Lighting Technology

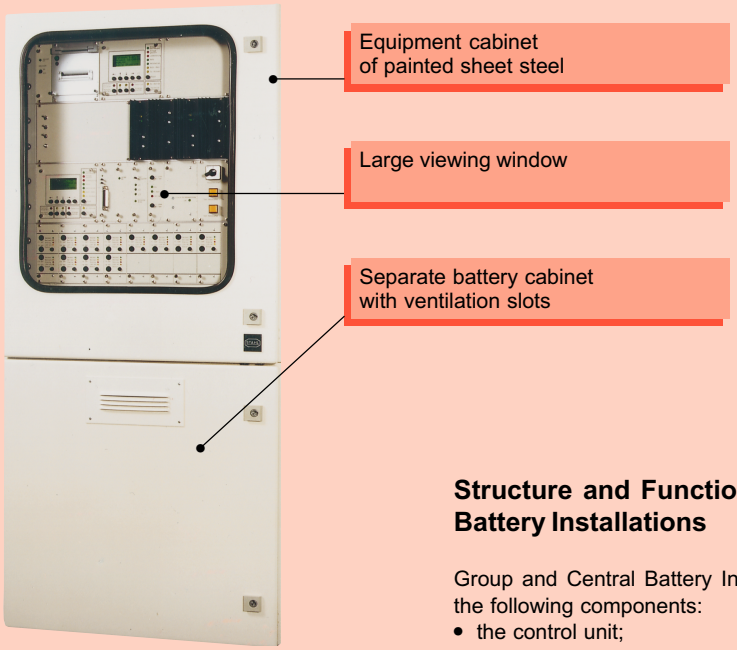
Use of group and central battery units

Group and central battery units are used in medium size and large safety lighting installations in order:

- on failure of the general lighting, to supply the safety lighting from the emergency lighting mains;
- on failure of the AC emergency lighting mains, to switch-over automatically to battery emergency lighting operation;
- to monitor the functional state of the safety lighting installation automatically and to display any faults which may occur;
- to document and store the operating state of the installation in the electronic test record.

Group and Central Battery Installations from R. STAHL

R. STAHL plans, designs and builds group and central battery installations for safety lighting in explosion-protected areas. The configuration and design of the units is done to order, in accordance with the plans, documents and information provided by the customer. We are at your disposal for further advice and information.



Function monitoring of safety lighting installations to DIN VDE 0108

The reliable function of a safety lighting installation must be guaranteed at every moment. Hence tests are set out in DIN VDE 0108 which an operator of such an installation must carry out regularly:

- Functional test of the complete installation
- Long-term operating test
- Functional monitoring of the safety lights in emergency operation
- Battery test

The timing and results of these tests must be recorded and kept for a period of at least 2 years.
It is left to the operator of the safety lighting installation whether the prescribed tests are carried out manually or automatically. Since manual tests demand a very high expenditure in personnel and time, it is sensible from economic and safety points of view to use computer aided test systems, such as those incorporated in the group and central battery installations from R. STAHL.

Structure and Function of Group and Central Battery Installations

Group and Central Battery Installations consist principally of the following components:

- the control unit;
- various switching, monitoring and display modules;
- interfaces for information transfer and networking installation;
- battery block and battery charging unit

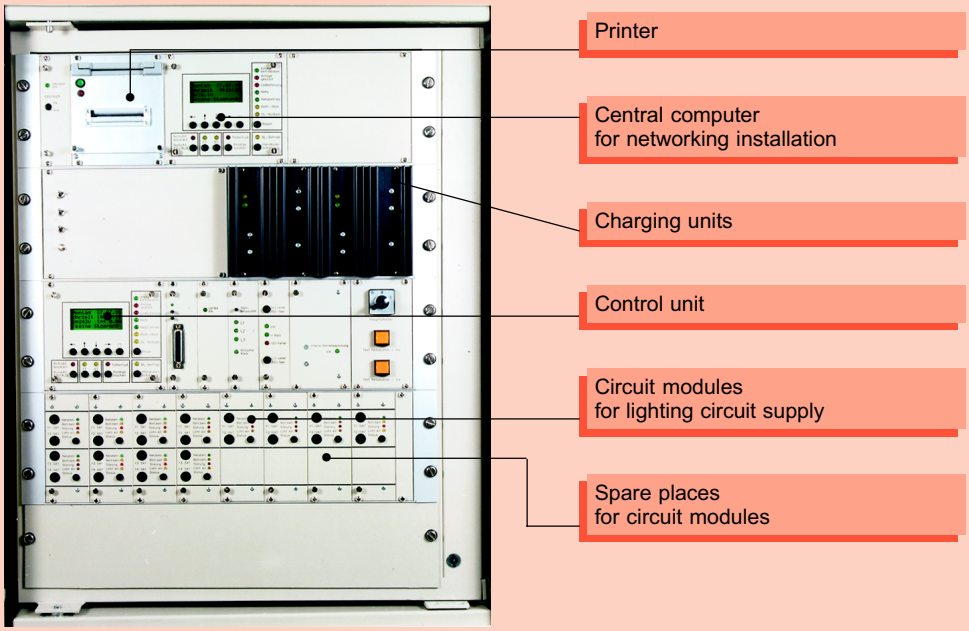
Key details of the individual components can be found in the sections which follow.

Mechanical and electrical configurations

Emergency light installations are accommodated in cabinets made of painted sheet steel:

- the battery set
  - in a separate battery cabinet or
  - in a battery compartment which is securely separated from the electronicmodules;
  - the electronics modules in the equipment cabinet.

All electronics modules are in the form of 19" inserts, in a hinged frame mounted behind the equipment cabinet door.
Individual module displays can be monitored through a large viewing window.
The individual circuits are connected via terminal strips (nominal cross section 4 mm^2).



Control unit

Every central battery installation has a microprocessor-controlled control unit which co-ordinates the operation of the individual installation components and thereby performs the following functions:

- Voltage monitoring in the main and subordinate distribution circuit;
- Supply of emergency lighting system from AC or DC emergency lighting network;
- Configuration of emergency lighting circuits using function keys;
  - identification of emergency lighting circuits;
  - allocation of required operating mode to each lighting circuit;
  - timer function;
  - staircase circuit;
- Reception and processing of external signals, e.g. from switch clocks, time switches, twilight switches ...;
- automatic initiation and execution of all required tests and checks;
  - function test
  - continuous operation test
  - network check
  - deep discharge test of battery (manual)
  - monitoring of emergency lighting function
- Display of programming steps, programming states, operating states and operating faults via display or LEDs.
- Independent maintenance of electronic test record with storage of all operating states and faults which have occurred over the previous two years.
- Provision of data for view on display, for printing or for transmission to other computer systems.

Network interrogation / network monitoring

Special network modules are used to monitor the general network. These make possible:

- Monitoring of main distribution network (basic requirement to DIN VDE 0108)
- Monitoring of individual sub-distribution networks
- Monitoring of individual lighting circuits

Main distribution network monitoring

Emergency battery installations are essentially fed from an AC emergency lighting circuit, which is brought directly from the main distribution system to the emergency installation. In order to ensure symmetrical loading of the total network, this supply is in the form of a three-phase network. The emergency lights are fed from this when there is an emergency AC network. Mains failure is detected by the mains monitoring unit and reported from there to the control unit. The control unit records the fault and switches the emergency supply to emergency battery operation via the circuit modules allocated to the lighting circuits.

Mains monitoring in sub-distribution circuit

It is possible to monitor the networks for individual sub-distribution circuit by using special monitoring modules. A monitoring module must be fitted to each of the circuits to be monitored. It is then connected to the control unit of the central battery installation.

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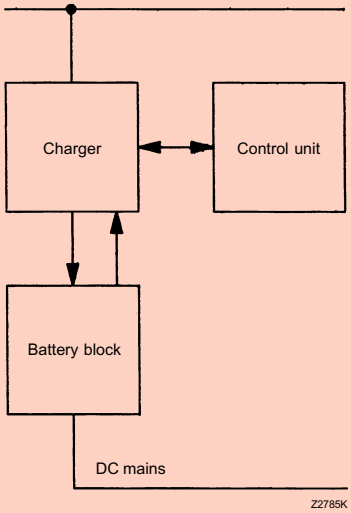
The batteries are installed in the battery cabinet



The battery is charged and monitored via the charger

Operating modes in emergency lighting circuits

Individual emergency lighting circuits can, by suitable programming of the control unit, have various operating modes allocated such as:

- non-maintained operation
- non-maintained operation with emergency lighting blocking
- maintained operation
- modified maintained operation
- light demand operation

Non-maintained operation

General lighting and emergency lighting are operated together. If the general lighting fails, the emergency lights continue to burn, fed from the AC or DC emergency mains.

Non-maintained operation with emergency lighting blocking

The emergency lights operation is non-maintained. The supply to the emergency lights is activated via a timing function during required operating times only.

Maintained operation

The emergency lights are in operate exclusively on failure of the AC mains; they are then fed from the DC emergency lighting mains.

Modified maintained operation

The emergency lights are also fed in normal operation from the AC mains of the general lighting (sub-distribution circuit). When the general AC mains fails, the emergency lighting operates from the AC emergency mains (main-distribution circuit). Only on failure of the AC emergency lighting mains the emergency lighting supplied from the battery.

Light demand operation

When the general lighting fails, the safety lighting is activated if the light switch of the corresponding lighting circuit is on.

Battery supply

In DC emergency lighting operation the emergency lights are fed from the battery block, as are all modules of the central battery installation. The battery block, which is kept in a battery cabinet or drawer separated from the control cabinet, delivers an output voltage of 24 V DC (inverter technology), or 216 V DC (circuit module technology). The battery block is dimensioned according to the lighting power to be delivered and the required emergency lighting operating time. The battery block is charged through a primary pulsed charger unit from the AC emergency lighting mains.

Charger unit

The charger unit has a temperature dependent charging regulator; this ensures charging of the battery block matched to various temperature conditions. The automatic charging unit incorporated in the charging unit regulates the charging current as a function of the charge level of the battery:

- in fast charge mode:
  up to a cell voltage of 2.4 V,
- in trickle mode:
  from a cell voltage > 2.4 V.

The charging mode can be read off directly on the charging unit, a charging fault is shown on the control unit display. In order to increase redundancy or charging current, up to 4 charging units can be connected in parallel. Charging units connected in parallel are fed from different phases.

Circuit modules

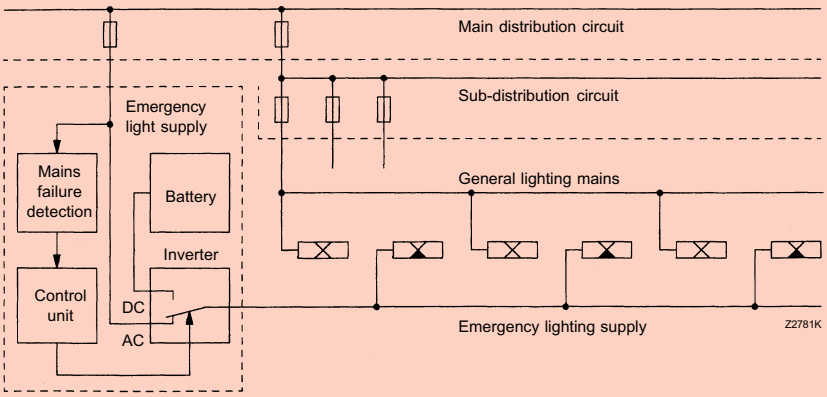
Emergency lighting is supplied from the AC or DC emergency lighting supply via the circuit modules assigned to the individual lighting circuits. Thus these circuit modules take over switching of the power supply in AC mains operation and in DC emergency battery operation.
Function, operating state and faults in the circuit modules are indicated directly on the units by LEDs. System and programming states of a lighting circuit can be indicated on the control unit display can be means of a status key incorporated in the module.

Automatic light timing / timer

An automatic light timer for staircase illumination can be installed if required.

Fan module

This module is used to control an external battery-chamber fan. If the charger is operating in fast charge mode, then the fan is switched on. Fan operation is monitored, enabling a fan fault to be communicated to the control unit and displayed there. So long as there is a fan fault, fast charge operation of the charger is blocked.



The safety lights are fed from the AC emergency mains or, if it fails, from the battery emergency lighting supply.

Light failure detection

The control unit monitors the function of the emergency lights. There are two types of light failure detection:
- Lighting group current monitoring
- Individual light current monitoring

Lighting group current monitoring
The current consumption of the assigned light fitting group is measured by the circuit module when commissioned, and this is stored as reference value in the control unit. In both AC and DC operation, the lighting operating current is measured continuously and compared with the reference value. If the actual and reference values differ because of e.g. a lamp failure, an error is signalled and logged in the „electronic test book“.

Individual light current monitoring
A convenient alternative to light group current monitoring is individual light current monitoring. In this type of monitoring a fault is indicated referred to a specific light fitting. A light analysis module is necessary per light fitting for this. The light fitting is indexed via the light analysis module and thus recognisable to the control unit. Changes in current are detected, reported to the control unit, indicated there as a light fitting failure and recorded in the test book.

Printer

If required every emergency lighting installation can be equipped with a printer. It can be used to print out, individual test reports and statistics, and also the entire test record. It is possible to connect of an external printer.

Interfaces

The following interfaces are available for connection of external units:
- SZG for printers and notebooks
- SVZ for combined operation of individual central battery installations
- SGR for data transfer to building control system

Networking of installations

A central computer can be used to operate and monitor a combined of several individual battery installations. The operating states of the individual networked installations can be called up on the central computer. Programming for individual installations cannot be changed from the central computer. A three-wire bus is sufficient for networking such a installations.
The emergency lighting supply unit can be incorporated in the building control system by means of an SGR interface.