

# SELFTESTING OPERATION

## 1) Selftesting (S device types)

All emergency lighting units including an automatic selftesting functionality conforming with the EN62034:2012 standard are marked with an S in the product name. Every 8 days a test is performed automatically in order to check the functionality of the unit, the lamp (LED or fluorescent tube) and the battery. This so-called functional test lasts 2 minutes. Additionally, a full duration test is performed every 12 months to check the battery capacity. The selftesting emergency lighting unit types EMCU KS, EMCU TS and EM BOX MS perform full duration testing every 12 weeks. Each full duration test is followed by a complete discharge of the battery in order to avoid memory effect and to ensure battery reactivation.

### Important notes

- Selftesting is performed irrespective of the state of the emergency lighting unit in maintained mode. As soon as selftesting is launched, the lamp will be switched on and powered by the battery, regardless of its switching state (on or off) in maintained mode.
- The status LED permanently glows green during selftesting.
- Selftesting is only enabled with fully charged batteries i.e. only 48h after power-on or 48h after a discharge of more than one minute.
- **SAFETY:** In case of mains failure, all emergency lighting units being in a fault condition state will still try to switch on the lamp regardless of the fault type (lamp fault, battery fault or system failure).

## 2) Self-testing in combination with LFP batteries

Ideally, emergency lighting units using the LFP battery technology (LiFePO<sub>4</sub>) should be of the selftesting variant; the reason being that batteries in standard (i.e. non-self-testing) emergency lighting units are seldom discharged. Therefore, they are almost permanently on float charge, which is nearly as detrimental to capacity retention as mere storage. Thanks to the duration test performed by selftesting emergency lighting units, the LFP battery will be fully discharged every 12 weeks. Together with the partial discharges resulting from the weekly functional tests, this automatic repetitive discharge procedure will help to recover some of the capacity loss incurred by float charging. Therefore, the lifetime of LFP batteries will be significantly improved when used in combination with selftesting units.

## 3) Selftesting for computer addressable M-Bus units (BS device types)

Automatic selftesting is controlled by the M-Bus controller, i.e. by a command sent once a week on a specific day and time of day. The test type (functional or duration test) may be specified by a manual bus command. The test type triggered by the command sent automatically once a week is specified by the unit itself, i.e. according to its internal testing sequence.

### Important notes

- After installation and power-on, and as long as the controller sends no commands to the M-Bus emergency lighting units, they will selftest autonomously (i.e. as S device types). After commissioning of the M-Bus controller, the selftesting sequence will be determined by the controller. The unit's internal 8-day cycle will be replaced by the weekly cycle defined by the M-Bus controller. The synchronisation process between both cycles may take up to one week.
- If the M-Bus controller is faulty or if no test commands are sent within 8 days, the emergency lighting unit will automatically start and keep testing itself automatically as an autonomous selftesting unit using its internal 8-day testing cycle.

## 4) Self-testing for computer addressable DALI units (DS device types)

Automatic selftesting is controlled by the DALI controller, i.e. by a command sent on a specific day and time of day according to DALI programming. The test type (functional or duration test) is specified by the DALI command.

### Important notes

- After installation and power-on, and as long as the DALI controller sends no commands to the DALI emergency lighting units, they will selftest autonomously (i.e. as S device types). After commissioning of the DALI installation, the selftesting sequence will be determined by the DALI controller.
- If the DALI controller is faulty or the DALI bus damaged after commissioning, test commands can no longer be sent. In such cases, DALI emergency lighting units will not selftest automatically but will operate as standard emergency lighting units (i.e. non-selftesting).
- DALI emergency lighting units will not reactivate the battery after the duration test, as this is not provided in the DALI standard.

## 5) Selftesting sequence

The first test is launched automatically 8 days after the emergency lighting unit has been powered on, consisting of a full duration test, followed by battery reactivation. The interval between tests is programmed in the emergency lighting unit's firmware and has a random value set between 8 and 8.25 days. Thus, a so-called random testing regime is implemented for the whole emergency lighting installation, minimising the probability of two adjacent emergency luminaires selftesting at the same time (and consequently discharging their batteries simultaneously). Within one year a full duration test followed by a subsequent battery reactivation is being performed. The EMCU KS, EMCU TS and EM BOX MS device types will perform a full duration test every 12 weeks.

## 6) Initial battery regeneration process (not to be mistaken for the battery reactivation following each duration test)

In order to regenerate the battery after warehouse storage, an automatic battery regeneration process is being carried out by all selftesting and M-Bus units (standard and DALI units being excluded) immediately after their first power-on. A total of three cycles is performed for all battery technologies (NiCd, NiMH and LFP). Each cycle consists of a 24h battery charge followed by a full discharge. No capacity measurement is made during the discharge cycles.

### Important notes

- The battery regeneration process is not performed after any battery discharge, even if such discharge leads to battery deep discharge protection. Neither is it performed after the full duration test. However, it will be performed after each battery replacement or after each battery disconnection.
- The status LED glows intermittently green with a short pause every 8 seconds during the battery regeneration process.

## 7) Battery charging fault

A battery charging fault is mostly due to a battery being disconnected or badly connected, but may also result from a faulty unit with damaged charger.

In the battery charging fault state...:

- ...mains operation is inhibited. The luminaire is switched off, irrespective of its on/off state under mains operation.
- ...the status LED continuously flashes red.
- ...all subsequent selftests are inhibited.

### Important note

Battery charging is continuously monitored, irrespective of the selftesting cycles. If the battery is disconnected or its connection damaged, the battery charging fault detection may be delayed due to charging cycles required to charge NiMH or LFP batteries. In such cases, the charger is blocked during long periods and activated only during shorter ones. The battery charging can only be monitored when the charger is activated.

### Battery charging fault clearing

Due to the continuous monitoring of the battery, the battery charging fault condition will be cleared as soon as the problem is resolved in which case mains operation will be released and the status LED turns green.

### Important note

The battery charging fault clearing is considered as a new power-on of the unit. This means that the battery regeneration process will be performed and that the selftesting sequence will start again from scratch (first duration test within 8.25 days and the following one within one year or within 12 weeks depending on the unit type).

## 8) Battery capacity fault

A battery capacity fault is detected if the battery capacity is not sufficient to perform the full duration test (i.e. that the battery is fully discharged before the end of the duration test).

In the battery capacity fault state...:

- ...the status LED continuously flashes red.
- ...all subsequent selftests are inhibited.

### Important note

In the case of a battery capacity fault, and contrary to a battery charging fault, mains operation is not inhibited.

### Battery capacity fault clearing

Due to the continuous monitoring of the battery, the battery capacity fault will be cleared as soon as the battery is replaced. The status LED will turn back to green.

### Important note

As in battery charging fault clearing, the battery capacity fault clearing is considered as a new power-on of the unit. Thus, the battery regeneration process will be performed and the selftesting sequence will restart from scratch.

### 9) Lamp (LED or fluorescent tube) fault

During selftesting, the lamp is powered by the battery. The lamp fault condition results from a faulty or failed switch-on of the lamp.

In the lamp fault state...:

- ...the status LED intermittently flashes red.
- ...an ignition procedure is started every minute (longer cycles with fluorescent tubes and shorter ones with LED lamps) to switch on the lamp.
- ...mains operation (i.e. maintained mode) is inhibited.

#### Important note for emergency lighting units in non-maintained operation (i.e. units without LED driver for LED lamps or without electronic ballast for fluorescent lamps)

A lamp fault can only be detected during selftesting. Therefore, it is possible that the status LED is green although the lamp is faulty under mains operation and hence cannot be switched on in maintained mode. This may happen more frequently with fluorescent tubes due to the fact that they are preheated on one side only during emergency and on both sides during mains operation.

#### Important note for emergency lighting units in maintained operation (i.e. units with LED driver for LED lamps or with electronic ballast for fluorescent lamps)

In such units, it is possible to detect a lamp fault not only during selftesting but also in maintained mode, as soon as or each time the lamp is switched on. In both cases the unit is in the lamp fault state as described above and the same ignition procedure takes place until the lamp is repaired or replaced.

#### Lamp fault clearing

Due to the fact that ignition attempts are performed periodically, this fault condition will be cleared at most one minute after replacement or repair of the lamp. The new (or repaired) lamp will automatically turn on and the fault condition be cleared. The status LED will turn back to green.

#### Important note

Contrary to battery charging conditions, the re-initialisation after lamp fault clearing is not considered as a new power-on of the emergency lighting unit. This means that selftesting will keep being performed in the existing sequence (functional/duration testing sequence) and that battery regeneration will not be performed.

### 10) System fault

If a selftesting cycle cannot be performed to its full length (for both the short functional test or the full duration test) and not due to lamp fault, battery fault or due to external mains failure, the emergency lighting unit will identify this problem as a system fault (internal malfunction).

In the system fault state...:

- ...the status LED will be turned off.

#### Important note

Contrary to a battery charging or lamp fault, mains operation will not be inhibited in the case of a system fault.

#### System fault clearing

The system fault will automatically be cleared at the launch of the next selftesting procedure. If that selftesting cycle is performed successfully, the status LED will turn back to green.

### 11) Visual status indication

	intermittently green	= battery regeneration	<b>Status LED intermittently green:</b> initial battery regeneration process (see item 6)
	permanently green	= no fault	<b>Status LED permanently green:</b> no fault / normal state
	continuously flashing red	= battery fault	<b>Status LED continuously flashing red:</b> battery fault due to insufficient capacity or bad connection
	intermittently flashing red	= luminaire fault	<b>Status LED intermittently flashing red:</b> lamp fault, i.e. lamp not connected or defectuous
	dark	= emergency operation / no mains	<b>Status LED dark:</b> emergency operation / no mains, battery fully discharged, system fault or faulty unit

Selftesting emergency lighting units only require a periodical visual inspection of the LED status indicator and the connected luminaire.

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