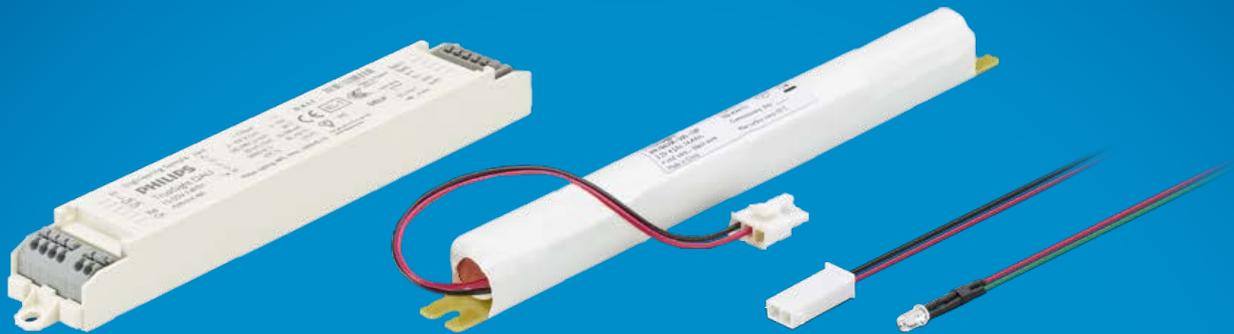


PHILIPS

TrustSight

Emergency kit



Design-in Guide

TrustSight Gen3 LED Emergency Kit

August 2019

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Introduction to this guide



TrustSight Emergency driver (EM) for built-in use

TrustSight driver for independent application



Thank you for choosing the Philips TrustSight Emergency driver (EM) for LED applications. In this guide you will find the information needed to integrate an emergency driver into a LED luminaire or LED system. This design-in guide describes the TrustSight LED Emergency kit developed for indoor lighting applications. We advise you to consult our websites for the latest up-to-date information.

Applications

Typical applications are linear or point source type of luminaires applied in: offices, public buildings, industrial and retail environments.

Information and support

Please consult your local Philips office or visit us at: www.philips.com/technology

Design-in support

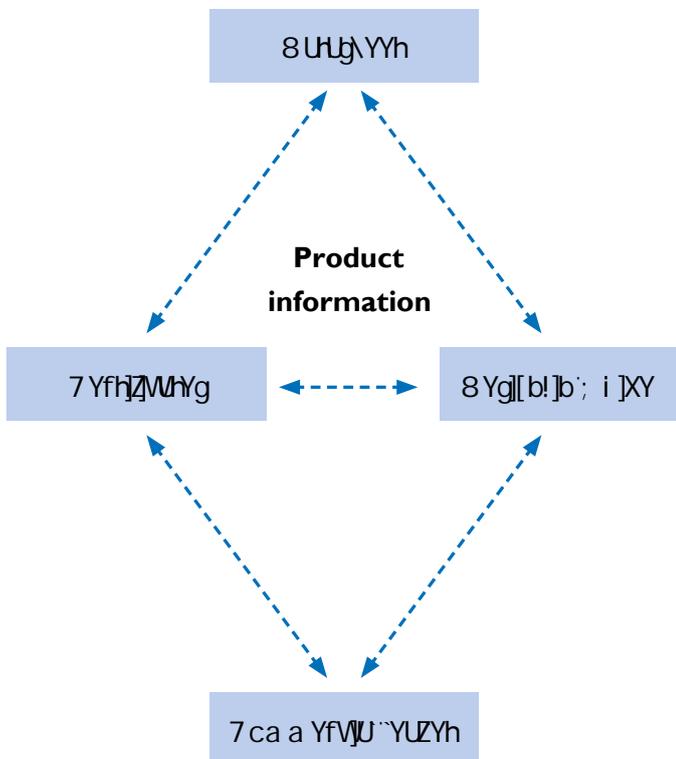
On request Design-in support from Philips is available. For this service please contact your Philips sales representative.

Determine which documents contain what information

In order to provide information in the best possible way, Philips' philosophy on product documentation is the following.

- Commercial leaflet contains product family information & system combinations
- Datasheet contains the product-specific specifications
- Design-in guide describes how the product must be used
- Driver certificates list up-to-date compliance with relevant product standards

All these documents can be found on the download page of the OEM website www.philips.com/technology. If you require any further information or support please consult your local Philips office.



Safety precautions



Safety warnings:

- Avoid touching live parts!
- Do not use drivers with damaged housing and/or connectors!
- Do not service the driver when the mains voltage is connected; this includes connecting or disconnecting the LED module!

Important installation instructions

- Do not use damaged products
- The luminaire manufacturer is responsible for its own luminaire design and compliance with all relevant safety standards including minimum required IP rating to protect the driver.
- The TrustSight Emergency drivers must be protected against ingress of and exposure to including but not limited to snow, water, ice, dust, insects or any other chemical agent - be it in the gaseous, vapor, liquid or solid form - which can be expected to have an adverse effect on the driver (e.g. use in wet /corrosive / dusty environments). It is the responsibility of both luminaire manufacturer and installer to prevent ingress and exposure. Any suggestion from Philips with reference to minimum required luminaire IP rating serves only as non-binding guidance; a higher IP rating may be required under certain application conditions to protect the driver. Common sense needs to be used in order to define the proper luminaire IP rating for the intended application.
- Do not service the driver when mains voltage is connected; this includes connecting or disconnecting the LED module. The driver generates an output voltage which may be lethal. Connecting a LED module to an energized driver may damage both the LED module and driver.
- No components are allowed between the LED driver and the LED module(s) other than connectors and wiring intended to connect the Xitanium driver to the LED module.
- Adequate earth and/or equipotential connections needs to be provided whenever possible or applicable.
- The TrustSight low-voltage SELV driver does not support operation combined with non-SELV AC-powered drivers.
- The TrustSight drivers are not intended for use in high risk task areas.
- H.Y.VUHYfmc JfYgWffYbhmXc bchgi ddcfh]bXYdYbXYbhc dYfUhc b k]h fYgdYVhrc Vta d]UbW dYf -97* \$) - , ! & WU gY &&%* i b Ygg U ZfY UbX \YUhfYgltUbhgi dd Ya YbUfmi]bg Uhc b gYYj Y]g di hUfci bX hY k JfYg fbch]bWl XYXl" h]g hY fYgdcbg]V]]mc ZhY C 9A rc gY VVhY dfcdYf hmlY cZ gYYj Y"
- Philips Design-in support is available; please contact your Philips sales representative.

Introduction to the TrustSight Emergency Driver

Introduction

The TrustSight Emergency kit is a self-contained and/or maintained solution, designed to operate LED modules in case of a mains power failure. An unswitched mains line is used to continuously charge TrustSight batteries and keep them in a state of readiness. At the same time the unswitched mains line is being monitored in order to detect mains power failure. When this happens, the TrustSight LED Emergency driver uses the TrustSight battery as energy source and provides power to (a part of) the LED array.

TrustSight Emergency drivers are available in three different versions for built-in or independent use:

TrustSight Basic

TrustSight Basic offers the basic emergency functionality with manual testing feature.

TrustSight Pro

TrustSight Pro offers same as basic with selftest feature

TrustSight DALI

TrustSight DALI offers same as Pro version including DALI interface for use in DALI network

All versions are available with either a low-voltage SELV or a High-Voltage (HV) output and are supporting either NiMH or LiFePO₄ (LFP) battery types in different cell configurations.

Non-maintained

A non-maintained luminaire only operates when mains power fails. In case of a power failure the non-maintained luminaire will start-up on battery supply.

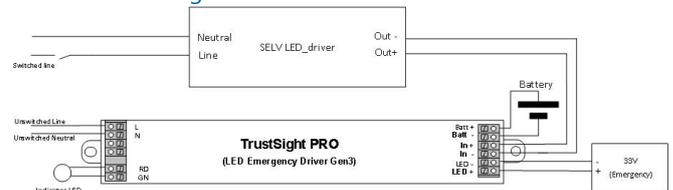
Non-maintained configuration: example schematic



Maintained

A maintained luminaire is designed to be lit continuously and will continue to work in case of a power failure. In case of a power failure the TrustSight driver will switch over the connected LED module to the battery supply.

Maintained configuration



Sustained

This is an exit or emergency luminaire with two or more light sources where at least one light source operates in non-maintained mode and is only illuminated when mains supply fails. The other light source operates on switched mains supply only. This is identical in functionality to having a Non-Maintained Luminaire and a Normal Luminaire both in the same housing. A sustained luminaires have two mains inputs: one input is connected to switched mains voltage while the other mains input is connected to permanent non-switched mains voltage which supplies power to charge the internal battery and to use as a signal to turn on the light source in the event of a power failure.

Features

The TrustSight emergency drivers are designed for easy design-in and ease to use:

- Constant output power
- Compact, low-profile batteries
- Easy wiring
- Compatible with all dimmable and non-dimmable constant current LED control gear in LV and HV versions.
- Over-voltage protected LED output
- Short-circuit proof LED output and battery connection
- Battery polarity reversal protection
- Deep discharge protection

Batteries

Two different kind of battery technologies are supported by the TrustSight drivers:

- **NiMH (Nickel Metal Hydride)**
- **LFP (LiFePO₄, Lithium Iron Phosphate)**

Connection

The batteries are supplied with cables and corresponding connectors. Together with the emergency driver, a corresponding battery harness is shipped, which has two flying leads on one end and a connector on the other end. The insulation class of the battery insulation is basic.

Charging

After first installation (and after each emergency mode operation), the batteries need to be charged for at least 24 hours to become sufficiently charged again. If the battery is not completely discharged the required charge time is shorter accordingly. The status of the battery is given by the LED indicator.

Periodic testing

Periodic tests of emergency lighting luminaires must be performed according to EN50172 clause 7.2.3 and 7.2.4. Switch on in the emergency mode each month by simulation of a failure of the supply to the normal lighting for a period sufficient to ensure that each lamp is illuminated. Twice per year, each luminaire shall be tested for its full rated duration (at least 3hrs).



Warning:

- The battery wires currently do not support independent operation with respect to compliance per IEC60598-2 clause 22.16 unless a fire and heat resistant supplementary insulation sleeve is put around the wires (not included). It is the responsibility of the OEM to select the proper type of sleeve.

Self-Test Pro driver

The TrustSight Pro version is equipped with a self-test functionality according IEC62034. 28 days after power-up the driver will perform a functional test of 30 seconds. Every 6th test (after half a year) will be a duration test. This test will run until the battery is fully discharged and the driver will verify if the capacity of the battery is sufficient to provide 3hrs emergency time. This will result in 2 full duration tests every year. A duration test will only be performed if the battery is sufficient charged.

In case of a failure, an error will be indicated by the LED indicator. See also the overview table in chapter quality.

Self-test DALI driver

The TrustSight DALI version is equipped with a self-test functionality according IEC62034. Automatic tests will be performed according the duration test (DT) and functional test (FT) programmable interval times.

The DT Interval Time can be set at "0", disabling the duration tests. This means that there will be no DT initiated by the driver and the DT must be initiated by ATS (lighting management system). The same holds for the FT interval time. Via DALI interface the FT and DT can be initiated with DALI commands. In DALI standard operating mode the DT will be performed as long as the rated duration time (default 3 hour for TrustSight) When via OEM specific mode a DT is initiated also when a self-test DT is performed the test will take until the battery is fully empty. Full discharges are recommend for battery maintenance.

Conditions for Self-test

For both, DT and FT the TrustSight, permanent mains must be available and the battery must be charging or fully charged. A DT will only be performed when the battery is fully charged. A FT can be performed when the battery is partially charged.

When scheduling a test (functional or duration test) the operation of the AC-driver is also checked. When the AC-driver is active (so normal lighting turned on), the test will be postponed for a maximum of 3 days. When the AC-driver is off for at least 2 hours the test will be started.

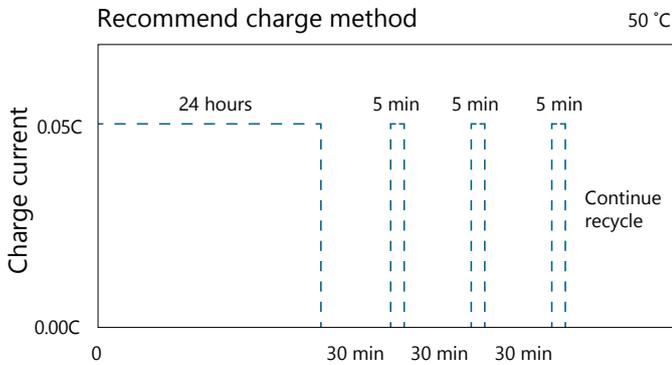
Manual Test

The TrustSight Basic version must be tested manually according regulations. This can be done by disconnecting the permanent mains and observing the performance of the system. It is also possible to initiate a DT or FT with the test switch function. For details see chapter Test Switch.

Battery lifetime

The batteries have a life time expectancy of 4 years when maintained properly, as shown in the table below. See also the datasheet.

NiMH battery type	Technical Data	International standards Clauses
Cells intended for permanent charge at elevated temperature	Yes	IEC 62133-1 :2017 IEC61951-2:2011 (type U)
Expected operation life under following conditions Maximum continuous battery case temperature Maximum occasional temperature Discharge	> 4 years + 50°C (55°C @charging) + 65°C (1 month) 2 discharges per year (minimum requirement) Note: Pro- and DALI version will have (automatically) 2 discharges per year	
LiFePO ₄ battery type	Technical Data	International standards Clauses
Cells intended for emergency lighting	Yes	IEC 62133: 2017
Expected operation life under following conditions Maximum continuous battery case temperature Maximum occasional temperature Discharge	> 6 years + 55°C (55°C @charging) + 60°C (1 month) 2 discharges per year (minimum requirement) Note: Pro- and DALI version will have (automatically) 2 discharges per year	



Battery charging

NiMH batteries will be charged before shipment and need to be used before the date indicated on the battery packaging due to self-discharging when stored at ambient storage temperature $t_{\text{storage}} \leq 30^{\circ}\text{C}$.

Initially the NiMH battery is charged with a constant current, according to the manufacturer's specification. After 24 hours the battery will be fully charged and the charger will switch over to pulse-charging to keep the battery fully charged. The pulse charge scheme is shown on page 9.

LiFePO4 batteries will be charged before shipment and need to be used before the date indicated on the battery packing due to self-discharging when stored at $t_{\text{storage}} \leq 30^{\circ}\text{C}$. These batteries will be charged by the TrustSight driver per the CC-CV method.

LED status indicator

The LED status indicator shows whether:

- The system is in charging mode
 - Batteries are fully charged
 - A system error has occurred
 - See also the overview table in chapter quality.
- This LED status indicator will have the same response for the Basic, Pro and DALI version.



Warning:

- Do not exceed 2m cable length between TrustSight driver and LED status indicator.
- Do not combine a single LED status indicator with multiple TrustSight drivers. Each driver must have its own LED status indicator.
- Independent use: the LED status indicator wires must have an additional supplementary insulation sleeve when used with a non-SELV AC LED driver.

LED indicator status

LED indicator (color / flashing)	Error condition	Cause	Solution
Green / no flashing		System OK, battery fully charged	
Off		Mains off, EM mode, Rest mode, test in progress	
Green / slow (0.25s on, 1.25s off)		System OK, battery is charging	
Green / fast (0.25s on, 0.25s off)		System OK, recently tested (< 5 days, Australia mode only)	
Red / no flashing	Battery voltage too high or too low	No battery connected	Connect battery
		Wrong or bad battery connected	Replace battery
Red / fast (0.25s on, 0.25s off)	Output voltage too low or too high	Wrong LED load connected	Connect right load and perform functional test
		No load connected or output shorted	Connect right load and perform functional test
Red / slow (0.25s on, 1.25s off)	Failed test due to battery	Battery end of life	Replace battery and perform duration test.
		Charger failure	Replace driver
Red-green / fast		DALI device identification	
Fast flashing: (on-time = 0.25s, off-time = 0.25s) Slow flashing: (on-time = 0.25s, off-time = 1.25s)			
Green / short on-time = 50ms, off-time = 0.95s)		Battery detection	

Test switch

An optional test switch can be connected to the TrustSight emergency driver. This switch can be connected in parallel to the indicator LED and be used in the following ways:

- Press 0 < time < 10s to initiate functional test as long as switch is pressed.
- Press > 10s will complete the FT when the battery is not fully charged. Press > 10s when battery is fully charged: a DT will be performed (indicator stays green). When the TrustSight is in Emergency mode there is a possibility to disconnect the battery by pressing the test switch for 3 seconds. This is intended to be able to switch off the emergency system after a light up test in Luminaire factory.



Warning:

- Do not exceed 2m cable length between TrustSight driver and test switch.
- Do not combine a single test switch with multiple TrustSight drivers. Each driver must have its own test switch.
- Independent use: the test switch wires must have an additional supplementary insulation sleeve when used with a non-SELV AC LED driver.

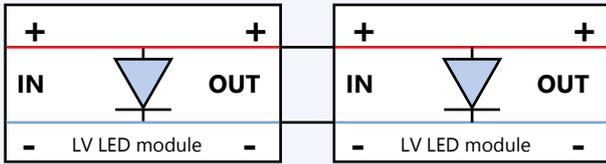
Automatic battery selection

The TrustSight emergency drivers are equipped with an automatic battery detection feature. Depending on the technology of the connected battery, the driver will charge the battery accordingly and will detect the number of cells in the battery pack. The resulting output power during emergency mode will be set according to the detected amount of battery cells (see datasheet for details). After installation and power up the driver will detect the battery and start the automatic detection process.

- During automatic detection, the indicator LED will light up with short green flashes.
- Between minimum 6 and maximum 30 seconds the TrustSight driver will set the battery type (number of cells) and will set the emergency output power accordingly.

After that, the system is defined and fully operational. The battery type definition has influence on the performance during the self-test and on the battery charge method. When the automatic battery detection process is disrupted, e.g. by switching off the permanent mains, the detection process is stopped and the TrustSight emergency driver will go into emergency mode with the lowest output power. At a next power up, the automatic detection process will start again.

Electrical design-in



Schematic representation of the wiring of 2 connected LV LED modules in an LV system, not needing a Return-End cable

Short introduction into High- and Low voltage systems

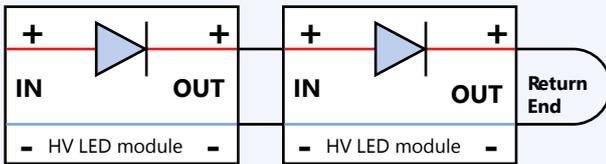
Low voltage system

Low Voltage (LV) systems typically use LV LED modules or Hybrid LED modules suitable for LV usage, connected to driver with insulated output. LV products make a parallel system; adding a LED module requires a higher current. The majority of the LV systems are point source systems which can be installed outside the luminaire (independent) or built-in the luminaire



Warning

- Avoid touching live parts
- Avoid touching any bare components on the PCB, e.g. LEDs!
- Do not use damaged LED modules!



Schematic representation of the wiring of 2 connected HV LED modules, including the Return-End cable.

High voltage system

High Voltage (HV) systems typically use HV LED modules or Hybrid LED modules suitable for HV usage, connected to a driver with a non-insulated output. HV products make a series system; adding a LED module requires a higher voltage. The majority of the HV systems are built-in linear systems



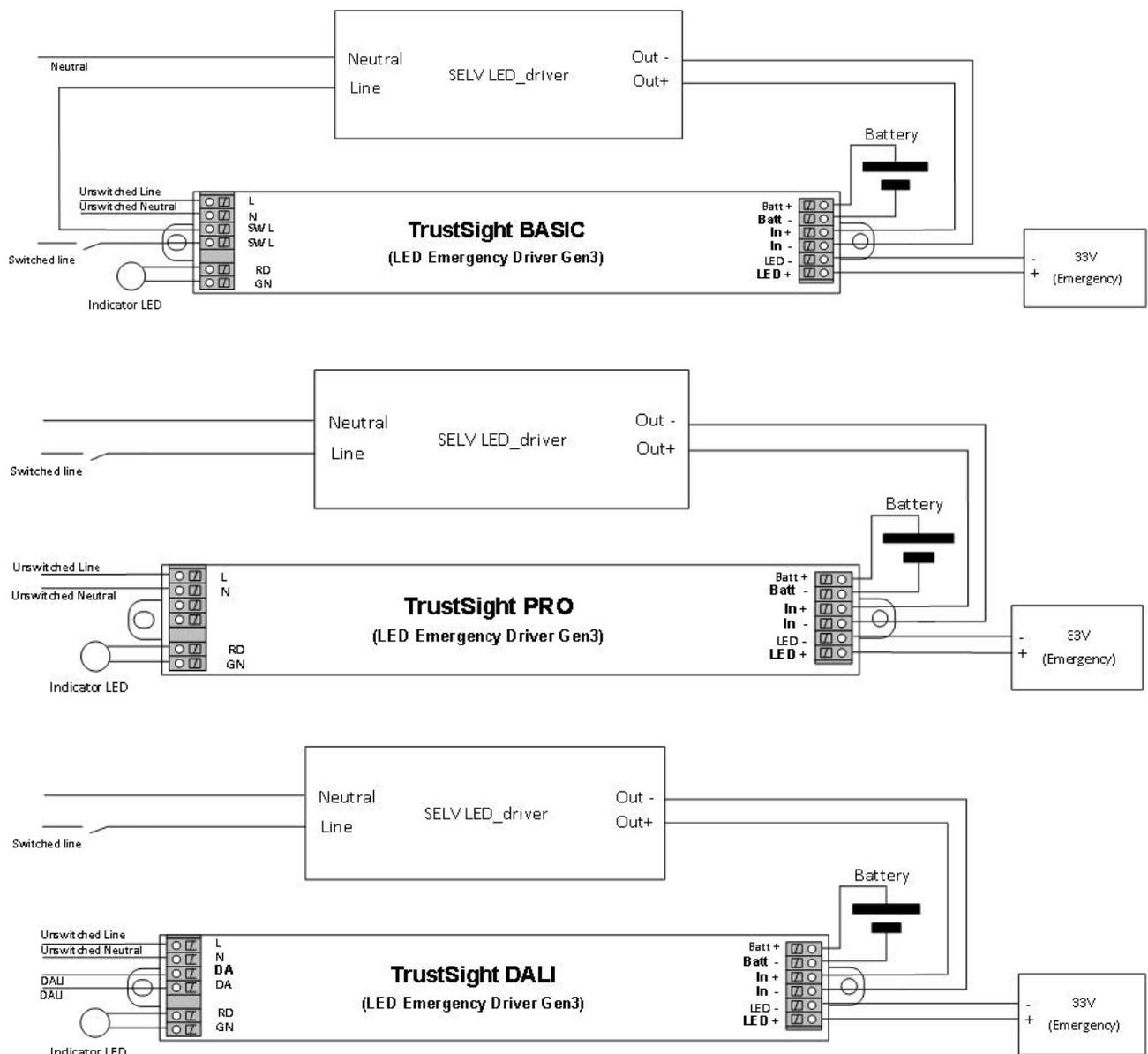
Warning

- Avoid touching live parts
- Avoid touching any bare components on the PCB, e.g. LEDs!
- Do not use damaged LED modules!
- Insulation Class I luminaires must be connected to protective earth!

Connection scheme

How to Configure a LV system in combination with a EM system

A typical LV system in combination with an EM system consists of a LV SELV AC LED driver, a LED module and a TrustSight BASIC, PRO or DALI LV emergency driver. Typical examples of connection diagrams are shown below, using a LED module with a forward voltage between 15 V and 55 V.



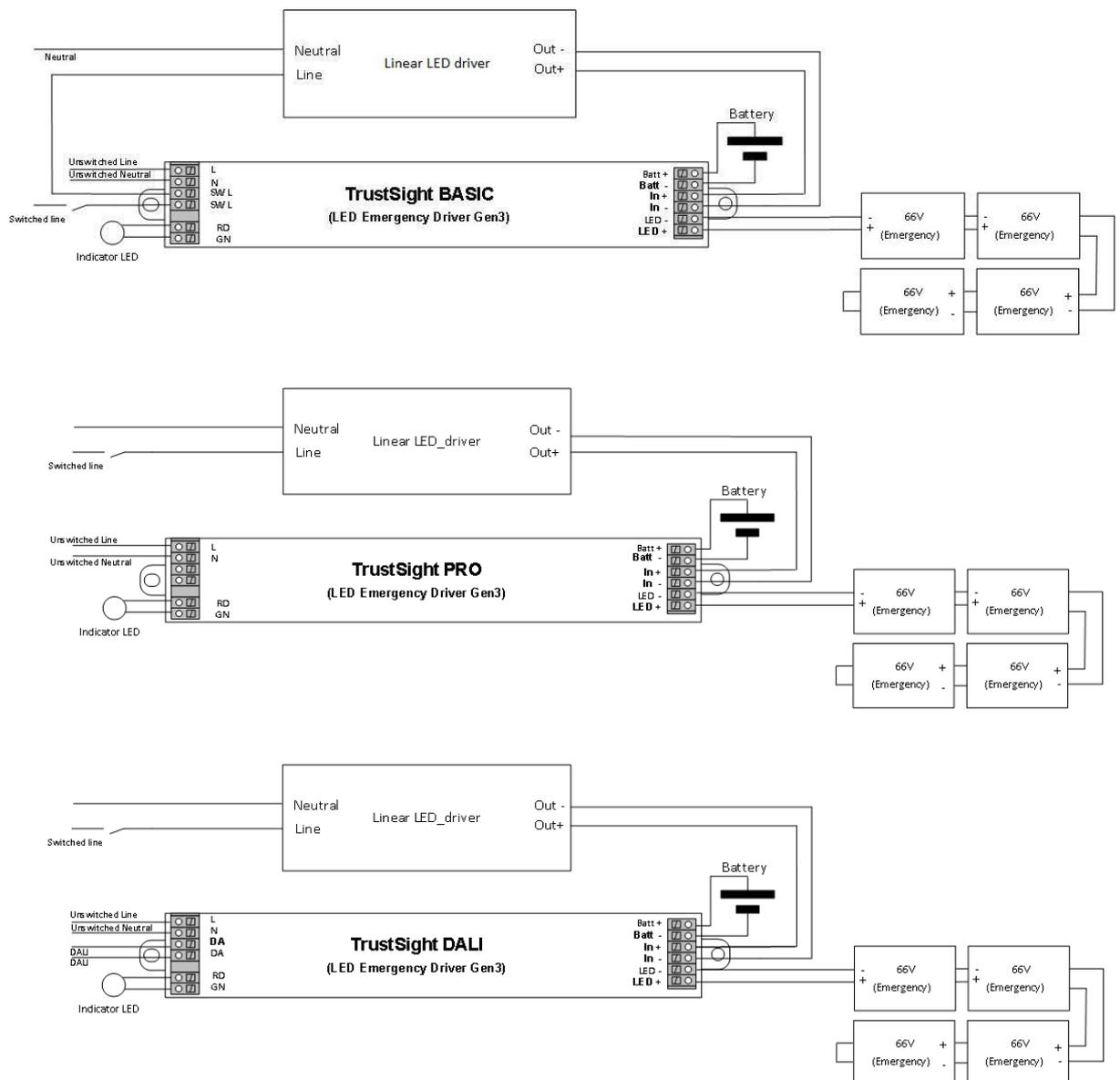
Warning: The TrustSight LV SELV driver does not support operation combined with non-SELV AC drivers.

Connection scheme

How to Configure a HV system combined with an EM system

Due to the fact that a linear system can consist of multiple LED modules, a HV system has a lot of potential configuration possibilities. The following steps can help you in selecting the right one based on your requirements:

- Based on the outcome of above mentioned questions it may be possible that within a given application some LED modules will be illuminated in EM-mode and some not.
- The TrustSight HV has an output voltage range up to 300V that makes it possible to light up all LED modules in Emergency mode.
- Determine the LED driver- and LED module settings in normal operation mode
- Determine the required amount of lumen in an emergency situation
- Based on the applied LED module determine (from the module datasheet) the specified amount of lumen per watt (lm/w). Depending on EM-power configuration as specified in the TrustSight driver datasheet, the outcome of this calculation will be the amount of lumen in an emergency situation.

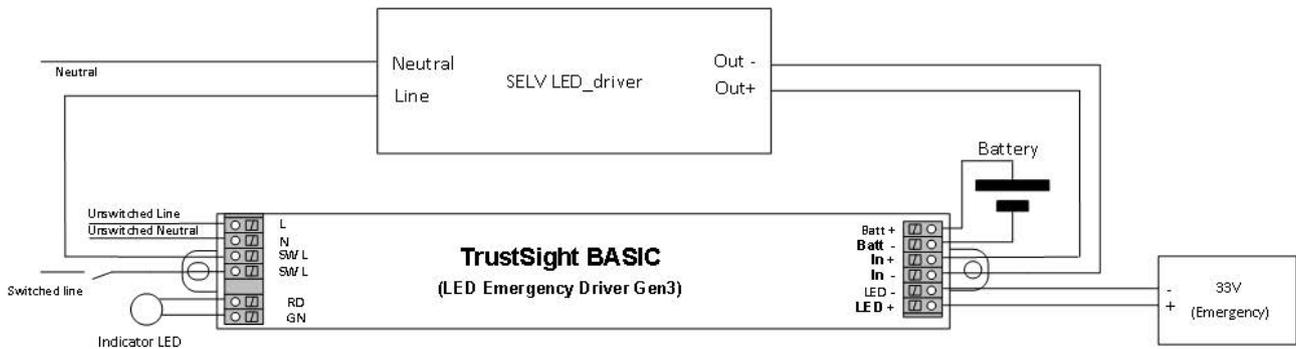


The amount of light in Emergency mode

The amount of emergency light in lumen (lm) is determined by the delivered power by the TrustSight driver and the efficacy of the LED module(s) connected to the emergency driver.

Example

The application (as shown below) is equipped with a LED module with an LED efficacy of 150lm/W. The amount of lumen in emergency mode is: LED power x LED module efficacy = 2.7W x 150lm/W = 405lm.



More lumen in emergency mode

- Connect a LED module with a higher lumen efficacy
- Use a higher emergency power

Series operation

It is important to determine the total forward voltage of the in series connected LED modules. The number of LED modules which can be connected to an EM driver is limited by the maximum output voltage of either 55V or 300V, depending on TrustSight driver type.



Important

It is not advised to mix LED modules with different forward voltage in one system.

Example 1

Optical characteristics - table per CCT

Fortimo LED SLM 2000 lm L13 830

Parameter	Min	Typ	Max	Unit
Luminous Flux	1810	2020	2230	lm
Module Efficiency		117		lm/W
Correlated Colour Temperature		3000		K
Colour Coordinates		(0.434, 0.403)		-
Colour Coordinates Premium White		(0.430, 0.395)		-
Colour Consistency		3		SDCM
CRI		>80		-
Radiation Angle		115		deg
Thermal Power			11.9	W
Energy efficiency label		A+		-

TrustSight Basic 15-55V LFP, connected to SLM 2000 lm

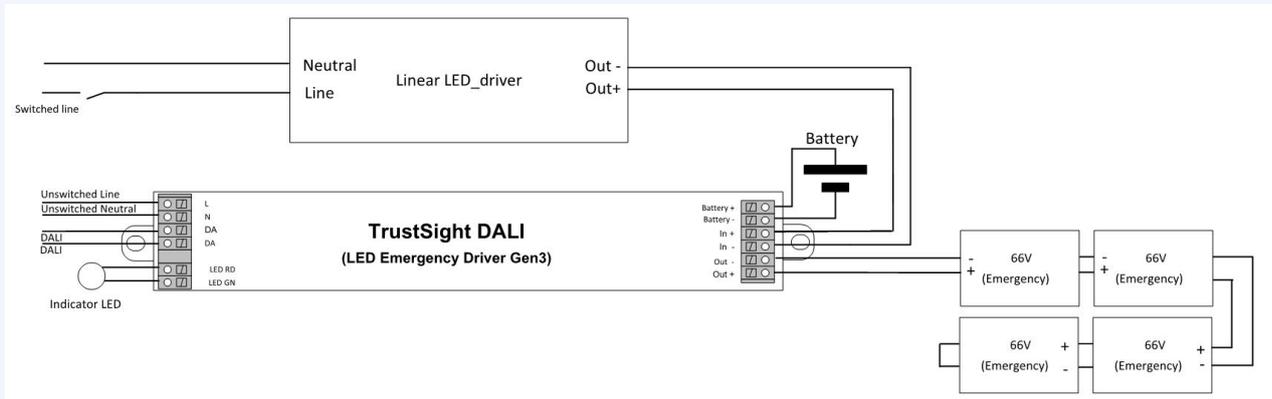
Wanted : The amount of light in EM mode

Given : Output power in EM mode is 2.7 W for 1 hour

Needed : LED efficiency? See datasheet: 117 lm/W

$$\text{Answer: } 117 * 2.7 = 316 \text{ lm}$$

Example 2



Wanted : The amount of light in EM mode per module

Given : Output power in EM mode is 2.7 W for 3 hour

Needed : LED efficiency? See datasheet LED-module LED Line 1 ft 1100 lm 1R HV3, 165 lm/W

$$\text{Answer: } \text{Each module consumes } 4.7 \text{ W} / 4 = 1.17 \text{ W so light output per LED-module is } 1.17 * 165 \text{ lm} = 193 \text{ lm}$$



Examples of what solutions could look like for pairing wires.



Twin-wire ferrules.

How to... wire – general remarks

In the datasheet of the EM driver the following is specified:

- Wire diameter range
- Wire strip length
- Maximum output wiring length for EMC compliance

Direct wiring between LED driver, LED module, TrustSight EM driver and battery

Please note that no components are allowed between the LED driver EM-driver and LED modules other than connectors and wiring intended to connect the LED driver to the LED board. For example it is not allowed to install a switch between the driver and LED boards.

Two wires into one connector hole

In some scenarios two wires need to be connected to one connector hole. In this case the pairing has to be done outside the LED driver or EM-driver, resulting in only one wire going into the driver. Two wires into one connector hole are not supported.

Ferrules

The reliability of twin-wire ferrules (or wire end stop), accepting the wires intended to use, should be checked with the supplier of these ferrules.

Independent use

For independent use there are add-on strain reliefs available for input and output cables which can be attached to the existing EM TrustSight housing.

Interconnecting LED drivers and LED modules

See the Design-In Guide for Xitanium Indoor LED drivers and LED modules at www.philips.com/technology.

Electromagnetic compatibility (EMC)

Electromagnetic compatibility (EMC) is the ability of a device or system to operate satisfactorily in its electromagnetic environment without causing unacceptable interference in practical situations. TrustSight EM LED drivers meet EMC requirements per CISPR15. This test is conducted with a reference luminaire, representing a common application that includes a LED driver, TrustSight emergency driver, LED load (incl. heatsink), battery and LED indicator.

Cable length and EMC

For each setup it is advised to perform EMC tests. It is recommended to place the battery as closely as possible to the the TrustSight emergency-driver.

In plastic Class I luminaires a suitable LED driver needs to be selected with enough margin (overall > 6dB) to enable EMC compliance of the total luminaire. Alternatively, a metal luminaire for office applications needs to be selected (preferred).

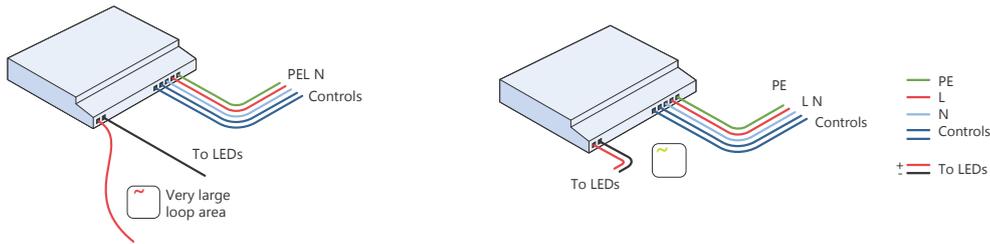
How to... improve EMC performance

Both applies to a point and linear EM driver. Below a point source LED driver is used as example.

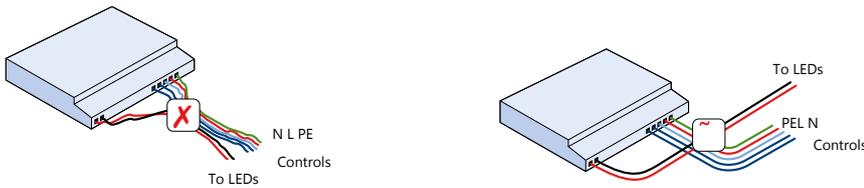
Improvement in EMC Performance

The following practical precautions need to be taken into account in a lighting system to minimize EMC:

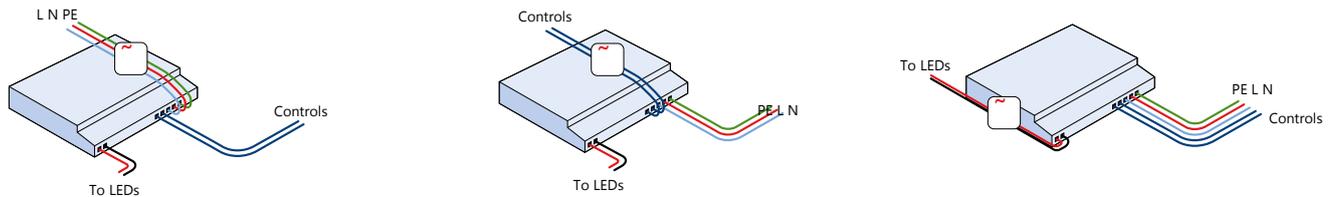
- Minimize the differential mode loop area of the lamp wires going from the driver to the light source by keeping the wires close together (bundling). This will minimize the magnetic field and reduce the radiated EMI.



- Minimize the common mode parasitic capacitance of the output wiring + light source to earth by keeping the length of the wires between driver and light source as short as possible. Keep the length of the incoming mains wire inside the luminaire as short as possible.
- Keep mains and control wires (DALI) as well as battery wires separated from the output wires. Do not bundle or cross the wires.



- Do not route any wiring over and/or along the driver enclosure to avoid any coupling/crosstalk with internal components of the driver.



Ground the lighting system chassis and other internal metal parts to protective earth (class I luminaires): do not let large metal parts electrically insulated from functional or protective earth. Always connect the protective/functional earth/equipotential connector or wire from the driver and use equipotential bonding wires for all large unconnected metal luminaire parts like luminaire housing, driver mounting plate, reflector, heatsink etc. Keep the protective/ functional earth/equipotential wires as short as possible to maximize their effectiveness and use, as much as possible, large metal areas (chassis, mounting plates, brackets) for earthing purposes instead. Establish a reliable electrical connection by using a toothed washer and screw(s) fastened with adequate torque.

Electrical insulation and protective earth



Warning

Connecting the luminaire to Protective Earth.

If the driver needs to be connected to Protective Earth, like non-isolated Xitanium LED drivers, then also the luminaire needs to be connected to protective earth in order to comply with safety and EMC regulations. Please also consult the Design-In-Guide of the Xitanium Indoor Linear LED drivers on www.philips.com/technology

Surge immunity

The TrustSight Emergency drivers have built-in surge protection up to a certain limit according EN 61547. Depending on the mains connected, additional protection against excessive high surge voltages may be required by adding a Surge Protection Device. The actual surge immunity levels can be found in the driver datasheet.

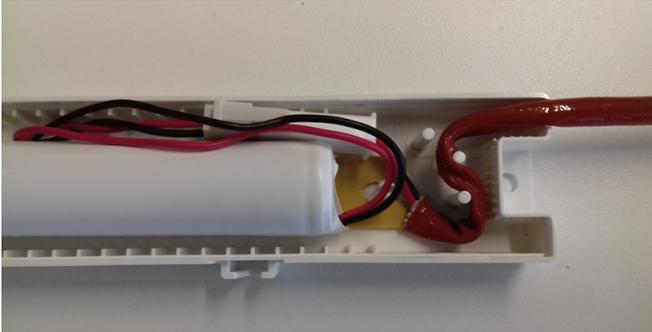
Touch current

The TrustSight Emergency LED drivers have no earth or equipotential connector. Therefore, the touch current contribution of the driver in a luminaire will be negligible.

Insulation

The LED indicator and the battery are reinforced insulated from the mains power supply. The output of the TrustSight drivers is double insulated from the mains input (LV and HV). The insulation classification between the LED indicator + battery towards the LED output is functional.

Mechanical design-in



Proper routing of battery sleeve for adequate strain relief

Dimensions

The dimensions of the TrustSight Emergency driver, indicator LED and battery packs can be found in the driver datasheet. Be sure to use all available mounting feet in order to achieve reliable fixation.

For independent applications separate strain reliefs for input and output cabling are available.

Special attention has to be paid to the independent application with a separate battery box: the battery wiring sleeve (red) must be routed as shown in the picture on the left to achieve adequate strain relief.

Thermal design-in

This chapter describes the thermal design-in of the Philips TrustSight Emergency driver and batteries. Points of attention are the t_c point temperature of the TrustSight driver and its lifetime as well as the battery temperature.

To facilitate design-in of LED drivers, the critical thermal management points of the LED driver are set out in this section. In Philips' product design phase all possible precautions have been taken to keep the component temperature as low as possible. However, the design of the luminaire and the ability to guide the heat out of the luminaire are of utmost importance. If these thermal points are taken into account this will ensure the optimum performance and lifetime of the system.

Case Temperature Point (t_c point)

To achieve optimal lifetime and reliability, it is critical that the temperature of the components in the driver remains within their ratings. In the LED driver design, all precautions are taken to ensure that the components within the driver are at the lowest possible temperatures.

The case temperature point (t_c) is a reference for the temperatures of the critical internal driver components. The location of the t_c point is identified on the product label. The t_c point is marked by the *-sign on the label of the driver.

How to measure the temperature of the t_c point

The t_c point temperature can be measured using a thermocouple that is firmly glued to the indicated t_c point on the driver housing. For a representative measurement the temperature must be stable before any reliable data can be obtained (typically > 3 hours).

Relation between t_c and ambient temperature t_a

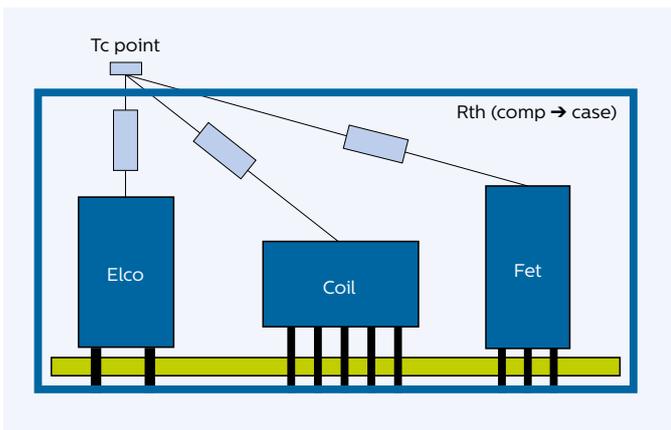
The t_c point temperature increases, by approximation, linearly with the ambient temperature (t_a). The temperature offset between t_a and t_c depends on the thermal design of the luminaire. The TrustSight driver has been designed for indoor use: the minimum and maximum t_a values in the application should be respected. For approved t_a range and maximum t_c temperatures please check the associated LED driver datasheet.

Battery storage and operating temperature

The batteries are pre-charged before shipment to extend their shelf life. The indicated date on the batteries is valid when the batteries are stored within the specified temperature range. Please refer to page 8 for temperature limits for the different battery technologies.

The battery has no dedicated T_c point for thermal verification. It is advised to glue a thermocouple to the center part of the battery body to measure its temperature.

Operating or storing the batteries outside the specified temperature ranges as shown on page 8 and the datasheet will reduce the lifetime of the batteries and must be avoided.



Schematic representation of internal thermal resistances and driver t_c point

Controllability

DALI

Digital Addressable Lighting Interface, or DALI, is a digital communication protocol popular in the lighting industry. It is an IEC standard and there are many control devices from Philips and other manufacturers that communicate using DALI. The voltage across DALI wires is typically 16V and it is polarity-insensitive. For more information on DALI, refer to the IEC specification for DALI protocol below.

- IEC 62386: 102 - General requirements - Control gear.
- IEC 62386: 207 - Particular requirements for control gear
 - LED modules.
- IEC 62386: 202 - Particular requirements for control gear
 - Self-contained emergency lighting.

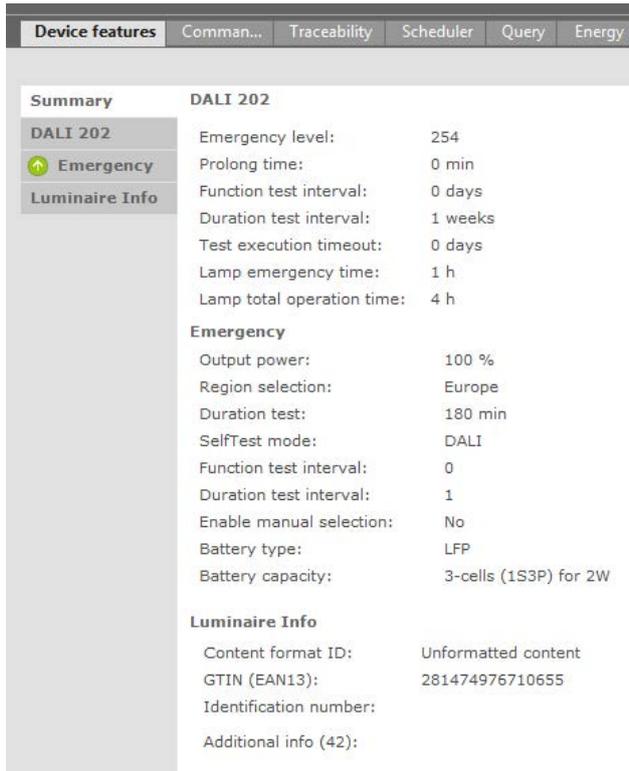
The DALI standard allows additional emergency features to be configured as options.

Every emergency gear conforming to the DALI emergency gear standard IEC 62386-202 is able to carry out an emergency test when commanded across the DALI bus – either a short (function) test or a discharge (duration) test.

The emergency gear carries out the test autonomously when requested to do so; it selects its battery as the power source during the test, so that there is no need to interrupt its permanent mains supply. Once the test is complete the test results can then be read over the DALI bus. In the event that the permanent mains supply fails during a test, the DALI emergency gear immediately stops the test and goes into full emergency operation, so that the requirement for the escape lighting to illuminate quickly, reliably and unconditionally is met.

Each DALI emergency gear is individually addressable on its DALI bus and each gear can be commanded individually to carry out an emergency test. So rather than testing all the emergency luminaires in one zone together each emergency luminaire in the zone can be tested at a different time, therefore ensuring the safety of the zone at all times.

If the emergency and normal drivers in a luminaire are both DALI gear, then each can be separately addressed on the same DALI bus. This allows common wiring to be used for both normal lighting control and emergency test control. During a failure of the permanent mains supply, the TrustSight driver acts autonomously to provide escape lighting, regardless of the state of the DALI bus.



Default test times are factory pre-set, in accordance with the DALI standard EN 62386-202, to conduct an automatic function test every 7 days and a duration test every 52 weeks. Since the DELAY time is factory pre-set to Zero, all units are tested at the same time. Test times can be changed via DALI by means of MultiOne software. See below.

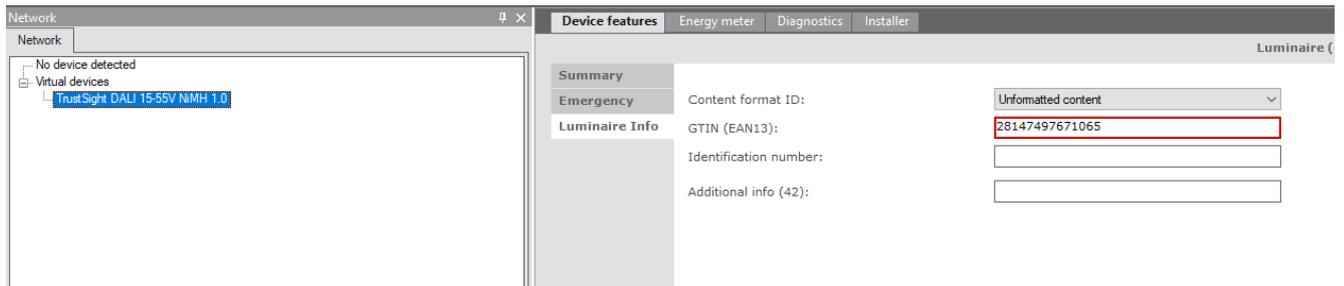
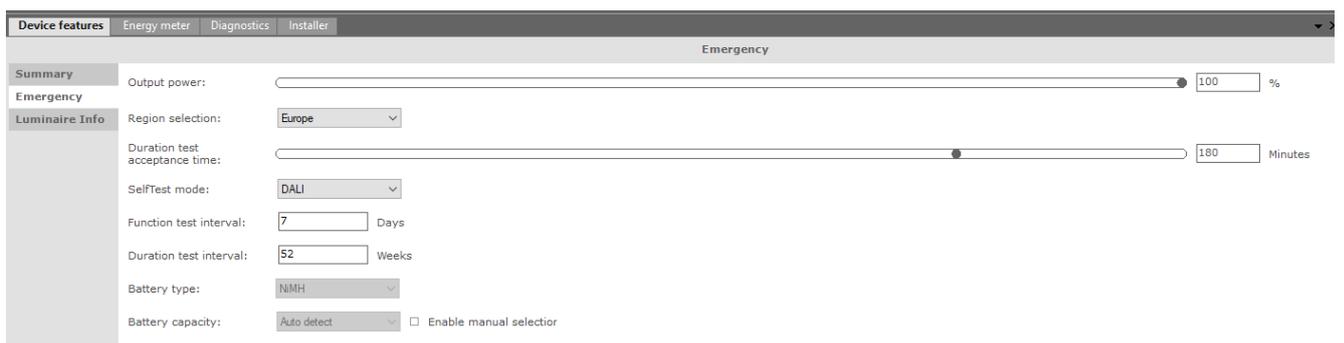
Set able Emergency items via Device features in MultiOne:

- Output power in EM mode (between 50 and 100%)
- Region selection (Europe and Australia)
- Function Test interval
- Duration Test interval
- Battery cell count
- Selftest mode

Via the diagnostic tab several logged items can be viewed:

- lamp emergency time
- lamp total operation time
- Last duration test time
- Time since last duration time
- Total numbers of discharge cycles

Via SimpleSet the same device features can be set and diagnostic items can be checked.

When making a feature file, the user can decide to add specific device info in that featurefile (device name and version). Furthermore is in MultiOne Workflow an option to check whether the featurefile is specifically made for the connected driver. Both options regarding the featurefile makes it possible to use a feature file created for one type of device, for a completely other type. In case of Emergency is it possible to define a battery capacity for a type of device, related to a battery type and configure a device of another type and even with another battery type. In the design-in documentation of the emergency drivers, this possibility with potential "bad" consequences should be noted to prevent complaints from customers.

Reset to factory default

In certain cases, it may be required that the TrustSight driver be reset to factory default settings. This can be achieved in the following way:

1. Apply mains power and apply 12Vdc on battery input (apply at the same time or within 2s)
2. After 1s the LED indicator will start flashing fast RED for 2s (4 times)
3. Remove 12Vdc on battery input while the LED is flashing.
4. After 1s the LED indicator will light up continuously GREEN for 2s.
5. Disconnect mains power.

The driver has now been reset to its factory default settings.

How to set Australia mode:

For application in Australia the driver can be set accordingly:

1. Apply mains power and apply 12Vdc on battery input (apply at the same time or within 2s)
2. After 1s the LED indicator will start flashing fast RED for 2s (4 times)
3. Remove 12Vdc on battery input while the LED is flashing. Press the test button. The LED indicator will extinguish..
4. Disconnect mains power after 4s.

The driver has now been set in Australia mode.

Notes:

In ergo, pressing the test button during the procedure will reset the device with Australia mode enabled. Not pressing the button will reset the device with Australia mode disabled.

Not removing the 12Vdc within 3s or applying for at least 1.5s will not perform the factory reset.

Note that applying an invalid battery voltage will trigger battery failure state (RED indicator LED), which when mains is lost, will not produce emergency light.

To verify the successful execution, connect a valid battery and rated mains voltage. If it takes 30s before the indicator LED starts flashing then the reset will have been successful. Remove mains voltage well within 30s to ensure that the driver stays in autodetect mode.

To verify that Australia mode is active, press the test button for at least 10s while the battery is being charged. The 30s functional test is then started. When the test succeeds, the LED indicator will flash fast green (for 5 days). This is specific for Australia mode.

Quality and Reliability

Relevant Standards

Compliance and approval	Generated disturbances, EMI and EMC
EN 55015 A2/CISPR15	Conducted EMI 9 kHz-30 MHz
EN 55015 A2/CISPR15	Radiated EMI 30 MHz-300 MHz
IEC 61000-3-2 A1 + A2	Limits for harmonic current emissions
IEC 61000-3-3	EMC – Limitation of voltage fluctuation and flicker in low voltage supply systems for equipment rated up to 16 A
Immunity	
IEC / EN 61547, A12000	Equipment for general lighting purposes – EMC immunity requirements
IEC / EN 61000-4-2	Electrostatic Discharge
IEC / EN 61000-4-3 A1	Radiated radio frequency, electromagnetic field immunity
IEC / EN 61000-4-4	Electrical fast transient/burst immunity
IEC / EN 61000-4-5	Surge immunity
IEC / EN 61000-4-6	Conducted disturbances induced by RF fields
IEC / EN 61000-4-11	Voltage dips, short interrupts, voltage variations
Performance	
IEC 62384	DC or AC supplied electronic control gear for LED modules - Performance requirements
IEC 62386	Digital Addressable Lighting Interface (DALI)
Safety standards	
IEC 61347-1	General and safety requirements
IEC 61347-2-13	LED Particular requirements for DC or AC supplied electronic control gears for LED modules
Emergency standards	
IEC 61347-2-7	Particular requirements for DC supplied electronic ballasts for emergency lighting
IEC 62034	Automatic test systems for battery powered emergency escape lighting

System Disposal

We recommend that the Xitanium LED drivers and its components are disposed of in an appropriate way at the end of their (economic) lifetime. The drivers are in effect normal pieces of electronic equipment containing components that are currently not considered to be harmful to the environment. We therefore recommend that these parts are disposed of as normal electronic waste, in accordance with local regulations.

Battery installation at OEM

After the TrustSight Emergency has been installed in a luminaire, the luminaire should not be left in emergency mode (battery powered light) to prevent the batteries from being drained for a long time. After mains disconnect, the battery should be disconnected and (after a few seconds) connected again. In this way, no energy will be drained from the battery (except for its self-discharge) during the time before installation.

Mains voltage fluctuations

The driver is able to withstand high and low mains voltages for limited periods of time.

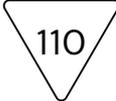
Low mains voltage

A continuous low AC voltage (<198 V) has no adverse effect on the driver's lifetime. However, according IEC 61347-2-7 Ed.3 Clause 21, below 195 V AC mains the TrustSight is allowed to go into emergency mode.

High mains voltage

A high mains voltage will stress the driver and have an adverse effect on the lifetime (maximum 320 V for a period of 48 hours, 350V for 1 hours .

Marking

Standard	Description
	CE marking
	ENEC marking the European certification mark for electrical products that gives a product access to the markets of countries in the European Union, EFTA, and a number of Eastern European countries. 05 is the body certified to give the marking, KEMA/DEKRA
	F-marking, temperature declared, thermally protected ballast/transformer(s) symbol acc. IEC61347-1 Clause 7.1. m, 110 °C
	Control gear classified as being provided with an automatic test function shall be marked with this symbol.
	Electronic control gear complying with IEC61347-2-7 shall be marked with this symbol.

Disclaimer

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