LED Driver

EM powerLED PRO DIM
Manual

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Scope of documentation

This operating instruction is valid for combined LED Drivers for general and emergency lighting from the EM powerLED PRO DIM 45W series.

The series comprises additional versions. However, the other versions EM powerLED ST FX 45W, EM powerLED BASIC FX 80W and EM powerLED BASIC FX 50W are not covered within this documentation.

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The latest version of these operating instructions is available on our home page.

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Please send them to info@tridonic.com

1.2. Imprint

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Safety instructions

The instructions in this section have been compiled to ensure that operators and users of combined emergency lighting LED Drivers of the EM powerLED PRO DIM 45W series from Tridonic are able to detect potential risks in good time and take the necessary preventative measures.

The operator must ensure that all users fully understand these instructions and adhere to them. This device may only be installed and configured by suitably qualified personnel.

2.1. Intended use

2.1.1. Proper use

Operation of LED modules in general lighting and in single battery supplied emergency lighting. The device may only be used for this intended purpose.

2.1.2. Improper use

Outdoor use. Extensions and modifications to the product.

> ⚠ **WARNING!**
>
> Improper use could result in injury, malfunction or damage to property.
>
> It must be ensured that the operator informs every user of existing hazards.

2.2. Dangers associated with the operation of the system

> ⚠ **DANGER!**
>
> Danger of electrocution
>
> Disconnect the power to the entire lighting system before working on the lighting system!

2.3. Environment

> ⚠ **DANGER!**
>
> Not to be used in corrosive or explosive environments.

> ⚠ **CAUTION!**
>
> Risk of damage caused by humidity and condensation
>
> _ Only use the LED Driver in dry rooms and protect it against humidity!
>
> _ Prior to commissioning the system, wait until the LED Driver is at room temperature and completely dry!

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Safety instructions

2.4. Additional instructions

> ⚠ **CAUTION!**
>
> Electromagnetic compatibility (EMC)
>
> Although the device meets the stringent requirements of the appropriate directives and standards on electromagnetic compatibility, it could
>
> potentially interfere with other devices under certain circumstances!

Introduction

3.1. About the device

The combined LED Drivers for general and emergency lighting EM powerLED is the smart solution where cost optimised or feature driven emergency lighting is required. It integrates functions for mains operation and emergency lighting into one unit. Devices are available for a broad range of applications from compact housings for installations inside the luminaire to independent devices with strain relief for use with downlights. The strain relief variant (SR) in conjunction with plug-in remote batteries offers a turnkey solution.

Available are versions for manual testing (BASIC), versions for selftest (ST) and DALI addressable devices (PRO) for automatically controlled and monitored testing.

This document covers the PRO version of the portfolio. The selftest (ST) version is covered in a separate documentation (see Reference list, p. 73).

The innovative compact PRO versions are true all in one products which enable lighting control, dimming capability and emergency testing with a single DALI address. The devices are fully compatible with the LED Driver series premium (PRE) from Tridonic and can be used seamlessly in any installation with these devices.

3.2. Testing of emergency systems

There are statutory requirements covering the testing of emergency systems in buildings accessible to the public. This includes that testing must be carried out at a time of minimum risk, normally during unsocial hours, and must allow time for the batteries to be recharged before the next expected occupancy of the building.

Without automated test systems all steps must be performed manually. This includes the initiation of the test by interrupting the power supply, the visual inspection of each luminaire and the logging of all test results.

The combined emergency LED Driver EM powerLED enables automated tests with a number of advantages:

_ In conjunction with the appropriate DALI control system the EM powerLED PRO DIM covers the complete test procedure including error indication, monitoring and logging. This is possible without any expensive, time-consuming testing procedures. Tests are therefore more reliable and cheaper.

_ Combining mains and emergency operation in one unit eliminates compatibility issues between LED Driver and emergency units and ensures an optimal electromagnetic compatibility.

_ The EM powerLED PRO DIM devices are designed to meet the requirements of IEC 62034 and the DALI standard IEC 62386-101 Vers. 2, IEC 62386-102 and IEC 62386-202 Vers. 2.

Portfolio of products

4.1. Housing variants

The EM powerLED PRO DIM is available in two different housing variants: compact and compact strain relief (independent).

Image	Description
	Housing variant compact _ Compact shape _ For installations inside the luminaire _ Typical area of application: Spotlights, downlights _ Dimensions: 183 x 82 x 34 mm
	Housing variant compact strain relief (independent) _ Compact shape _ For installations outside the luminaire _ Typical area of application: Spotlights, downlights _ Dimensions: 209 x 82 x 34 mm

Output voltage range

4.2. Output voltage range

The output voltage range results from the current selected.

The diagrams below show the forward voltage ranges as a function of the output current and are intended as a guide.

For detailed values and explanations please refer to the data sheets (see Reference list, p. 73).

Output voltage [V]
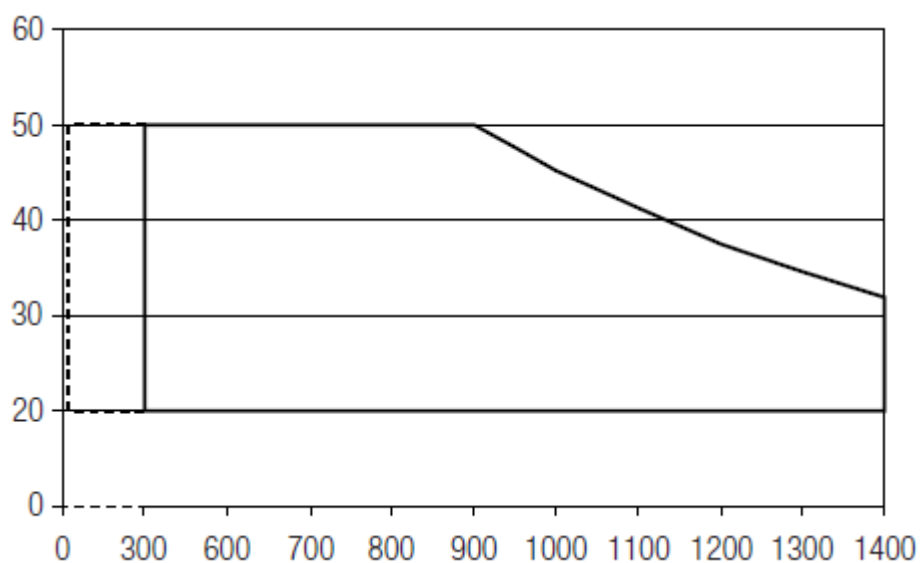
Output current [mA]

Legend:

———————

Operating window 100 %

- - - - - - - - - -

Operating window dimmed

DALI functionality

5.1. DALI standard

> **ⓘ NOTICE**
>
> EM powerLED PRO DIM devices support the new DALI standard V2 EN 62386-101, EN 62386-102, EN 62386-202.

DALI (Digital Addressable Lighting Interface) is an interface protocol for digital communication between electronic lighting equipment.

The DALI standard was developed by Tridonic together with renowned manufacturers of operating and control equipment. Today, these manufacturers belong to the DALI Activity Group which promotes the use and further development of DALI.

The DALI standard is defined in IEC 62386. A test procedure standardised by the DALI Activity Group ensures compatibility between products from different manufacturers. Tridonic products have undergone this test and meet all the requirements. This is indicated by the logo of the Activity Group DALI on the device.

The agreement by the lighting industry to adopt a common protocol has opened up a virtually unlimited number of options. With the right choice of individual DALI components an extremely wide range of requirements can be met, from operating a simple light switch to lighting management systems for entire office complexes with thousands of light sources and the integration of centrally controlled and monitored emergency lighting.

5.2. DALI in Action

DALI offers a lot of possibilities:

- Addressability: All control gear are individually addressable
- DALI line: 64 control gear can be grouped to a line
- DALI groups: Every control gear can be attributed to 16 groups
- Grouping: Possible without complicated rewiring
- Programmability: Individual programmability makes it possible to use functions which transcend the DALI standard
- Monitoring by status feedback on the DALI bus
- Wiring: Simple wiring with five pole standard cables and a cable length of max. 300 meters
- Wiring: Polarity-free control lines for mains and control lines
- Wiring: Multiple wiring possibilities (star, series and mixed wiring)
- Unaffected by interruptions: All luminaires receive the same, unaffected digital signal and dimming level
- Similar light level from first to last luminaire

Technical data of a DALI line:

- DALI voltage: 9.5 V - 22.5 VDC
- DALI current supply: max. 250 mA
- Data transfer rate: 1200 Baud
- Maximum line length: up to 300 m (for 1,5 mm^2)

DALI functionality

5.3. Commissioning

> **ⓘ NOTICE**
>
> If the corridorFUNCTION is activated the LED Driver is controlled only by motion detection. To operate the LED Driver via DALI, DSI or switchDIM the corridorFUNCTION must be deactivated.

Further information can be found in the DALI Handbook (see).

eD ("enhanced DALI") offers extended DALI commands. They can be used to activate specific commands of the control gear. These commands are Tridonic specific. They are not part of the DALI standard and are not publicly available.

Functions in mains operation

Overview of the main functions in mains operation:

Area	Function	Parameter
DALI functionality, p. 10	DALI standard	Version 2 (V2)
	Device type	Multi device type: DT1 + DT6
	DALI address	Single DALI address for mains and emergency operation
Dimming and light control	Dimming technology, p. 23	Via current amplitude
	Dimming range	100 - 1 %
	DALI V2-DT6	✅
	DSI, p. 13	✅
	switchDIM, p. 14	✅
	corridorFUNCTION V2, p. 18	✅
Adjustable output current, p. 24	Adjustable via resistor or I-select 2 plug	Step size: 25 mA
	Adjustable via DALI V2-DT6	Step size: 1 mA
	ready2mains, p. 31	Step size: 1 mA
Functions and performance	Constant Light Output and Over the Lifetime, p. 26	✅
	Intelligent Temperature Guard (ITG), p. 28	✅
	Standby losses	< 0.2 W
	Rated supply voltage	220 - 240 V
	Power-up fading, p. 30	✅

DSI

6.1. DSI

6.1.1. Description

With DSI (Digital Serial Interface) it is possible to control DSI capable LED Driver. The DSI control line can be wired separately via a two-core cable or together with the mains cable in a five-core cable. Communication is not impaired by the mains cable. In contrast to DALI, there is no individual addressing of the LED Driver with DSI.

DSI offers a series of benefits:

_ Expansion options via submodules, for example in combination with daylight control or additional switch modules

_ Wiring: Simple wiring with five pole standard cables and line length of up to 250 metres

_ Wiring: Polarity-free control lines can be used for mains and control lines

_ Wiring: Multiple wiring possibilities (star, series and mixed wiring)

_ Unaffected by electrical interference: All luminaires receive precisely the same interference-sensitive digital signal and therefore the same dim level

_ Uniform light level: No voltage drop as in analog applications -› uniform light level from the first to the last light source

The main benefit of DSI lies in the energy optimised implementation of extensive groups of luminaires (e.g. in sports stadiums and factories).

6.1.2. Commissioning

> **ⓘ NOTICE**
>
> If the corridorFUNCTION is activated the LED Driver is controlled only by motion. To operate the LED Driver via DALI, DSI or switchDIM the corridorFUNCTION must be deactivated.

Further information can be found in the DALI Handbook (see Reference list, p. 73).

switchDIM

6.2. switchDIM

6.2.1. Description

With the switchDIM function it is possible to use the mains voltage as a control signal.

The phase is connected via a simple standard mains voltage push button to the terminal marked DA/L and the neutral conductor is connected to the terminal DA/N.

Using the function is easy and convenient:

   _ A short press (50-600 ms) switches the device on or off

   _ A long press (> 600 ms) fades the connected operating device alternately up and down (between 1 and 100 %).

switchDIM is therefore a very simple form of lighting management. It also has a positive effect on material and labour costs.

The device has a switchDIM memory function. This is used, among other things, for storing the last dimming value in the event of interruptions in the power supply.

When power returns, the device automatically returns to its previous operating state and the light source is dimmed to the stored value.

> ⚠ CAUTION!
>
> Glow switches are not approved for using switchDIM.
>
> Glow switches may cause the LED Driver to spontaneously switch on or off or make sudden changes in the dimming value.

> ⚠ CAUTION!
>
> To ensure correct operation a sinusoidal mains voltage with a frequency of 50 Hz or 60 Hz is required at the terminal.
>
> Special attention must be paid to achieving clear zero crossings. Serious mains faults may impair the operation of switchDIM and corridorFUNCTION.

> ⚠ CAUTION!
>
> A maximum number of 25 operating devices per switchDIM system should not be exceeded.
>
> If you have more devices please use DALI or DSI.

6.2.2. Commissioning

> ⓘ NOTICE
>
> If the corridorFUNCTION is activated the LED Driver is controlled only by motion. To operate the LED Driver via DALI, DSI (only PRO DIM) or switchDIM the corridorFUNCTION must be deactivated.

Using the switchDIM function

switchDIM is operated by the push button that connects phase with the terminal marked DA/L.

Procedure:

   _ Switch the device on/off by briefly actuating the switch (50-600 ms) or

   _ Dim the device by holding down the switch (> 600 ms)

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switchDIM

Synchronising devices

If the devices in a system do not operate synchronously the devices must be synchronised, i.e. put in the same status (on/off) and the same dim level.

Procedure:

_ Hold down the switch for 10 seconds
-> All devices will be synchronised to the same status
-> LEDs will will be set to a uniform light value (approx. 50 %)
-> The fading time will be set to it default value (approx. 3 seconds)

Changing the fading time

The default value for the fading time is approx. 3 seconds. It can be changed to approx. 6 seconds.

Procedure:

_ Hold down the switch for 20 seconds
-> After 10 seconds: all devices will be synchronised to the same status
-> After 20 seconds: a fading time of approx. 6 seconds will be set
-> LEDs will be set to a uniform light value (approx. 100 %)

Switching the LED Driver to automatic mode

In automatic mode the device detects which control signal (DALI, DSI, switchDIM, ready2mains) is connected and automatically switches to the corresponding operating mode.

Procedure:

_ Press the switch 5 times within 3 seconds

6.2.3. Installation

Wiring variants

There are two options for installing switchDIM: four-pole and five-pole wiring

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switchDIM

Four-pole wiring

Configuration:

220–240 V
50/60 Hz

L
N
⏚

EM powerLED PRO

| L |
| N |
| DA/N |
| DA/L |
| S/L |
| ⏚ |
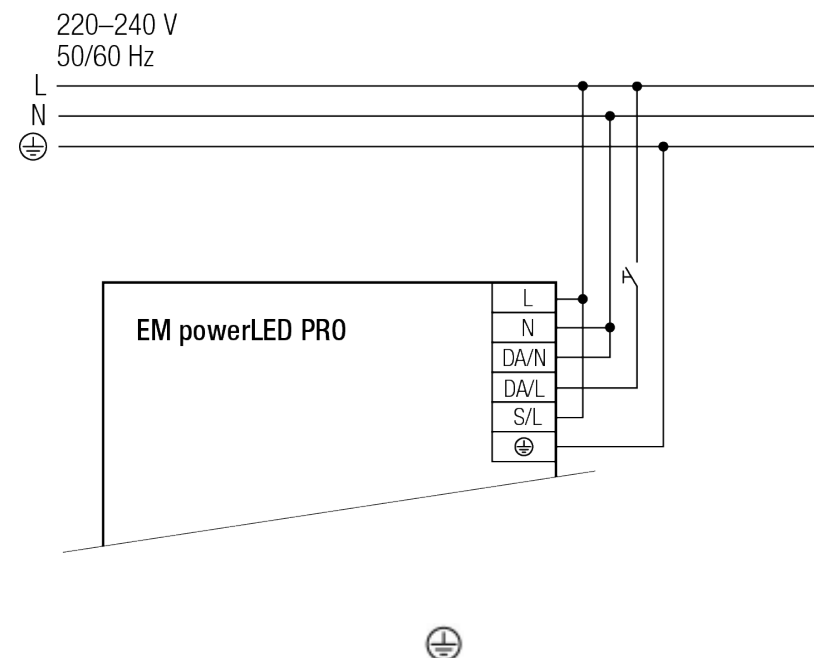
phase (L), neutral (N), control line (S/L), earth

Benefits:

No need for a control line thanks to connecting terminal 8 with the N-connection of the luminaire

Five-pole wiring

Configuration:

220–240 V
50/60 Hz

L
N
⏚

EM powerLED PRO

| L |
| N |
| DA/N |
| DA/L |
| S/L |
| ⏚ |
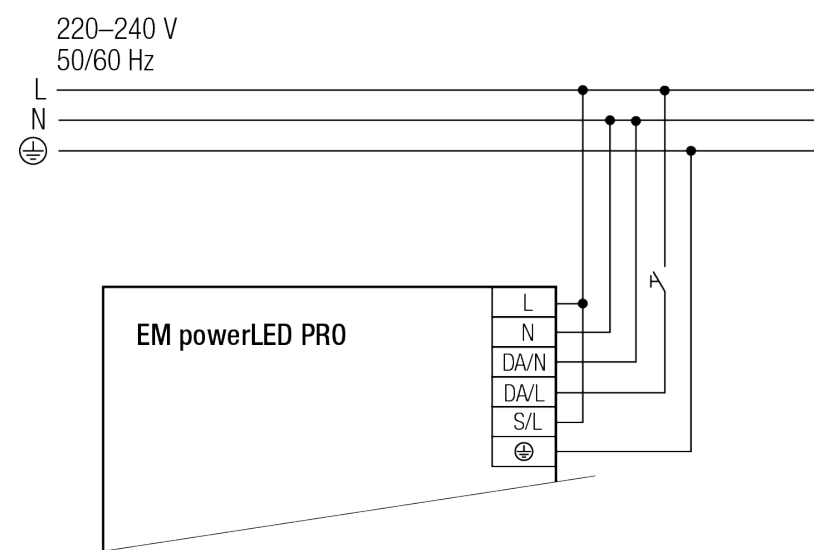
switchDIM

phase (L), neutral (N), control line (S/L), earth

Benefits:

Control can be changed at any time to a digital control signal (DSI or DALI) without having to change the luminaire or provide an additional control line

> ⚠️ **CAUTION!**
>
> For five-pole wiring the neutral conductor must be connected to DA/N.
>
> This prevents 400 V being applied between adjacent terminals if a different phase is used for the control input.

corridorFUNCTION V2

6.3. corridorFUNCTION V2

6.3.1. Description

The corridorFUNCTION enables the illuminance to be linked to the presence or absence of people. A conventional relay motion sensor is connected. The luminous intensity is increased when a person enters the room. When the person leaves the room the motion sensor switches off after a certain delay and the luminous intensity is automatically reduced.

The corridorFUNCTION is particularly beneficial in applications in which light is needed round the clock for safety reasons, for example in public buildings, large apartment complexes, car parks, pedestrian underpasses and underground railway stations. Since the luminous intensity only has to be increased when there is a demand for light the corridorFUNCTION offers effective lighting management and helps saving energy and costs. Another benefit of the corridorFUNCTION is the enhanced convenience of automatic lighting control.

> ⚠ CAUTION!
>
> To ensure correct operation a sinusoidal mains voltage with a frequency of 50 Hz or 60 Hz is required at the control input.
> Special attention must be paid to achieving clear zero crossings. Serious mains faults may impair the operation of corridorFUNCTION.

Profile settings:

Standard profile for activating via 230V on the interface terminal DA/N - DA/L for 5 minutes is "Never off":

The LED Driver have different profiles so they can provide the best possible performance in a range of conditions. The profiles are defined by a series of values:
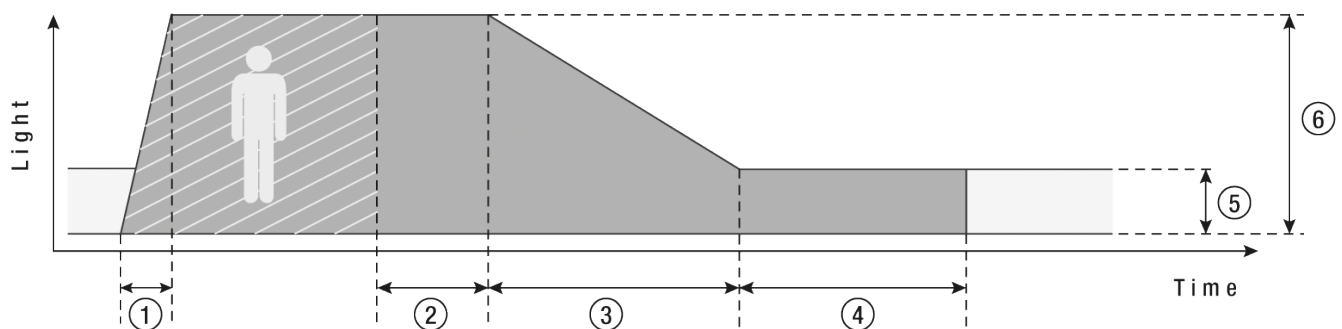
1. Fade-in time: the time that starts as soon as the presence of a person is detected. During the fade-in time the luminous intensity is faded up to the presence value (default: 0 s).

2. Run-on time: the time that starts as soon as the presence of a person is no longer detected. If the presence of a person is detected again during the run-on time the run-on time is restarted from zero. If no presence is detected during the run-on time the fade time is started as soon as the run-on time expires.

3. Fade time: the time during which the luminous intensity is faded from the presence value to the absence value (default: 30 s).

4. Switch off delay: the time during which the absence value is held before the lighting is switched off. Depending on the profile selected the switch-off delay may have different values or may not be defined (default: "Never Off").

5. Absence value: the luminous intensity when there is no person present (default: 10 %).

6. Presence value: the luminous intensity when persons are present (default: 100 %).

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corridorFUNCTION V2

Variable switch-off times

The profiles and their values can be freely adjusted. The values can be adjusted via a connection to a DALI bus with a suitable control system (e.g. the configuration software masterCONFIGURATOR).

6.3.2. Commissioning

Activating the corridorFUNCTION

Procedure by means of the mains voltage

Activating the corridorFUNCTION is simple. If an a.c. voltage of 230 V is applied to the digital interface of the LED Driver for a period of at least 5 minutes the LED Driver detects the corridorFUNCTION and automatically activates it. Activation is required only once per device.
There are three procedures for activating by means of the mains voltage. The requirements are the same in each case.

Requirements:

_ Device is correctly wired according to wiring diagram

_ Input voltage is applied

_ A motion sensor is connected to DA/N or DA/L

Procedure Version 1:

_ Remain in the activation range of the motion sensor for more than 5 minutes
  -> The motion sensor detects movement and switches on
  -> The corridorFUNCTION is activated automatically after 5 minutes
  -> The light value switches to presence level (default: 100 %)

Procedure Version 2:

_ Set the run-on time on the motion sensor to a value greater than 5 minutes

_ Remain in the activation range of the motion sensor for a short time
  -> The motion sensor detects movement and switches on
  -> The corridorFUNCTION is activated automatically after 5 minutes
  -> The light value switches to presence value (default: 100 %)
_ Reset the run-on time of the motion sensor to the required value

Procedure Version 3: Only possible if the motion sensor offers a manual override option

_ Set the slide switch on the motion sensor to the "Never-Off" function

_ Wait 5 minutes
  -> The corridorFUNCTION is activated automatically after 5 minutes
  -> The light value switches to presence value (default: 100 %)
_ Reset the slide switch on the motion sensor to the "automatic" function

Procedure via the masterCONFIGURATOR

The corridorFUNCTION can also be activated via the configuration software masterCONFIGURATOR. Further information can be found in the masterCONFIGURATOR manual (see

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corridorFUNCTION V2

Deactivating the corridorFUNCTION

If the corridorFUNCTION is activated, the LED Driver is controlled only by motion. To operate the LED Driver via DALI, DSI or switchDIM the corridorFUNCTION must be deactivated.

Procedure via mains

_ Connect mains voltage push button to the terminal marked DA/L

_ Connect neutral conductor to the terminal marked DA/N

_ Press the push button 5 times within 3 seconds

Procedure via DALI/DSI

_ Send 5 DALI or DSI commands within 3 seconds to the LED Driver

Procedure via masterCONFIGURATOR

If the corridorFUNCTION was activated via the masterCONFIGURATOR it can be deactivated as follows:

_ Send 5 DALI or DSI commands within 3 seconds to the LED Driver

Adjusting the values of the corridorFUNCTION

The values of the corridorFUNCTION can be individually adapted. The setting of the values is done by entering special DALI commands via the configuration software masterCONFIGURATOR. Here, a DALI USB for connecting a computer to the DALI control line is necessary.

Further information can be found in the manual of the configuration software masterCONFIGURATOR (see).

6.3.3. Installation

Requirements:

_ Device is correctly wired according to wiring diagram

_ A motion sensor is installed in the lighting system

_ The motion sensor is connected to the LED Driver

Procedure:

_ Connect the neutral conductor (N) to terminal DA/N on the LED Driver

_ Connect the output of the motion sensor (switched phase) to terminal DA/L on the LED Driver

corridorFUNCTION V2

Wiring versions:
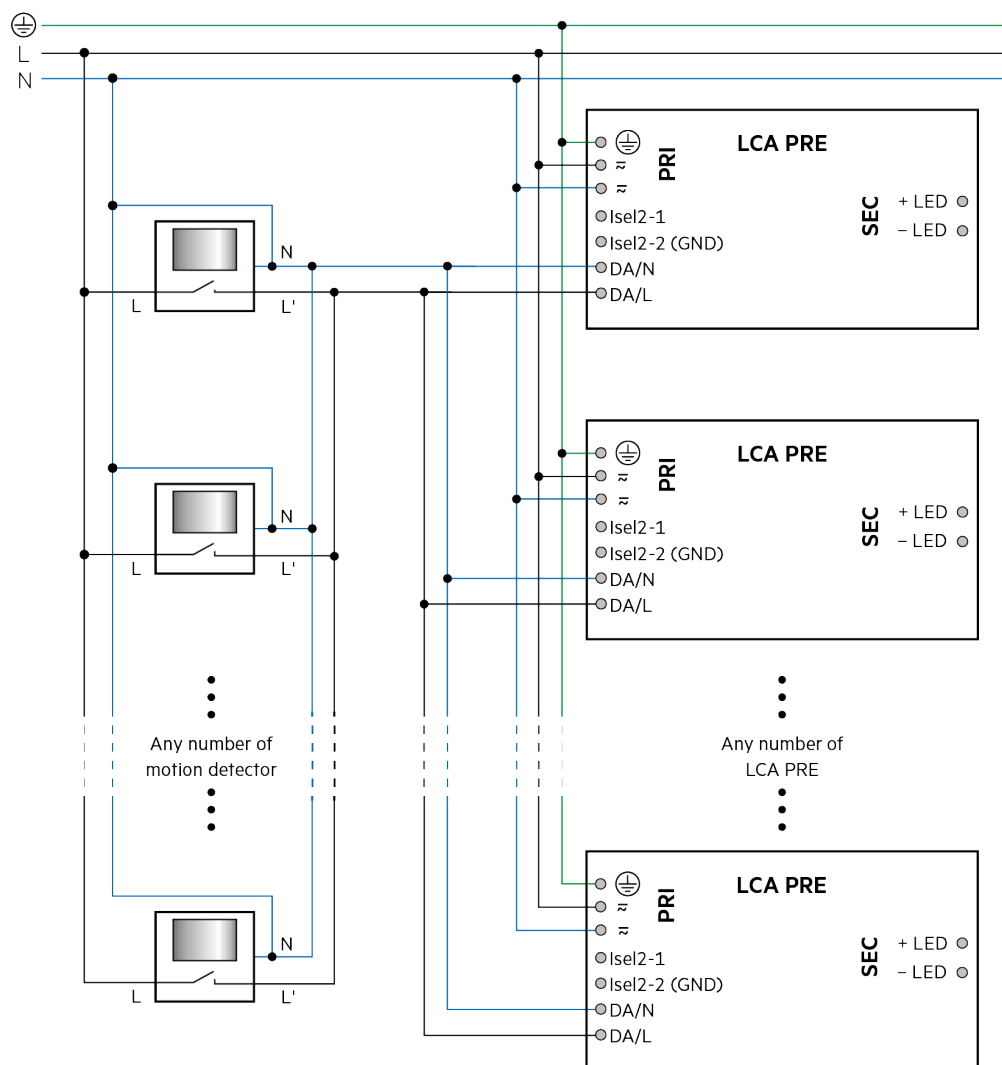
Benefits:

With five-pole wiring control can be changed at any time to a digital control signal (DSI or DALI) without having to change the luminaire or provide an additional control line

> ⚠ CAUTION!
>
> Use conventional relay motion sensors!
> Electronic motion sensors (Triac) are not suitable because of their technical design.

> ⚠ CAUTION!
>
> Do not use glow switches!
> Glow switches may affect the control system.

corridorFUNCTION V2

> ⚠ **CAUTION!**
>
> Make sure that the control line (L') of the motion sensor is connected to terminal DA/L and the neutral conductor (N) to terminal DA/N.

> ⚠ **CAUTION!**
>
> For five-pole wiring the neutral conductor must be connected to DA/N.
>
> This prevents 400 V being applied between adjacent terminals if a different phase is used for the control input.

> ⓘ **NOTICE**
>
> For large installations, supply to the LED Driver may be split among several phases (L1, L2, L3).
>
> Any phase can be used for the control input.
>
> Any number of motion sensors can be connected in parallel.

Dimming technology

6.4. Dimming technology

Output current/dimming level
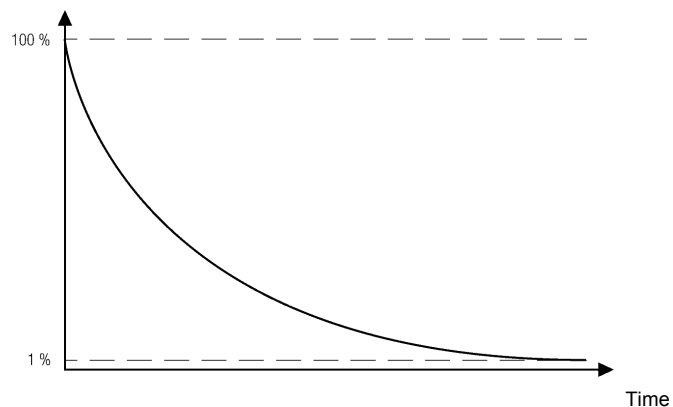
The dimming range is controlled by adjusting the amplitude of the current. The current value specified for the device corresponds to a dimming level of 100 %. The amplitude of the current is reduced to reduce the dimming level. The logarithmic dimming curve is stepless and adapted to the human eye.

The device can be switched to a linear dimming curve via the configuration software masterCONFIGURATOR (see Reference list, p. 73).

Adjustable output current

6.5. Adjustable output current

EM powerLED PRO DIM allow for different combinations of current and forward voltage based on the standard lumen packages available on the market.

The output current can be adjusted via DALI / masterCONFIGURATOR, different resistance values, I-select 2 plugs or ready2mains.

6.5.1. Adjusting the output current via DALI

The output current of the LED Driver can be adjusted via DALI by using the configuration software masterCONFIGURATOR (see).

6.5.2. Adjusting the output current via different resistance values

The output current of the LED Driver can be adjusted by using different resistance values. The resistance values are taken from the E96 series.

The mathematical relationship between output current and resistor value looks like this:

$$R[k\Omega] = \frac{5\,V}{I_{out}[mA]}\,1000$$

_ Resistor value tolerance <= 1 %; resistor power >= 0.1 W; base isolation necessary

> **ⓘ NOTICE**
>
> If the resistor is connected by wires a max. wire length of 2 m may not be exceeded and potential interferences have to be avoided.

6.5.3. Adjusting the output current via I-select 2 plugs

The output current of the LED Driver can be adjusted by using a suitable I-select 2 plug which has to be inserted into the I-select 2 terminal.

Most important data about I-select 2 plugs:

_ Ready-for-use resistor to set output current value

_ Compatible with LED Driver featuring I-select 2 interface; not compatible with I-select (generation 1)

_ Resistor is base isolated

_ Resistor power 0.25 W

_ Current tolerance ± 2 % to nominal current value

_ Compatible with LED Driver series EM powerLED PRO DIM, EM powerLED ST FX, LCA PRE, LC EXC

Example of calculation:

_ R [kOhm] = 5 V / I_out [mA] x 1000

_ Resistor value tolerance <= 1 %; resistor power >= 0.1 W; base isolation necessary

_ When using a resistor value beyond the specified range, the output current will automatically be set to the minimum value (resistor value too big), respectively to the maximum value (resistor value too small)

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Adjustable output current

> **ⓘ NOTICE**
>
> Unlike DALI which does not generate any additional tolerances in the output current, the tolerances are higher when using I-select 2 plugs.

> **ⓘ NOTICE**
>
> Please note that the resistor values for I-select 2 are not compatible with I-select (generation 1). Installation of an incorrect resistor may cause irreparable damage to the LED module(s).
>
> Resistors for the main output current values can be ordered from Tridonic. Information can be found in the data sheet at "accessories" (see Reference list, p. 73).

6.5.4. Adjusting the output current via ready2mains

ready2mains can be used to configure both drivers with a separate communication interface as well as fixed output drivers.

The adjustment of the output current via ready2mains interface is done via the mains wiring (for LCA PRE, LC EXC and EM powerLED ST FX). The parameters can be adjusted either via ready2mains-capable configuration software or directly via the ready2mains programmer.
Further information can be found in the Leaflet ready2mains (see Reference list, p. 73).

Constant Light Output and Over the lifetime

6.6. Constant Light Output and Over the Lifetime

6.6.1. Description

The light output of an LED module reduces over the course of its life. The Constant Light Output function compensates for this natural decline by constantly increasing the output current of the LED Driver throughout its life. As a results, a virtually uniform light output is achieved at all times.

For configuration purposes the expected module-specific values for lifetime and residual luminous flux must be specified. The output current is then controlled automatically on the basis of these values.

The LED Driver typically starts with an output current ("Required Intensity") that corresponds to the expected residual luminous flux and calculates the increase in the value on the basis of the anticipated lifetime.

If the Over the Lifetime function is enabled, visual feedback is given as soon as the LED exceeds the expected LED lamp life. If the expected LED lamp life is exceeded, the luminaire flashes for 2 seconds after being switched on.

6.6.2. Commissioning

Procedure via the masterCONFIGURATOR

> 🛈 NOTICE
>
> To be able to adjust the parameters "Required intensity", "LED burning hours" and "Expected LED life" the "Advanced settings" must be activated. Further information can be found in the manual of the configuration software masterCONFIGURATOR (see Reference list, p. 73).

Activating the Constant Light Output function

_ Open dialog box "Tridonic-specific configuration"

_ Click tab "CLO and OTL"

_ Set drop-down menu "Constant intensity" to "enabled"

_ Click "save"

   -> Changes are saved

Activating the Over the Lifetime function

_ Open dialog box "Tridonic-specific configuration"

_ Click tab "CLO und OTL"

_ Set drop-down menu "Visual feedback" to "enabled"

_ Click "save"

   -> Changes are saved

Setting Required intensity and Expected LED life

_ Open dialog box "Tridonic-specific configuration"

_ Click tab "CLO and OTL"

_ Enter values in input fields "Required intensity" and "Expected LED life"

_ Click "save"

   -> Changes are saved

Constant Light Output and Over the lifetime

Transferring existing values to a new LED Driver

If a LED Driver is replaced the existing parameter values can be transferred to the new LED Driver.

- _ Chose a LED Driver that is in the same room as the new LED Driver

- _ Open dialog box "Tridonic-specific configuration"

- _ Click tab "CLO and OTL"

- _ Note down the values for "Required intensity", "LED burning hours" and "Expected LED life"

- _ Close dialog box "Tridonic-specific configuration"

- _ Chose the new LED Driver

- _ Open dialog box "Tridonic-specific configuration"

- _ Click tab "CLO and OTL"

- _ Take the noted values and enter them in the input fields "Required intensity", "LED burning hours" and "Expected LED life"

- _ Click "save"

    -> Changes are saved

Replacing the LED module

If a LED module is replaced the parameter "LED burning hours" must be set to "0".

- _ Open dialog box "Tridonic-specific configuration"

- _ Click tab "CLO and OTL"

- _ Delete value from input field "LED burning hours"

    -> CLO function is automatically restarted

    -> Changes are saved

Further information can be found in the manual of the configuration software masterCONFIGURATOR (see Reference list, p. 73).

Intelligent Temperature Guard

6.7. Intelligent Temperature Guard

> ⚠ WARNING!
>
> The maximum t_c temperature is the maximum permitted in terms of life time. Operating the LED Drivers above the permitted t_c temperature is not allowed.
>
> The Intelligent Temperature Guard function does not replace the proper thermal design of the luminaire and does not enable the lighting to operate for lengthy periods of time in impermissible ambient temperatures.

6.7.1. Description

The Intelligent Temperature Guard function provides protection against temporary thermal overloads. Thermal overload protection is triggered if the t_c temperature is exceeded. This way, instant failure of the LED Driver can be prevented.

6.7.2. Behaviour

The following table shows the exact behaviour and parameters of the Intelligent Temperature Guard function.

Parameter	Description
Starting point of power reduction	When maximum t_c temperature is exceeded. [1] ℹ NOTICE The temperature at which the power reduction starts is device-specific and depends on the load and the installation situation. Depending on the installation situation and the load of the device, the temperatures at different measuring points of the device may differ. As a result, it may happen that the actual measured temperature is not identical to the temperature at the t_c point. In any case, the starting point of the power reduction is higher than the predetermined maximum t_c temperature. For the functioning of the protective function these deviations are not decisive. The starting point of the power reduction is selected by the device in a way that the protective function starts when the rated life time would otherwise be significantly affected.
Type of power reduction	Power reduction takes place in gradual steps.
Power reduction process and control	Power reduction is dependent on temperature: _ Power reduction continues if temperature still rises _ Power reduction stops if temperature does not rise anymore or if maximum power reduction is reached (minimum power level = 50 %) _ If temperature falls below a certain level, power is increased again until 100 % is reached _ If temperature still rises even if maximum power reduction is reached, drivers go to 15 % dim level

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Intelligent Temperature Guard

Min. power level	ca. 50 % dim level [2]
Shut-off behaviour	No shut off behaviour: Device will not shut off if temperature still rises. _ AC mode: Device switches to 15 % dimming level
Automatic restart behaviour	No automatic restart behaviour (because there is no shut off behaviour).
Restart temperature	No restart temperature.

[1] Rated t_c is device-specific.

[2] The lowest possible dim level depends on the connected load.

> **ⓘ NOTICE**
>
> The standard setting for the dimming curve is logarithmic:
>
> If alternative dimming curves are used the power reduction can be implemented differently.

Power-up fading

6.8. Power-up fading

6.8.1. Description

The power-up fading function offers the opportunity to realise a soft start. The soft start will be applied at turning on the mains and at starts by switchDIM.

The function is programmed as a DALI fade time in the range from 0.7 to 16 seconds and dims in the selected time from 1 % to the power-on level.

By factory default power-up fading is not active (0 seconds).

6.8.2. Commissioning

Procedure via the masterCONFIGURATOR

_ Open dialog box "Tridonic-specific configuration"

_ Click tab "Power-up Fading"

_ Choose value from drop-down menu "Power-up Fading"

_ Click "save"
   -> Changes are saved

Further information can be found in the manual of the configuration software masterCONFIGURATOR (see Reference list, p. 73).

ready2mains

6.9. ready2mains

6.9.1. Description

ready2mains uses the mains cable to transmit information: easily, reliably and professionally.

ready2mains can be used to configure both drivers with a separate communication interface as well as fixed output drivers. The configuration saves time and is very flexible. ready2mains reduces production costs and also reduces possible sources of error.

Configuration

The ready2mains interface can be used to configure the main parameters of LED Drivers via the mains wiring (LED output current and CLO for LCA PRE and EM powerLED PRO DIM). These parameters can be adjusted either via ready2mains-capable configuration software or directly via the ready2mains programmer (output current only). Further information can be found in the Leaflet ready2mains (see Reference list, p. 73).

_ Easy configuration of luminaires

_ Simple integration in existing test setups

Settings for emergency tests

7.1. Time intervals between emergency tests

The timing for the individual tests is defined by the DALI parameters INTERVAL time and DELAY time.

_ INTERVAL time:

This determines the time interval in which function and duration tests are carried out. The factory presets specify that the function test is performed every 7 days and the duration test every 52 weeks. Typically the same INTERVAL time is assigned to all the connected luminaires. If the INTERVAL time is reset to zero this means that the test is no longer automatically initiated by the device but only via the connected control system.

_ DELAY time:

This determines the delay for initiating the tests between the individual luminaires. The factory default is DELAY time = 0. This means that there is no delay and all the luminaires are tested at the same time. By assigning a DELAY time to an individual luminaire the test for that luminaire will be delayed by the appropriate value. The delay is based on the point in time when the device was first connected to the power supply.

Both values are stored in the device's internal memory. The values can be changed by connecting a DALI bus and by sending appropriate DALI commands or can also be deactivated, i.e. reset to zero. This provides different setting options which are crucial for implementing different test systems.

Settings for emergency tests

7.2. Type of test system: DALI-controlled or selftest mode

There are two types of test system:

_ Centrally controlled and monitored (DALI-controlled)

_ Decentrally controlled and monitored (selftest mode)

The following table gives an overview of the test systems and setting options:

Test system	Trigger	Test times	Requirements	Comments
DALI-controlled	Test triggered by the DALI control system	Test time and interval are stored in the DALI control system	Selftest mode was deactivated by resetting the DELAY time and INTERVAL time in the emergency lighting unit to zero	Tests are only performed if an appropriate command is received by the emergency lighting unit.
Selftest mode	Test triggered by emergency lighting unit	The time for the function test (time and day) corresponds to the time when the emergency lighting unit was first connected to the power supply. The time for the duration test (only time) is determined by the adaptive test mode of the emergency lighting unit (see Adaptive test mode, p. 33). The time between the tests is determined by the INTERVAL time. The time between the individual luminaires is determined by the DELAY time.	The DELAY time and INTERVAL time are programmed to appropriate values and are NOT reset to zero.	The DELAY time and INTERVAL time can be changed by appropriate commands via the DALI bus.

> **ⓘ NOTICE**
>
> As soon as the preset parameters are reset to zero, tests are only carried out on request by the DALI control system.
>
> If the DALI bus is interrupted, the EM powerLED PRO DIM does not go back to selftest mode.

> **ⓘ NOTICE**
>
> DALI communication with a connected battery is only possible after a mains reset.

7.3. Adaptive test mode

Adaptive test mode sets the time for the duration test to a time of minimum risk and minimum presence.

This is achieved by monitoring the switched phase of the lighting. This tells the emergency lighting unit which times the lighting is switched off (i.e. no one is in the room) and the unit stores these times. If non-presence of more than five hours is detected the start time for the duration test is set to one hour after the start of the non-presence time.

Settings for emergency tests

Example:

A room is not used between 8 pm and 6 am. The lights are therefore switched off. The duration test will therefore begin at 9 pm. This provides a certain buffer before the start and after the end of the duration test, and the batteries can be recharged after the duration test before the room is in use again.

Room usage is monitored on a monthly basis and the time for the duration test is constantly adjusted. This allows for seasonality in room usage to be taken into account.

If a suitable time cannot be found (perhaps because the room is in use round the clock) the duration test is performed at the time set during startup (this is the time when the emergency lighting unit was first connected to the power supply). If subsequently a suitable period is found the time for the duration life test will be suitably adapted.

If none of this is successful because the startup time is unsuitable and no other suitable period can be found, the time for the duration test can be set manually (see).

7.4. Functionality of the test switch

The optional test switch enables you to make a series of settings manually.

> **ⓘ NOTICE**
>
> The test switch can remain permanently connected and used as a startup tool.

7.4.1. Starting the function tests

_ A short press on the button (0.15 - 1 s) starts a function test lasting 5 seconds.
  -> The indicator LED flashes GREEN.
  -> The result of the function test is displayed on the two-colour indicator LED.

7.4.2. Starting the test mode

_ A longer press on the button (1 - 10 s) switches the light sources to emergency mode but does not perform a function test.
  -> The indicator LED goes off for 1 second and then on for the rest of the time (maximum of 9 seconds).

7.4.3. Setting the test time

The time and day for the function and duration test is stored in the internal timer. To change the test time the timer needs to be reset. All the test times previously stored will be deleted and replaced by the time of resetting.

> **ⓘ NOTICE**
>
> Resetting the timer deactivates the . Because of this the test time is no longer adapted to the room usage of the building. The function test and duration test is always carried out at the time of resetting.

Depending on whether the timer is to be reset for one luminaire or for multiple luminaires, there are two different methods:

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Intelligent multilevel charging system

Setting the test time for one luminaire

_ Holding down the button (> 10 s) resets the timer.

    -> The indicator LED goes off for 1 second and then shows GREEN and goes off again after 10 seconds.

    -> The indicator LED going off after 10 seconds confirms that the timer has been successfully reset (to the current time).

Setting the test time for all the light sources in an emergency lighting circuit

_ Switching the unswitched power supply for an emergency lighting circuit on and off 5 times within 60 seconds resets the timers for all the light sources in the emergency lighting circuit.

7.5. Intelligent multilevel charging system

The multilevel charging system is used for minimising charging times while maximising battery life. During normal functional mains operation the module charges the batteries using a specially developed charging algorithm.

_ Initial charge mode:

20 hours of high charging current at the start to prepare the new battery cells and fully charge them.

_ Trickle charge mode:

Continuous low charge to maintain battery output and reduce battery temperature.

_ Fast charge mode:

Automatic adjustment of the charge time ensures minimal overcharging:

    _ 10 or 15 hours of rapid charge after a full discharge.

    _ Shorter charge time after only a partial discharge.

When the permanent power supply is switched on for the first time the EM powerLED PRO DIM starts to charge the batteries for 20 hours in fast charge mode. This 20-hour preparatory charge ensures that the new batteries are completely charged before being used. The 20-hour recharge is also used if a new battery is connected or if the device leaves the Rest mode (see Rest mode, Inhibit mode and Relight command, p. 37).

At the end of the 20-hour charge the module automatically switches to trickle charge mode. This ensures that the batteries remain at optimum charge levels and avoids any overheating due to overcharging.

_ batteries are charged with a constant charging current in trickle charge mode

After a power outage and subsequent emergency mode the EM powerLED PRO DIM recharges the batteries in fast charge mode. However, the charge time is set so that only the power consumed during emergency mode is replaced. If emergency mode did not last as long as the prescribed operating time the charging time will be reduced. If emergency mode extended for the full operating time the charging time will be 10 hours for modules with an operating time of 1 hour, and 15 hours for modules with an operating time of 2 and 3 hours. Once the batteries are fully charged again the module automatically switches to trickle charge mode.

In trickle charge mode the battery status is continually monitored to ensure that the charging currents and battery voltages remain within the specified limits. If these limits are exceeded error status flags are set for monitoring with the aid of a suitable control system. The status LED also shows such faults locally.

If a duration test is required while the battery is not yet fully charged the test will be postponed until charging is complete. This prevents a duration test from being carried out with a battery that is not fully charged.

Intelligent multilevel charging system

> **ⓘ NOTICE**
>
> A partially charged battery is defined as one for which the charger is operating in fast charge mode.
>
> A fully charged battery is defined as one for which the charger is operating in trickle charge mode. The appropriate bit in the internal memory (command number 253 Bit 3) is set.

If the power supply fails during rapid charging the module will power the lamp immediately in emergency mode for as long as the charge in the batteries will allow.

Rest mode and Relight function

7.6. Rest mode, Inhibit mode and Relight command

Emergency operation is automatically started when the mains supply is switched off. If the Rest mode is activated, the discharging of the battery will be minimized by switching off the LED output.

Rest mode can be used during short periods of time when a building is completely unoccupied and the mains supply is to be switched off intentionally, for example during a holiday period. Using Rest mode prevents a full discharge and possible damages to the batteries during these times.

Rest mode has to be activated by a competent person. Activation is only possible after the mains supply has been switched off. Contrary to this, if the Inhibit mode has been activated in advance, Rest mode will be automatically switched on if the mains supply is switched off.

By sending the Relight command both modes, Rest mode and Inhibit mode, will be deactivated. The emergency unit will switch back to the previous operating mode. If it has been in Rest mode, it will switch back to emergency mode, if it has been in Inhibit mode, it will switch back to charging mode

For all the different changes, activating Rest mode and Inhibit mode and sending the Relight command, DC voltage pulses of different lengths are used. The table at gives an overview of all the operating modes.

> **⚠ CAUTION!**
>
> Even in Rest mode there is self discharge current and an extremely small level of discharge current flowing from the batteries. If the batteries remain in Rest mode for prolonged periods of time this can lead to deep discharge and potential damage. Further information can be found in the data sheet of the batteries (see).

7.6.1. Activate Rest mode

Rest mode is activated as follows:

_ Disconnect power supply

_ Apply DC voltage pulse at the two terminal points "REST/L" and "REST/N"

  _ The signal must have an amplitude of 9.5 - 22.5 V with a pulse length of 150 - 1,000 ms

  _ The polarity of the voltage pulse does not matter

> **ⓘ NOTICE**
>
> Rest mode cannot be activated as long as the power supply hasn't been disconnected.
> The maximum number of emergency units on one bus is 100 pieces with a maximum recommended cable length of 1000 metres.
> Rest mode voltage can be applied across all emergency modules (parallel connection).

7.6.2. Deactivate Rest mode via Relight command

By sending the Relight command the Rest mode is deactivated. The emergency unit will switch back to emergency mode.
To deactivate Rest mode via Relight command, proceed as follows:

_ Apply DC voltage pulse at the two terminal points "REST/L" and "REST/N"

  _ The signal must have an amplitude of 9.5 - 22.5 V with a pulse length of 1,001 - 2,000 ms

  _ The polarity of the voltage pulse does not matter

Rest mode and Relight function

> ℹ NOTICE
>
> Reapply the power supply does also deactivate Rest mode. In this case, the device switches from Rest mode to charge mode.

7.6.3. Activate Inhibit mode

Inhibit mode is activated as follows:

_ Make sure that the mains supply is switched on

_ Apply DC voltage pulse at the two terminal points "REST/L" and "REST/N"

   _ The signal must have an amplitude of 9.5 - 22.5 V with a pulse length of 150 - 1,000 ms

   _ The polarity of the voltage pulse does not matter

-> Emergency unit switches to Inhibit mode

-> Inhibit mode is active for a duration of 15 minutes

-> Inhibit mode is indicated by indicator LED (double pulsing GREEN)

For further information see

> ℹ NOTICE
>
> The inhibit mode must be activated before the mains supply is switched off.

7.6.4. Automatically switch from Inhibit mode to Rest mode

The emergency unit automatically switches from Inhibit mode to Rest mode if the following conditions are met:

_ Inhibit mode has been activated -and-

_ Within 15 minutes after activation, the mains supply is switched off

7.6.5. Automatically deactivate Inhibit mode

Inhibit mode is automatically deactivated and the emergency unit switches back to charging mode if the following conditions are met:

_ Within 15 minutes after activation, the mains supply is **not** switched off

7.6.6. Deactivate Inhibit mode via Relight command

By sending the Relight command the Inhibit mode is deactivated. The emergency unit will switch back to charging mode.

To deactivate Inhibit mode via Relight command, proceed as follows:

_ Apply DC voltage pulse at the two terminal points "REST/L" and "REST/N"

   _ The signal must have an amplitude of 9.5 - 22.5 V with a pulse length of 1,001 - 2,000 ms

   _ The polarity of the voltage pulse does not matter

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Rest mode and Relight function

7.6.7. Switching between operating modes

The device has four different operating modes (Standby/Charge mode, Emergency mode, Rest mode and Inhibit mode). Depending on the initial mode and the length of the applied DC voltage pulse the device switches between these operating modes. The following table gives an overview:

Applied pulse length	Charging mode	Emergency mode	Rest mode	Inhibit mode
150 - 1,000 ms	Switches to Inhibit mode	Switches to Rest mode	-	-
1,001 - 2,000 ms (Relight command)	-	-	Switches to Emergency mode	Switches to charging mode

Prolong time

7.7. Prolong time

The command "Store prolong time" (command number 239) allows the EM powerLED PRO DIM to continue emergency operation after restoration of the power supply. This time can be set in 30 second steps. The maximum value is 127.5 minutes. The device leaves this continued emergency operation after the set time has expired or as soon as the low voltage battery cut off level has been reached (discharge protection), that is, when the total operating time has been exceeded.

The prolong time can be set by the DALI controller.

Indicator LED

7.8. Indicator LED

System status is locally indicated by a bi-colour indicator LED.

LED indication	Status	Description
Permanent GREEN	Standby /Charge mode, System OK	Mains operation, battery is charged
Fast flashing GREEN (0,1 s on - 0,1 s off)	Function test underway	
Slow flashing GREEN (1 s on - 1 s off)	Duration test underway	
Double pulsing GREEN	Inhibit mode is activated	The Inhibit mode makes it possible to set the emergency mode to "inhibited"; in this mode, the power can be turned off without switching to emergency mode. The Inhibit mode is activated by sending the inhibit command (command number: 225), while the modules are still connected to mains. Just as in Rest mode, the device does not support the Relight command (command number: 226). After a break of 15 minutes, the inhibit mode is automatically reset.
Permanent RED	Lamp failure	Open circuit -or- Short circuit -or- LED failure **ⓘ NOTICE** After an exchange of the LED module, the RED light of the indicator LED remains on and the lamp failure flag remains set until a scheduled function test or a "maintenance" function test requested by the control system has been successfully completed. The LED module's mains operation does reset the lamp failure flag.
Fast flashing RED (0,1 s on - 0,1 s off)	Charging failure -or- device failure	Incorrect charging current **ⓘ NOTICE** After an exchange of the device in a DALI-controlled system it is necessary to address the LED Driver and reset the DELAY time and INTERVAL time.

Indicator LED

| Slow flashing RED (1 s on - 1 s off) | Battery failure | Battery failed duration test or function test -or- Battery is defect -or- Incorrect battery voltage

NOTICE

After an exchange of the battery the indicator LED switches to GREEN to indicate satisfactory charging.

The battery failure flags will only be reset after a successful completion of a "maintenance" duration test, though. This "maintenance" duration test can only be performed if the batteries are fully charged. For this, new batteries must have completed the 20-hour initial charge mode (see Intelligent Multilevel battery system , p. 35). |
| GREEN and RED off | Battery operation | Emergency mode: Mains disconnected -or- mains failure |

NOTICE

If a lamp error was detected at an emergency test and then corrected (by changing the lamp for example), the error indication can only be corrected by a renewed emergency test. Switching to mains operation does not reset the error indication.

Functions in emergency operation

Overview of the main functions in emergency operation:

Area	Function	
DALI emergency functionality	DALI V2 DT1	✅
Test function, p. 32	Automatic function and duration test	Centralized test activation via DALI
	Function test (interval)	Adjustable via DALI
	Duration test (interval)	Adjustable via DALI
Rated duration	Adjustable to 1, 2 or 3 hours [1]	✅
	Adjustable on the device via DIP switch	✅
Status display	Via two-colour indicator LED, p. 41	✅
Battery charge system	Intelligent multilevel charging system, p. 35	✅
Adjustable output current in emergency operation, p. 44	Automatic adjustment by device	✅
DALI addressing and identification	Addressing function EZ easy addressing, p. 46	✅
Commissioning	Automatic	✅
Rest mode, Inhibit mode and Relight command, p. 37	Activation	Via DALI
Prolong time, p. 40	Adjustable in 30-second steps to a maximum of 127.5 minutes	Via DALI

[1] Special case: 2-hours rated duration

The first duration test will take 120 minutes, following duration tests are rated with 90 minutes. If the battery is disconnected or replaced, the next duration test will again be rated with 120 minutes.

Adjustable output current in emergency operation

8.1. Adjustable output current in emergency operation

8.1.1. Description

If the EM powerLED PRO DIM switches to emergency operation in case of a power failure, the device will detect the forward voltage of the connected LED modules and set the correct LED current. Setting a constant output power ensures maximum light output in emergency mode for the specified operating time.

An EM powerLED PRO DIM with 3 or 4 watts output power operates the connected LED modules with said output power. For this purpose, the device detects the connected LED forward voltage, and adjusts the LED forward current to the appropriate value, resulting in an output power of 3 or 4 watts.

> **ℹ NOTICE**
>
> At the lowest range of permissible forward voltage, the efficiency may be slightly lower. In this case the output power is also slightly lower.

EM powerLED PRO DIM 103	EM powerLED PRO DIM 104
Max. output power: 3 W	Max. output power: 4 W
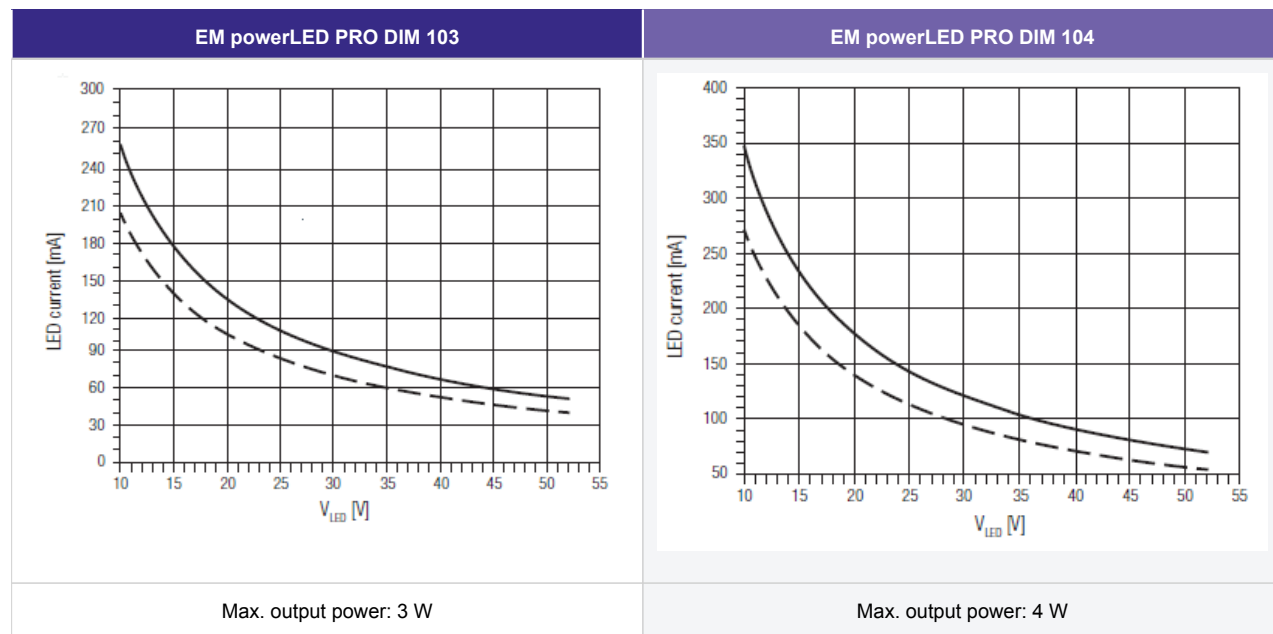
8.1.2. Calculation

Formel: $P = U * I$

P	=	U	*	I
Emergency output power: Given by the EM powerLED PRO DIM type		LED forward voltage: Detected by the EM powerLED PRO DIM		LED forward current: Automatically adjusted by the EM powerLED PRO DIM

Example

Given:

_ LED forward voltage: 45 V (chosen as an example)

_ LED forward current (at 45 V): 60 mA (taken from diagram EM powerLED PRO DIM 103)

TRIDONIC

Adjustable output current in emergency operation

Wanted:

_ Emergency output power?

Result:

_ Emergency output power:

P = U * I = 45 V * 60 mA = 3 W

Different battery cell numbers offer flexibility in the available emergency output power - 3 cells and 4 cells for LED modules from 20 V to 50 V forward voltage.

The LED current in emergency mode is automatically adjusted by the EM powerLED PRO DIM based on the total forward voltage of the LED modules connected and the associated battery.

Device types	Forward voltage range	SELV	Number of battery cells
EM powerLED PRO DIM 103	20-50 V	SELV < 60 V	3 cells for lower light output in emergency operation
EM powerLED PRO DIM	20-50 V	SELV < 60 V	4 cells for higher light output in emergency operation

> **ℹ NOTICE**
>
> There is a separate chapter that describes how the light output in emergency operation can be determined (see chapter Determining light output in emergency operation, p. 49).

Addressing system EZ easy addressing

8.2. Addressing function EZ easy addressing

In a DALI installation addresses are assigned to the control gear. The EM powerLED PRO DIM operates with only one DALI address for both mains and emergency operation (Multi Device Type according to DALI standard). After the automatic addressing it is necessary to assign the physical address in the building plan to the corresponding DALI address. With the patented addressing function "EZ easy addressing" this address assignment can be performed in a simple way.

The addressing function "EZ easy addressing" is activated by sending the DALI identification command for single battery supplied emergency lighting (device type 1, command number 240). As a result, the bi-colour status LEDs of all the devices in the selected DALI circuit will start to blink. The addresses of the devices can be calculated by the sequence of blinking signals that the devices emit.

_ A 3 second pause marks the beginning of a sequence.

_ After this, the status LED blinks for six times in a row:
A blinking green light indicates the value "1", a blinking red light indicates the value "0". Starting with the highest value, the sequence of colours can be noted.

_ The result is a 6-bit binary code, which can be converted into a decimal DALI address between 0 and 63 and can be entered in the light installation plan.

Addressing system EZ easy addressing

The following table shows two examples of blinking light sequences and how they are converted into a decimal address is:

Sequence of blinking lights						Address
32	16	8	4	2	1	
⊖	⊕	⊖	⊖	⊖	⊕	16+1=17
⊖	⊖	⊕	⊕	⊖	⊖	8+4=12

⊕ Green blinking => Value 1

⊖ Red blinking => Value 0

> **ℹ NOTICE**
>
> The Android app "Emergency ADDRESSING Decoder" can be used to convert blinking light sequences into a decimal address. The app can be downloaded at https://play.google.com/store/apps/details?id=net.gmx.royder.knight.EZ_easyADRESSING.

> **ℹ NOTICE**
>
> The LED modules are switched off at the beginning of the addressing function EZ easy addressing. They are turned back on, when leaving this function.

Further information about the EZ addressing tool (article number: 89899836) can be found in the product catalogue (see).

In the DALI standard version 2, a new DALI identification command (command number 37) for control gear is described. Using this identification command, the LED module switches back and forth between the minimum and the maximum light value. Both DALI identification commands are supported by the EM powerLED PRO DIM. The DT1 command (command number 240) has priority over the new identification command (command number 37). Both commands operate independently.

Typical Installation

9.1. Initial startup

After initial connection of the permanent power supply and after connection of the batteries to the EM powerLED PRO DIM the module starts to charge the batteries with the initial high charging current for 20 hours (initial charge mode).

Since the DELAY time is preset to zero at the factory, the EM powerLED PRO DIM tries to perform an initial function and duration test (commissioning test) as soon as connection to the power supply is made. Since at this time the batteries are not yet adequately charged the EM powerLED PRO DIM postpones the commissioning test.

Generally, the batteries will be fully charged within 24 hours and the commissioning test can then be carried out. The operation time corresponds to the preset value. If the power supply is interrupted before the end of the 20 hours of continuous initial charging the initial charging process will be completely restarted and the commissioning test postponed accordingly.

> **ℹ NOTICE**
>
> If the INTERVAL time was reset to zero by the control system during the addressing, the commissioning test is performed only after the initial commissioning. If mains supply and batteries are disconnected and then reconnected at a later time, this does not trigger a renewed commissioning test. If the battery is replaced, it is expected that the control system requests the test.

9.2. Installation without a control system

If a control system is not connected, the EM powerLED PRO DIM will carry out all further tests in accordance with the parameters preprogrammed in the internal memory (INTERVAL time and DELAY time), i.e. a function test every seven days and a duration test every 52 weeks.

Function tests are performed irrespective of the charge status of the battery, duration tests are only performed if the battery is fully charged.

If a duration test is required while the battery is not yet fully charged the test will be postponed until charging is complete. This prevents a duration test from being carried out with a battery that is not fully charged (see Intelligent multilevel charging system, p. 35).

> **ℹ NOTICE**
>
> If the INTERVAL time has not been reset to zero, the procedure after a battery replacement is the same as during initial commissioning:
> The batteries are charged for 20 hours, after that a commissioning test is performed (see Intelligent multilevel charging system, p. 35).

> **ℹ NOTICE**
>
> A partially charged battery is defined as one for which the charger is operating in fast charge mode.
> A fully charged battery is defined as one for which the charger is operating in trickle charge mode. The appropriate bit in the internal memory (command number 253 Bit 3) is set.

Determining light output in emergency operation

To determine the light output in emergency operation the following parameters are crucial:
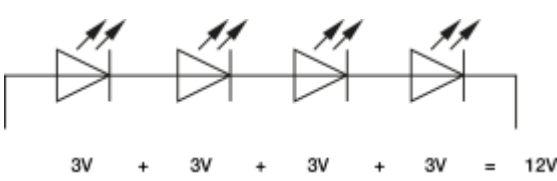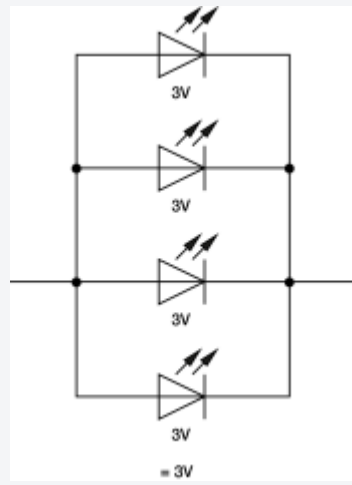
1. LED forward voltage (total forward voltage of all connected LED modules)

2. LED current in emergency operation

3. Light output in emergency operation

10.1. Parameter 1: LED forward voltage

_ The total forward voltage of all connected LED modules must be within the forward voltage range of the EM converterLED PRO DIM.
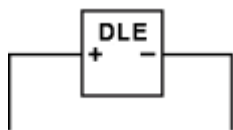
10.1.1. Total forward voltage of all LED modules

The forward voltage of a single LED module can be found in the data sheet. When calculating the total forward voltage of all LED modules, series and parallel circuits must be handled differently:

Series circuit	Parallel circuit
3V + 3V + 3V + 3V = 12V	3V 3V 3V 3V = 3V
The values of the individual LED modules are summed up.	The total value is the same as the value of a single LED module

Parameter 1: LED forward voltage

10.1.2. Example 1: 1 LED module DLE

Given:

_ Forward voltage DLE: 24.2 V (taken from data sheet)

Wanted:
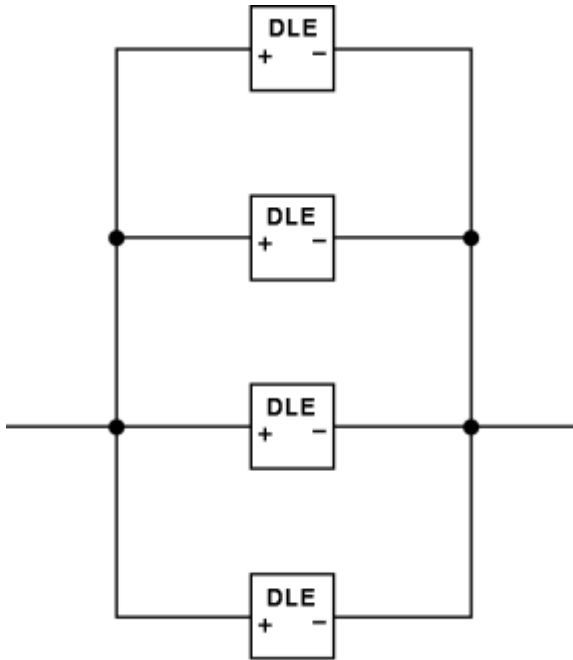
_ Total forward voltage of all LED modules in emergency operation

Result:

_ The total forward voltage of all LED modules is 24.2 V because there is only 1 LED module.

Parameter 1: LED forward voltage

10.1.3. Example 2: 4 LED module DLE in parallel

Given:

  _ Forward voltage DLE: 24.2 V (taken from data sheet)

Wanted:

  _ Total forward voltage of all LED modules?

Result:

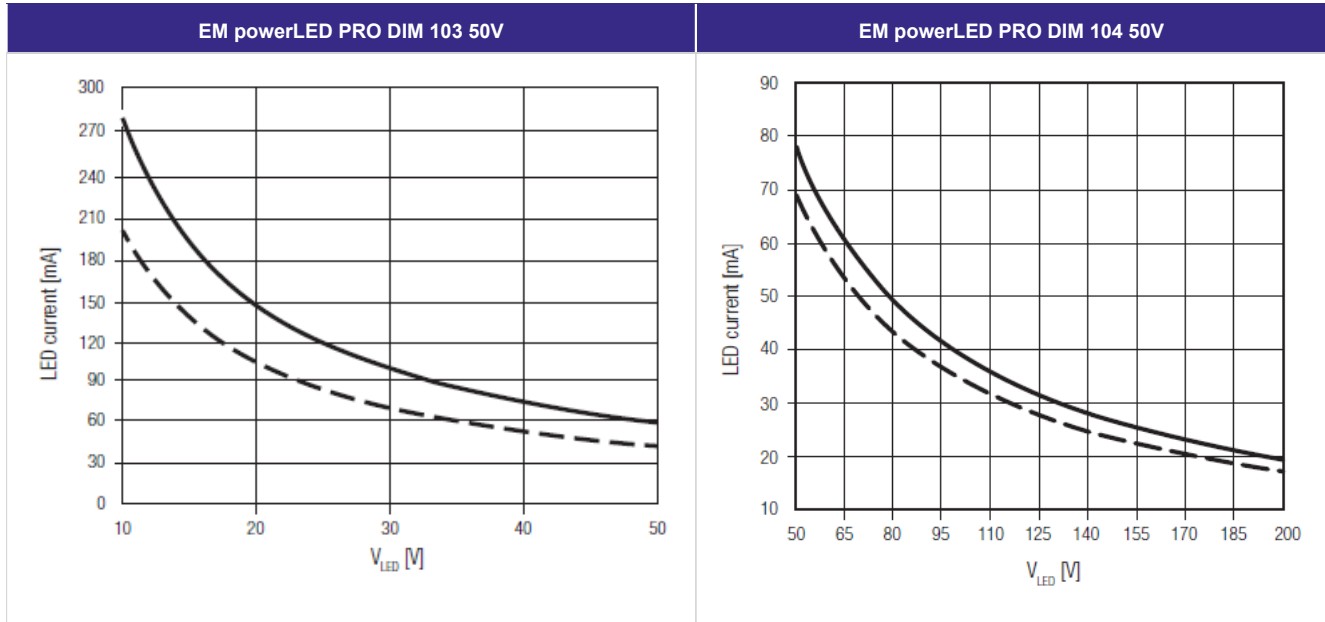 _ The total forward voltage of all LED modules is 24.2 V (no addition of the values in a parallel circuit).

> ⓘ NOTICE
>
> As Example 2 shows, parallel circuits make it possible to use multiple LED modules where the forward voltage does not add up.

Parameter 2: LED current

10.2. Parameter 2: LED current

Each EM powerLED PRO DIM has a specific current/voltage characteristic. The corresponding current/voltage curve can be found in the datasheet:

EM powerLED PRO DIM 103 50V	EM powerLED PRO DIM 104 50V

Knowing the total forward voltage of all LED modules, the value for the LED current can be read from the current/voltage curve:

_ Mark the value of the total forward voltage of all LED modules on the x-axis of the graph

_ From that point move up vertically

-> The crossing points with the two curves define a range of values.

The value of the LED current lies within this range. The effective value depends on tolerances.

Parameter 2: LED current
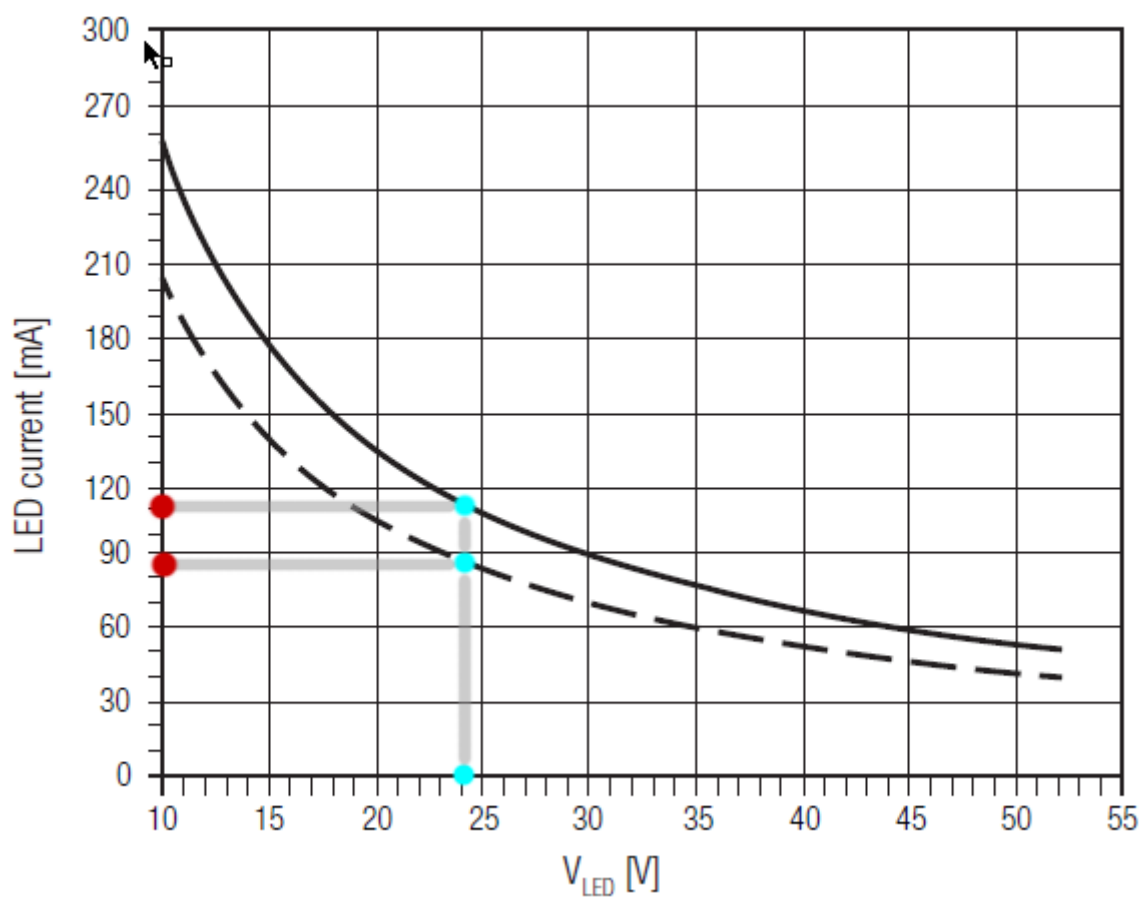
10.2.1. Example 1: 1 LED module DLE

Given:

_ Total forward voltage of all LED modules: 24.2 V (calculated before)

Wanted:

_ LED current?

Result:

Figure: Determining LED current for EM converterLED PRO DIM 103 50V

_ The two crossing points are at around 85 mA (minimum value) and 111 mA (maximum value).

_ The effective value of the LED current is between these two values.

Parameter 3: Light output in emergency operation

10.3. Parameter 3: Light output in emergency operation

The ratio between emergency operation and normal operation is the same for light output and LED current. The values for normal operation can be found in the LED module data sheet, the value for the LED current in emergency operation can be found in the data sheet (see example above).

$$\frac{light\ output\ in\ emergency\ operation}{light\ output\ in\ mains\ operation} = \frac{LED\ current\ in\ emergency\ operation}{LED\ current\ in\ mains\ operation}$$

With this equation the light output in emergency operation can be isolated and calculated:

$$light\ output\ in\ emergency\ operation = \frac{LED\ current\ in\ emergency\ operation}{LED\ current\ in\ mains\ operation} \times light\ output\ in\ mains\ operation$$

10.3.1. Example 1: 1 LED module DLE

Given:

_ LED current in emergency operation: approx. 85 mA (minimum value) and approx. 111 mA (maximum value) (taken from the previous example,

_ LED current in mains operation 750 mA (taken from data sheet DLE G3 2000 lm, Article number: 89600574)

_ Light output in mains operation: 2,100 lm (taken from data sheet DLE G3 2000 lm, Article number: 89600574)

Wanted:

_ Light output in emergency operation?

Result:

_ Minimum light output in emergency operation = 85 mA / 750 mA * 2,100 lm = 238 lm

_ Maximum light output in emergency operation = 111 mA / 750 mA * 2,100 lm = 310.8 lm

Compatibility between LED module and LED Driver

10.4. Compatibility between LED module and LED Driver

There are two stages involved in the check for compatibility between the LED module and the LED Driver.

_ The requirements for operating together can be checked by comparing the data sheets

_ Subsequent practical tests can ensure that there are no unexpected problems during actual operation

10.4.1. Comparison of data sheet values with a 5-point guideline

Different values for the two devices need to be considered when comparing the data sheets. The following table shows which values are involved and which requirements they must meet.

Comparison of…	Value in LED module		Value in LED Driver	Detailed procedure
(1) Current	I_{rated} @HO	≥	Output current	_ Determine forward current of module _ Check whether LED Driver can be operated with the same output current _ Check whether I_{max} of module is greater than or equal to output current of LED Driver (including tolerances) ⚠ **CAUTION!** The I_{max} can be temperature dependent! Refer to the derating curve of the LED module data sheet.
	I_{max}	≥	Output current + tolerances	

TRIDONIC

Compatibility between LED module and LED Driver

Comparison of…	Value in LED module		Value in LED Driver	Detailed procedure
(2) Voltage	Min. forward voltage	≥	Min. output voltage	_ Check whether voltage range of LED module is completely within the voltage range of LED Driver
	Max. forward voltage	≤	Max. output voltage	**⚠ CAUTION!** The forward voltage is temperature dependent! Refer to the Vf/t_p diagram in the data sheet.
	Min. forward voltage @ min. dim level	≥	Min. output voltage	Only relevant for dimmable LED Driver ! **ⓘ NOTICE** To ensure full dimming performance the forward voltage of the LED module at min. dim level must be greater than or equal to the min. output voltage of the driver. _ Determine the forward voltage of the LED module at lowest dim level _ In case there is no data available for the LED module at lowest dim level: take the min. forward voltage minus 20% as an approximation _ Check whether the forward voltage of the LED module is greater than or equal to the min. output voltage of the driver
(3) LF current ripple	Max. permissible LF current ripple	≥	Output LF current ripple (<120Hz)	_ Check whether max. permissible LF current ripple of LED module is greater than or equal to output LF current ripple of LED Driver
(4) Max. peak current	Max. permissible peak current	>	Max. output current peak	_ Check whether max. permissible peak current of LED module is greater than max. output current peak of LED Driver
(5) Power (pertinent for multi channel LED Driver)	Min. power consumption	>	Min. output power	_ Check whether power range of LED module is completely within output power range of LED Driver
	Max. power consumption	<	Max. output power	

Compatibility between LED module and LED Driver

10.5. Application of the 5-point guideline

The compatibility check with the 5-point guideline is shown here using two examples.

10.5.1. Example 1

Comparison data for LED Driver

LED Driver	
Designation	LCI 20W 350mA-900mA TOP C
Manufacturer	TRIDONIC

Data sheet values of LED Driver	
Output current	500 mA
Output current tolerance	± 5 %
Min. output voltage	18 V [1]
Max. output voltage	40 V [1]
Output LF current ripple	± 2 %
Max. output current peak	600 mA
Output power	20.0 W

[1] Values at 500mA

Comparison data for LED module

LED module	
Designation	Fictitious LED module
Manufacturer	Other manufacturer

Data sheet values of LED module	
Forward current	500 mA
Max. DC forward current	1,050 mA
Typ. forward voltage	33 V +/-10 % [1]
Min. forward voltage	29.7 V [1]
Max. forward voltage	36.3 V [1]
Max. permissible LF current ripple	100 mA
Max. permissible peak current	1,500 mA

Compatibility between LED module and LED Driver

Power draw	16.4 W

(1) Values at 500mA

Questions

_ Are the two components mutually compatible?

_ Can the required luminous flux of 1,510 lm be achieved with this combination?

Compatibility between LED module and LED Driver

Procedure

Comparison of data sheet values

Comparison of…	Value in LED module		Value in LED Driver	Result	Explanation
(1) Current	500 mA	=	500 mA	✅	_ To produce a luminous flux of 1,510 lm the LED module must be operated with a forward current of 500 mA. _ The LED Driver can be set so that it delivers precisely this value of 500 mA as the output current (with a resistance of 49.90 kOhm).
	1,050 mA	≥	525 mA	✅	_ The output current of the LED Driver including tolerances (500 mA + 5 % = 525 mA) is less than or equal to the max. DC forward current of the LED module (1,050 mA).
(2) Voltage	29.7 V	>	18 V	✅	_ The voltage range of the LED module (29.7 V - 36.3 V) lies completely within the voltage range of the LED Driver (18 V - 40.0 V).
	36.3 V	<	40 V	✅	
(3) LF current ripple	100 mA	>	10.5 mA	✅	_ The Output LF current ripple (2 % of output current plus tolerances: [500 mA + 5 %] x 0.02 = 10.5 mA) of the LED Driver is less than the max. permissible LF current ripple of the LED module (100 mA).
(4) Max. peak current	1,500 mA	>	600 mA	✅	_ The max. output current peak of the LED Driver (500 mA + 20 % = 600 mA) is less than the max. permissible peak current with which the LED module can be operated (1,500 mA).
(5) Power	16.4 W	<	20.0 W	✅	_ The power draw of the LED module (16.4 W) is less than the output power of the LED Driver (20.0 W).

Result

All the values meet the requirements. The components are mutually compatible.

10.5.2. Example 2

Comparison data for LED Driver

LED Driver	
Designation	LCI 20W 350mA-900mA TOP C
Manufacturer	TRIDONIC

Data sheet values of LED Driver

TRIDONIC

Compatibility between LED module and LED Driver

Output current	500 mA
Output current tolerance	± 5 %
Min. output voltage	18 V [1]
Max. output voltage	40 V [1]
Output LF current ripple	± 2 %
Max. output current peak	600 mA
Output power	20.0 W

[1] Values at 500mA

Comparison data for LED module

LED module	
Designation	Fictitious LED module
Manufacturer	Other manufacturer

Data sheet values of LED module	
Forward current	500 mA
Max. DC forward current	1,050 mA
Typ. forward voltage	39.5 V +/-10 % [1]
Min. forward voltage	35.55 V [1]
Max. forward voltage	43.45 V [1]
Max. permissible LF current ripple	100 mA
Max. permissible peak current	1,500 mA
Power draw	19.75 W

[1] Values at 500mA

Questions

_ Are the two components mutually compatible?

_ Can the required luminous flux of 1,800 lm be achieved with this combination?

Compatibility between LED module and LED Driver

Procedure

Comparison of data sheet values

Comparison of…	Value in LED module		Value in LED Driver	Result	Explanation
(1) Current	500 mA	=	500 mA	✅	_ To produce a luminous flux of 1,800 lm the LED module must be operated with a forward current of 500 mA. _ The LED Driver can be set so that it delivers precisely this value of 500 mA as the output current (with a resistance of 49.90 kOhm).
	1,050 mA	≥	525 mA	✅	_ The output current of the LED Driver including tolerances (500 mA + 5 % = 525 mA) is less than or equal to the max. DC forward current of the LED module (1,050 mA).
(2) Voltage	35.55 V	>	18 V	✅	_ The voltage range of the LED module (35.55 V - 43.45 V) is **not** within the voltage range of the LED Driver (18 V - 40.0 V)
	43.45 V	<	40 V	❌	
(3) LF current ripple	100 mA	>	10.5 mA	✅	_ The Output LF current ripple (2 % of output current plus tolerances: [500 mA + 5 %] x 0.02 = 10.5 mA) of the LED Driver is less than the max. permissible LF current ripple of the LED module (100 mA).
(4) Max. peak current	1,500 mA	>	600 mA	✅	_ The max. output current peak of the LED Driver (500 mA + 20 % = 600 mA) is less than the max. permissible peak current with which the LED module can be operated (1,500 mA).
(5) Power	19.75 W	<	20.0 W	✅	_ The power draw of the LED module (19.75 W) is less than the output power of the LED Driver (20.0 W).

Result

One of the values **does not** meet the requirements. The components are **not** mutually compatible.

Installation notes

10.6. Practical tests

Practical tests are used to ensure fault-free operation of the LED module and LED Driver. The following aspects must be checked.

10.6.1. Technical aspects

_ Transient behaviour

_ Colour shift

_ Connection during operation

_ Parasitic capacitance

10.6.2. Visual aspects

_ Flickering

_ Stroboscopic effect (video applications)

_ Dimming behaviour

_ Colour change/stability

_ Luminous flux

10.6.3. Conditions

When conducting the tests the following conditions must be considered:

_ All tolerances

_ Entire temperature range

_ Different output voltage ranges (incl. no load)

_ Entire dimming range

_ Short circuit

> ⓘ NOTICE
>
> If the values are slightly over or under the specified threshold values or if there are any other concerns or questions please contact Technical Support: techservice@tridonic.com

Installation notes

> **ℹ NOTICE**
>
> The cabling, wiring and mounting for an LED Driver varies depending on the design and manufacturer of the LED module.
> The following description should therefore not be taken as comprehensive installation instructions but merely as important general information.
>
> To obtain further information, proceed as follows:
>
> _ Read the documentation provided by the lamp manufacturer. Follow the guidelines and instructions of the lamp manufacturer!
>
> _ Observe all relevant standards. Follow the instructions given in the standards!

11.1. Safety information

> **⚠ WARNING!**
>
> _ Comply with the general safety instructions (see Safety instructions, p. 5) !
>
> _ To avoid failures due to ground faults protect the wiring against mechanical loads from sharp-edged metal parts (e.g. cable penetrations, cable holders, metal frames, etc.
>
> _ Electronic LED Driver from Tridonic are protected for a maximum of 48 hour against overvoltage of up to 320 V. Make sure that the LED Driver is not exposed to overvoltage for long periods!
>
> _ Electronic LED Driver of the EM powerLED PRO DIM, EM powerLED ST FX series from Tridonic have type of protection IP 20. Comply with the requirements for this type of protection!

Installation notes

11.2. Function of the earth terminal

The earth connection is conducted as protection earth (PE). The LED Driver can be earthed via earth terminal or metal housing (if device has metal housing). If the LED Driver will be earthed, protection earth (PE) has to be used. There is no earth connection required for the functionality of the LED Driver. Earth connection is recommended to improve following behaviour.

_ Electromagnetic interferences (EMI)

_ LED glowing at standby

_ Transmission of mains transients to the LED output

In general it is recommended to earth the LED Driver if the LED module is mounted on earthed luminaire parts respectively heat sinks and thereby representing a high capacity against earth.

11.2.1. Avoiding residual LED glow on standby

Residual LED glow on standby may occur as a result of capacitive leakage currents from the LED module onto earthed luminaire parts (such as the heat sink). This mainly affects high-efficiency LED systems with large surface areas installed in luminaires with protection class 1.

The topology has been improved so that residual LED glow can be virtually eliminated by earthing the devices.

> ⓘ NOTICE
>
> If the LED Driver cannot be earthed or if earthing is not desired, residual LED glow can be minimised by adequate insulation (for example by using heat-conducting double-sided insulation foil).

11.2.2. Avoiding the transfer of mains transients to the LED output

The transfer of mains transients to the LED output presents a problem for many LED driver topologies currently on the market, and TRIDONIC devices may be affected.

Voltage peaks at the input of the LED Driver may be transferred to the output of the device where they lead to differences in potential between the LED output and earthed luminaire parts. These differences in potential may result in flashovers if the insulation is inadequate or if the creepage and clearance distances are too small. Flashovers will cause the LED module to fail.

Earthing the LED Driver attenuates voltage peaks and reduces the likelihood of flashovers. The precise degree of attenuation depends on the capacitance of the LED module with respect to earth. If voltages at the output are higher than 0.5 kV, it is mentioned in the data sheet.

Installation notes

Figure: Voltage peaks for LED Driver without earthing (left) and with earthing (right)
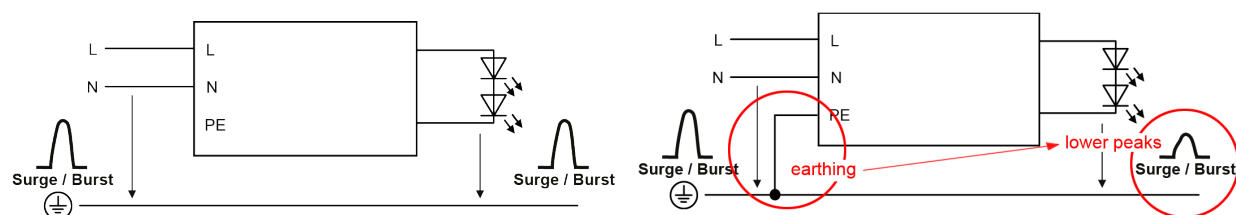
> **ⓘ NOTICE**
>
> Irrespective of whether the LED Driver is earthed or not, LED modules must be insulated in accordance with the requirements of the luminaire protection class. Improved insulation of the LED module can also reduce the risk of flashovers.

Installation notes

11.3. Routing the wires

11.3.1. Tests

> **ℹ NOTICE**
>
> The performance of the prescribed tests and compliance with relevant standards are the responsibility of the luminaire manufacturer.
>
> The following descriptions merely indicate the most important tests and are no substitute for a full research of the relevant standards.

11.3.2. Insulation and dielectric strength testing of luminaires

LED Driver for lamps are sensitive to high-voltage transients. This must be taken into consideration when subjecting luminaires to routine testing during manufacture.

According to IEC 60598-1 Annex Q (for information only!) and ENEC 303-Annex A, each luminaire should be subjected to an insulation test for 1 second at 500 V DC. The test voltage is applied between the linked phase/neutral conductor terminal and the protective earth terminal. The insulation resistance must be at least 2 megaohm.

> **⚠ CAUTION!**
>
> As an alternative to measuring the insulation resistance, IEC 60598-1 Annex Q describes a dielectric strength test at 1,500 V AC (or 1.414 x 1,500 V DC). To avoid damaging electronic LED Driver, it is strongly disadvised to perform this dielectric strength test.

11.3.3. Type testing

Type testing of the luminaire is performed according to IEC 60598-1 Section 10.

The wiring for protection class 1 luminaires is tested at a voltage of 2xU + 1,000 V. In order not to overload the LED Driver all the inputs and outputs of the LED Driver are connected to one another.

U_{out} is used for measuring the voltage for luminaires with LED Driver with U_{out} > 250 V:

For U_{out} 480 V the voltage for the type test is 2000 V.

11.3.4. Wiring

> **ℹ NOTICE**
>
> The wiring procedure is device specific. Further information about wiring, wire cross sections and the length of stripped off insulation can be found in the data sheet.

Wiring guidelines

_ The cables should be run separately from the mains connections and mains cables to ensure good EMC conditions.

_ The LED wiring should be kept as short as possible to ensure good EMC. The max. secondary cable length is 2 m (4 m circuit), this applies for LED output as well as for I-select and temperature sensor.

_ Depending on the design of the luminaire it may be possible to improve the radio interference properties by earthing the device at the earth connection.

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Installation notes

_ The LED Driver has no inverse-polarity protection on the secondary side. Wrong polarity can damage LED modules with no inverse-polarity protection.

_ Maximum lead length for the test switch and indicator LED connection is 1 m.

_ The test switch and indicator LED wiring should be separated from the LED leads to prevent noise coupling.

_ The battery wires are specified with a cross section of 0.5 mm and a length of 1.3 m.

_ If the optional mains switch is not used, connect S/L to L.

Wiring the plug-in terminal

_ Use solid wire or stranded wire with the correct cross-section

_ Strip off correct length of insulation; you may need to twist the tool slightly

_ If stranded wire is used: push onto the terminal from above to be able to insert the wire

_ Insert the bare end into the terminal

Detaching the plug-in terminal

_ Push onto the terminal from above to release the wire

_ Pull out the wire at the front

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Installation notes

11.4. Maximum loading of circuit breakers

11.4.1. Importance of maximum loading

A circuit breaker is an automatically operated electrical switch that protects an electrical circuit from damage caused by overload or short circuit. Unlike a fuse that must be replaced if it triggers, a circuit breaker can be reset (either manually or automatically) and used further. Circuit breakers are available in different sizes and with different technical data.

The inrush current is a short increased peak current that occurs when an electronic control gear is switched on.

In electrical installations, numerous control gear are connected to one circuit breaker. The maximum loading of a circuit breaker indicates how many control gear can be connected to the circuit breaker without triggering the circuit breaker because of the summation of the different inrush currents. The value is calculated through simulation programs based on the circuit breakers characteristic.

Information about the maximum loading can be found in Tridonic data sheets. The following table shows the data for EM powerLED PRO DIM 45W as an example

Automatic circuit breaker type	C10	C13	C16	C20	B10	B13	B16	B20	Inrush current	
Installation Ø (in mm²)	1.5	1.5	2.5	4	1.5	1.5	2.5	4	I_{max}	time
EM powerLED PRO DIM	18	26	30	36	9	13	15	18	23.9 A	187 µs

11.4.2. Calculation of maximum loading

Tripping characteristics of circuit breakers

The load at which a circuit breaker triggers is defined by the height and the duration of the applied current.

The following table shows exemplary values for different circuit breakers (B10, B13, B16, B20).

Duration [µs]	Current B10 [A_{peak}]	Current B13 [A_{peak}]	Current B16 [A_{peak}]	Current B20 [A_{peak}]
100	700	910	1,120	1,400
200	260	338	416	520
300	177	230.1	283	354
400	145	188.5	232	290
500	122	158.6	195	244
600	110	143	176	220
700	102	132.6	163	204
800	97	126.1	155	194
900	93	120.9	149	186
1000	90	117	144	180

The combination of both parameters can also be displayed graphically. This results in the tripping characteristic for a certain circuit breaker.

Installation notes

Current [A]
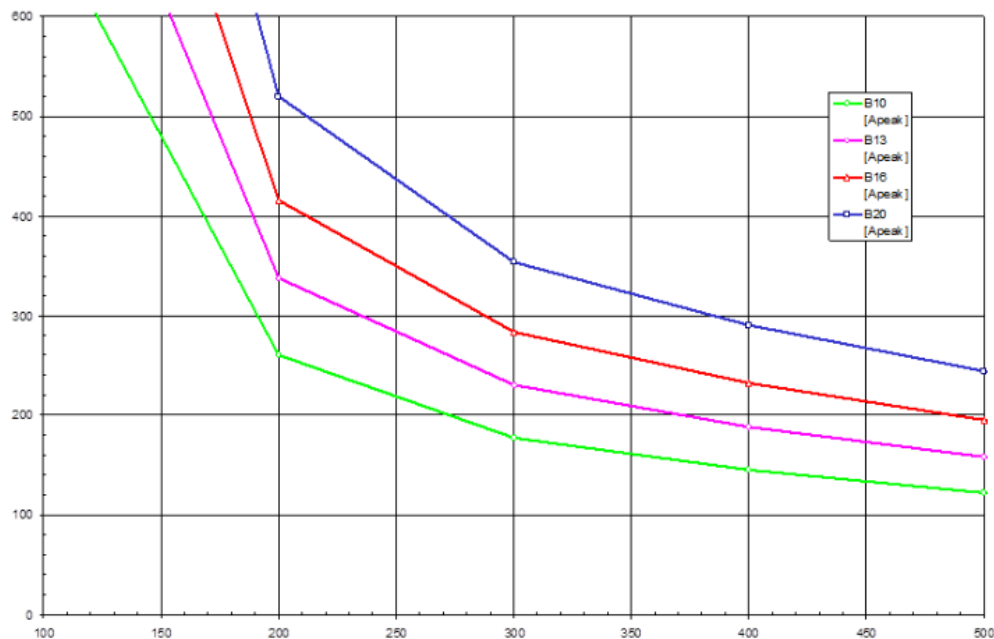
Duration [μs]

> **ⓘ NOTICE**
>
> Information about the specific tripping characteristics of a circuit breaker must be requested from the respective manufacturer !

Calculation of the inrush current

The inrush current of a control gear is also defined by its duration and its height. The duration is typically measured as the time between 10 % of maximum current (ascending) and 50 % of maximum current (descending).

The following illustration shows the inrush current of a single control gear:
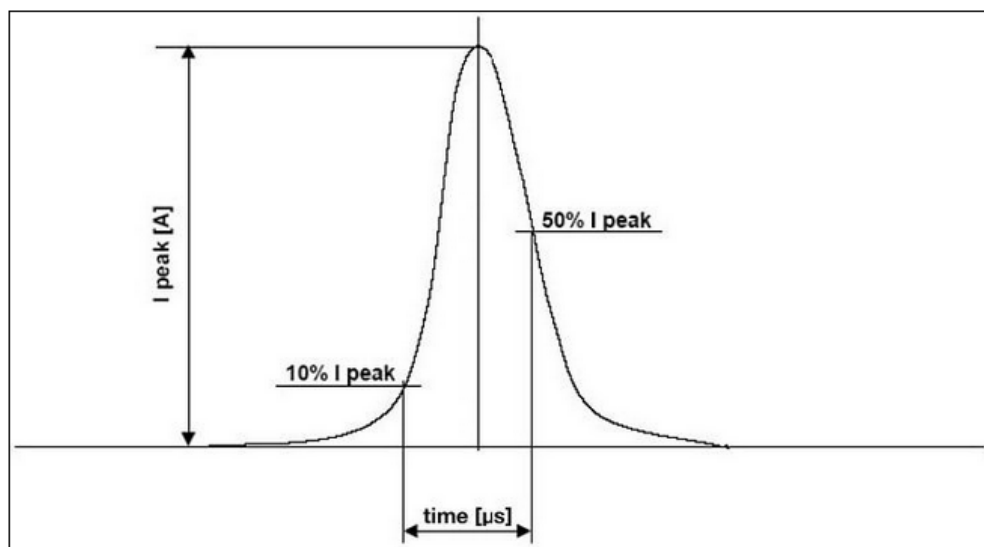
Installation notes

If several control gear are connected to one circuit breaker, the inrush current increases with the number of connected devices.
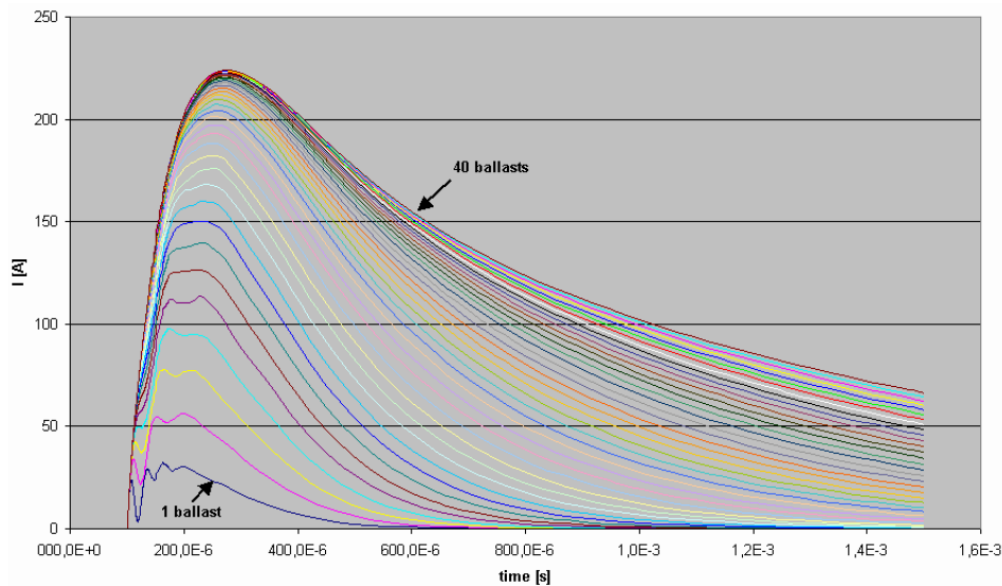
Implementation of the simulation

The above-mentioned parameters, height and duration of the current pulse in both the circuit breaker and the control gear, are entered into the simulation program.

The result of the simulation is presented in graphical form.
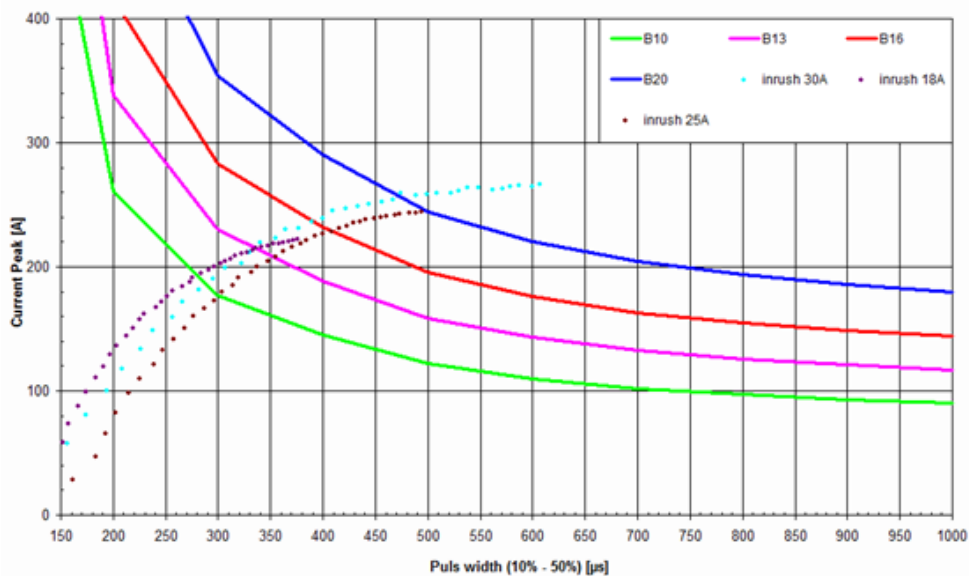
The different elements have the following meaning:

_ Circuit breaker:
 B10, B13, B16, B20 (solid line) represent the tripping characteristics of different circuit breakers.

 _

Installation notes

Inrush current:

The dotted lines represent different inrush currents.

The index of a point signifies the number of control gear, that is, point 1 represents the result for 1 ballast, point 2 the result for 2 ballasts, etc.

The simulation results can be read as follows:

_ The crossing of the two lines shows the maximum value for the selected combination of circuit breaker and inrush current.

_ The index of the point at this maximum value shows the max. number of ballasts.

The following example shows the maximum number of control gear at four different circuit breakers:

_ max. 5 devices at circuit breaker B10 (green tripping characteristic)

_ max. 7 devices at circuit breaker B13 (pink tripping characteristic)

_ max. 9 devices at circuit breaker B16 (red tripping characteristic)

_ max. 12 devices at circuit breaker B20 (blue tripping characteristic)
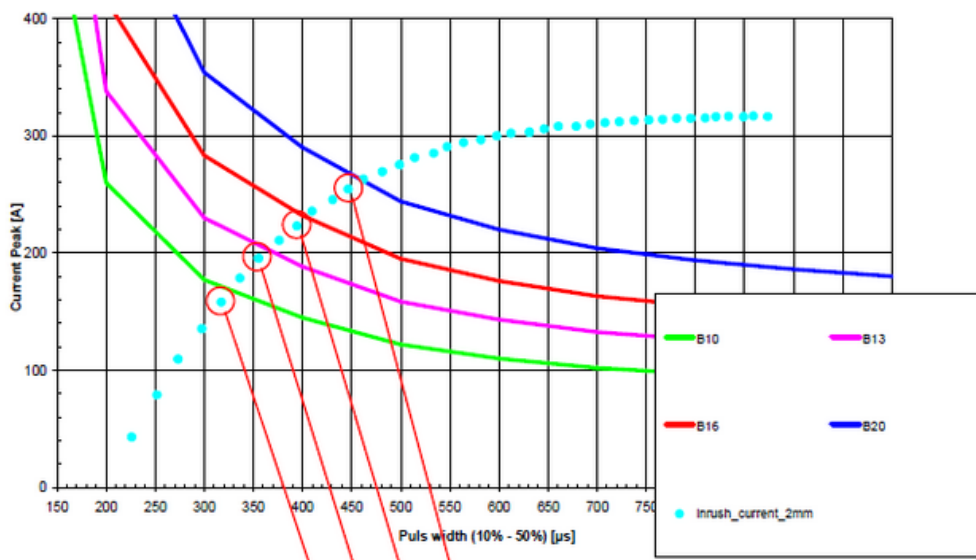
> **ℹ NOTICE**
>
> The results of different simulations can only be compared if all of the relevant factors are the same. The following points can influence the results:
>
> _ Tripping characteristic used for the circuit breakers
>
> _ Definition used for the duration of the inrush current (Tridonic: 10-50 %)
>
> _ Gear used for the measurement of the inrush current (especially important: Which electrolytic capacitor is installed in the control gear?)
>
> _ Considering a safety buffer (Tridonic: +20 % for the electrolytic capacitor)
>
> _ Considering different system impedances
>
> _ Switch-on point used: should always be at max. input voltage
>
> _ Adopted cable lengths and cable data (Tridonic: Cable length 40 cm; Resistivity: 0.0172 Ohm * mm^2 / m; inductance: 5nH / cm; terminal resistance: 2mOhm)
>
> _

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Installation notes

The modeling of the control gear is performed from the input to the bus voltage electrolytic capacitor . For inductance the saturation values must be used.

Reference list

12.1. Related documents

_ Data sheet EM powerLED ST FX C 45 W: http://www.tridonic.com/com/en/download/data_sheets/EM_powerLED_ST_FX_C_45W_en.pdf

_ Data sheet EM powerLED ST FX SR 45 W: http://www.tridonic.com/com/en/download/data_sheets/EM_powerLED_ST_FX_SR_45W_en.pdf

_ Data sheet EM powerLED PRO DIM C 45 W: http://www.tridonic.com/com/en/download/data_sheets/EM_powerLED_PRO_DIM_C_45W_en.pdf

_ Data sheet EM powerLED PRO DIM SR 45 W: http://www.tridonic.com/com/en/download/data_sheets/EM_powerLED_PRO_DIM_SR_45W_en.pdf

_ Flyer EM powerLED PRO DIM C/SR: http://www.tridonic.com/com/en/download/brochures/Flyer_EM_powerLED_PRO_DIM_C_SR_45W.pdf

_ Brochure Emergency Lighting: http://www.tridonic.com/com/en/download/Emergency_Lighting_Overview_EN.pdf

_ DALI manual: http://www.tridonic.com/com/en/download/technical/DALI-manual_en.pdf

_ Documentation masterCONFIGURATOR: http://www.tridonic.com/com/en/download/Manual_masterConfigurator_en.pdf

_ Leaflet ready2mains: http://www.tridonic.com/com/en/download/brochures/Leaflet_ready2mains_EN_web.pdf

_ corridorFUNCTION: http://www.corridorfunction.com/corridorFUNCTION/index.html

12.2. Downloads

_ Tridonic software: http://www.tridonic.com/com/en/software.asp

_ Download masterCONFIGURATOR: http://www.tridonic.com/com/de/software-masterconfigurator.asp

_ Download Android-App Emergency ADDRESSING Decoder: https://play.google.com/store/apps/details?id=net.gmx.royder.knight.EZ_easyADRESSING

12.3. Additional information

_ Declarations of conformity: http://www.tridonic.com/com/en/news-declarations-of-conformity.asp

_ Company certificates: http://www.tridonic.com/com/en/company-certificates.asp

_ Guarantee conditions: http://www.tridonic.com/com/en/guarantee.asp

_ Data sheets: http://www.tridonic.com/com/en/data-sheets.asp

_ Environmental declarations: http://www.tridonic.com/com/en/environmental-declarations.asp

_ Tender text: http://www.tridonic.com/com/en/tender.asp

_ Other technical documents: http://www.tridonic.com/com/en/technical-docs.asp

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