Setup and Commissioning

Power Supply System

microControl plus





| Customer Order No.: | | |
|---------------------|--|--|
| Manufacturing No.: | | |
| Commission/Object: | | |
| Device No.: | | |

Version 1.7.3, Date: 18/11/01-STS Subject to change without prior notice

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1 General

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

1.1 Further applicable documents

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

1.2 Liability and warranty

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

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

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

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

1.3 Copyright protection

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

1.4 Spare parts

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

1.5 Disposal

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

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

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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.

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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)

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3 Preface

Thank you very much for buying a power supply system of type microControl *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 microControl plus system (chapter 4.1)
- 3. Mount the system and batteries and connect them (chapter 4.2)
- 4. Commission the system (chapter 6)
- 5. Program the system (chapter 7)

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

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

Note: Instructions regarding the programming of the system 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 \pm 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 observe the safety instructions when installing and using your microControl 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! |
|-----|---|
| 4 | 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 EN 50 272-2 paragraph 8 (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 microControl plus system are:

- 1x microControl plus system in a compact cabinet
- 18x battery type RPower 1245/1250 (standard), other types are possible
- 1x operating tool angled 2.5mm, partially insulated
- 1x ½"- hexagonal bit 3 x 25mm with centre bore hole
 1x connector cable set
 RPower 1250: 5x tier connectors 680mm x 2.5mm², 12x row connectors 150mm x 2.5mm²
 RPower 1245: 2x tier connectors 680mm x 2.5mm², 15x row connectors 150mm x 2.5mm²
- 1x brief instruction (this document)

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

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

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6 System overview

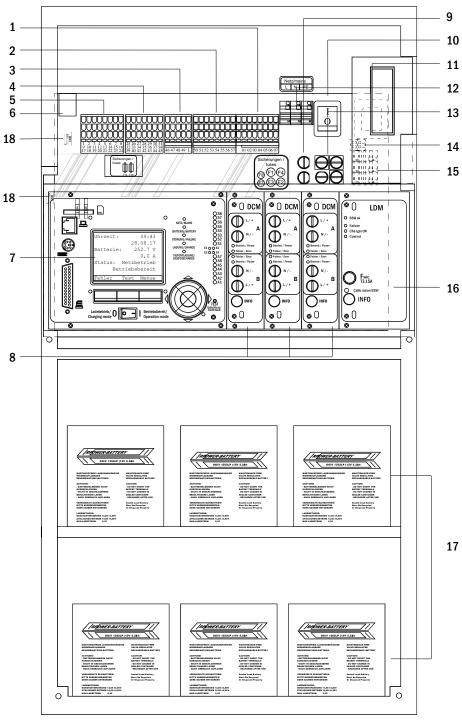


Figure 1: Inside view

- 1 electric circuits
- 2 SAM-inputs (Switch query module)
- 3 IOM-inputs (Input- / Output module)
- 4 IOM-outputs (Input- / Output module)
- 5 communication
- 6 ethernet interface

- 7 control centre
- 8 electric circuit modules
- 9 fuse auxiliary circuit
- 10 mains switch
- 11 mains filter
- 12 mains supply

- 13 fuses mains / battery
- 14 connection toroidal transformer
- 15 battery conenction
- 16 charger unit
- 17 battery blocks
- 18 USB-Port for 5V-WLAN-module

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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 rear main board inside the cabinet. For connection please use standard network cable according to the standard EN 50173 (Cat5 patch cable with RJ45 plug).

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

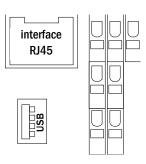


Figure 1: Ethernet interface

6.1.2 Connection of bus-compatible modules

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

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

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

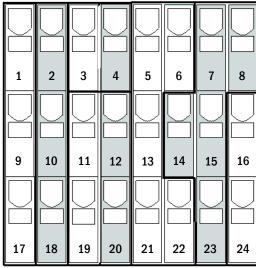


Figure 2: Communication terminals

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

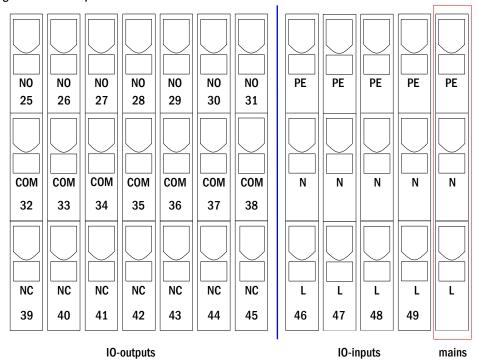


Figure 3: Inputs and outputs IO-module

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Note: The galvanically isolated inputs accept the following voltages: 24V-255V DC or 220/230V (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 |
|------------|---------------------------|-----------------|----------------------------------|
| 05 00 00 | | 39 - 32 | ready to operate |
| 25, 32, 39 | system state | 32 - 25 | emergency lighting blocked |
| 00 22 40 | ahawaa wali | 40 - 33 | failure |
| 26, 33, 40 | charger unit | 33 - 26 | ОК |
| 07 24 41 | ovtovnol maino monitor | 41 - 34 | normal operation |
| 27, 34, 41 | 41 external mains monitor | 34 - 27 | modified non-maintained lighting |
| 00 05 40 | | 42 - 35 | failure |
| 28, 35, 42 | system | 35 - 28 | ОКІ |
| 20.26.42 | hattanı daan diaaharra | 43 - 36 | initiated |
| 29, 36, 43 | battery deep discharge | 36 - 29 | ОК |
| 20 27 44 | for anaration | 44 - 37 | off |
| 30, 37, 44 | fan operation | 37 - 30 | on |
| 24 20 45 | avetem eneration | 45 - 38 | battery |
| 31, 38, 45 | system operation | 38 - 31 | mains |

10-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).

- 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

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

^{**} Input 4 deactivated by default, but may be configured for one of the following functions:

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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 0.5mm² to 2.5mm². Each of these power supply systems provides 8 3-level spring-loaded terminals (50-57) as switch inputs (220/230V AC, 50/60Hz; 24-250V DC switching voltage) as well as one more terminal (L) for the power supply (230V/50Hz) of potential-free switch contacts. For the connection please use mains voltage compatible cables which comply with DIN 57250-1 VDE 0250-1 as well as MLAR, EltBauVo and DIN VDE 0100.

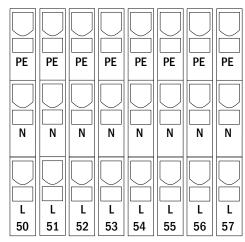


Figure 4: SAM-inputs

| circuit setup | switch mode SAM | switch contact | maintained lights | non-maintained lights | note |
|----------------------------|--------------------|-------------------|----------------------|--------------------------|---|
| maintained lighting | DS | open closed | OFF ON | OFF OFF | maintained light activated non-maintained light remains off |
| maintained lighting | МВ | 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 | МВ | 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 1.5mm² to 2.5mm². Correct polarity is essential. For the connection please use mains voltage compatible cables which comply with DIN 57250-1 VDE 0250-1 as well as MLAR, EltBauVo and DIN VDE 0100.

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

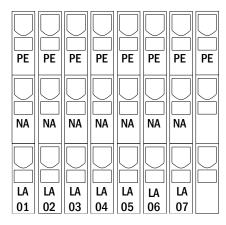


Figure 5: Electric circuits

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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.

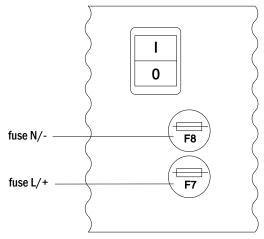


Figure 6: Fuses auxiliary circuit

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 a double-pole switch.

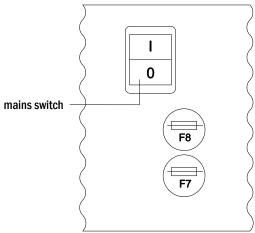


Figure 7: mains switch

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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!

| Sicherung | F1 | F2 | F3 | F4 |
|-----------|------|------|-----|------|
| Größe | T10A | T10A | T1A | T10A |

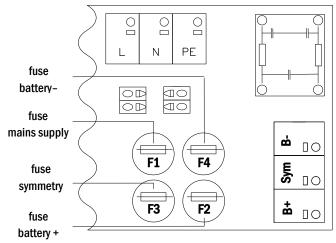


Figure 8: Fuses mains and battery supply

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 $4\mbox{mm}^2$.

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.

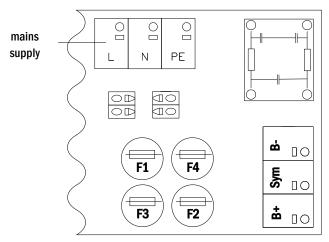


Figure 9: Mains supply

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6.1.10 Fuses for 24V-switching voltage

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

| | voltage divider* | NT24** |
|-----------------|------------------|----------------|
| F14+F15 | 5x20mm 250mA F | 5x20mm 500mA T |
| maximum current | 2mA | 300mA |

- * Standard execution
- ** Special version only on order (can not be retrofitted)

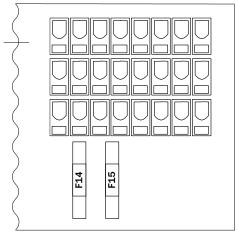


Figure 10: fuses F14 + F15

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.

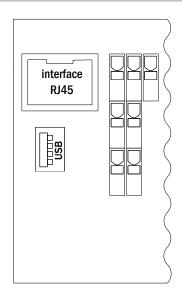


Figure 11: USB-Port

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

Fig. 12 illustrates the connection of an internal fan when the system is built in an optional E30-housing. The following terminals are used: terminal 4 (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 12: microControl plus in E30-housing

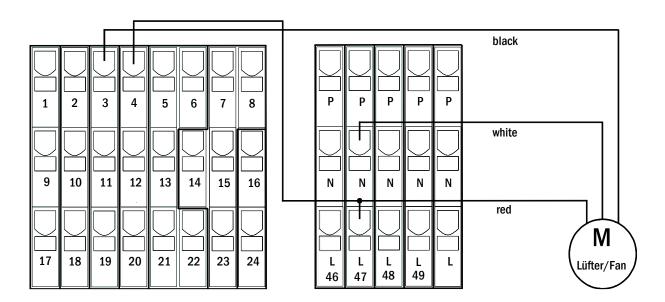


Figure 13: Connection terminals for an internal fan

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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 F2/F3/F4 (fig. 9) have been removed. Mount the batteries on the respective shelves of the cabinet according to fig. 13 or fig. 14. The temperature difference between the battery blocks must not exceed 3 °C. The distance between the battery blocks should be at least 5 mm.

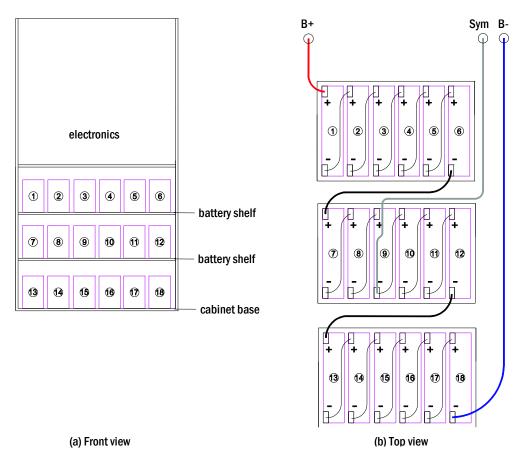


Figure 14: Mounting and connection of the battery blocks 12V 4.5Ah

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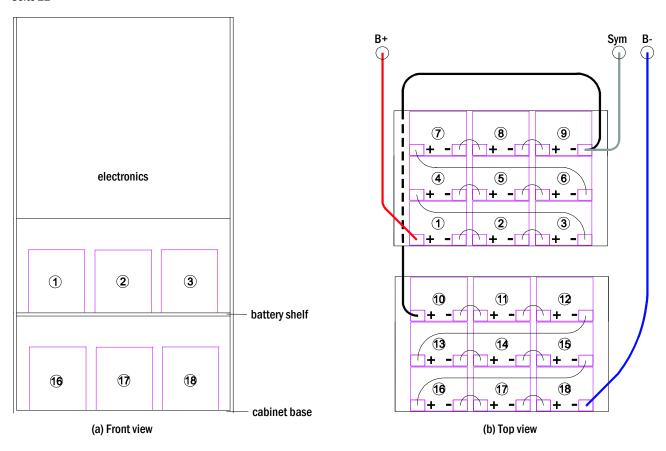


Figure 15: Mounting and connection of the battery blocks 12V 5Ah

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

6.2.2 Connection of battery blocks

Remove the battery fuses F2 and F4. Connect the battery blocks in row as illustrated in fig. 13(b) or fig. 14(b). After that connect the cables coming from the battery terminal (fig. 1, point 15) according to fig. 13(b) or fig. 14b) - (red = B+/positive pole to the positive pole of block 1, grey = symmetry to the negative pole of block 9 and blue = B-/negative pole to the negative pole of block 18). Depending on the used battery type you must fix the pole covers before connecting.

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

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

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

7 Operating your system

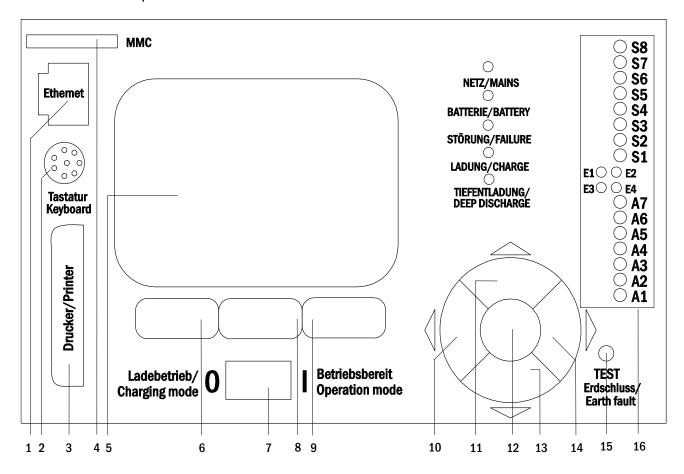
7.1 Control elements

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

- 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
- 2 PS2 interface
- 3 Centronics interface
- 4 MMC/SD-slot
- 5 LC-display
- 6 function key F1
- 7 operation mode switch BAS

- 8 function key F2
- 9 function key F3
- 10 arrow key left
- 11 arrow key up
- 12 enter key
- 13 arrow key down
- 14 arrow key right

15 simulation earth fault

16 Status LEDs (see next page)

Figure 16: Central control and monitoring unit

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

| LED | LED leuchtet | LED leuchtet nicht |
|-------------------------------------|--|--|
| \$1/\$2/\$3/\$4/ \$5/\$6/\$7/\$8 | 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 → in case of ext. temperature sensor: temp. too high | Input #1 of the internal IOM module has no voltage → in case of ext. temperature sensor: temp. OK |
| E3 | Input #1 of the internal IOM module has voltage → in case of ext. air flow sensor: fan failure/blockage | Input #1 of the internal IOM module has no voltage → in case of ext. air flow sensor: fan is OK |
| E4 | Input #1 of the internal IOM module has voltage → in case of ext. test switch: test will be initiated | Input #1 of the internal IOM module has no voltage → in case of ext. test switch: no action |
| 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

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

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

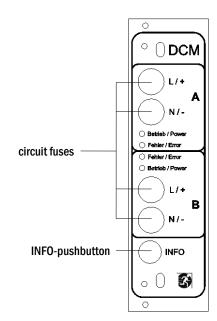


Figure 17: DCM-circuit module

LEDs explained (see fig. 16):

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

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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 0.5A 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.

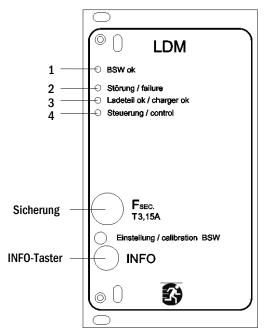


Figure 18: Charger module

LEDs explained (see fig. 17):

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

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7.2 General operating instructions

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

The LCD-screen (2) displays Menus and Information. In the bottom line you can see – if active – the Softkey–Functions which are reachable via the 3 keys (3) (example see fig. 20, point 8). For navigation and data input please use the arrow keys \triangle , ∇ , \triangleleft and \triangleright (4) as well as the enter key \bigcirc (5). The up \triangle and down ∇ keys are mostly used for selecting menus and input fields. A selected menu item is indicated by inverted colouring. The right \triangleleft and left \triangleright keys are used to change values; in some cases you have to confirm your input with the enter key \bigcirc . An arrowhead \triangleright 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.

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

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

Note: The arrow keys \triangle , ∇ , \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.

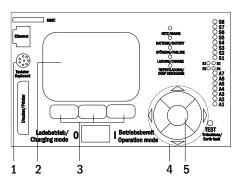


Figure 19: Control elements

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 45. For saving the changed settings the system requires a confirmation (Yes/No). If you have not logged in with password yet, you can do this at this point and then continue with the confirmation. In any case the authorisation expires ca. two hours after the last setting and the system returns to the default user status "Guest".

Service address

The contact address of the service technician who is responsible for your system is entered during the installation process. To reach this information follow the instructions in chapter 9.12 "Show contact address" on page 49.

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7.3 Menu - quick reference guide

| Menu Diagn | nsis | | | | |
|---------------|---|----------|--|---|---|
| Diagn | Battery | | | | Show battery state and conduct capacity test |
| | Mains | | | | Check mains voltages |
| | Modules | | | | oncor mains voitages |
| | Circuit modules | | | Show states of ACM / DCM / RSM - modules and conduct test | |
| | | | er modules | | Show states of charger modules (LDM) |
| | | | OM inputs | | Check states of SAM- and IOM- inputs |
| | Sub-dis | | | | Check states of sub-distributions |
| | Subsyst | | | | Check states of subsystems |
| | System information | | | | Serial number, MAC, show firmware and hardware version |
| | | | rameters | | Number of circuits, battery capacity, supply time etc. |
| | - | Show I | | F4 | Show internal system log |
| Test re | esults | | -0 | | View last test |
| | Last tes | it | | | Show results of the last function or capacity test |
| | Functio | n test | | | Show function test results |
| | Capacit | y test | | | Show capacity test results |
| | Manual | - | | | Show results of a manual test |
| | Print lo | g | | | Print test results over a certain period of time |
| Install | lation | | | | |
| | Module | s | | | Setup modules (operation mode, follow-up time, monitoring) |
| | Calibra | te c-mo | nitor | | Calibrate current of the circuit modules |
| | Lamps | | | | Check number of luminaires |
| | Service | | | | Service menu |
| | Detect | module | s | | Detect modules in the system |
| | Operati | on mod | е | | Define BAS / MCT / BMT - controlled, ready-to-operate, charging mod |
| Config | guration | | | | |
| | Admini | stration | l en | | |
| | | Netwo | | | |
| | | | IP - addresses | F6 | Set addresses for the network adapter (front + internal) |
| | | | Communication | | Configure status query (system communication) |
| | | | Contrast | | Set contrast of LC-display |
| | | Timer | | | Configure all timers (switch times, electric circuits) |
| | | IOM - | | | Configure IOM – inputs |
| | | SAM - | | | Configure SAM - inputs |
| | Langua | | ction | | Change display language (German, English, French) |
| | Passwo | • • • | | | Change authorisation level |
| | Date / Time | | | | Set system time |
| | Function test | | | | Turn on/off pre-heating during function test |
| | Schedule Current monitor Capacity test time | | | Set time schedule for function test | |
| | | | | Set parameters for circuit monitoring | |
| | | | | Set duration, time and date for capacity test | |
| | | • | | | B |
| Reset | errors Show e | | | | Reset error messages Show all error messages |

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).

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8 Commissioning of the power supply system

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

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

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

voltage between L1 and N voltage between L1 and PE voltage between PE and N These voltages should range from ca. 220V to 240V (supplied mains power).

If they do not, this indicates a connection error.

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

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

The system is now activated.

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



Figure 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. 19, right image, arrow). Also check the LEDs of the DCM- and LDM-modules. Steady or flashing green light indicates a correct functioning.
- 7. Operation mode switch to "ready to operate". Turn the operation mode switch (fig. 15, point 7) to "ready to operate" (position "1"). This activates the electric circuits.



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

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

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

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9 Checking the system state and basic settings

9.1 System state

After commissioning the LC-display shows the state of the system (fig. 20) i.e. time (1) and date (2), current battery voltage (3) and battery charging current (in battery operation – discharging current) (4), system state (5, 6). Via the softkeys (8) you can select the help-function, conduct a test or reach the menu.

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

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



Figure 21: System state

| 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 mains failure of sub-station |
| sub-station mains fail fan failure | fan failed |
| | |
| BMS gateway comm. | communication failure between central control unit and BMS gateway central control unit does not support the firmware version of substation # <nr>: status</nr> |
| Subst. <nr> firmware</nr> | request failed |
| LDM jumper error | invalid jumper setting on charging module |

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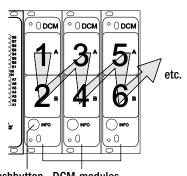
9.2 Selecting circuits and checking their status State → INFO-pushbutton DCM/ACM → △∇(select circuit)

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

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

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

The number of the selected circuit is marked by inverted colouring (see fig. 22 for circuit A with number $\$ 1). With the up $\$ 2 and down $\$ 7 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 $\$ 5 or Enter $\$ 6 takes you to the setup of the selected circuit (see next paragraph). For each circuit the following status messages can be displayed in line 3 (fig. 22, point 3):



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

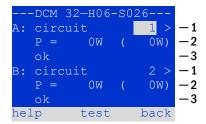


Figure 23: Circuit status

| 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 | none (ACM has only circuit A) |
| | circuit B does not exist). | |
| 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 \triangle and ∇ (see previous chapter), you reach the setup for this circuit by pressing \triangleright or Enter \bigcirc (fig. 23). The following information is displayed:

- 1 number of circuit (fig. 23, point 1). If this is selected (i.e. invertedly coloured), you can change to the other circuits with \triangleleft and \triangleright .
- 2 stop delay time* (explanation see below) (fig. 23, point 2). It can be set in steps between 1 min and 15 min using < and ▷; alternatively you can select a manual ** switch-back.
- 3 operation mode (fig. 23, point 3). With < | and | > you can select the following operation modes:

| Operation mode | status when system is ready to operate |
|----------------------------|---|
| 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. 23, point 4). You can reach the setup screen for the monitoring mode with ▷ or Enter (see next chapter 7.3.1).
- 5 name (two lines) (fig. 23, point 5). You have 42 digits for naming each circuit. After selecting a line you can change to edit mode by pressing Enter \bigcirc . With \triangleleft and \triangleright you choose the position to be changed; the character can be chosen with \triangle and \bigtriangledown (available characters see fig. 24). You finish the input by pressing Enter \bigcirc or done. Tip: Use an external keyboard for entering the names.
- *stop delay: When switching back from "modified non-maintained lighting" (failure of mains monitor) to "ready to operate", all luminaires remain on for the programmed stop delay time. When switching back from battery operation, all luminaires keep being supplied with battery voltage for another minute; afterwards the programmed stop delay time starts running. After this time has elapsed, the circuits are switched back to their programmed operation mode (see point 3 above).
- **manual: Turn the operation mode switch briefly to "charging mode" (0) and then back to "ready to operate" (I) for switching back from battery operation.

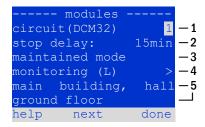


Figure 24: Circuit status



Figure 25: Survey of all available characters

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9.3.1 Setting the circuit monitoring mode

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

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

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

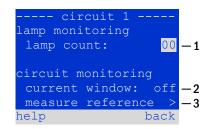


Figure 26: Setting of the circuit monitoring

9.3.2 Programming the SAM-module

State \rightarrow INFO-pushbutton DCM/ACM \rightarrow $\triangle \nabla$ (select circuit) \rightarrow Enter \rightarrow next \rightarrow SAM programming > \rightarrow Enter

Pushing the softkey <code>next/F2</code> takes you to the menu for programming the SAM and the supply time (battery operation) (fig. 26). If you select the line <code>supply:</code> using the keys \triangle or ∇ (fig. 26, point 2), you can set the supply time for the respective circuit in steps from 3 minutes (<code>3min</code>) to 8 hours (<code>8h Omin</code>) or unlimited (<code>unlimited</code>). Selecting <code>SAM programming > (fig. 26, point 1)</code> using \triangleright or Enter \bigcirc takes you to the table shown in fig. 27. For navigating within the table use \triangle , ∇ or Enter \bigcirc . In each line you can change the following settings using \triangleleft or \triangleright :

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

The softkey back/F3 takes you back to the previous display (fig. 26). Now push the softkeys done/F3 and back/F3 in order to leave the programming. A confirmation prompt appears (fig. 28). Here you can save the changes with yes or cancel with no. After that you are in the circuit selection menu again.

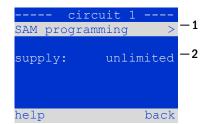


Figure 27: SAM-programming

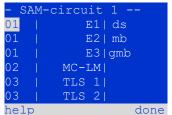


Figure 28: SAM-programming

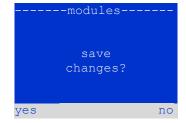


Figure 29: SAM-programming

| 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 7.1). In this state the test function is blocked. Upon return of the voltage the system switches back to regular operation after the set stop delay time. |
| gmb (switched modified non-maintained lighting) | The luminaires in non-maintained and switched maintained lighting mode get switched on when a voltage is applied to the input. In the event of a voltage failure the system switches back to regular operation immediately. |

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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. 29): number of the LDM25 (1), rack and slot number (2), float charge/boost charge or possible failures (3), current (4), voltage (5) and temperature (6). You can change between the data of several connected charger modules using \triangleleft and \triangleright . The following table explains possible error messages (fig. 29, point 3):

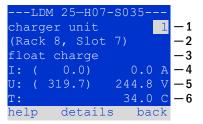


Figure 30: state of charger unit

| State | Explanation | Measure |
|------------------------------------|--|---|
| fuse tripped over temperature | overcurrent/short circuit charger unit overheated | Check Fsec. on LDM25 or fuses of respective isolating transformer (TR). 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.

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

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

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

After finishing the test the display shows a summary for a few seconds (fig. 33) and the message "test finished" (fig. 33, point 2). Afterwards the display returns to showing the system state. The test results are saved in the log which can be selected and read (see chapter 8.3).

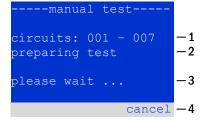


Figure 31: Test programming

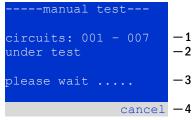


Figure 32: Setting schedule

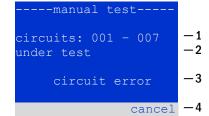


Figure 33: Test programming

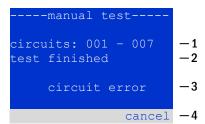


Figure 34: Test programming

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10.2 Programming automatic function tests

State \rightarrow menu/F3 $\rightarrow \triangle \nabla$ configuration \rightarrow Enter $\bigcirc \triangle \nabla \rightarrow$ function test \rightarrow Enter \bigcirc

In the state display press menu/F3 and navigate with \triangle and ∇ to configuration, press \triangleright or Enter \bigcirc , and navigate with \triangle and ∇ to function test. Then press \triangleright or Enter \bigcirc again. Now you are in the function test display (fig. 34). Here you can

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

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.

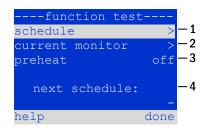


Figure 35: Test programming

10.2.1 Setting the schedule

function test $\rightarrow \Delta \nabla$ schedule \rightarrow Enter O

Fig. 35 shows the display after selecting schedule with ▷ or Enter ○. The following settings are possible:

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

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

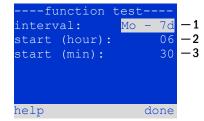


Figure 36: Setting schedule

10.2.2 Setting the current monitor window

function test $\rightarrow \Delta \nabla$ current monitor \rightarrow Enter O

Selecting current monitor with \triangle and ∇ followed by \triangleright or Enter \bigcirc takes you to the display shown in fig. 36. Here you can find:

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

The softkey done/F3 finishes the input and takes you back to the display function test (see chapter 8.2). The confirmation prompt save changes? appears again (see fig. 28). If confirmed with yes/F1, the new values are saved.

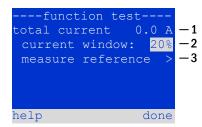


Figure 37: Test programming

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10.2.3 Activating/deactivating the preheating phase and finishing the programming function test $\Rightarrow \Delta \nabla$ preheat

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

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

Press menu/F3, navigate with \triangle and ∇ to test results and press \triangleright or Enter \bigcirc . You can now see a survey of the saved results of function or capacity tests (see fig. 37):

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

By pressing \triangleright or Enter \bigcirc after selecting a category with \triangle and ∇ you can see information on the selected test (see fig. 38). The display shows the type of test (fig. 38, point 1), execution date and time (fig. 38, point 2), the number of tested lamps (fig. 38, point 3) as well as the battery characteristics (fig. 38, point 4). If there are results of several tests, you can browse them with \triangle and ∇ . When circuit monitoring is activated, these circuits are displayed as well.

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

The menu item print test log (fig. 37, point 5) lets you print the saved data of the test log or store in files. You can do this either via internal 19-inch printer (if available) or via Centronics-interface and thus an external printer.

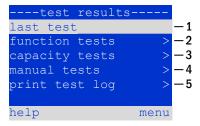


Figure 38: Test results (survey)

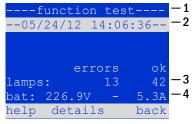


Figure 39: Info function test

10.4 Reset errors State → menu/F3 → △▽ reset errors → Enter ○

Press menu/F3, navigate with \triangle and ∇ to reset errors and press \triangleright or Enter \bigcirc . You can now see the display shown in fig. 39.

- 1 how 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.

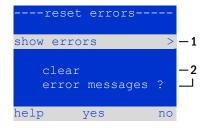


Figure 40: Reset errors

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11 Menu reference

11.1 Main menu State → menu/F3

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

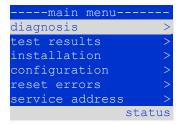


Figure 41: Main menu

11.2 Diagnosis

State \rightarrow menu/F3 \rightarrow $\triangle \nabla$ diagnosis \rightarrow Enter \bigcirc

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

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

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

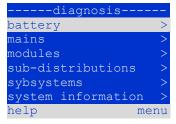


Figure 42: Diagnosis menu

11.3 State of battery and manual activation of a capacity test

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

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

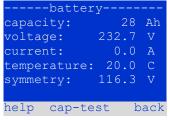


Figure 43: State of battery

11.4 State of mains supply

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

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

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

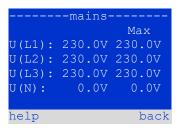


Figure 44: State of mains supply

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11.5 State of the modules (DCM/LDM/IOM/SAM) State \rightarrow menu/F3 \rightarrow $\triangle \nabla$ diagnosis \rightarrow Enter $\bigcirc \rightarrow$ $\triangle \nabla$ modules \rightarrow Enter \bigcirc

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

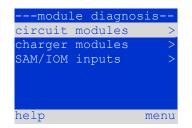


Figure 45: Menu for module diagnosis

11.5.1 State of the electric circuit modules (DCM/ACM)

```
State \rightarrow menu/F3\rightarrow \triangle \nabla diagnosis \rightarrow Enter \bigcirc \rightarrow \triangle \nabla modules \rightarrow Enter \rightarrow \triangle \nabla circuit modules \rightarrow Enter
```

This display informs about the type of the respective circuit module as well as the last measured power consumption of all connected consumers (OW) 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 \rightarrow INFO-pushbutton DCM/ACM \rightarrow $\triangle \nabla$ (select circuit)

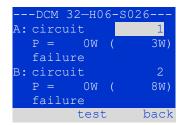


Figure 46: State of DCM/ACM-modules

11.5.2 State of the charger modules (LDM)

```
State \rightarrow menu/F3 \rightarrow \triangle \nabla diagnosis \rightarrow Enter \bigcirc \triangle \nabla modules \rightarrow Enter \rightarrow \triangle \nabla charger modules \rightarrow Enter
```

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

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

```
State → INFO-pushbutton LDM
```

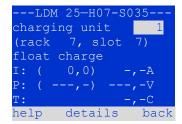


Figure 47: State of charger modules

11.5.3 State of the SAM and IOM inputs

```
State \rightarrow menu/F3 \rightarrow \triangle \nabla diagnosis \rightarrow Enter \bigcirc \rightarrow \triangle \nabla modules \rightarrow Enter \rightarrow \triangle \nabla SAM/IOM inputs \rightarrow Enter
```

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

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

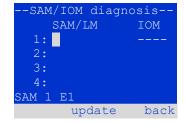


Figure 48: State of SAM/IOM modules

Above the softkeys (fig. 47) a description of the selected (\triangle 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.

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11.6 State of the sub-distributions State \rightarrow menu/F3 \rightarrow $\triangle \nabla$ diagnosis \rightarrow Enter O \rightarrow $\triangle \nabla$ sub-distribution \rightarrow Enter O

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

```
11.7 State of the subsystems
State \rightarrow menu/F3\rightarrow \triangle \nabla diagnosis \rightarrow Enter O \rightarrow \triangle \nabla subsystems \rightarrow Enter O
```

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

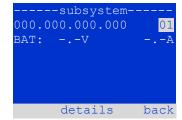


Figure 49: State of subsystems

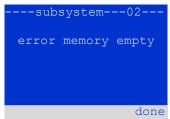


Figure 50: Detailed information

```
11.8 System information & system log
State \rightarrow menu/F3 \rightarrow \triangle \nabla diagnosis \rightarrow Enter O \rightarrow \triangle \nabla system information \rightarrow Enter O
```

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

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

In the log (fig. 52) you can select (\triangle and ∇) a year; pushing \triangleright or Enter \bigcirc 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 informationkey 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

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

Figure 52: System key parameters

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

Figure 53: System log

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Table 1: System Log Messages

| Message | Description |
|---|---|
| ACM fault <slot></slot> | ACM failure in slot <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" |
| | Invalid symmety voltage (voltage value) |
| bat. center volt. (<value>)</value> | |
| bat. current (<value>)</value> | Invalid battery current (current value) |
| bat. discharge (<value>)</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>)</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></slot> | DCM failure in slot <slot></slot> |
| deep discharge 1 | Deep discharge, level 1 |
| · • | Deep discharge, level 2 |
| deep discharge 2 | |
| defrag | File system was defragmented |
| earth (<value>;<flag>)</flag></value> | Earth fault in circuit module detected (internal measurement values) |
| earth-b (<value>;<flag>)</flag></value> | 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></revision> | BMS gateway detected (revision) |
| glt gateway | BMS gateway fault |
| IOM fault <nr></nr> | IOM fault in module # <nr></nr> |
| L1/L2/L3/N fault | Faulty mains connection, detected non-zero voltage on N-line |
| lamps <circuit>/<luminaire></luminaire></circuit> | Luminaire fault summary |
| LDM fault <slot></slot> | Charger failure in slot # <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</duration></n></l3></l2></l1> | Mains failure and return, with voltage values and duration of the power failure |
| mains fault | Mains failure (configured as error) |
| mains mb ' <sam input="">'</sam> | System entered into modified non-maintained mode (SAM input) |
| • | System ended the modified non-maintained mode |
| mains ind ok | |
| | Mains return |
| mains ok | Mains return Maintenance successful |
| mains ok maintenance | Maintenance successful |
| mains ok maintenance mb fault | Maintenance successful System entered into modified non-maintained mode (configured as error) |
| mains ok maintenance mb fault new firmware | Maintenance successful System entered into modified non-maintained mode (configured as error) A firmware update was carried out |
| mb fault new firmware no TCP/IP sockets | Maintenance successful System entered into modified non-maintained mode (configured as error) A firmware update was carried out No more TCP/IP sockets available. The WebInterface cannot be accessed. |
| mains ok maintenance mb fault new firmware | Maintenance successful System entered into modified non-maintained mode (configured as error) A firmware update was carried out No more TCP/IP sockets available. The WebInterface cannot be accessed. Circuits module is operated with at current above the maximum allowed limit. |
| mains ok maintenance mb fault new firmware no TCP/IP sockets overload fault <n></n> | Maintenance successful System entered into modified non-maintained mode (configured as error) A firmware update was carried out No more TCP/IP sockets available. The WebInterface cannot be accessed. Circuits module is operated with at current above the maximum allowed limit. (Range determined by fuse size) |
| mains ok maintenance mb fault new firmware no TCP/IP sockets overload fault <n> PCM fault <slot></slot></n> | Maintenance successful System entered into modified non-maintained mode (configured as error) A firmware update was carried out No more TCP/IP sockets available. The WebInterface cannot be accessed. Circuits module is operated with at current above the maximum allowed limit. |
| mains ok maintenance mb fault new firmware no TCP/IP sockets overload fault <n> PCM fault <slot></slot></n> | Maintenance successful System entered into modified non-maintained mode (configured as error) A firmware update was carried out No more TCP/IP sockets available. The WebInterface cannot be accessed. Circuits module is operated with at current above the maximum allowed limit. (Range determined by fuse size) PCM failure in slot <slot> Plug&Play error in slot <slot> (can occur while configuring the circuit modules o reading from the charging modules)</slot></slot> |
| mains ok maintenance mb fault new firmware no TCP/IP sockets overload fault <n></n> | Maintenance successful System entered into modified non-maintained mode (configured as error) A firmware update was carried out No more TCP/IP sockets available. The WebInterface cannot be accessed. Circuits module is operated with at current above the maximum allowed limit. (Range determined by fuse size) PCM failure in slot <slot> Plug&Play error in slot <slot> (can occur while configuring the circuit modules o</slot></slot> |

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| RSM fault <slot></slot> | RSM error in slot <slot></slot> |
|---|---|
| RTC error <n></n> | Real-time clock error (error code) |
| SAM fault <nr></nr> | SAM error in module # <nr></nr> |
| subsystem <nr> fault</nr> | Substation failure # <nr></nr> |
| subsystem <nr> mains</nr> | Mains failure # <nr> in substation</nr> |
| subsystem <nr> mb</nr> | Substation # <nr> entered modified non-maintained mode</nr> |
| system rebooting | System was re-bootet (warm start) |
| system started <sw version=""> <hw version=""> <serial no.=""></serial></hw></sw> | System was switched on (cold start or warm start) |
| TCB <cmin> <cmax> <bmin> <bmax></bmax></bmin></cmax></cmin> | Measured temperatures: Daily minimum and maximum temperature for cabinet (<cmin> <cmax>) and battery (<bmin> <bmax>)</bmax></bmin></cmax></cmin> |
| test <a> cf: ok:<c> lf:<d> ok:<e></e></d></c> | 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></wert> | Total current monitoring |
| uv-c fault <nr></nr> | Sub-distribution fault |
| uv-c mains <nr></nr> | Mains failrue in sub-distribution |

11.9 Detecting all modules State \rightarrow menu/F3 \rightarrow $\triangle \nabla$ installation \rightarrow Enter \bigcirc \rightarrow $\triangle \nabla$ detect modules \rightarrow Enter \bigcirc

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

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

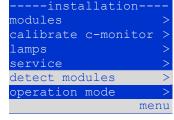


Figure 54: Detect modules

11.10 Select operation mode State \rightarrow menu/F3 \rightarrow $\triangle \nabla$ installation \rightarrow Enter O \rightarrow $\triangle \nabla$ operation mode \rightarrow Enter O

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



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.

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11.11 Configuration and administration

State \rightarrow menu/F3 \rightarrow $\triangle \nabla$ configuration \rightarrow Enter O (\rightarrow $\triangle \nabla$ administration \rightarrow Enter O)

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

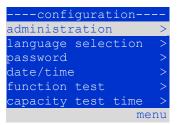


Figure 56: Configuration menu

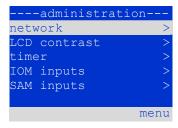


Figure 57: submenu "administration"

11.11.1 Network settings and master-slave-monitoring

 $\textbf{State} \rightarrow \texttt{menu/F3} \rightarrow \triangle \nabla \texttt{ configuration} \rightarrow \textbf{EnterO} \rightarrow \triangle \nabla \texttt{ administration} \rightarrow \textbf{EnterO} \rightarrow \triangle \nabla \texttt{ network} \rightarrow \textbf{EnterO}$

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

Submenu ip-addresses (fig. 58)

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

Thus in the menu <u>ip addresses</u> (fig. 58) under the menu item "adapter" (fig. 58, point 1) you can select the respective connection with \triangleleft and \triangleright (Intern or Front). Now the buttons \triangle 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 \triangleleft and \triangleright to select the different characters and change them with \triangle and ∇ . With Enter \bigcirc you finish the input, so that you can use the keys \triangle and ∇ for selecting another line in the menu. By pushing the softkey done/F3 you leave the ip-addresses input page; settings changes have to be confirmed with yes/F1.

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

Submenu communication (fig. 59)

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

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



Figure 58: Network menu

```
-----network-----
adapter: intern
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 ipaddresses

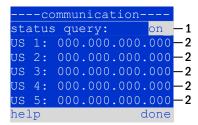


Figure 60: IP-addresses of monitored systems

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11.11.2 Setting the LCD contrast

State \rightarrow menu/F3 \rightarrow \triangle ∇ configuration \rightarrow Enter \bigcirc \rightarrow \triangle ∇ administration \rightarrow Enter \rightarrow \triangle ∇ LCD-contrast \rightarrow Enter

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



Figure 61: Setting the LCD-contrast

11.11.3Timer settings

State \rightarrow menu/F3 \rightarrow \triangle ∇ configuration \rightarrow Enter O \rightarrow \triangle ∇ administration \rightarrow Enter O \rightarrow \triangle ∇ timer \rightarrow Enter O

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

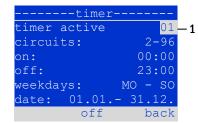


Figure 62: Timer programming

| 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. |
| 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 \triangle and ∇ keys; the values are changed using the \triangleleft and \triangleright keys. The highlighted timer can be set to active or inactive using on/F2 or off/F2. The new settings become effective after leaving the menu by pushing done/F3 and confirming with yes/F1.

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11.11.4 Programming the IOM-inputs State \rightarrow menu/F3 \rightarrow \triangle ∇ configuration \rightarrow Enter \bigcirc \triangle ∇ administration \rightarrow Enter \bigcirc IOM-inputs \rightarrow Enter

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

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



Figure 63: Programming of the IOM-inputs

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

The setting to be changed can be selected using \triangle and ∇ ; the values are changed with \triangleleft and \triangleright . For entering a message text press Enter \bigcirc , 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 \triangle , ∇ , \triangleleft and \triangleright . The new settings become effective after leaving the menu by pushing done/F3 and confirming with yes/F1.

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

```
11.11.5 Programming the SAM-inputs
State \rightarrow menu/F3 \rightarrow \triangle \nabla configuration \rightarrow Enter\bigcirc \triangle \nabla administration \rightarrow Enter\bigcirc SAM-inputs \rightarrow 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 SAMinputs can be provided with a clear text message via the menu SAM-inputs (fig. 63).

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

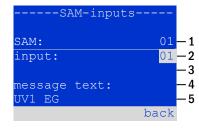


Figure 64: Programming of the SAM-inputs

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11.11.6 Setting the menu language

State \rightarrow menu/F3 $\rightarrow \triangle \nabla$ configuration \rightarrow Enter O $\rightarrow \triangle \nabla$ language selection \rightarrow Enter O

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



Figure 65: Language selection

11.11.7 Authorisation, login with password, logout State \rightarrow menu/F3 \rightarrow $\triangle \nabla$ configuration \rightarrow Enter O \rightarrow $\triangle \nabla$ password \rightarrow Enter O

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

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



Figure 66: Login and logout

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

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

```
11.11.8 Setting the system date and time
State \rightarrow menu/F3 \rightarrow \triangle \nabla configuration \rightarrow Enter \bigcirc \rightarrow \triangle \nabla date/time \rightarrow Enter \bigcirc
```

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

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



Figure 67: Setting the system time

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11.11.9 Programming an automatic capacity test State \rightarrow menu/F3 \rightarrow $\triangle \nabla$ configuration \rightarrow Enter \bigcirc \rightarrow Capacity test time \rightarrow Enter \bigcirc

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

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

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

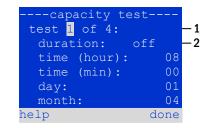


Figure 68: settings for automatic capacity tests

11.11.10 Configuration of the automatic Email notification

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

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

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

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

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 microControl *plus* and the mail server. Connect the PC via network cable to a switch in the MultiControl network. Open the prompt and run a ping command. Example:

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

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

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Step 2: Configuration of the Email function in the WebInterface

Open a web browser on the PC and enter the IP-address of your system as address. The WebInterface main page of the system opens (fig. 68). Click on the menu item "Administration" and choose "E-Mail" (login required). This takes you to the Email-configuration page (fig. 69).

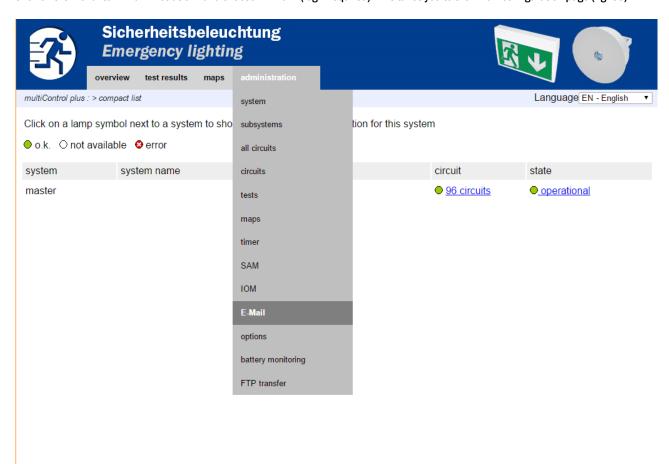


Figure 69: WebInterface main page and access to the email configuration page.

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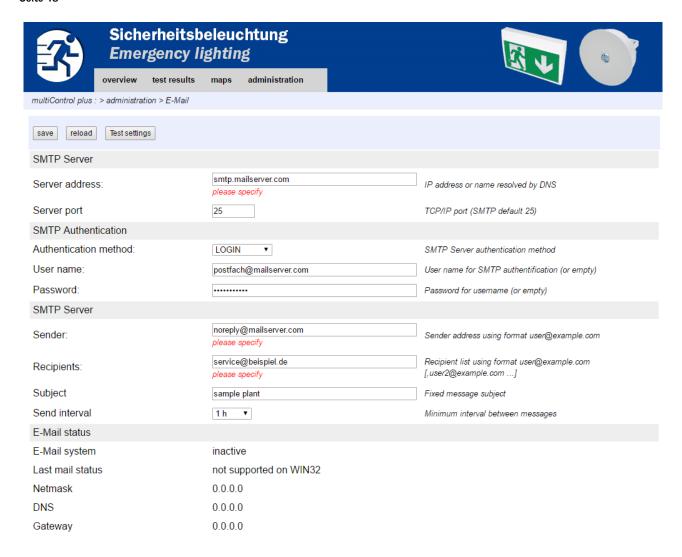


Figure 70: Email configuration page

Enter the following information in the input boxes on the Email configuration page (fig. 69):

| 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: Use "noreply" as user name, because the receiver is not supposed to reply. 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). | |

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| receiver | Address of a single receiver (e.g. <u>benutzer@beispiel.de</u>) or a list of several receivers (separated by commas, e.g. <u>benutzer1@beispiel.de</u> , <u>benutzer2@beispiel.de</u> , <u>benutzer3@beispiel.de</u>). 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 <i>mail.beispiel.de</i> | Mail server address cannot be resolved into IP-address by the DNS-server. | Check DNS in network settings. |
| benutzer@beispiel.de: Authentication rejected , reply: 535 Incorrect authentication data | Mail server has rejected the login to the mail account. | Check user name, password and Authentication method. |
| benutzer@beispiel.de: RCPT command failed, reply: 550 Submission from dynamic IP 172.16.5.26 requires authentication | Mail server has rejected login to the mail account due to missing login data. | Enter user name, password and authentication method. |

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

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

11.12 Show service address State → menu/F3→ △▽ service address → Enter ○

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

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

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

Figure 71: Service-contact details

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

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 0.5A for charging. This unit consists of a charger module (LDM25) with a maximum charging current of 0.5A whose output is connected in parallel to the battery. Batteries, which are later built in a battery assembly as replacement, do not need an equalisation charge with normal float charge voltage in order to adjust to the terminal voltage of other batteries.

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

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

| Temperature (°C) | Charging voltage boost/quick charging (V/cell) | Float charge voltage (V/cell) |
|------------------|--|-------------------------------|
| 0 | 2,53 | 2,36 |
| 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.

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

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

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

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)

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2. check the battery current (status screen or chapter 11.3, fig. 43) by imitating a mains failure (see "testing through imitation of a mains failure") with a measuring device (see 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)

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- 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 | microControl <i>plus</i> / serial number see front page power converter E 230 / G220 |
| mains input data | |
| nominal voltage U _{Nom} | 230V AC +/- 10% |
| nominal current | 6,52A |
| 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) | max. 1500W |
| nominal voltage (DC-operation) | 216V |
| nominal current at | see table in chapter 12.1, 3A per circuit** |
| nominal output at \rightarrow 1h / 3h / 8h DC-operation | see table in chapter 12.1, 650W per circuit** |
| min. voltage after | 185V / 185V / 185V |
| operation time for above-mentioned data | 1h / 3h / 8h |
| nominal temperature of the battery | 20°C |
| battery type and number of cells | |
| battery type | Pb |
| number of cells | 108 |
| make | 18 x OGIV RPower 1245 or OGIV RPower 1252 |
| charging current | 0.5A |
| float charge voltage | 2.275V per cell* |
| boost charge voltage | 2.35V per cell* |
| deep discharge 1 | 1.71V per cell* |
| deep discharge 2 | 1.53V per cell* |
| other system characteristics | |
| number of electric circuits/DCMs | max. 6/ max. 3x DCM32 (option DCM12E) |
| 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 (dany, weekly) or manually |
| radio shielding | according to VDE 0875, class N |
| surrounding temperature (with battery inserted) | 0 - 35°C (10 - 35°C) |
| housing dimensions HxWxD | 660mm x 350mm x 230mm |
| | IP 20 |
| protection type protection level | |
| protection level cable entry | I from above |
| · | |
| recommended cable cross sections mains cables | 1.5. Amm² rigid |
| 1 11111 | 1.5 - 4mm² rigid 0.5 – 2.5mm² rigid |
| natantial fusa sirusi sal-i | ロカーフカmm4 rioin |
| potential-free signal cables | |
| potential-free signal cables electric circuits battery cables NSGAFÖU +/- | 1.5 - 2.5mm² rigid 1.5 - 4mm² |

^(*) Values depend on working temperature.

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

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| relevant fuses/connection cross section | |
|---|--|
| mains fuse F1 | Fuse ceramics 6.3 x 32mm 10AT |
| battery fuses F2, F4 (B+, B-) | Fuse ceramics 6.3 x 32mm 10AT |
| battery fuse F3 (Sym) | Fuse ceramics 5 x 20mm 1AT |
| internal fuses L/B+ (F5/F6) | Fuse ceramics 5 x 20mm 3,15AT |
| fuses F7/F8 - circuit 7 | Fuse ceramics 5 x 20mm 1AT |
| charger module LDM25 | Fuse ceramics 5 x 20mm 3,15AT |
| circuit module DCM12E L(+) and N(-) | Fuse ceramics 6,3 x 32mm 5AF |
| circuit modules DCM32 L(+) and N (-) | Fuse ceramics 6,3 x 32mm 5AT |
| Fuses for 24V-switching voltage F14,F15 | Fuse ceramics 5 x 20mm 250mA F (standard) Fuse ceramics 5 x 20mm 500mA T (systems with NT24) |

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:

| | Tn | 1h | 3h | 5h | 8h | 10h | 20h | Q* | A* | d* |
|-------------|----|------------|------------|------------|------------|------------|------------|------|-----------------|----|
| Type RPower | | US=1.80V/c | US=1.80V/c | US=1.80V/c | US=1.80V/c | US=1.80V/c | US=1.80V/c | m³/h | cm ² | cm |
| 0GIV 1245 L | | 2.67 | 1.08 | 0.73 | 0.48 | 0.41 | 0.225 | 0.1 | 3 | 24 |
| 0GIV 1252 L | | 1.28 | 1.28 | 0.84 | 0.58 | 0.47 | 0.26 | 0.1 | 3 | 25 |

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

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

| | Tn | 1h | 3h | 5h | 8h | 10h | 20h |
|-------------|----|------------|------------|------------|------------|------------|------------|
| Type RPower | | US=1.80V/c | US=1.80V/c | US=1.80V/c | US=1.80V/c | US=1.80V/c | US=1.80V/c |
| OGIV 1245 L | | 5.15 | 2.14 | 1.46 | 0.96 | 0.83 | 0.45 |
| 0GIV 1252 L | | 5.51 | 2.47 | 1.65 | 1.15 | 0.94 | 0.50 |

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15 Module descriptions

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

15.1 Electric circuit module DCM

Eigenschaften auf einen Blick:

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



Figure 72: DCM

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, MU05¹, 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 plus, miniControl 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.

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15.3 Switch query module SAM08 (optional)

Characteristics at a glance:

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



Figure 73: SAM08

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

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

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



Figure 75: MC-LM

The MultiControl Line Monitor MC-LM mainly monitors the general mains installation (voltage supply of the general lighting). The MC-LMs are bus-compatible mains monitors for the connection to the multi-bus (RS485) of a microControl *plus* emergency lighting system and they are suitable for switching the circuits in the respective DCMs. The MC-LM can monitor three phases of e.g. a mains distribution. 85% of the nominal mains voltage (230V AC), i.e. ca. 195V AC, is the switch threshold for the recognition of a mains failure or an intense mains voltage fluctuation. The MC-LM can be addressed separately and are connected to the microControl *plus* system in series (feed through wiring) via screened 4-core data line; up to 15 of these MC-LM can be connected via this line as one of the available addresses is already allocated to the internal SAM08. A J-Y(St)-Y cable or similar in compliance with DIN VDE 0815 and 0816 have to be used as data line.

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
- · operation mode of the system can be changed
- maintained light consumers can be switched on/off



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

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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

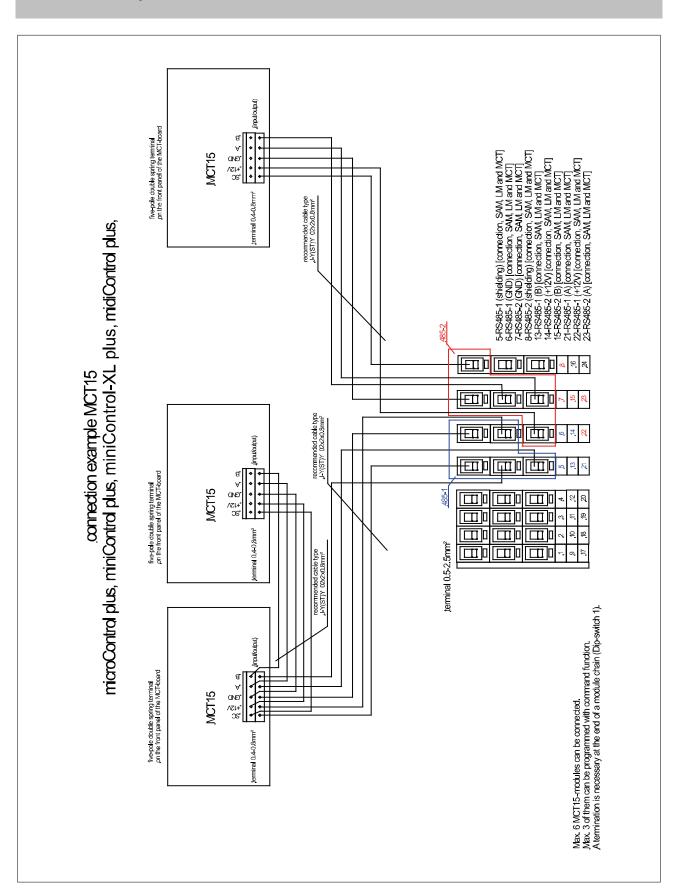
The Power-Control (PC230) monitors voltages in sub-distributions of the general lighting. Three phases can be monitored. If fewer phases are monitored, unused monitoring contacts have to be bridged with connected contacts. The upper switch threshold is set to $195\,V$, i.e. 15% lower than mains voltage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



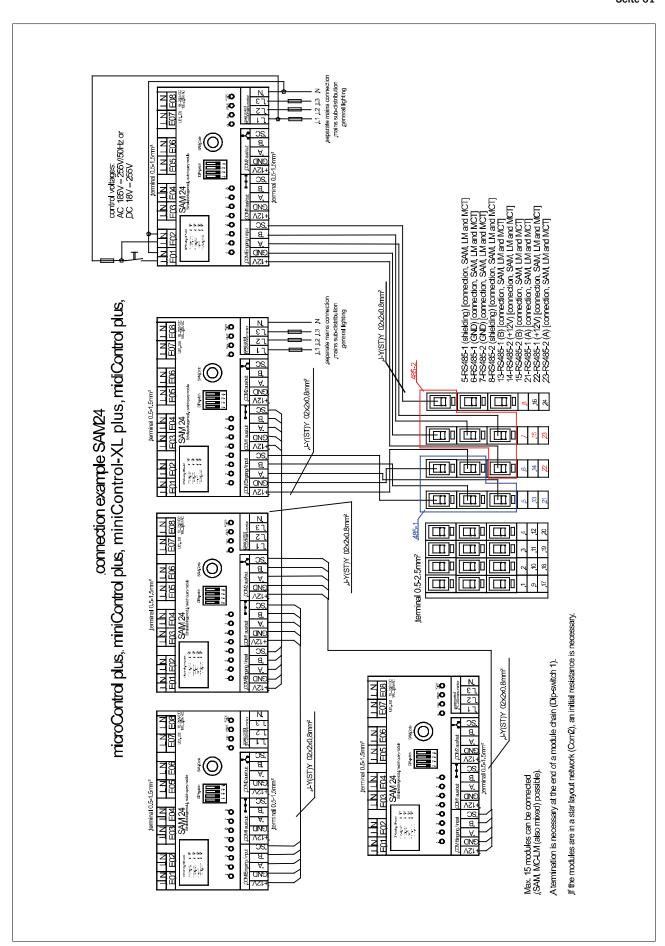
Figure 77: PC230

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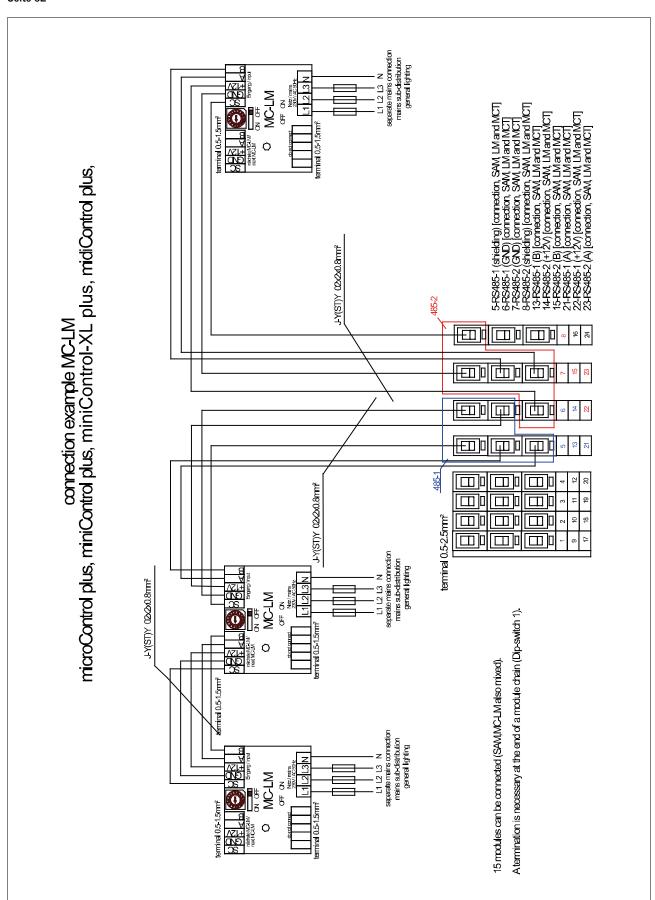
16 Connection examples

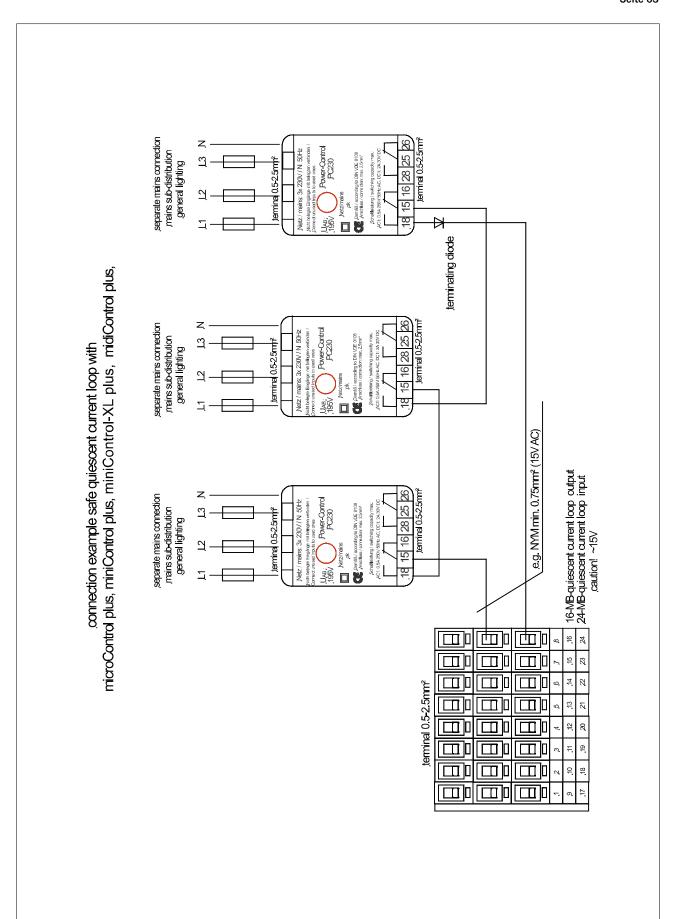


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17 Revision history

| 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 | Added front panel LED description |
| 1.7 | 2017-03-20 | added chapter: first inspection, repeating inspection, inspection before commissioning procedure in case of failure |
| 1.7.1 | 2017-06-08 | surrounding temperature with battery inserted 10 – 35°C |
| 1.7.2 | 2018-02-08 | Exchanged system overview |
| 1.7.3 | 2018-11-01 | Added waiting time between shutdown and restart |

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18 Appendix: system specification, commissioning, notes

| General information on your system | |
|--|---|
| Device type | ☐ microControl <i>plus</i> / Type MI102 ☐ microControl <i>plus</i> / Type MI104 ☐ microControl <i>plus</i> / Type MI106 |
| 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 | 630 x 350 x 230 |
| | |
| Used battery type | |
| Battery manufacturer | RP-Technik Notstromsysteme |
| Battery type | RPower Battery- OGiV1245 / OGiV 1252 |
| Nominal voltage U _N | 216V |
| Number of cells (2V) | 108 |
| Number of blocks (12V) | 18 |
| Nominal capacity C ₂₀ | 4.5Ah / 5.2Ah |
| Nominal temperature T _N | 20°C |
| Ventilation requirements | According to EN 50 272-2, paragraph 8 |
| Nominal discharge current I _N | 1h - 2.31A; 3h - 0.93A; 8h - 0.37A |
| | • |
| Modules | Check sum / Software |
| NLSR | |
| control centre 2 | |
| Z2 SAM / 10 | |
| LDM25 | |
| DCM12E | |
| DCM32 | |
| MCT15 / 15S | |
| MC-LM | |
| BusCan Temp | |

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| Accessories/Options | |
|--------------------------------|------------|
| log printer | □ yes □ no |
| glazed door | □ yes □ no |
| E30 fire protection wall mount | □ yes □ no |
| | |
| Commissioning | I Date: |
| Mounted by: | Date: |
| | |
| Commissioned by: | Date: |
| | |
| Safety signs installed by: | Date: |
| | |
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| Notes | |
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| | | | Seite |
|---|------------|----------|----------------------|
| Measurement protoco | ls battery | | |
| ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | , | | |
| Datas | | Time | |
| Date: | Dis-1: 00 | Time: | Dis-I-04 |
| 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 |
| DIOCK 17 | DIOCK 10 | Symmetry | Total |
| Date: | | Time: | |
| Block 01 | Block 02 | Block 03 | Block 04 |
| Block 05 | Block 06 | Block 07 | |
| Block 09 | Block 10 | Block 11 | Block 08 Block 12 |
| | | | |
| Block 13 | Block 14 | Block 15 | Block 16 |
| Block 17 | Block 18 | Symmetry | Total |
| <u> </u> | | | |
| 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: | T-2 |
| 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 |
| DIOOK 11 | DIOCK TO | Symmous | Iotai |

Setup and Commissioning

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Identification no. : 011118
Issuing date : 01.11.2018
Publisher: Schrack Technik GmbH
Seybelgasse 13, A-1230 Vienna
Subject to change without prior notice

