

SELF-TESTING OF CONTROL GEAR AND LUMINAIRES

SELF-TESTING OF 'S' UNITS

All Lux Box emergency lighting control gear and luminaires identified with the letter S include an automatic self-testing function compliant with the EN62034:2012 standard. Every 8 days a 30 second functional test is performed automatically in order to check the functionality of the unit, the lamp (LED or fluorescent). Full discharge tests are also performed during each 44th activation of the 8-day test, to check the battery capacity. Each full duration test is followed by a complete discharge of the battery in order to avoid memory effect and to ensure battery reactivation.

Notes:

- > Self-testing is performed irrespective of the state of the emergency lighting in maintained mode. As soon as self-testing is initiated, the lamp will be switched on and powered by the battery, regardless of its operational state (on or off) in maintained mode.
- > During self-testing the status LED is will indicate the type of test being performed. Function test (Fast Green Flash) and Duration test (Slow Green Flash)
- > Self-testing is only enabled with fully charged batteries i.e. only up to 48h after powering-up or up to 48h after a discharge of more than one minute.
- > SAFETY: In case of mains failure, any emergency lighting units in a fault condition state will still try to switch into emergency operation regardless of the fault type (lamp fault, battery fault or system failure).

SELF-TESTING IN COMBINATION WITH LFP BATTERIES

Emergency lighting control gear and luminaires using the LFP battery technology (LiFePO₄) should be operated with self-testing emergency lighting units. Batteries in standard (i.e. non-self-testing) emergency lighting applications are seldom discharged; therefore, they are almost permanently in normal float charge which is almost as detrimental as mere storage for capacity retention.

Thanks to the duration test performed by self-testing emergency lighting units, the LFP battery will be fully discharged each time a duration test is performed and together with the partial discharges resulting from the weekly functional tests, this automatic repetitive discharge procedure will help to recover capacity loss due to the float charge.

The lifetime of LFP batteries is therefore significantly improved when used in combination with self-testing units.

SELF-TESTING FOR 'DALI' COMPUTER ADDRESSABLE UNITS

In such units, the automatic self-testing function is performed according to the commands sent by the DALI control unit, i.e. on a specific day and time of day depending on the timing sequence and period programmed in the DALI installation. The type of the test (functional or duration test) is specified by the DALI command.

Notes:

- > After installation and powering-up, DALI inverters will operate as autonomous self-testing units (i.e. as S units). Immediately after commissioning of the DALI installation and DALI commands are received by these units, the self-testing sequence is controlled by the DALI control unit.
- > If the DALI control unit is faulty or the DALI bus damaged after commissioning, such that test commands can no longer be sent, DALI units will not test themselves automatically. This will depend on the DALI Control Unit manufacturers guidelines.

INITIAL BATTERY REGENERATION PROCESS

In order to regenerate the battery after warehouse storage, an automatic battery regeneration process is carried out by all self-testing units immediately after their first connection to an uninterrupted power supply. A total of 1 cycle is performed for all battery types (NiCd, NiMH and LFP). This cycle consists of a 24h battery charge followed by full discharge. There is no capacity measurement is made during the discharge cycles.

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.
- > During this battery regeneration process the status LED is illuminated green with a short pause every 8 seconds. Not to be confused with the battery reactivation following each duration test.

SELF-TESTING SEQUENCE

The first test is launched automatically after the emergency lighting unit has completed the initial battery regeneration process and fully recharged. This first test is a full duration test. The time between tests is programmed in the unit firmware and has a random value set between 8 and 8.25 days. By doing so, a so-called random testing regime is implemented for the whole emergency lighting installation. Thus, the probability of 2 adjacent emergency luminaires performing self-testing at the same time (and consequently discharging their batteries simultaneously) is extremely low.

Exceeding the requirements of BS EN 62034:2012, a full duration test is performed every 50 weeks.

BATTERY CHARGING FAULT

A battery charging fault is most often due to a battery being disconnected or only loosely connected but can also result from a faulty unit with damaged charger.

In the “battery charging fault” state:

- > Mains operation is not inhibited. The control gear module or luminaire is switched off, irrespective of its on/off state under mains operation.
- > The status LED (visual indicator) flashes red (period: 1s on / 1s off).
- > All subsequent self-tests are inhibited.

Notes: Battery charging is continuously monitored, irrespective of the self-testing cycles. 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.

Clearing a battery charging fault:

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 the mains operation will be released and the status LED returned to green.

Notes: Clearing battery charging faults is seen by the unit as a new powering-up condition. This means that the battery regeneration process will be performed and that the self-testing sequence will start again from scratch (first duration test within 8.0 - 8.25 days* and the following one within 50 weeks).

*See Initial battery regeneration process (not to be confused with the battery reactivation following each duration test).

BATTERY CAPACITY FAULT

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

In the “battery capacity fault” state:

- > The status LED (visual indicator) flashes red (period: 1s on / 1s off).
- > All subsequent self-tests are inhibited.

Clearing a battery capacity fault:

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

Notes: Clearing battery capacity faults is seen by the unit as a new powering-up condition. This means that the battery regeneration process will be performed and that the self-testing sequence will start again from scratch (first duration test within 8.0 - 8.25 days* and the following one within 50 weeks).

*See Initial battery regeneration process (not to be confused with the battery reactivation following each duration test).

LAMP FAULT

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

In the “lamp fault” state:

- > The status LED (visual indicator) intermittently flashes red (period: x4—1s on / 1s off the 4s off).
- > Every minute an ignition procedure is started to switch on the lamp.
- > Mains operation (i.e. maintained mode) is inhibited.

Important note for emergency lighting units without integrated converter for maintained operation: (i.e. inverters without LED-converter for LED light sources or without electronic ballast for fluorescent lamps);

A lamp fault can only be detected during self-testing. Therefore, it is possible that the status LED is green although the lamp is faulty under mains operation hence cannot be switched on in maintained mode. With fluorescent tubes, this situation can happen more frequently due to the fact that fluorescent tubes are preheated only on one side under emergency operation and on both side during mains operation.

Important note for emergency lighting units with integrated converter for maintained operation: (i.e. inverters with integral LED driver for LED light sources or with electronic ballast for fluorescent lamps);

In such units, it is possible to detect a lamp fault not only during self-testing but also in maintained mode, as soon as or each time the lamp is switched on. In both cases the unit is in the same state (“lamp fault” state as described above) and the same ignition procedure is attempted until the lamp is repaired or replaced.

Clearing a lamp fault:

Since lamp ignition attempts are frequently attempted, this fault condition will be cleared within one minute after replacement or repair of the lamp. The new (or repaired) lamp will automatically turn on and the fault condition cleared. The status LED will turn back to green.

Notes: Contrary to battery fault conditions, the re-initialisation after lamp fault clearing is not considered as a new powering-up of the emergency lighting. This means that the self-testing will continue being performed in the existing sequence (functional/duration testing sequence) and that battery regeneration will not be performed.

DURATION TEST INTERRUPTION

If a duration test is interrupted by disconnection of the lamp or battery, the control gear or luminaire will indicate the interrupted test by the status LED continuously illuminated alternately green with a momentary red flash until the duration test is repeated, after which the indicator LED will turn back to green.

If a duration test is interrupted by a failure of the mains supply to the control gear or luminaire, it will revert to normal emergency operation and continue to provide emergency lighting until the battery is switched off by the low voltage battery disconnection. Upon being powered-up again the status LED will be continuously illuminated alternately green with a momentary red flash until the duration test is repeated, after which the indicator LED will turn back to green.

Note: the duration test will only be repeated after the battery has been recharged for at least 24 hours and initiated by the next scheduled self-testing.

SELF-TESTING FAILURE

If either a function test has not been carried out within the previous 30 days or a duration test not carried out with the previous 50 weeks, the self-test failure will be indicated by the status LED continuously illuminated alternately red and green. This pattern of flashing will continue until the fault is rectified.

SYSTEM FAILURE

If self-testing cannot be performed to its intended duration (for both short functional test or duration test) and if this self-testing interruption is not due to lamp fault, battery fault or to external mains failure, meaning that this interruption is due to an internal malfunction, then the emergency lighting unit will identify this problem as a system failure.

In the “system failure” state:

Notes: In this case, contrary to battery charging fault or lamp fault conditions, mains operation is not inhibited.

Clearing system failure:

The system failure will automatically be cleared at the launch of the next self-testing procedure. If that self-testing procedure is performed successfully, the status LED will turn back to green.

STATUS INDICATOR

Visual status indicator for Self-Testing models



LED Intermittently Flashing Green: commissioning/battery regeneration after initial connection. (7s on/1s off)



LED Green: No fault / normal state.



LED Continuous Flashing Red: battery fault—either insufficient battery capacity or interrupted connection. The fault indication is reset once the fault is cleared.



LED Intermittently Flashing Red: Lamp fault



LED Flashing Green / Momentary Red: Duration test interrupted, postponed or self-testing failure.



LED Extinguished: If the LED is still off after more than 5 minutes of switching on the mains, then the mains or the unit is faulty

Visual status indicator for DALI models

-  **LED Intermittently Flashing Green:** commissioning/battery regeneration after initial connection. (7s on/1 s off). Function test (fast flash 100ms on/off) or duration test (slow flash 1s on/off)
-  **LED Regularly Flashing Green:** inhibit
-  **LED Green:** No fault / normal state.
-  **LED Continuous Flashing Red:** battery fault (fast flash 100ms on/off) or test failed (slow flash 1s on/off). The fault indication is reset once the fault is cleared.
-  **LED Red:** Luminaire fault
-  **LED Flashing Green / Momentary Red:** Duration test interrupted, postponed or self- testing failure.
-  **LED Alternating Flashing Red/Green*** : Identification switched on to locate individual unit address (DALI only)
-  **LED Extinguished:** If the LED is still off after more than 5 minutes of switching on the mains, then the mains or the unit is faulty

Visual status indicator for Wireless models

-  **Intermittently Flashing Green** – Commissioning/battery regeneration after initial connection. (7s on/1s off). Function test (fast flash; 100ms on/off) or duration test (slow flash; 1s on/off).
-  **Continuous Flashing Green** – Battery charging after discharging or after powering up.
-  **Solid Green** – No fault / normal state.
-  **Continuous Flashing Red** – Battery fault. Insufficient battery capacity or interrupted connection. The fault indication is reset once the fault is cleared.
-  **Intermittently Flashing Red** – Lamp fault. Please note that the fault is not indicated (or reset) immediately when it occurs (or is cleared), but after the next self-test.
-  **Flashing Green / Momentary Red** – Duration test interrupted, postponed.
-  **Alternating Flashing Red/Green** – Identification switched on to locate individual unit address.
-  **LED Extinguished** - If the LED is still off after more than 5 minutes of switching on the mains, then the mains or the unit is faulty.

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