at circuit outputs.** The internal outputs of the circuits which are programmed for maintained mode are energised with an AC mains voltage. For this reason, all circuit module fuses should be removed prior to switching on the system. Be sure to insert the fuses only after checking each circuit for short-circuits and proper isolation. Check the voltage on each circuit terminal (fig. 1, point 11 (see also fig. 6 and fig. 7)). The measured voltage of each circuit should correspond with the AC mains voltage.

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

9   Checking the system state and basic settings

9.1   System state

After commissioning the LC-display shows the state of the system (19) 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
                17/08/13    —2
battery:        245.0 V    —3
                   0.0 A    —4
State:          mains ok    —5
         off (charging)    —6
                            —7
error    test      menu    —8
```

Figure 17: System state

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

Status	Explanation
line 5	
`mains ok`	mains connected and OK
`mains failure`	mains voltage failed
line 6	
`(off) charging`	luminaires switched off, emergency operation blocked, battery is being charged
`operational`	maintained lighting luminaires (DS) switched on, emergency operation possible, battery is being charged
`off`	mains failure, but no emergency operation possible
`active (battery)`	mains failure, emergency operation active
`active (mains)`	all luminaires with mains connection on
line 7 (if required, additional messages possible)	
(empty)	--
`critical circuit`	break of quiescent current loop
`SAM 1 E 1` or similar	modified non-maintained lighting activated by SAM or MC-LM (text configurable)
`RS485 fault`	failure of RS485 bus interface (no connection to external modules; see chapter 9.5.3)
`earth fault`	earth fault in mains operation
`earth fault (B)`	earth fault in battery operation
`maintenance required`	carry out maintenance (service)
`deep discharge 1`	battery deeply discharged
`charger fault`	charger module failed/fuse activated
`Plug & Play error`	wrong component used
`DCM fault`	DCM failed
`ACM fault`	ACM failed
`IOM fault`	IO-module failed
`battery fuse`	battery fuse defect
`battery voltage`	battery voltage out of tolerance
`battery current`	battery current out of tolerance
`battery discharge`	battery is being discharged in mains operation
`battery temperature`	battery temperature out of tolerance
`bat.temp.sensor`	battery temperature sensor error
`luminaire fault`	luminaire failure after testing
`luminare current faul`	current value of one circuit out of set tolerance after testing
`total current fault`	total current value out of set tolerance after testing
`circuit fault`	error in electric circuit (fuse activated etc.)
`sub-station fault`	(communication) failure of sub-station
`sub-station mb`	sub-station in modified non-maintained operation
`sub-station mains fail`	mains failure of sub-station
`fan failure`	fan failed
`BMS gateway comm.`	communication failure between central control unit and BMS gateway
`Subst. <nr> firmware`	central control unit does not support the firmware version of substation # <nr>; status request failed
`LDM jumper error`	invalid jumper setting on charging module

9.2 Selecting circuits and checking their status
Status ➜ INFO-pushbutton DCM/ACM ➜ △▽(select circuit)

The electric circuits are numbered beginning with 1; each DCM-module has two circuits named A and B, whereas an ACM-module has only one circuit named A. The circuits are numbered according to their slot position from left to right, so that the A-circuits have an uneven and the B-circuits an even number (see fig. 20). If a slot is not used, the respective circuit numbers do not exist either. This means you can add circuits to the system without changing the numbers of existing circuits.

After pressing the INFO-pushbutton on the DCM- or ACM-module (fig. 20), the display shows the status of the respective circuits. Now the display shows the following information for circuits A and B (fig. 21):

- 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. 21 for circuit A with number   1). With the up △ and down ▽ keys you can change between circuits A and B. Repeated pressing of these keys takes you to the circuit status display of the other modules. Pressing ▷ or Enter ○ takes you to the setup of the selected circuit (see next paragraph). For each circuit the following status messages can be displayed in line 3 (fig. 21, point 3):

Figure 18: Numbering of the circuits
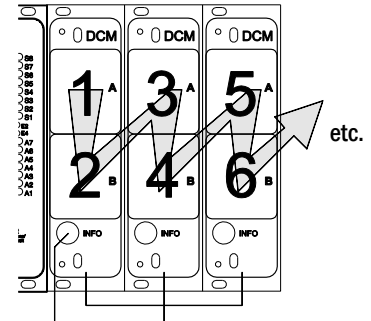
INFO-pushbutton   DCM-modules

Figure 19: Circuit status

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

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9.3 Viewing and changing of further circuit settings
State ➔ INFO-pushbutton DCM/ACM ➔ △▽ (select circuit) ➔ Enter ○

After pressing the INFO-pushbutton and selecting the required circuit with △ and ▽ (see previous chapter), you reach the setup for this circuit by pressing ▷ or Enter ○ (fig. 22). The following information is displayed:

1 – number of circuit (fig. 22, 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. 22, 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. 22, 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 when mains or sub-distributions fail, i.e. **no emergency operation!**).

4 – monitoring mode (sub-menu) (fig. 22, point 4). You can reach the setup screen for the monitoring mode with ▷ or Enter ○ (see next chapter 7.3.1).

5 – name (two lines) (fig. 22, 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 23). You finish the input by pressing Enter ○ or `done`. Tip: Use an external keyboard for entering the names.

*stop delay: When switching back from "modified non-maintained lighting" (failure of mains monitor) to "ready to operate", all luminaires remain on for the programmed stop delay time. When switching back from battery operation, all luminaires keep being supplied with battery voltage for another minute; afterwards the programmed stop delay time starts running. After this time has elapsed, the circuits are switched back to their programmed operation mode (see point 3 above).

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

Figure 20: Circuit status

Figure 21: Survey of all available characters

9.3.1 Programming circuit monitoring

Statusanzeige ➜ INFO-Taster DCM/ACM ➜ △▽(Stromkreis wählen) ➜ Enter ○ ➜ △▽ Überwachung ➜ Enter ○

The monitoring setup screen (fig. 24) shows the number of the circuit in the top line (fig. 24, point 1). Using the keys △ and ▽ you can reach the following setup options:

1 – highest address of luminaires with single luminaire monitoring existing in the circuit, settable from 01 to 20. This number mostly corresponds with the number of luminaires existing in this circuit. The setting 00 deactivates the single luminaire monitoring.

2 – tolerance for the current monitoring. Possible settings: off (no current monitoring), 5%, 10%, 20% (recommended), 50% (fig. 24, point 2).

3 – measuring of the reference current (fig. 24, point 3). The current value is reset and newly defined with the next test and saved as a reference for the current monitoring.

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

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

Figure 22: Setting of the circuit monitoring

9.3.2 Programming the SAM-module

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

Pushing the softkey next/F2 takes you to the menu for programming the SAM and the supply time (battery operation) (25). If you select the line supply: using the keys △ or ▽ (25, 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 > (25, point 1) using ▷ or Enter ○ takes you to the table shown in 26. For navigating within the table use △, ▽ or Enter ○. In each line you can change the following settings using ◁ or ▷:

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

The softkey back/F3 takes you back to the previous display (22). Now push the softkeys done/F3 and back/F3 in order to leave the programming. A confirmation prompt appears (27). Here you can save the changes with yes or cancel with no. After that you are in the circuit selection menu again.

```
----- circuit 1 ----
SAM programming      >  —1

supply:      unlimited  —2

help              back
```

Figure 23: SAM programming

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

Figure 24: SAM-programming

```
-------modules-------


      save
      changes?


yes                  no
```

Figure 25: 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.

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9.4 Checking the state of the charger module
State ➜ INFO-pushbutton LDM

Push the INFO-pushbutton in order to check the state of the charger module. After that the following parameters of the LDM are shown (see 28): number of the LDM25 (1), rack and slot number (2), float charge/boost charge or possible failures (3), current (4), voltage (5) and temperature (6). You can change between the data of several connected charger modules using ◁ and ▷. The following table explains possible error messages (28, point 3):

```
---LDM 25—H10-S037---
charging unit        1  — 1
(Rack 8, Slot 7)        — 2
float charge            — 3
I: (    0.0)      0.0 A  — 4
U: ( 319.7)     244.8 V  — 5
T:               34.0 C  — 6
help    details    back
```

Figure 26: State of the charger unit

State	Explanation	Measure
fuse tripped	overcurrent/short circuit	Check Fsec. on LDM25 or fuses of respective isolating transformer (TR...).
over temperature	charger unit overheated	Check cabinet ventilation. Contact your dealer or service.
operation mode switch activated	output voltage of operation mode switch 260V or higher for more than 20 sec.	Contact your dealer or service.
charge off (T_BAT)	battery cabinet temperature >40°C	adjust battery cabinet temperature

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

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

10   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.

10.1 Execution of a function test
State ➜ test/F2

When the display shows the system state (see chapter 7.1), press test/F2 in order to start a function test. If the softkey test is not shown there, this indicates a mains failure or that the system is running in modified non-maintained lighting mode. The test function is blocked then. If you hear an acoustic signal on pushing test/F2, the test function is blocked by boost charge or a battery voltage below 230V. If there is no signal tone, a so-called manual test is carried out.

The LC-display shows the tested circuits (29, 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 (29, 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" (29, point 3).

The test can be cancelled at the preparing time using the softkey cancel/F3 (fig. 29, point 4).

At the beginning of the actual test the display shows the message "under test" (30, point 2). A detected error is shown in line 3 (31, point 3).

After finishing the test, the display shows a summary for a few seconds (32) and the message "test finished" (32, point 2). Afterwards the display returns to showing the system state. The test results are saved in the log which can be selected and read (see chapter 8.3).

```
-----manual test-----

circuits: 001 - 007    —1
preparing test         —2

please wait ...        —3

              cancel   —4
```
Figure 27: Test programming

```
----manual test---

circuits: 001 - 007    —1
under test             —2

please wait .....      —3
                       —4
```
Figure 28: Setting schedule

```
-----manual test-----

circuits: 001 - 007    —1
under test             —2

    circuit error      —3
                       —4
```
Figure 29: Test programming

```
-----manual test-----

circuits: 001 - 007    —1
test finished          —2

    circuit error      —3
                       —4
```
Figure 30: Test programming

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10.2 Programming automatic function tests
State ➔ menu/F3 ➔ △▽ configuration ➔ Enter ○△▽ ➔ function test ➔ Enter ○

In the state display press menu/F3 and navigate with △ and ▽ to configuration, press ▷ or Enter ○, and navigate with △ and ▽ to function test. Then press ▷ or Enter ○ again. Now you are in the function test display (33). Here you can

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

  next schedule:       —4
                    -
help              done
```
Figure 31: Test programming

    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.

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

10.2.1   Setting the schedule
function test ➔ △▽ schedule ➔ Enter ○

Fig. 34 shows the display after selecting schedule with ▷ or Enter ○. The following settings are possible:

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



help              done
```
Figure 32: Setting schedule

    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)

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

10.2.2   Setting the current monitor window
function test ➔ △▽ current monitor ➔ Enter ○

Selecting current monitor with △ and ▽ followed by ▷ or Enter ○ takes you to the display shown in 35. Here you can find:

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



help              done
```
Figure 33: Test programming

    1 – the total current,
    2 – the current window which can be set from 5%, over 10% and 20% up to 50%,
    3 – the command "measure reference". After selecting this line with △ or ▽ and pressing ▷ or Enter ○ the reference value is set back and measured in the next test again.

The softkey done/F3 finishes the input and takes you back to the display function test (see chapter 8.2). The confirmation prompt save changes? appears again (see 27). If confirmed with yes/F1, the new values are saved.

Note: For more precise test results, please program the selective current monitoring for each circuit individually (see section 7.3.1).

10.2.3   Activating/deactivating the preheating phase and finishing the programming
`function test` ➜ △▽ `preheat`

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

10.3 Test results
State ➜ `menu`/F3 ➜ △▽ `test results` ➜ Enter ○

Press `menu`/F3, navigate with △ and ▽ to `test results` and press ▷ or Enter ○. Now you can see a survey of the saved results of function or capacity tests (see 36):

    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 37). The display shows the type of test (37, point 1), execution date and time (37, point 2), the number of tested lamps (37, point 3) as well as the battery characteristics (37, 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` (36, point 5) let you print the saved data of the test log or store in files. You can do this either via internal 19-inch printer (if available) or via Centronics–interface and thus an external printer..

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

help              menu
```
Figure 34: Test results

```
----function test----  —1
--05/24/12 14:06:36--  —2


          errors    ok
lamps:       13    42  —3
bat: 226.9V   -   5.3A  —4
help  details     back
```
Figure 35: Info function test

10.4 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 38.

    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 ?   ⌐

help     yes       no
```
Figure 36: Reset errors

Power Supply System miniControl XL *plus*

Setup and Commissioning

11 Menu reference

11.1 Main menu
State ➔ menu/F3

The main menu offers 6 sub-menues, between which you can navigate using △ and ▽. By pressing ▷ or Enter ○ you select the respective sub-menu and with the softkey status/F3 you reach the status display.

```
-----main menu------
diagnosis          >
test results       >
installation       >
configuration      >
reset errors       >
service address    >
            status
```
Figure 37: Main menu

11.2 Diagnosis
State ➔ menu/F3➔ △▽ diagnosis ➔ Enter ○

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

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

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

```
-----diagnosis------
battery            >
mains              >
modules            >
sub-distributions  >
sybsystems         >
system information >
help           menu
```
Figure 38: Diagnosis menu

11.3 State of battery and manual activation of a capacity test
State ➔ menu/F3➔ △▽ diagnosis ➔ Enter ○➔ △▽ battery ➔ Enter ○

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

```
-----battery--------
capacity:     17 Ah
voltage:    232.7  V
current:      0.0  A
temperature: 20.0  C
symmetry:   116.3  V

help  cap-test  back
```
Figure 39: State of battery

11.4 State of mains supply
State ➔ menu/F3➔ △▽ diagnosis ➔ Enter ○➔ △▽ mains ➔ Enter ○

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

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

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

help            back
```
Figure 40: State of mains supply

11.5 State of the modules (DCM/LDM/IOM/SAM)
State ➔ menu/F3➔ △▽ diagnosis ➔ Enter ○➔ △▽ modules ➔ Enter ○

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

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



help             menu
```
Figure 41: Menu for module diagnosis

11.5.1   State of the electric circuit modules (DCM/ACM)
State ➔ menu/F3➔ △▽ diagnosis ➔ Enter ○➔ △▽ modules ➔ Enter ➔ △▽ circuit modules ➔ Enter

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

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

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

```
---DCM 32-H15-S037---
A: circuit          1
   P =    0W (    3W)
   failure
B: circuit          2
   P =    0W (    8W)
   failure
help     test     back
```
Figure 42: State of DCM/ACM-modules

11.5.2   State of the charger modules (LDM)
State ➔ menu/F3➔ △▽ diagnosis ➔ Enter ○➔ △▽ modules ➔ Enter ➔ △▽ charger modules ➔ Enter

Display with the state of the charger module(s). More information in chapter 7.4.

Note: This screen can also be reached via INFO-pushbutton on every LDM (More information in chapter 7.4):

State ➔ INFO-pushbutton LDM

```
---LDM 25-H10-S037---
charging unit        1
(rack  7, slot  7)
float charge
I: (   0,0)    -,-A
P: ( ---,-) ---,-V
T:            -,-C
help   details   back
```
Figure 43: State of charger modules

11.5.3   State of the SAM and IOM inputs
State ➔ menu/F3➔ △▽ diagnosis ➔ Enter ○ ➔ △▽ modules ➔ Enter ➔ △▽ SAM/IOM inputs ➔ Enter

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

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

```
--SAM/IOM diagnosis--
    SAM/LM      IOM
  1:               ----
  2:
  3:
  4:
SAM 1 E1
help   update   back
```
Figure 44. State of SAM/IO modules

Above the softkeys (46) a description of the selected (△ and ▽) input is shown; the message not installed indicates a communication error between central unit and module. The message RS485 fault indicates a connection or allocation error with the external modules (SAM, MC-LM or MCT15) and automatically switches the circuits to modified non-maintained operation, which is then shown in the display MB. This way the system realises the "safe operation" in case of a communication failure according to existing standards.

11.6 State of the sub-distributions
State ➔ menu/F3➔ △▽ diagnosis ➔ Enter ○ ➔ △▽ sub-distribution ➔ Enter ○

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

11.7 State of the subsystems
State ➔ menu/F3➔ △▽ diagnosis ➔ Enter ○ ➔ △▽ subsystems ➔ Enter ○

Subsystems are power supply systems of the same type which are administered and monitored by this system. This requires a connection of the systems via ethernet (incl. TCP/IP-address allocation. The diagnosis screen (47) for subsystems shows the state of one subsystem only; the subsystems are selected with ◁ and ▷. Via softkey details/F2 you can select another page with additional information (48).

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




help   details    back
```
Figure 45: State of subsystems

```
----subsystem---02---

   error memory empty




              done
```
Figure 46: Detailed information

11.8 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 its MAC-address (49).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:      12345
firmware: 1.8.2 1109
hardware: 21
MAC:00:1f:3e:00:1f:a1
help            back
```
Figure 47: System information

The key parameters page (50) shows the number of installed circuits, the nominal capacity of the battery, the set supply time, the set cut-off voltage, the number of connected charger modules, and the programmed duration of the capacity test.

```
----key parameters---
circuit:         13
battery:       017Ah
supply time:    001h
cut off voltage:185V
charger:        001
capacity test:  off
help            done
```
Figure 48: System key parameters

In the log (51) 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-----
2017                >
2016                >
2015                >
2014                >
2013                >
2012                >
help            back
```
Figure 49: 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 symmety 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 opend
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 mocules at the same time.
login master	Master-login was carried out
login service	Service-login was carried out
luminare 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 at 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:<b> 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

11.9 Detecting all modules

State ➔ menu/F3➔ △▽ installation ➔ Enter ○ ➔ △▽ detect modules ➔ Enter ○

Internal and external modules have to be detected after installation so that the central control and monitoring unit can recognise and monitor them. For detection, switch the system to „ready to operate" (operation mode switch to position "I", see also chapter 9.10). Then select detect modules > in the menu installation and press Enter. When the module detection is finished, all identified modules are listed. In order to save the results of the detection in the system settings press done/F3 and confirm the security prompt with yes/F1.

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

Figure 50: Detect modules

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

11.10   Select operation mode

State ➔ menu/F3➔ △▽ installation ➔ Enter ○ ➔ △▽ operation mode ➔ Enter ○

Setting the operation mode prevents an undesired activation of the emergency lighting during company shutdown times. Selecting the operation mode can be done either via internal or external operation mode switch (BAS) or directly via menu depending on the system configuration. In the menu shown in 53 you can select the following settings with ◁ and ▷:

```
----operation mode---

present mode:
BAS/MCT/BMT control



help              menu
```

Figure 51: Select operation mode

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

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

11.11   Configuration and administration
State ➔ `menu`/F3➔ △▽ `configuration` ➔ Enter ◯ (➔ △▽ `administration` ➔ Enter ◯)

In the menu configuration (54) as well as the submenu `administration >` (55) 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 52: Configuration menu

```
----administration---
network             >
LCD contrast        >
timer               >
IOM inputs          >
SAM inputs          >
                  menu
```
Figure 53: Submenu "administration"

11.11.1 Network settings and master-slave-monitoring
State➔ `menu`/F3➔△▽ `configuration`➔Enter◯➔△▽ `administration`➔Enter◯➔△▽ `network`➔Enter◯

The `network`-menu (56) 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 (57)

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

Thus in the menu `ip addresses` (57) under the menu item "adapter" (57, point 1) you can select the respective connection with ◁ and ▷ (`internal` or `front`). Now the buttons △ and ▽ let you make settings for the active adapter. You can set the ip-address (`ip`), subnet mask (`Mask`), `Gateway` and `DNS`. Use the buttons ◁ and ▷ to select the different characters and change them with △ and ▽. With Enter ◯ you finish the input, so that you can use the keys △ and ▽ for selecting another line in the menu. By pushing the softkey `done`/F3 you leave the ip-addresses input page; settings changes have to be confirmed with `yes`/F1.

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

Submenu communication (58)

Each power supply system can be linked to other systems which have a similar central control unit. This requires a clear allocation of an own IP-address to each system (see above). When they are networked, one system (called master) monitors all others (slaves). To achieve this in master and slave systems the status query in the menu communication (58) has to be set to `on` (58, point 1). Additionally, the IP-addresses of all slave systems have to be entered in the master system (58, point 2). The selection and change of addresses can be done as described in the above submenu `ip addresses`. The new settings become effective after leaving the submenu by pushing `done`/F3 and confirming with `yes`/F1.

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

```
-------network-------
ip addresses        >
communication       >
                  menu
```
Figure 54: Network menu

```
-------network-------
adapter:     internal  ──1
ip:   010.000.020.031
mask: 255.000.000.000
gateway:
      010.000.000.001
dns:  010.000.000.003
help            done
```
Figure 55: Submenu for setting ip-addresses

```
----communication----
status query:     on  ──1
US 1: 000.000.000.000 ──2
US 2: 000.000.000.000 ──2
US 3: 000.000.000.000 ──2
US 4: 000.000.000.000 ──2
US 5: 000.000.000.000 ──2
help            done
```
Figure 56: IP-addresses of monitored systems

11.11.2 Setting the LCD contrast
State➜menu/F3➜△▽ configuration➜Enter○➜△▽ administration➜Enter➜△▽ LCD-contrast➜Enter

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

```
-------display-------

 LCD-contrast: 25 %

abcdefghijklmnopqrstu
vwxyz0123456789ABCDEF
GHIJKLMNOPQRSTUVWXYZ
help            done
```

Figure 57: Setting LCD-contrast

11.11.3 Timer settings
State➜ menu/F3➜△▽ configuration➜Enter ○➜△▽ administration➜Enter ○➜△▽ timer➜Enter ○

In the menu "timer" you can program up to 32 different switch times for individual circuits or for combined circuit groups. These switch programmes only and exclusively deactivate maintained lighting circuits during shut-off times (e.g. school holidays, shop closing times etc.). At the top of the timer menu (60, point 1) the number of the selected timer is shown (right) as well as its current state (inactive/active, middle). With every timer the following settings are possible:

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

Figure 58: Timer programming

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 △ and ▽ keys; the values are changed using the ◁ and ▷ 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.

11.11.4 Programming the IOM-inputs

State➜menu/F3➜△▽ configuration➜Enter○➜△▽ administration➜Enter➜△▽ IOM-inputs➜Enter

Each IO-module has four voltage inputs. Inputs IOM1.E1 (BAS) is pre-programmed and not changeable. IOM1.E2/E3/E4 (pushbutton) are configurable (see chapter 4.1.3). Inputs IOM1.E2/E3 can cause a message being displayed or additionally put the system in a state of failure either in the de-energised (E=0) or energised state (E=1).

At the top of the IOM-input menu (61, point 1) you select the number of the IO-module (01 to 05) as well as the input (01 to 04) to be configured; under function one of the following settings can be selected:

```
-----IOM-inputs------

IOM/input: 01/02          ─ 1
function:
 E=0, message+failure
message:
Internal Fan              ─ 2
            back
```

Figure 59: Programming IOM-inputs

none	input status has no effect
E=0	function is executed when input is de-energised
E=1	function is executed when input is energised
message	a configurable message is displayed (61, point 2)
message+failure	the system changes to state of failure
fan failure	the system shows a fan failure
fan failure K6	the system shows a fan failure (depending on the fan control via K6)

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

Note: The inputs and outputs of a first factory-fitted IOM are pre-programmed.

11.11.5 Programming the SAM-inputs

State➜menu/F3➜△▽ configuration➜Enter○➜△▽ administration➜Enter➜△▽ SAM-inputs➜Enter

The built-in switch query module (SAM) or external switch query modules (type SAM08, MC-LM or SAM24) can be used in order to switch maintained lighting circuits of the system on and off in mains operation together with the general lighting. Up to 15 switch query modules (SAM08/SAM24) can be connected to each BUS of your system. All SAM-inputs can be provided with a clear text message via the menu SAM–inputs (62).

The message text is entered after the selection of the SAM-module (62, point 1, sequential number 01 to 16) and the input (62, point 2, numbers 01 to 08) as described in the above paragraph. The new settings become effective after leaving the menu by pushing done/F3 and confirming with yes/F1.

```
------SAM-inputs-----

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

Figure 60: Programming SAM-inputs

11.11.6 Setting the menu language
State➔ `menu`/F3➔△▽ `configuration`➔Enter ◯➔△▽ `language selection`➔Enter ◯

This menu lets you select the language for the LCD-menu control using ◁ and ▷. The new settings become effective after leaving the menu by pushing `done`/F3 and confirming with `yes`/F1.
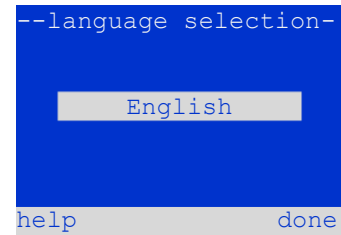
```
--language selection-


      English


help              done
```
Figure 61: Language selection

11.11.7 Authorisation, login with password, logout
State ➔ `menu`/F3➔ △▽ `configuration` ➔ Enter ◯ ➔ △▽ `password` ➔ Enter ◯

Before you can change settings in the menus `installation` and `configuration`, you have to log in with 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 ▷ (64, 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 ▷ (64, point 1). Then press Enter ◯.
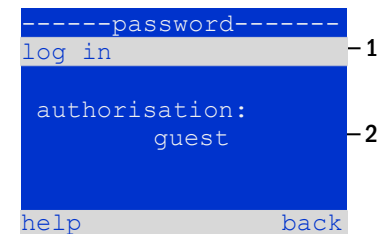
```
------password-------
log in                ─1

authorisation:
      guest           ─2

help              back
```
Figure 62: Login and logout

The current user status (authorisation) is shown in the centre of the screen (64, point 2) as soon as you enter the menu "`password`".

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

11.11.8 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.
Automatc change to DST: If you select `auto` (65, point 1), the system switches automatically between DST and Standard Time. The time is not changed if you select `off`.
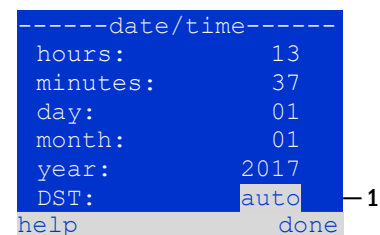
```
-----date/time------
hours:           13
minutes:         37
day:             01
month:           01
year:          2017
DST:           auto  ─1
help             done
```
Figure 63: Setting the system time

11.11.9 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.

```
----capacity test----
 test 1 of 4:              ── 1
  duration:      off       ── 2
  time (hour):      08
  time (min):       00
  day:              01
  month:            04
help               done
```

Figure 64: settings for automatic capacity tests

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, 66, point 1), its duration can be set duration (66, point 2) between (5min to 8h) or deactivated (off). A date (day, month) have to be set for the beginning of the test.

11.11.10   Configuration of the automatic Email notification

The miniControl XL *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 miniControl XL *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 miniControl XL *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.

Setup and Commissioning

Step 2: Configuration of the Email function in the WebInterface

Open a web browser on the PC and enter the IP-address of your system as address. The WebInterface main page of the system opens (fig. 67). Click on the menu item "Administration" and choose "E-Mail" (login required). This takes you to the Email-configuration page (fig. 68).
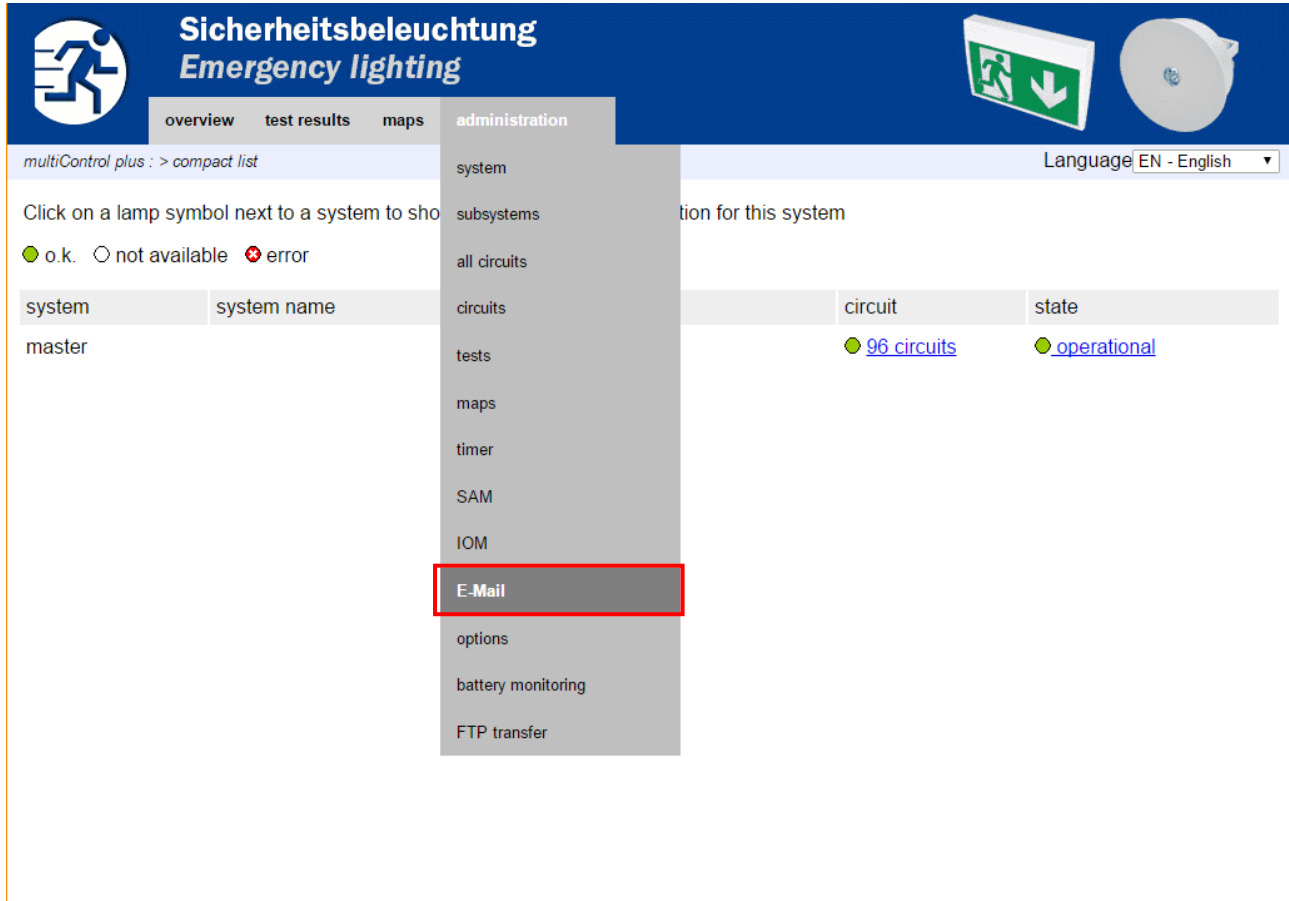
Figure 65: Web-interface main page and access to the email configuration page.

Figure 66: Email configuration page

Enter the following information in the input boxes on the Email configuration page (fig. 68):

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: 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.	
benutzerbeispiel.de: Recipient de is an invalid Email address - no @ character	Invalid Email address without "@"-sign.	Check Email address and add "@"-sign.
benutzer@beispiel.de: connect() failed	System cannot connect to mail server.	Check gateway in network settings. Check server address in Email configuration.
benutzer@beispiel.de: Unable to resolve system name *mail.beispiel.de*	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.

11.12   Show service address

State ➔ menu/F3➔ △▽ service address ➔ Enter ○

If you want to contac 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 67: Service – contact details

12   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. 14, point 7) to charging mode (position "0"). **Important**: Make sure that the LC-display (fig. 14, point 5) shows "charging".

2.   **Disconnect system from mains.** Turn the fuse switch disconnector down (fig. 1, point 10)".

3.   **Remove mains fuse.** Remove the mains fuses (fig. 1, point 10).

4.   **Remove battery fuses F2/F4.** Remove the battery fuses (fig. 1, point 8). The system is now shut down and disconnected.

13   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.

13.1 Charging and discharging

The system uses one IUTQ-controlled charger unit for charging. They consist of a charger module (LDM25) with a maximum charging current of 1A 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	2,30
20	2,45	2,27
30	2,40	2,24
40	2,34	Charging unit switches off*

*Above 40°C, the charging unit switches of in order to protect the batteries from further upheating and over-charge.

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

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

13.1 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.

13.2 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)

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 chapter5) 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.

13.3 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.

13.4 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.

13.5 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.

13.6 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.

14   Technical data

performance characteristics	
system type / serial number	miniControl XL *plus* / serial number see front page
mains input data	
nominal voltage U$_{Nom}$	230V AC +/-10%
nominal current	6,52A
nominal frequency	50/60Hz +/-4%
number of phases	1

rating of the mains fuse	
nominal current of the mains fuse (F1)	16AT

output data	
nominal voltage (AC-operation)	230V
nominal output (AC-operation)	1800VA
nominal voltage (DC-operation)	216V
nominal current at	6,94A / 2,31A / 1,38A (total of all final circuits)**
nominal output at 1h / 3h / 8h DC-operation	1500W / 500W / 300W (total of all final circuits)**
min. voltage after	185V / 185V / 185V
operation time for above-mentioned data	1h / 3h / 8h
nominal temperature of the battery	20°C

battery type and number of cells	
battery type	Pb
number of cells	108
make	RPower
charging current	1A
float charge voltage	2.275V per cell*
boost charge voltage	2.35V per cell*
deep discharge 1	1.71V per cell*
deep discharge 2	1.53V per cell*

other system characteristics	
number of electric circuits/DCMs	max. 32/ max. 16x DCM32 (optional DCM12E / DCM42)
Number of electric circuits/ACMs	max. 16/ max. 16x ACM
operation mode	maintained or non-maintained lighting in changeover operation
number of SAM-modules	1 internal
number of switch inputs 230V AC	8
charging curve	IUTQ
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 electronics cabinet	1472,5mm x 570mm x 230mm
protection type	IP 20
protection level	I
cable entry	from above

recommended cable cross sections	
mains cables	2.5 - 6mm² rigid
potential-free signal cables	0.25 – 2.5mm² rigid
electric circuits	1.5 – 2.5mm² rigid
battery cables NSGAFÖU +/-	2.5 - 25mm²
Symmetry	2.5 - 25mm²

(*) Values depend on working temperature.

(**) Values are valid for DCM32; When using optional current circuit modules, the product information must be observed

Relevante Sicherungen/Anschlussquerschnitte	
mains fuse F1 (L)	C16 circuit breaker
battery fuses F2, F4 (B+, B-)	Innozed D02 ceramics, 2 x 20AT
battery fuse F3 (Sym)	Innozed D01 ceramics 2AT
internal fuses L/B+ (F19/F18)	fuse ceramics 5 x 20mm 1AT/3.15AT
Circuit modules DCM12E L(+) and N(-)	fuse ceramics 6,3 x 32mm 5AF
Circuit modules DCM32 L(+) and N(-)	fuse ceramics 6,3 x 32mm 5AF
circuit modules DCM42 L(+) and N (-)	fuse ceramics 6,3 x 32mm 6,3AF
Circuit modules ACM L	fuse ceramics 5x20mm 4AT
charger module LDM25	fuse ceramics 5 x 20mm 3.15AT
fuse switching voltage F22, F23	fuse ceramics 5x20mm 250mAF
fuse fan F21	fuse ceramics 5x20mm 500mAT
fuse BAT-LOGG®	fuse ceramics 5x20 1AT

14.1 Available battery types and mounting conditions

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

Type RPower	Tn	1h	2h	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	m³/h	cm²	cm
OGiV 12170 L		9.85	5.71	4.08	2.77	1.87	1.56	0.85	0.1	3	37

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

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

Type RPower	Tn	1h	2h	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 12170 L		114.00	66.80	48.50	33.10	22.40	18.80	10.20

Note: Do not exceed the maximum connected load of the system of 1500W.

14.2 Connection diagram
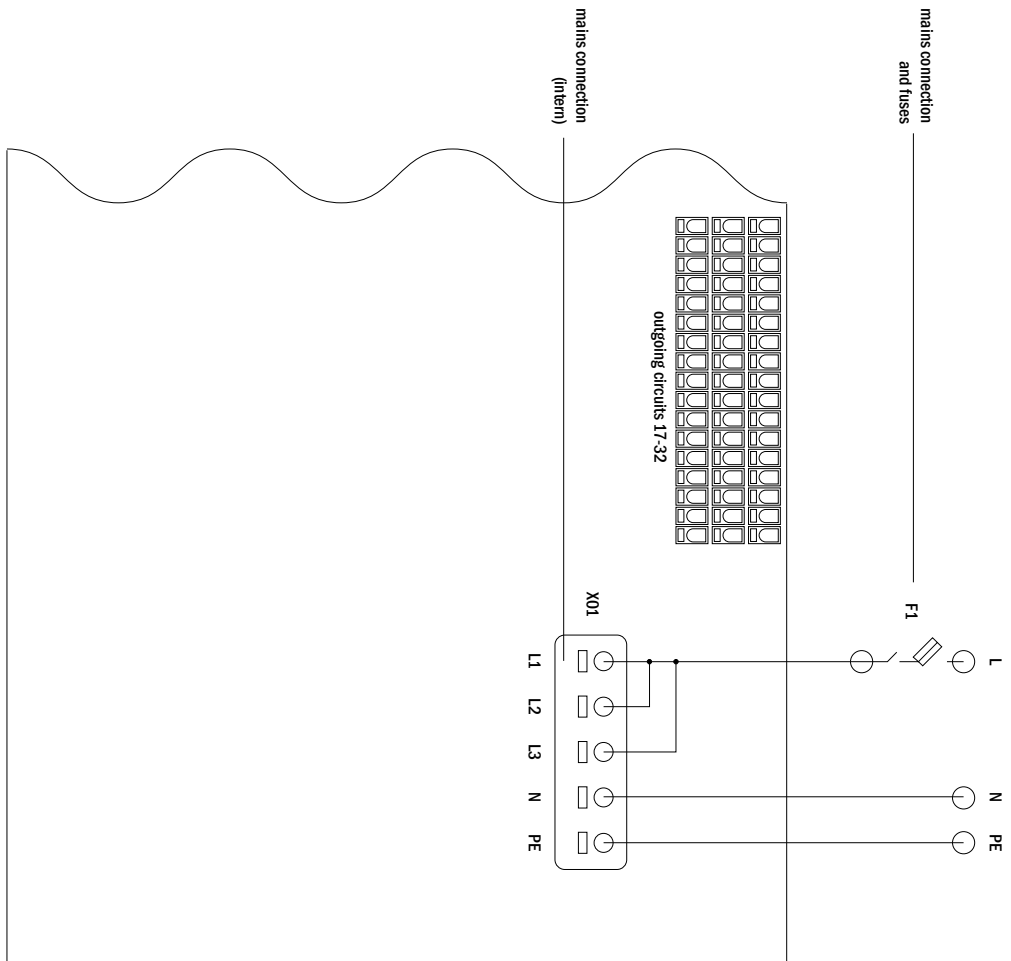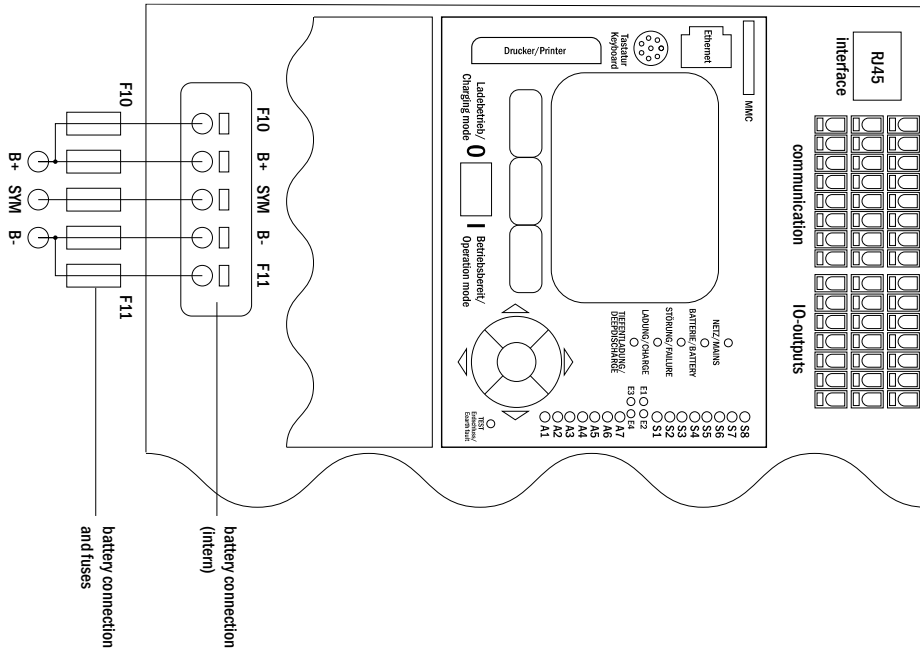
15   Module descriptions

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.

15.1 Electric circuit module DCM32 / DCM42 (special order)

characteristics at a glance:

- 216V DC output voltage in battery operation
- 2 electric circuits per module
- 2x3A output current per module
- mixed mode in the circuit
- single luminaire or circuit monitoring in the circuit

Figure 68: DCM

A DCM32/42 slot-in card can contain up to two circuits at the same time. When the general power supply fails, they realise the automatic switching of the circuits to battery operation. Each circuit works separately in changeover mode and can be switched separately. The electric circuits can be programmed either for maintained or non-maintained lighting. A combination of both in one circuit is also possible. Each circuit has an integrated monitoring unit for monitoring earth fault, overload, electric circuits and single luminaires. These circuits have a double pole overcurrent protection device (system protection fuses), which are also monitored in operation (fuse type: 6,3x32mm, ceramic tube, delay fuse, 1.500A breaking capacity). After pressing the INFO-pushbutton, the LC-display of the central control and monitoring unit (14, point 5) shows the state of the two electric circuits (A/B) of the module. By means of this display in combination with the direction, enter and function keys you can program operation mode, follow-up time, luminaire monitoring and supply time for each electric circuit.

15.2 Electric circuit module DCM12E (special order)

characteristics at a glance:

- 216V DC output voltage in mains backup operation
- 2 circuits per module
- per module 2x1A output current
- mixed mode operation in the end circuit, integrated single light switchability
- single light and circuit control in the end circuit
- just in case with luminaires on ELS capable stand(MLED, MU05[1], IL (V57.3.4), KM (V38.5.2, V84.5.2))

Figure 69: DCM12E

The electric circuit module DCM12E is an end circuit component for emergency lighting systems of the types multiControl plus, midiControl plus, miniControl (XL) plus, miniControl plus and microControl plus.
The electric circuit module is equipped with two electric circuits each ("circuit A" and "circuit B"), where each circuit is designed for a maximum output current of 1A. Each electric circuit module can realise a single light scanning as well as a self-calibrating circuit control.
Furthermore, each circuit has an earth connection monitoring, which signalizes a possible earth fault in the end circuit by means of a red LED (error). However, this monitoring is only active when the BAS (mode selection switch) is set to charge mode (emergency lighting blocked), i.e. the end circuits are not engaged.
The programming of each control mode of the lights in the end circuit is carried out at the central computer separately for each circuit. The configuration of the lighting switching mode and the single light switchability via powerline requires a PC/Laptop.
By means of the INFO button, integrated in the front panel, all relevant data of each DCM can be retrieved and are shown on the display of the central computer. Possible errors and states of the components and electric circuits such as consumer control mode, connected consumer rating, end circuit defects etc. are displayed here.

15.3 Electric circuit module ACM (special order)

characteristics at a glance:

- 230V 50Hz output voltage in mains standby operation
- Up to 500VA connected load with integrated overload protection
- switch mode oft he end circuit DS, MB or gMB
- circuit monitoring

Figure 70: ACM

The circuit modules are equipped with an electric circuit („circuit A"), suitable for a maximum output power of 500VA.

The ACM works in changeover operation, which means, in normal operation 230V AC 50/60 Hz are connected to the end circuit terminal and in emergency operation a 230V 50Hz square wave voltage. Each circuit module can realise a single light query as well as a self-calibrating circuit monitoring.

Furthermore, each ACM has an earth fault monitoring, which signalises a possible earth leakage by a red LED (Fehler / Error). This monitoring is only active, however, if the BAS (mode selection switch) is set to charging mode (emergency light blocked), and thus the end circuits are not connected. The integrated overload protection guarantees switching the end circuit off as well as an optical signal (LED Fehler / Error) if a too high consumer load is connected in battery operation. The programming of the respective light monitoring mode in the end circuit is carried out on the central computer separately for each circuit. The INFO pushbutton, integrated in the front, is used to retrieve all relevant data of the respective ACM and display them on the central computer. Possible errors, module status or circuit status, monitoring mode, connected loads, defects of an end circuit fuse etc. are displayed here.

15.4 Switch query module SAM08 (optional)

characteristics at a glance:

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

Figure 71: SAM08

The switch query module SAM08 is a bus-compatible light switch query module which can be used for a joint switching of emergency and general lighting. When connected to the multi-bus RS485 of the miniControl XL *plus* emergency lighting system, it transmits the switch commands to the control computer by which the switch commands can be allocated to the respective circuits. For this purpose it has 8 galvanically isolated inputs, which are designed for a voltage of 230V AC +/- 10% and so can be connected to the light switches and circuits of the general lighting. The SAM08 module and the miniControl XL *plus* systems are connected in series (feed through wiring) via screened 4-core data line; up to 15 of these SAM08 modules can be connected via this line as one of these lines is already connected to the internal SAM08. A J-Y(St)-Y cable or similar in compliance with DIN VDE 0815 and 0816 have to be used as data line.

15.5 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 72: 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 miniControl XL *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 200V – 255V/50Hz or DC 24V – 255V and so can be connected to the light switches and circuits of the general lighting. The SAM24 module and the miniControl XL *plus* systems 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.

15.6 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 73: MC-LM

The MC line monitors are line monitors for connection to the miniControl XL emergency lighting system. With the MC-LM it is possible to monitor three phases, e.g. a general mains distribution. If less than 3 phases are to be monitored it is necessary to bridge unused phase inputs with assigned connections at the MC-LM. The switching threshold for recognising a mains failure or a severe mains fluctuation lies at 85% of the nominal mains voltage (230V AC), i.e. at approx. 195V AC. It is possible to connect the MC-LM modules to the emergency lighting device in series. Use the respective connections on the MC-LM for this purpose, and assign each individual MC-LM to a different address.
Setting the requisite addresses for each MC-LM is carried out using the rotary encoder switch on the module. The DIP switch is required for activating and deactivating the terminal resistance. This must be activated on the last module of the connected series (setting - ON).
An indicator LED provides information on the current status of the line monitor. If the LED is illuminated constantly then the connected voltage is OK. If the LED is not illuminated then the connected voltage of the general distributor is faulty.

15.7 MultiControl Tableau MCT-15(S) (optional available as a flush-mounted version)

characteristics at a glance:

- Display of the system status in plain text
- Visual (LED) and acoustic indications of the system statuses
- Remote triggering of the test function
- BUS-compatible
- Possible to switch the system operating mode
- Possible to switch maintained light consumers on and off

Figure 74: MCT-15(S)

The remote panels MCT-15 and MCT-15S are designed to provide a decentralised display of the statuses of emergency lighting systems of types MC-series. The panel provides visual and acoustic indications of the respective system status. Visual indications are provided in the form of plain text and LED. In the event of faults, an acoustic signal is also issued. The acoustic signal can be acknowledged with the „RESET acoustic signal" button although this does not influence the error message (visual indication).

In addition to these indications, statuses such as Mod non-maintained, test operation, mains OK, batt. OK, DCM fault etc. are also displayed in plain text. By using the (ON/OFF) button or key switch on the MCT-15, it is possible to switch the system operating mode from charging mode to standby mode or vice versa. By pressing the Switch „DS On/Off" the maintained circuits of the system can be turned on and off.

However, in the event that no key switch is integrated into the indicator panel it is necessary to ensure that the MCT-15 is safeguarded against access by unauthorised personnel (DIN VDE 0108 part 1 section 6.4.3.11). In order to be able to trigger the external test function, the test button must be pressed until the message „ready" appears in the display. This is necessary to prevent an accidental triggering of the test function. Please refer to the wiring documentation for connection variants and connection schematics.

15.8 PC230 (optional)

characteristics at a glance:

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

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

Figure 75: PC230

16 Connection examples

connection example MCT15

microControl plus, miniControl plus, miniControl-XL plus, midiControl plus,

MCT15

MCT15

MCT15

five-pole double spring terminal
on the front panel of the MCT-board

terminal 0.4–0.8mm²

recommended cable type
J-Y(ST)Y 02x2x0.8mm²

recommended cable type
J-Y(ST)Y 02x2x0.8mm²

recommended cable type
J-Y(ST)Y 02x2x0.8mm²

terminal 0.5–2.5mm²

485-2

485-1

5-RS485-1 (shielding) [connection, SAM, LM and MCT]
6-RS485-1 (GND) [connection, SAM, LM and MCT]
7-RS485-2 (GND) [connection, SAM, LM and MCT]
8-RS485-2 (shielding) [connection, SAM, LM and MCT]
13-RS485-1 (B) [connection, SAM, LM and MCT]
14-RS485-2 (+12V) [connection, SAM, LM and MCT]
15-RS485-2 (B) [connection, SAM, LM and MCT]
21-RS485-1 (A) [connection, SAM, LM and MCT]
22-RS485-1 (+12V) [connection, SAM, LM and MCT]
23-RS485-2 (A) [connection, SAM, LM and MCT]

Max. 6 MCT15-modules can be connected.
Max. 3 of them can be programmed with command function.
A termination is necessary at the end of a module chain (Dip-switch 1).

connection example SAM24

microControl plus, miniControl plus, miniControl-XL plus, midiControl plus,

control voltages:
AC 185V – 255V/50Hz or
DC 18V – 255V

5-RS485-1 (shielding) [connection, SAM, LM and MCT]
6-RS485-1 (GND) [connection, SAM, LM and MCT]
7-RS485-2 (GND) [connection, SAM, LM and MCT]
8-RS485-2 (shielding) [connection, SAM, LM and MCT]
13-RS485-1 (B) [connection, SAM, LM and MCT]
14-RS485-2 (+12V) [connection, SAM, LM and MCT]
15-RS485-2 (B) [connection, SAM, LM and MCT]
21-RS485-1 (A) [connection, SAM, LM and MCT]
22-RS485-2 (+12V) [connection, SAM, LM and MCT]
23-RS485-2 (A) [connection, SAM, LM and MCT]

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

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

If the modules are in a star layout network (Com2), an initial resistance is necessary.

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

MC-LM
OFF ON
Eingang / Input
Netz / mains
230V / AC50Hz
L1 L2 L3 N

separate mains connection
mains sub-distribution
general lighting

terminal 0.5-1.5mm²

J-Y(ST)Y 02x2x0.8mm²

5-RS485-1 (shielding) [connection, SAM, LM and MCT]
6-RS485-1 (GND) [connection, SAM, LM and MCT]
7-RS485-2 (GND) [connection, SAM, LM and MCT]
8-RS485-2 (shielding) [connection, SAM, LM and MCT]
13-RS485-1 (B) [connection, SAM, LM and MCT]
14-RS485-2 (+12V) [connection, SAM, LM and MCT]
15-RS485-2 (B) [connection, SAM, LM and MCT]
21-RS485-1 (A) [connection, SAM, LM and MCT]
22-RS485-1 (+12V) [connection, SAM, LM and MCT]
23-RS485-2 (A) [connection, SAM, LM and MCT]

485-2
485-1

terminal 0.5-2.5mm²

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

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

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

Power-Control PC230 (×3)

separate mains connection
mains sub-distribution
general lighting

N L3 L2 L1

terminal 0.5-2.5mm²

Netz / mains: 3x 230V / N 50Hz
Nicht belegte Eingänge mit belegten verbinden /
Connect unused inputs to used ones
U$_{AB}$: 195V
Netz/mains
pk

Gemäß / according to DIN VDE 0108
Anschluss / connection: max. 2.5mm²
Schaltleistung / switching capacity max.
AC1: 0.5A 250V 50Hz AC, DC1: 2A 30V DC

18 15 16 28 25 26

terminal 0.5-2.5mm²

terminating diode

e.g. NYM min. 0.75mm² (15V AC)

terminal 0.5-2.5mm²

16-MB-quiescent current loop output
24-MB-quiescent current loop input
caution! ~15V

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

17	Revision history

miniControl XL *plus* – setup and commissioning		
version	date of issue	most important changes compared to previous version
1.0	2012-05-09	-
1.1	2012-09-24	chapter on operating, setup and carrying out tests added
1.2	2013-05-07	menu-reference added 1.6.0 (Build 895)
1.3	2013-10-22	integration of new modules (SAM24) and LDM-Update
1.4	2015-11-12	corrections and additions to the LCD menu description
1.5	2016-09-21	Added front panel LED description; USV power supply for WLAN module
1.6.1	2017-02-13	converted to miniControl XL plus, corrections
1.6.2	2017-02-17	corrections
1.7	2017-03-20	added chapter: first inspection, repeating inspection, inspection before commissioning, procedure in case of failure
1.7.1	2017-06-08	surrounding temperature with battery inserted 10 – 35°C
1.7.2	2018-05-29	corrections
1.7.3	2018-05-30	Changed inside view

18 Appendix: system specification, commissioning, notes

General information on your system	
Device type	miniControl XL *plus*
Device number	
Manufacturing number	
Customer order number	
Commission/Object	

System specification	
Number DCM32-modules	
Number of circuits	
Housing protection class	IP20
Battery type	Pb - AGM OGiV
Housing dimensions (HxWxD) in mm battery cabinet	1472,5 x 570 x 230

Used battery type	
Battery manufacturer	RP-Technik GmbH
Battery type	
Nominal voltage U_N	216V
Number of cells (2V)	108
Number of blocks (12V)	18
Nominal capacity C_{20}	17
Nominal temperature T_N	20°C
Ventilation requirements	according to EN 50 272-2, chapter 8
Nominal discharge current I_N	5,32A

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

Accessories/Options	
log printer	☐ yes ☐ no
glazed door	☐ yes ☐ no

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

Notes

_____

_____

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_____

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_____

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_____

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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