Power Supply System

miniControl *plus*

KOMPETENZ VERBINDET. **SCHRACK** TECHNIK

Customer Order No.:

Manufacturing No.:

Commission/Object:

Device No.:

Power Supply System miniControl *plus*

Setup & Commissioning

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 *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 *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 0°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.

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4   Danger and information signs

Please strongly obey the safety instructions when installing and using your miniControl *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 *plus* system are:

- 1x miniControl *plus* system in a compact cabinet
- 18x battery type RPower 12170 (standard), other types available on request
- 1x operating tool angled 2.5mm, partially insulated
- 1x ¼"- hexagonal bit 3 x 25mm with centre bore hole
- 1x connector cable set (15x row connectors 300mm x 2.5mm²; 2x tier connectors 680mm x 2.5mm²)
- 1x brief instruction (this document)

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)
- slot screw driver width 5.5mm
- 8mm jaw or socket wrench (torque wrench), see battery handling instructions

6   System design
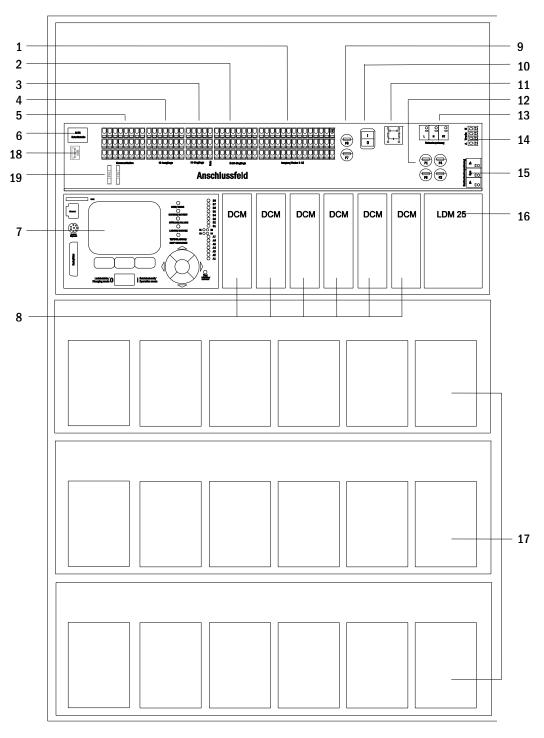
Figure 1: Inside view

1 electric circuits	7 control centre	13 mains supply
2 SAM inputs	8 electric circuit modules	14 connection toroidal transformer
3 inputs I/O-module	9 fuses auxiliary circuit	15 battery connection
4 outputs I/O-module	10 mains switch	16 charger unit
5 communication	11 mains filter	17 battery blocks
6 ethernet interface	12 fuses mains/battery	18 USB port for 5V WLAN module
		19 Fuses for IOM switching voltage (terminals 11/12/19/20)

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6.1 Connection of the charger and switch unit

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

6.1.1 Ethernet connection

Like all other systems of the MultiControl family also this system has an ethernet interface, by which it can be integrated in a network for remote monitoring. Fig. 2 shows the network interface on the 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.
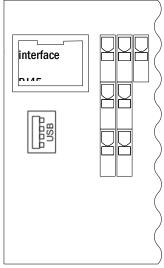
Figure 2: Ethernet

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".
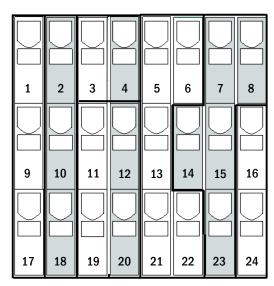
Figure 3: Communication

port name	terminal	contact allocation	port for
COM1	1 9 17	TXD RXD DCD	ModBus/GLT
COM2	2 10 18	TXD RXD GND	external printer (19 inch)
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	screen GND B A +12VDC	SAM08, SAM24, MC-LM, MCT15(S)
RS485-2	7 8 14 15 23	GND screen +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. Fig. 4 shows the respective 3-level PCB terminals.
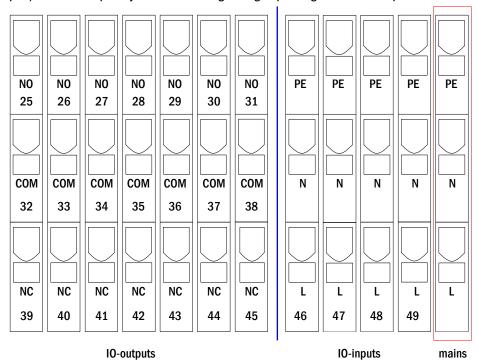
Figure 4: Inputs and outputs IO-module

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Note: The galvanically isolated inputs accept the following voltages: 24V-255V DC or 220/230V AC (50/ 60Hz). 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	OKI
29, 36, 43	battery deep discharge	43 – 36	initiated
		36 – 29	OK
30, 37, 44	fan operation	44 – 37	off
		37 – 30	on
31, 38, 45	system operation	45 – 38	battery
		38 – 31	mains

IO-inputs

terminal	function	voltage on	no voltage
46 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-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 unpower 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. 5 (or fig. 1 point 2), the switch inputs are also realised as 3-level spring-loaded terminals, which are fixed on the back plane. They are designed for wire cross sections (solid-core) from 0.08mm² to 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 which comply with DIN 57250-1 VDE 0250-1 as well as MLAR, EltBauVo and DIN VDE 0100.
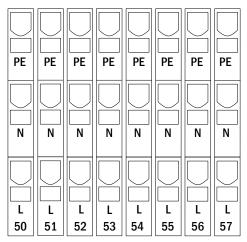
Figure 5: SAM-inputs

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

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 1). They are designed for wire cross sections (solid-core) from 0.08mm² 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.

Note: Prior to that the circuits to be connected have to be checked for installation faults (short circuit and earth fault).
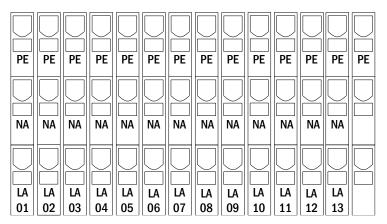
Figure 6: Electric circuits

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6.1.6   Fuses auxiliary circuits

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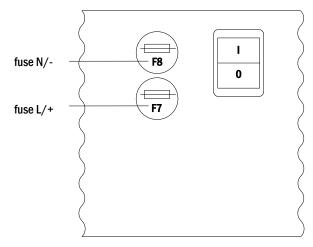
Figure 7: Fuses auxiliary circuits

6.1.7   Mains switch

Fig. 8 shows the mains switch of the power supply system which is used to switch the system on. This mains switch is an illuminated double-pole switch.
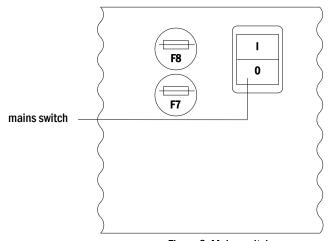
Figure 8: Mains switch

6.1.8   Fuses mains/battery supply

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

Note:

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

Insert the fuses correctly – they have a bayonet lock!

Fuse	F1	F2	F3	F4
Size	T10A	T10A	T1A	T10A
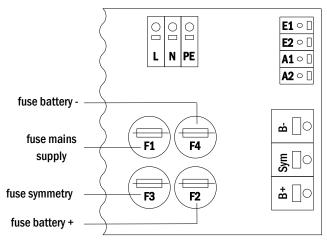
Figure 9: Fuses mains and battery supply

6.1.9   Mains supply

The terminals shown in fig. 10 serve the single-phase mains connection (230V/50Hz) of the system. Please observe correct polarity. These terminals are designed for a solid-core cable cross section of up to 4mm².

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

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

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

Figure 10: Mains supply

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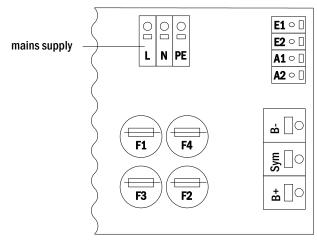
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6.1.10   Fuses for the 24V switching voltage

In order to protect the switching voltage on terminals 11/12 and 19/20 against overcurrent, the main board has dedicated fuses F14 and F15 right below the terminal block. The size of the fuses depends on how the switching voltage is generated (either by a resistive voltage divider or by a switched-mode power supply type NT24).

Figure 11: Fuses F14 + F15

	Voltage Divider*	NT24**
F14+F15 size	5x20mm 250mA F	5x20mm 500mA T
Maximum clamp current	2mA	300mA

* Standard

** Only when the system is ordered with it (the NT24 cannot be added later on).
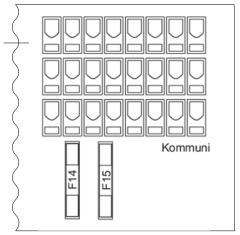
6.1.11   USB Power Supply for WLAN Module

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 12: USB Port
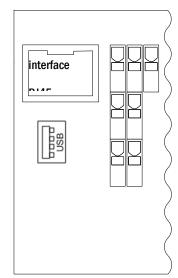
6.1.12   Connection of an internal fan (when built in an E30-housing)

Fig. 14 illustrates the connection of an internal fan when the system is built in an optional E30-housing. 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 13: miniControl *plus* in E30-housing
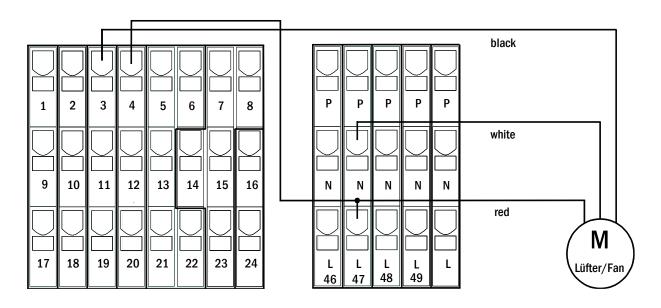
Figure 14: Connection terminals for an internal fan

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 (fig. 9) have been removed. Mount the batteries on the respective shelves of the cabinet according to fig. 15. 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
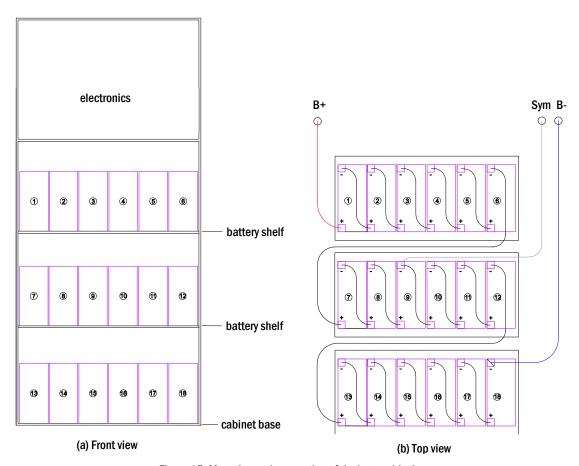
Figure 15: Mounting and connection of the battery blocks

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 and F4. Connect the battery blocks in row as illustrated in fig. 15 (b). After that connect the cables coming from the battery terminal (fig. 1, point 15) according to fig. 15 (b) - (red = B+/positive pole to the positive pole of block 1, grey = symmetry to the negative pole of block 9 and blue = B-/negative pole to the negative pole of block 18). Depending on the used battery type you must fix the pole covers before connecting.

After connecting the batteries as shown in fig. 15, please measure the battery voltage and check for correct polarity at the following poles (incorrect polarity is indicated by a beep):

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

The following torques apply to screw joints:

thread diameter	maximum torque
M5	2 - 3Nm
M6	4 – 5.5Nm

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7 Operating your system
7.1 Control elements
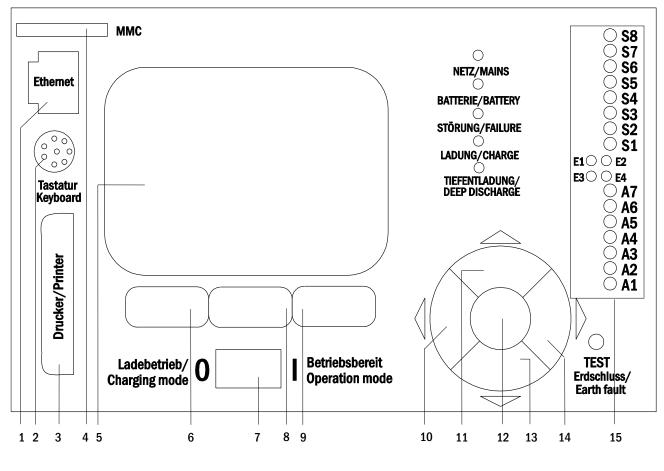
7.1.1 The central control and monitoring unit

The central control and monitoring unit is the main control element of this emergency lighting system (fig. 16) and realises the monitoring, programming and control of charging and switching processes. The system state is indicated by a back-lit LC-display as well as five multi-coloured LED. The central control and monitoring unit has the following interfaces on the front:

- 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	Status LEDs (see next page)
2	PS2 interface	9	function key F3		
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 16: Central control and monitoring unit

Status LEDs explained (see *Fehler! Verweisquelle konnte nicht gefunden werden.*, Number 15):

LED	LED leuchtet	LED leuchtet nicht
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	modifizierte Bereitschaftsschaltung inaktiv
A2	Charging unit is OK	Charging unit failure
A1	Emergency lighting blocked	System is operational

7.1.2 Electric circuit modules

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. 16, 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.
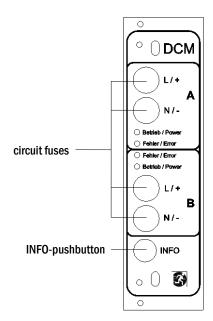
Figure 17: DCM-circuit module

LEDs explained (see fig. 17):

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 processorand can, if mains voltage is supplied, work completely self-sufficiently. This module has an output current limited to 1.0A and optimises the chrging 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.
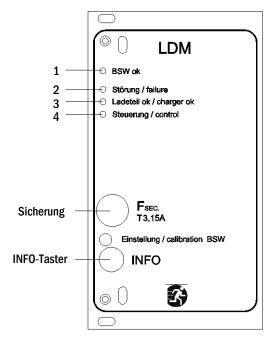
Figure 18: Charger module

LEDs explained (see fig. 18):

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. 19). 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. 21, point 8). For navigation and data input please use the arrow keys $\triangle$, $\bigtriangledown$, $\triangleleft$ and $\triangleright$ (4) as well as the enter key $\bigcirc$ (5). The up $\triangle$ and down $\bigtriangledown$ keys are mostly used for selecting menus and input fields. A selected menu item is indicated by `inverted colouring`. The right $\triangleleft$ and left $\triangleright$ keys are used to change values; in some cases you have to confirm your input with the enter key $\bigcirc$. An arrowhead `>` on the right indicates a submenu which can be selected with the right $\triangleright$ or enter $\bigcirc$ key. You can return from there using the softkey `back` or `done`.

Figure 19: 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) ➜ $\triangle\bigtriangledown$ (select circuit) ➜ Enter $\bigcirc$

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

Password login

A number of settings can only be changed with the necessary authorisation which requires a prior system login with a password. More detailed information you can find in chapter 9.11.7 "Authorisation, login with password, logout" on page 46. 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 50.

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 8) have to be removed before switching the system on.

1. Mains switch off and operation mode switch to charging mode. Turn the operation mode switch (fig. 16, point 7) to charging mode (position "0").

2. Insert battery fuses F2 / F4 . Insert the battery fuses (fig. 9) again.

3. Supply mains power. Supply mains power and check the power terminals for correct configuration (fig. 10) by conducting the below-listed measurements. In case of a misconfiguration (connection error) abort commissioning:

voltage between L1 and N   } These voltages should range from ca. 220V to 240V (supplied mains power).
voltage between L1 and PE   } If they do not, this indicates a connection error.

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

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

The system is now activated.

5. Wait for the boot process. After switching on the system you can hear an acoustic signal and the system starts booting. This process can take several minutes. **Caution:** Wait for the boot process to end and never switch the system off during this time! During the boot process or after, the LC-display (see fig. 16, point 5) should look like this:

```
      BOOTING              -----Plug & Play-----     time:            08:00
                                                                   17/08/13
  Please wait /            Configuring               battery:      245.0 V  ←
  Bitte warten ...         (Rack  1, Slot   1)                         0.1 A
                                                     State:       mains ok
  SW 1.4.1 (812)           Please wait...                     off (charging)
  HW 19
                                                     help    test    menu
   Booting in process      Automatic configuration running    Boot process finished
```
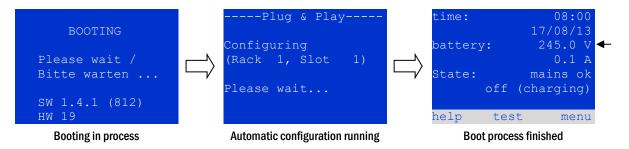
Figure 20: Boot process (left, middle) and status message (right).

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. 20, 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. 16, 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.

8. Check voltage at circuit outputs. Circuits programmed for maintained mode should have a voltage corresponding to the AC mains voltage. For this reason, all circuit module fuses should be removed prior to switching on the system. Check the voltage on each circuit terminal (fig. 1, point 1 (see also fig. 6)). Be sure to insert the fuses only after checking each circuit for short-circuits and proper isolation

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

Setup & Commissioning

9   Checking the system state and basic settings

9.1   System state

After commissioning the LC-display shows the state of the system (fig. 21) i.e. time (1) and date (2), current battery voltage (3) and battery charging current (in battery operation – discharging current) (4), system state (5, 6). Via the softkeys (8) you can select the `help`-function, conduct a `test` or reach the `menu`.

Note: The system returns from each display to the status after ca. two minutes if no input is made.
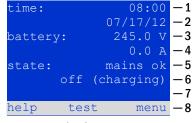
```
time:              08:00    —1
                07/17/12    —2
battery:        245.0 V     —3
                  0.0 A     —4
state:         mains ok     —5
       off (charging)       —6
                            —7
help   test       menu      —8
```
Figure 21: System state

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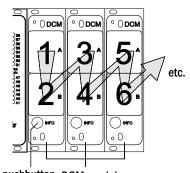
9.2   Selecting circuits and checking their status
Status ➜ INFO-pushbutton DCM/ACM ➜ △ ▽ (select circuit)

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. 22). 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. 22), the display shows the status of the respective circuits. Now the display shows the following information for circuits A and B (fig. 23):

    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. 23 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. 23, point 3):

INFO-pushbutton   DCM-modules
Figure 22: Numbering of the circuits
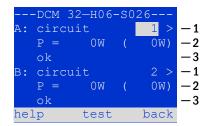
Figure 23: Circuit status

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. 24). The following information is displayed:

1 – number of circuit (fig. 24, 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. 24, 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. 24, point 3). With ◁ and ▷ you can select the following operation modes:

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

Figure 24: Circuit status

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. 24, 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. 24, point 5). You have 42 digits for naming each circuit. After selecting a line you can change to edit mode by pressing Enter ○. With ◁ and ▷ you choose the position to be changed; the character can be chosen with △ and ▽ (available characters see fig. 25). You finish the input by pressing Enter ○ or done. Tip: Use an external keyboard for entering the names.

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

Figure 25 Survey of all available characters

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

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

9.3.1 Setting the circuit monitoring mode

State ➔ INFO-pushbutton DCM/ACM ➔ △▽ (select circuit) ➔ Enter ◯ ➔ △▽ `monitoring` ➔ Enter ◯

The monitoring setup screen (fig. 26) shows the number of the circuit in the top line (fig. 26, 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. 26, point 2).

3 – measuring of the reference current (fig. 26, 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
```
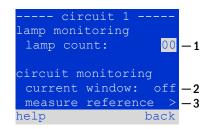
Figure 26: Setting of the circuit monitoring

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) (fig. 27). If you select the line `supply:` using the keys △ or ▽ (fig. 27, point 2), you can set the supply time for the respective circuit in steps from 3 minutes (`3min`) to 8 hours (`8h 0min`) or unlimited (`unlimited`). Selecting `SAM programming >` (fig. 27, point 1) using ▷ or Enter ◯ takes you to the table shown in fig. 28. For navigating within the table use △, ▽ or Enter ◯. In each line you can change the following settings using ◁ or ▷:

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

The softkey `back`/F3 takes you back to the previous display (fig. 27). Now push the softkeys `done`/F3 and `back`/F3 in order to leave the programming. A confirmation prompt appears (fig. 29). 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
```
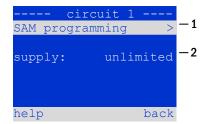
Figure 27: SAM-programming

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

Figure 28: SAM-programming

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



      save
    changes?



yes                 no
```
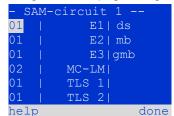
Figure 29: SAM-programming

SAM-operation mode	Explanation
`ds` (maintained lighting)	When a voltage is applied to the input, the luminaires in maintained lighting mode get switched on, the luminaires in non-maintained lighting mode remain off.
`mb` (modified non-maintained lighting)	In case of a voltage failure on the input all luminaires in non-maintained and switched maintained lighting mode get switched on and the system shows modified non-maintained lighting, see chapter 7.2). In this state the test function is blocked. Upon return of the voltage the system switches back to regular operation after the set stop delay time.
`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 fig 30): number of the LDM25 (1), rack and slot number (2), float charge/boost charge or possible failures (3), current (4), voltage (5) and temperature (6). You can change between the data of several connected charger modules using ◁ and ▷. The following table explains possible error messages (fig. 30, point 3):

```
---LDM 25—H07-S035---
charger unit        1  —1
(Rack 8, Slot 7)       —2
float charge           —3
I: (   0.0)     0.0 A  —4
U: ( 319.7)   244.8 V  —5
T:             34.0 C  —6
help    details    back
```
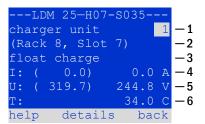
Figure 30: state of charger unit

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

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 (fig. 31, point 1). These circuits are "prepared" prior to the test, i.e. they are switched on with mains voltage and brought to working temperature for an exact current measurement (fig. 31, point 2). The duration of this process can be set to off, 5 minutes or 30 minutes. The progress is indicated by a line of dots behind the words "please wait" (fig. 31, point 3).

The test can be cancelled at any time using the softkey cancel/F3 (fig. 31 to 34, point 4).

At the beginning of the actual test the display shows the message "under test" (fig. 32, point 2). A detected error is shown in line 3 (fig. 33, point 3).

After finishing the test the display shows a summary for a few seconds (fig. 33) and the message "test finished" (fig. 34, 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).
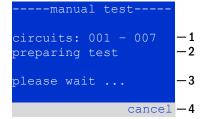
Figure 31: Test programming
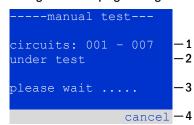
Figure 32: Setting schedule
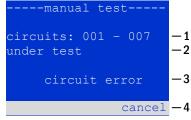
Figure 33: Test programming
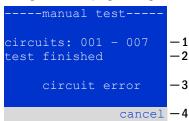
Figure 34: Test programming

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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 (fig. 35). Here you can

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

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

  next schedule:       ─4
                  _
help            done
```
Figure 35: Test programming

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

10.2.1 Setting the schedule

function test ➔ △▽ schedule ➔ Enter ○

Fig. 36 shows the display after selecting Zeitplan with ▷ or Enter ○. The following settings are possible:

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

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



help            done
```
Figure 36: Setting schedule

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 fig. 37. Here you can find:

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

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


help            done
```
Figure 37: Test programming

The softkey done/F3 finishes the input and takes you back to the display function test (see chapter 8.2). The confirmation prompt save changes? appears again (see fig. 29). If confirmed with yes/F1, the new values are saved.

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 (see fig. 29). 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 ○. You can now see a survey of the saved results of function or capacity tests:

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

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

help              menu
```
Figure 38: Test results (survey)

By pressing ▷ or Enter ○ after selecting a category with △ and ▽ you can see information on the selected test (see fig. 39). The display shows the type of test (fig. 39, point 1), execution date and time (fig. 39, point 2), the number of tested lamps (fig. 39, point 3) as well as the battery characteristics (fig. 39, 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`.

```
----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 39: Info function test

The menu item `print test log` (fig. 38, point 5) lets you print the saved data of the test log or store in files. You can do this either via internal 19-inch printer (if available) or via Centronics–interface and thus an external printer.

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 fig. 40.

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 40: Reset errors

Power Supply System miniControl *plus*
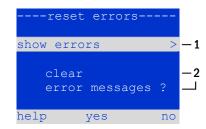
Setup & Commissioning

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.
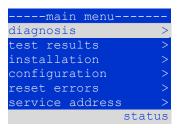
```
-----main menu-------
diagnosis            >
test results         >
installation         >
configuration        >
reset errors         >
service address      >
                status
```
Figure 41: Main menu

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, voltage current 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.
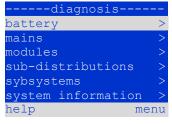
```
------diagnosis------
battery              >
mains                >
modules              >
sub-distributions    >
sybsystems           >
system information   >
help             menu
```
Figure 42: Diagnosis menu

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.
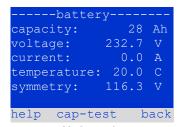
```
------battery--------
capacity:       28 Ah
voltage:     232.7  V
current:       0.0  A
temperature: 20.0   C
symmetry:    116.3  V


help  cap-test   back
```
Figure 43: 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 instantaneous values and the right column shows the minimal and maximal values measured so far. A value different from zero for the neutral line U(N) indicates a faulty mains connection.

Note: According to EN 50171 the power supply is switched from mains to battery if the supply voltage falls to less than 85% of the rated supply voltage of 230V, i.e. at 195.5V.
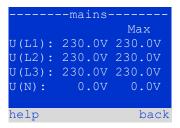
```
-------mains--------
                  Max
U(L1): 230.0V 230.0V
U(L2): 230.0V 230.0V
U(L3): 230.0V 230.0V
U(N):    0.0V   0.0V

help             back
```
Figure 44: 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
```
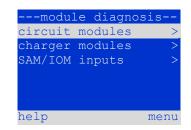
Figure 45: Menu for module diagnosis

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 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—H06-S026---
A: circuit        1
  P =   0W (    3W)
  failure
B: circuit        2
  P =   0W (    8W)
  failure
        test    back
```
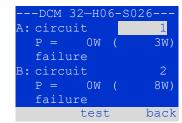
Figure 46: State of DCM/ACM-modules

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—H07-S035---
charging unit     1
(rack  7, slot  7)
float charge
I: (   0,0)    -,-A
P: ( ---,-)  ---,-V
T:            -,-C
help   details   back
```

Figure 47: 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:

```
--SAM/IOM diagnosis--
     SAM/LM        IOM
  1: █             ----
  2:
  3:
  4:
SAM 1 E1
        update     back
```
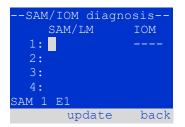
Figure 48: State of SAM/IOM modules

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

Above the softkeys (fig. 48) 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 *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 (fig. 49) for subsystems shows the state of one subsystem only; the subsystems are selected with ◁ and ▷. Via softkey `details`/F2 you can select another page with additional information (fig. 50).

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



        details    back
----subsystem---02---

  error memory empty




                  done
```
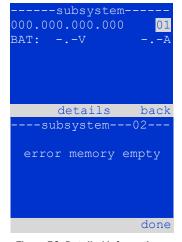
Figure 50: Detailed information

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 the MAC-address (fig. 51).Furthermore you can select (△ and ▽) other pages with key parameters and the log (access with ▷ or Enter ○).

```
--system information-
key parameters      >
show log            >
S/N:        0
firmware: 1.5.2  862
hardware: 19
MAC:00:1f:3e:00:1f:a1
                 back
```
Figure 51: System information

The key parameters page (fig. 52) 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 52: System key parameters

In the log (fig. 53) you can select (△ and ▽) a year; pushing ▷ or Enter ○ takes you to the entries made in the selected year. The table on the next page shows an overview of the possible messages the system log may contain.
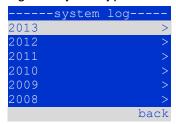
```
------system log-----
2013               >
2012               >
2011               >
2010               >
2009               >
2008               >
                 back
```
Figure 53: System log

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. Therefore select detect modules > in the menu installation and press Enter. When the module detection is finished, all identified modules are listed. In order to save the results of the detection in the system settings press done/F3 and confirm the security prompt with yes/F1.

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

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

Figure 54: Detect modules

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 fig. 55 you can select the following settings with ◁ and ▷:

```
---operation mode---

present mode:
BAS/MCT/BMT control



                menu
```

Figure 55: 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" (fig. 56) as well as the submenu `administration >` (fig. 57) all basic settings of the system are administered, which are described in the following chapters.
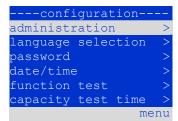
```
---configuration----
administration      >
language selection  >
password            >
date/time           >
function test       >
capacity test time  >
                 menu
```
Figure 56: Configuration menu
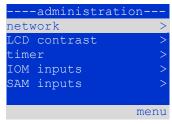
```
----administration---
network             >
LCD contrast        >
timer               >
IOM inputs          >
SAM inputs          >
                 menu
```
Figure 57: submenu "administration"

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

The `network`-menu (fig. 58) enables the configuration of the network interfaces by which a connection of several such power supply systems with each other is possible. Additionally, an access via network allows a remote control of the system by means of the internet browser of an external PC.

Submenu ip-addresses (fig. 59)

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

Thus in the menu `ip addresses` (fig. 59) under the menu item "adapter" (fig. 59, point 1) you can select the respective connection with ◁ and ▷ (`Intern` or `Front`). Now the buttons △ and ▽ let you make settings for the active adapter. You can set the ip-address (`ip`), subnet mask (`Mask`), `Gateway` and `DNS`. Use the buttons ◁ and ▷ to select the different characters and change them with △ and ▽. With Enter ○ you finish the input, so that you can use the keys △ and ▽ for selecting another line in the menu. By pushing the softkey `done`/F3 you leave the ip-addresses input page; settings changes have to be confirmed with `yes`/F1.

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

Submenu communication (fig. 60)

Each power supply system can be linked to other systems which have a similar central control unit. This requires a clear allocation of an own IP-address to each system (see above). When they are networked, one system (called master) monitors all others (slaves). To achieve this in master and slave systems the status query in the menu communication (fig. 60) has to be set to `on` (fig. 60, point 1). Additionally, the IP-addresses of all slave systems have to be entered in the master system (fig. 60, 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 58: Network menu

```
-------network-------
adapter:      intern  —1
ip:   010.000.020.031
mask: 255.000.000.000
gateway:
      010.000.000.001
dns:  010.000.000.003
help             done
```
Figure 59: submenu for setting ip-addresses
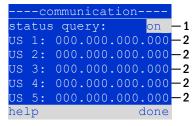
```
----communication----
status query:     on  —1
US 1: 000.000.000.000 —2
US 2: 000.000.000.000 —2
US 3: 000.000.000.000 —2
US 4: 000.000.000.000 —2
US 5: 000.000.000.000 —2
help             done
```
Figure 60: IP-addresses of monitored systems

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 61: Setting the LCD-contrast

11.11.3 Timer settings

State➔ menu/F3➔△▽ configuration➔Enter ◯➔△▽ administration➔Enter ◯➔△▽ timer➔Enter ◯

In the menu "timer" you can programme up to 32 different switch times for individual circuits or for combined circuit groups. These switch programmes only and exclusively deactivate maintained lighting circuits during shut-off times (e.g. school holidays, shop closing times etc.). At the top of the timer menu (fig. 62, 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
```
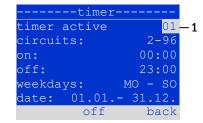
Figure 62: Timer programming

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.

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

At the top of the IOM-input menu (fig. 63, point 1) you select the number of the IO-module (01 to 05) as well as the input (01 to 04) to be configured; under function one of the following settings can be selected:

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

IOM/input: 01/02        —1
function:
  E=0, message+failure
message:
BMA Alarm               —2
Hilfe          Zurück
```
Figure 63: 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 (63, 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 preprogrammed.

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 (fig. 64).

The message text is entered after the selection of the SAM-module (fig. 64, point 1, sequential number 01 to 16) and the input (fig. 64, 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.
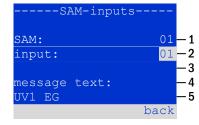
```
------SAM-inputs-----

SAM:              01    —1
input:            01    —2
                        —3
message text:           —4
UV1 EG                  —5
                back
```
Figure 64: 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 65: 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".

```
-----password-------
log in              —1

authorisation:
       guest        —2


            back
```
Figure 66: Login and logout

- This is how you login: Select "log in" and the requested action using the keys ◁ and ▷ (fig. 66, 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 ▷ (fig. 66, point 1). Then press Enter ○.

The current user status (authorisation) is shown in the centre of the screen (fig. 66, 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 (fig. 67, point 1), the system switches automatically between DST and Standard Time. The time is not changed if you select off.
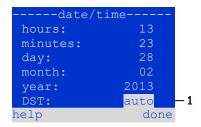
```
-----date/time------
hours:          13
minutes:        23
day:            28
month:          02
year:         2013
DST:          auto   —1
help            done
```
Figure 67: Setting the system time

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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 68: 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, fig. 68, point 1), its duration can be set duration (fig. 68, 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 *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 *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 *plus* and the mail server. Connect the PC via network cable to a switch in the MultiControl network. Open the prompt and run a ping command. Example:

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

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

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Step 2: Configuration of the Email function in the WebInterface

Open a web browser on the PC and enter the IP-address of your system as address. The WebInterface main page of the system opens (fig. 69). Click on the menu item "Administration" and choose "E-Mail" (login required). This takes you to the Email-configuration page (fig. 70).
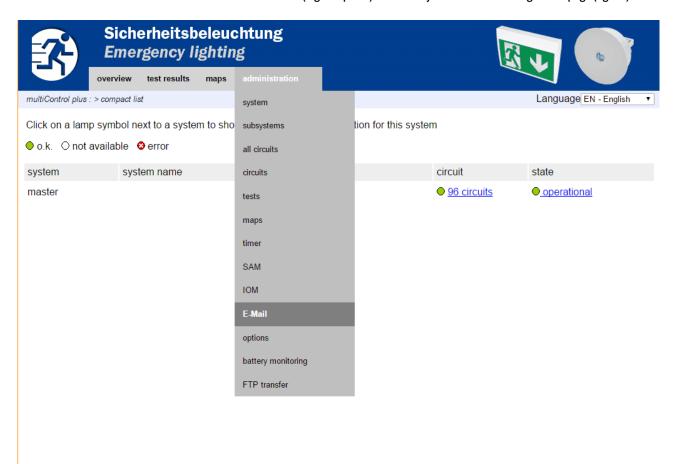
Figure 69: WebInterface main page and access to the email configuration page.

Figure 70: Email configuration page

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

field	input
server address	Name of the Email server (e.g. smtp.email-server.de); alternatively an IP-address can be entered (e.g. 192.168.1.1). Due to the fact that the IP-address of a mail server can change without prior notice, the **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.

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

provider	mail server	notes
www.clustermail.de		fee-based
www.freenet.de	mx.freenet.de	free registration

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
help            back
```

Figure 71: Service-contact details

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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. 16, point 7) to charging mode (position "0"). **Important**: Make sure that the LC-display (fig. 16, point 5) shows "charging".

2. Disconnect system from mains. Switch the mains switch (fig. 1, point 9) to position "0".

3. Remove mains fuse F1. Remove the mains fuse (fig. 9).

4. Remove battery fuses F2/F4. Remove the battery fuses (fig. 9). The system is now shut down and disconnected.

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

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 an IUTQ-controlled charger unit with a maximum output current of 1A for charging. This unit consists of a charger module (LDM25) with a maximum charging current of 1A connected in parallel. Batteries, which are later built in a battery assembly as replacement, do not need an equalisation charge with normal float charge voltage in order to adjust to the terminal voltage of other batteries.

The cut-off voltage of the battery, assigned to the discharge current, must not be underrun. For this purpose the power supply system is equipped with a deep discharge protection. 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.

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14 Technical data

performance characteristics	
system type / serial number	miniControl *plus* / serial number see front page
	power converter E 230 / G220

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

rating of the mains fuse	
nominal current of the mains fuse (F1)	10A

output data	
nominal voltage (AC-operation)	230V
nominal output (AC-operation)	2000VA (consumers incl. charger unit)
nominal voltage (DC-operation)	216V
nominal current at	6,94A / 2,31A / 1,38A (total of all circuits)
nominal output at 1h / 3h / 8h DC-operation	1500W / 500W / 300 W (total of all circuits)
min. voltage after	185V / 185V / 185V
operation time for above-mentioned data	1h / 3h / 8h
nominal temperature of the battery	20°C

battery type and number of cells	
battery type	Pb
number of cells	108
make	18 x OGIV RPower 12170 (default)
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. 12/ max. 6x DCM32
operation mode	maintained or non-maintained lighting in changeover operation
number of SAM-modules	1 internal
number of switch inputs 230V AC	8
charging curve	IUP(TS)
curve switching	automatically
mains monitoring	phase to N
activation	< 85% U_{Nom}
function test	programmable (daily, weekly) or manually
capacity test	programmable (annually) or manually
radio shielding	according to VDE 0875, class N
surrounding temperature (with battery inserted)	0 - 35°C (10 – 35°C)
housing dimensions HxWxD	1,100mm x 500mm x 230mm
protection type	IP 20
protection level	I
cable entry	from above

recommended cable cross sections	
mains cables	1.5 - 4mm²
potential-free signal cables	0.5 – 2.5mm² rigid
electric circuits	1.5 – 2.5mm² rigid
battery cables NSGAFÖU +/-	1.5 - 4mm²
Symmetry	1.5 - 4mm²

(*) Values depend on working temperature.

Relevant fuses/connection cross section	
Mains fuse F1	Fuse ceramics 6.3 x 32mm 10AT
Battery fuses F2, F4 (B+, B-)	Fuse ceramics 6.3 x 32mm 10AT
Battery fuse F3 (Sym)	Fuse ceramics 5 x 20mm 1AT
Fuses F7/F8 – Kreis 13	Fuse ceramics 5 x 20mm 1AT
Internal fuses L/B+ (F5/F6)	Fuse ceramics 5 x 20mm 3.15AT
Charger module LDM25	Fuse ceramics 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
Fuses for switching voltage F14, F15	Fuse ceramics 5 x 20mm 250mA F (standard)
	Fuse ceramics 5 x 20mm 500mA T (devices with NT24 only)

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 1272 L		4.27	2.42	1.76	1.20	0.79	0.66	0.36	0.1	3	28
OGIV 12120 L		7.11	4.03	3.06	2.01	1.32	1.10	0.60	0.1	3	33
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 1272 L		49.40	28.30	21.00	14.30	9.50	8.00	4.32
OGIV 12120 L		82.40	47.20	36.30	24.00	15.80	13.30	7.20
OGIV 12170 L		11.,00	66.80	48.50	33.10	22.40	18.80	10.20

<table>
<tr><td>15</td><td>Module descriptions</td></tr>
</table>

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

15.1 Electric circuit module DCM32

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 72: DCM

A DCM32 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 70.1: 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 Switch query module SAM08 (optional)

characteristics at a glance:

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

Figure 73: SAM08

The switch query module SAM08 is a bus-compatible light switch query module which can be used for a joint switching of emergency and general lighting. When connected to the multi-bus RS485 of the miniControl *plus* emergency lighting system, it transmits the switch commands to the respective relay switch module (RSM) of the integrated maintained or non-maintained light changeover switchings. For this purpose it has 8 galvanically isolated inputs, which are designed for a voltage of 230V AC +/- 15% and so can be connected to the light switches and circuits of the general lighting. The SAM08 module and the miniControl *plus* system are connected in series (feed through wiring) via screened 4-core data line; up to 16 of these SAM08 modules can be connected via this line. J-Y(St)-Y or similar in compliance with DIN VDE 0815 and 0816 have to be used as data line.

15.4 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 74: SAM24

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

Setup & Commissioning

15.5 MultiControl Line Monitor MC-LM (optional)

characteristics at a glance:

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

Figure 75: MC-LM

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

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

characteristics at a glance:

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

Figure 76: MCT-15(S)

The MCT-15 and MCT-15(S) are used as decentralised status indication units for emergency lighting systems of type miniControl *plus*. The status of the system is indicated optically through LED and clear text as well as acoustically. Malfunctions are indicated by a beep which can be reset by pressing the "RESET" button. The optical error message, however, keeps being displayed. The MCT-15(S) module and the miniControl *plus* system are connected in series (feed through wiring) via screened 4-core data line; up to 3 of these MCT-12(S) functional modules as well as further display modules can be connected via this line. A J-Y(St)-Y cable or similar in compliance with DIN VDE 0815 and 0816 have to be used as data line.

15.7 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
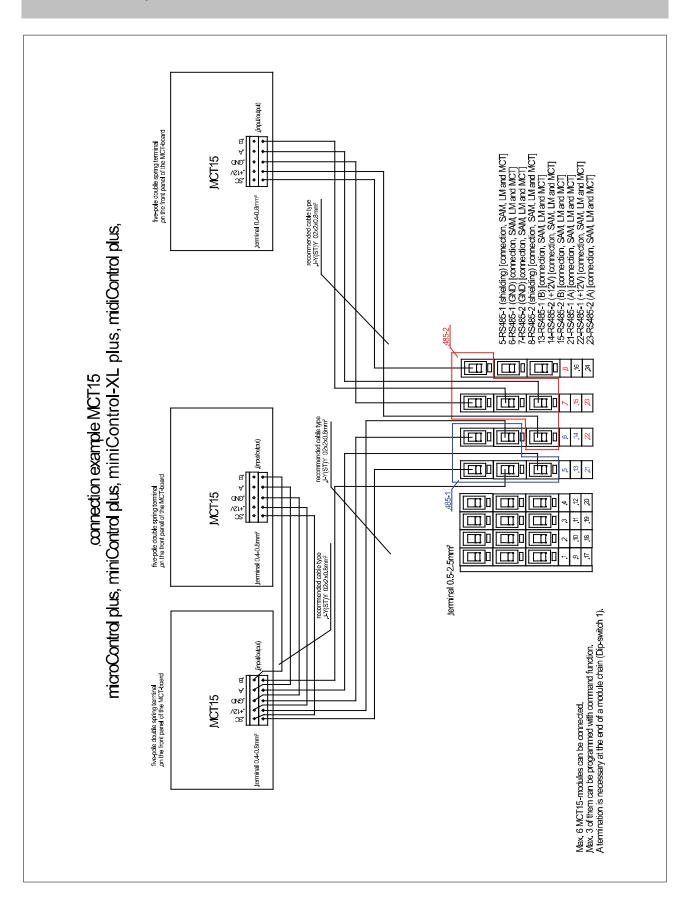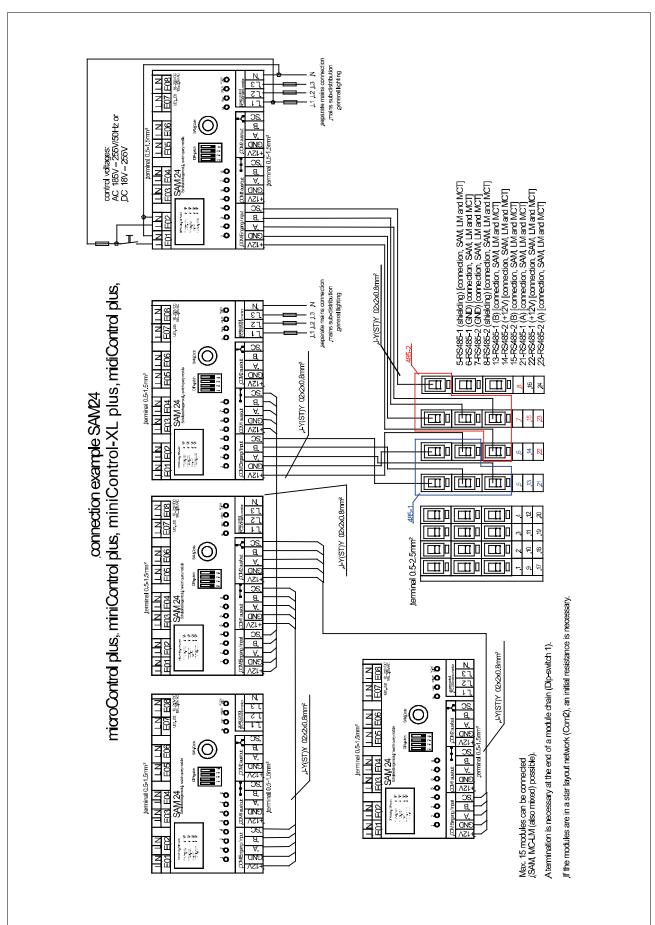
Figure 77: PC230

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

16   Connection examples

connection example MCT15

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

MCT15

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

terminal 0.4–0.8mm²

(Input/output)

recommended cable type
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]

terminal 0.5-2.5mm²

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

separate mains connection
mains sub-distribution
general lighting

5-RS485-1 (shielding) [connection, SAM, LM and MCT]
6-RS485-1 (GND) [connection, SAM, LM and MCT]
7-RS485-2 (shielding) [connection, SAM, LM and MCT]
8-RS485-2 (GND) [connection, SAM, LM and MCT]
13-RS485-1 (B) [connection, SAM, LM and MCT]
14-RS485-2 (B) [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.

Power Supply System miniControl *plus*

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

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]

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,

separate mains connection
mains sub-distribution
general lighting

L1 L2 L3 N

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
Power-Control PC230
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

separate mains connection
mains sub-distribution
general lighting

L1 L2 L3 N

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
Power-Control PC230
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

separate mains connection
mains sub-distribution
general lighting

L1 L2 L3 N

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
Power-Control PC230
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)

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

terminal 0.5-2.5mm²

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 *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	2016-08-09	new backplane with fuses F14/15
1.7	2017-03-21	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	2018-11-01	Added waiting time between shutdown and restart

18   Appendix: system specification, commissioning, notes

General information on your system	
Device type	☐ miniControl *plus* / Type MN102 ☐ miniControl *plus* / Type MN108 ☐ miniControl *plus* / Type MN104 ☐ miniControl *plus* / Type MN110 ☐ miniControl *plus* / Type MN106 ☐ miniControl *plus* / Type MN112
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	1,100 x 500 x 230

Used battery type	
Battery manufacturer	RP-Technik Notstromsysteme
Battery type	RPower Battery - OGiV12170
Nominal voltage U_N	216V
Number of cells (2V)	108
Number of blocks (12V)	18
Nominal capacity C_{20}	17 Ah
Nominal temperature T_N	20°C
Ventilation requirements	According to EN 50 272-2, paragraph 8
Nominal discharge current I_N	1h - 6,94A; 3h - 2,31A; 8h - 1,39A

Modules	Check sum / Software
NLSR	
control centre 2	
Z2 SAM / IO	
LDM25	
DCM12E	
DCM32	
MCT15 / 15S	
MC-LM	
BusCan Temp	

Power Supply System miniControl *plus*

Setup & Commissioning

Accessories/Options	
log printer	☐ yes ☐ no
glazed door	☐ yes ☐ no
E30 fire protection wall mount	☐ yes ☐ no

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

Notes

_____

_____

_____

_____

_____

_____

_____

_____

_____

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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