

xitanium



Design-in Guide

Reliable SR technology

For connected LED applications

a ignify brand

Creation date, Month, Year

Introduction to this guide

Thank you for choosing Xitanium LED SR drivers. In this guide you will find the information needed to integrate these drivers into a LED luminaire or LED system.

This edition describes the configurable Xitanium LED SR drivers. We advise you to consult our websites for the latest up-to-date information.



Applications

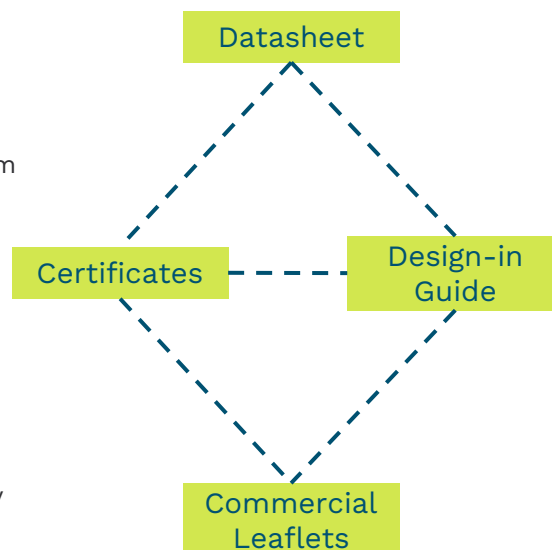
Xitanium LED SR drivers reduce complexity and cost of wireless connected lighting systems in outdoor and industrial applications. If you use Xitanium CR drivers in combination with Xitanium Sensors and Xitanium LED modules then specific design-in guides are available from the below mentioned technology websites for further support.

Information and support

Please consult your local Signify office or visit our websites.

Design-in Support

Dedicated design-in support from Signify is available on request. For this service, please contact your Signify representative.



Document Overview

To provide information in the best possible way, Signify's philosophy on product documentation is the following;

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

All these documents can be found on OEM website. If you require any further information or support, please consult your local Signify representative.

Warnings and Instructions



Safety warnings



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

Safety Warnings and installation instructions to be taken account during design-in and manufacturing.

- Do not use damaged products
- Do not connect mains voltage to the SR interface; immediate driver failure will result.
- The luminaire manufacturer is responsible for its own luminaire design and compliance with all relevant safety standards including minimum required IP rating to protect the driver.
- The Xitanium LED SR drivers are suitable for built-in use only and must be protected against ingress of and exposure to including but not limited to water, dust, insects or any other chemical agent - be it in the gaseous, vapor, liquid or solid form- which can be expected to have an adverse effect on the driver (e.g. use in wet/corrosive/dusty environments). It is the responsibility of both luminaire manufacturer and installer to prevent ingress and exposure. Any suggestion from Signify with reference to minimum required luminaire IP rating serves only as a non-binding guidance; a different IP rating may be required under certain application conditions to protect the driver. Common sense needs to be used to define the proper luminaire IP rating for the application.
- Do not service the driver when mains voltage is connected; this includes connecting or disconnecting the LED module. The driver generates an output voltage of the driver that may be lethal. Connecting a LED module to an energized driver may damage both the LED module and driver.
- No components are allowed between the LED driver and the LED module(s) other than connectors and wiring intended to connect the Xitanium driver to the LED module.
- Adequate earth and/or equipotential connections must be provided whenever possible or applicable.
- Signify Design-in support is available; please contact your Signify sales representative.

Xitanium LED SR Drivers

Xitanium LED D4i Certified SR Drivers

Our Xitanium SR drivers offer great benefits for Lighting Management Systems. To ensure full component interoperability, Signify provides SR Certification. The performance of third-party SR luminaire controllers is tested and certified on our SR drivers to eliminate any interfacing problems. This means you can offer connected lighting solutions without having to worry about software capabilities and system investments. We have a growing list of SR Certified Products that are compatible with our Xitanium SR LED drivers. They cover a wide range of connected lighting solutions from trusted providers of controller and connectivity modules, building management systems and city management systems. In order to support the development of SR Certified Components, Signify has launched the SR Partner Program. SR partners will receive all required details of the Xitanium SR driver interface for electrical and DALI data exchange protocols. Signify also provides test and verification services. Successfully tested products can be recognized via the SR Certified logo:



Xitanium LED SR driver versions

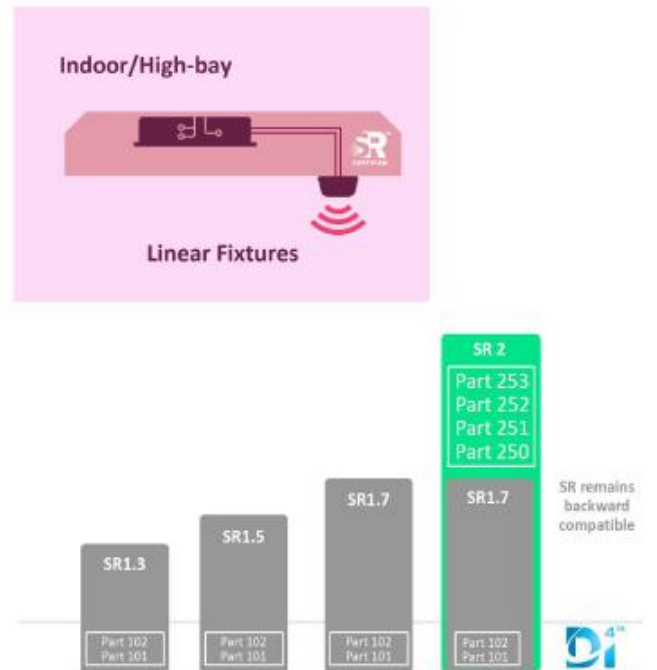
The Xitanium LED SR drivers described in this guide are available in multiple power and current ratings which enable the most popular light output levels for outdoor and industrial applications. It is always highly recommended to check our latest Xitanium LED SR driver leaflet for the most up-to-date overview of our range. This leaflet can be downloaded at www.lighting.philips.com/prof/led-electronics.

Detailed technical specifications can be found in the Xitanium driver datasheets at www.signify.com/oem

Configurability Interface (tooling)

The Xitanium LED SR drivers are configurable. A tailored package of features and parameters in these drivers can be set via a specific tool. This tool is the MultiOne Configurator. There are two types of interfacing technology used to communicate with this tool:

- DA Interface (wired)
- SimpleSet (wireless, based on Near Field Communication NFC)



Evolution of Sensor Ready (SR) intra-luminaire digital protocol

SimpleSet

Philips SimpleSet wireless programming technology allows luminaire manufacturers to quickly and easily program Xitanium LED SR drivers in any stage during of the manufacturing process without a connection to mains power, offering great flexibility. As a result, orders can be met faster while reducing cost and inventory.

For more information, please visit www.signify.com/oem

Xitanium LED SR Drivers

Sensor Ready (D4i) Interface (DA+/DA-)

Xitanium LED SR drivers reduce complexity and cost of luminaires used in wireless connected lighting systems. They feature a digital DALI interface to enable direct connection to any suitable luminaire-based CMS (City Management System) controller or sensor. The result is a simpler, less expensive luminaire that enables turning every luminaire into a wireless node. The simple two-wire DALI interface is -dependent on driver type- compliant with D4i DALI Parts 250/251/252/253.

Compatibility with regular DALI and D4i devices

D4i Certified Products are designed to fully benefit from the CR driver capability. Xitanium CR drivers are also DALI-2 Certified. So, DALI-2 control devices can also be used together with Xitanium CR drivers, full functionality will be achieved using D4i control devices combined with D4i Xitanium CR drivers.

DALI Part 102

Select drivers support Part 102 by enabling the configuration of 16 scene settings and associated fade time and power-on level via our wireless SimpleSet tool. This feature also supports quick and easy replacement of a (failed) driver by reading out these DALI variables from the replaced driver and transferring these to a replacement driver without the need for re-commissioning of the replacement driver. Please refer to the datasheet to look up whether Part 102 functionality is supported.

Auxiliary Power Supply

Next to the switchable DALI PSU, the Xitanium LED SR drivers are equipped with a permanently enabled auxiliary 24VDC power supply (+24VDC) which is short-circuit proof and intended to power auxiliary luminaire devices that need more power than the DALI PSU can deliver. This supply is compliant per DALI Part 150. More details about the auxiliary supply can be found in section Electrical design-in.

Tunable color temperature (FlexTune)

Xitanium SR FlexTune LED drivers offer unparalleled flexibility for your next lighting project that utilizes correlated color temperature (CCT) tuning capability. These drivers are equipped with our Sensor Ready (SR) interface, have two separately controllable outputs and offers a means for digital control of the driver including CCT tuning and all the benefits of a wireless connected system. These drivers can be used with different Philips Fortimo LED modules as part of the FlexTune system. Alternatively, they may also be used with non-Signify modules by appropriately configuring the driver settings as described in this document. Per DALI Part 209, Xitanium SR FlexTune LED drivers support precise CCT control and light output while maintaining compliance with TLA requirements across the full range of operation.

Xitanium SR FlexTune LED drivers are D4i-certified and compatible with the requirements outlined in DALI Part 209 (Device Type 8), and can directly accept CCT and dim commands from an external sensor or network controller (RGB excluded). This simplification offers an elegant system architecture to minimize complexity and maximize value to create the right digital foundation for your next connected lighting project.

Alternatively, the two driver output channels of the SR FlexTune LED driver can be controlled independently per DALI Part 207 (2x Device Type 6) in case CCT control is not required.

More details about FlexTune can be found in the Appendix.

Xitanium LED SR Drivers

Adjustable Output Current (AOC)

Flexibility in luminaire design is ensured by the Adjustable Output Current feature (AOC). This feature enables operation of various LED configurations from different LED manufacturers whilst also ensuring the solution remains “future-proof” for new LED generations. The output current can be configured with the Philips MultiOne software and the SimpleSet interface. More information about AOC and how to set the output current can be found in the section Electrical design-in.

Dimming interface

Interfacing with the Xitanium LED SR drivers can be done via the SR interface.

Amplitude Modulation (AM) dimming

Philips Xitanium LED SR drivers dim the output to the LEDs by means of continuous Amplitude Modulation (AM) dimming of the DC output current. No Pulse Width Modulation (PWM) is applied across any part of the entire output current range. AM dimming guarantees the smoothest and flicker-free operation over the entire dimming range.

Temporal Light Artifacts (flicker & stroboscopic effects)

A small inherent ripple is superimposed on the DC output current of Philips LED CR drivers. This ripple consists of a low- frequency LF component (double the mains grid frequency) and a high-frequency HF component. This ripple current has such a low amplitude that Temporal Light Artifacts (flicker & stroboscopic effects) with camera systems other than possibly those for high- speed slow-motion HD recording is not expected. The ripple value of both LF and HF components are specified in the driver datasheet. The typical values for TLA parameters short term flicker value (PstLM) and Stroboscopic

Visibility Measure (SVM) can be looked up in the driver datasheet.

LED Module Temperature Protection (MTP)

Adjustable limitation of thermal stress on the LED module is made possible by the Module Temperature Protection (MTP) feature combined with an NTC resistor integrated in the LED module. More details about MTP and the NTC resistor can be found in the Section Thermal design-in.

Xitanium LED SR Drivers

Hot-wiring and output sharing



Warning: Philips LED CR drivers do not support hot-wiring. In order to prevent damage to LEDs no connection or disconnection should be made to the driver output when mains voltage is present. Please ensure that power is turned off before doing so. Connecting multiple driver outputs in parallel or in series as well as the sharing of multiple LED+ or LED- connections in one wire is not supported either. Outputs of individual drivers must be kept fully separated.

OEM Write Protection (OWP)

OWP allows the OEM to protect their driver setting over the lifetime of the driver by using a password. Drivers equipped with OWP will show this in the feature list if read out by the tool MultiOne. Specific features and also the OWP feature itself can be enabled and protected with that password to prevent unauthorized changes. The password management is under the responsibility of the company which is setting it.

Driver diagnostics & maintenance

Xitanium LED SR drivers offer a Diagnostics & Maintenance feature. The purpose of this feature is to gather information and help diagnose the history of the driver and connected LED module for maintenance purposes. This feature consists mainly of counters which keep track of specific variables like the number of startups of the driver, operating hours, temperature of driver and LED modules, current and voltages etc. The Diagnostics & Maintenance feature stores applicable parameters in the non-volatile memory bank specified in DALI Part 253 and the D4i Certified specification.

More information on the diagnostics see the instruction manual of MultiOne Engineering at: www.philips.com/multione.

Energy data

Xitanium SR drivers have built-in energy measurement capability and can report energy and actual power consumption data. The metered data accuracy is equal to the accuracy as prescribed in EN50470-1 and EN50470-3, but its accuracy is not certified as such. Accuracy of the power measurement is the higher of following two values across the entire driver operating window: +/-4% of measured input power between %50-%100 load. The energy data feature stores energy reporting data in the nonvolatile memory bank provision specified in DALI-2 Part 252 and the D4i Certified specification.

Luminaire data

Xitanium LED SR drivers are equipped with the Luminaire Info feature. This feature supports the extraction of luminaire data as input for system asset management and enables the OEM to issue a unique Global Trade Identification Number (GTIN). This feature is implemented in compliance with DALI Part 251 version 4.

DC Mains Operation

Xitanium LED SR drivers support operation in a DC power grid (e.g. central emergency system). The driver behavior once switched to DC input voltage can be programmed via MultiOne software. More details about DC input voltage suitability can be found in the driver datasheet.

Xitanium LED SR Drivers

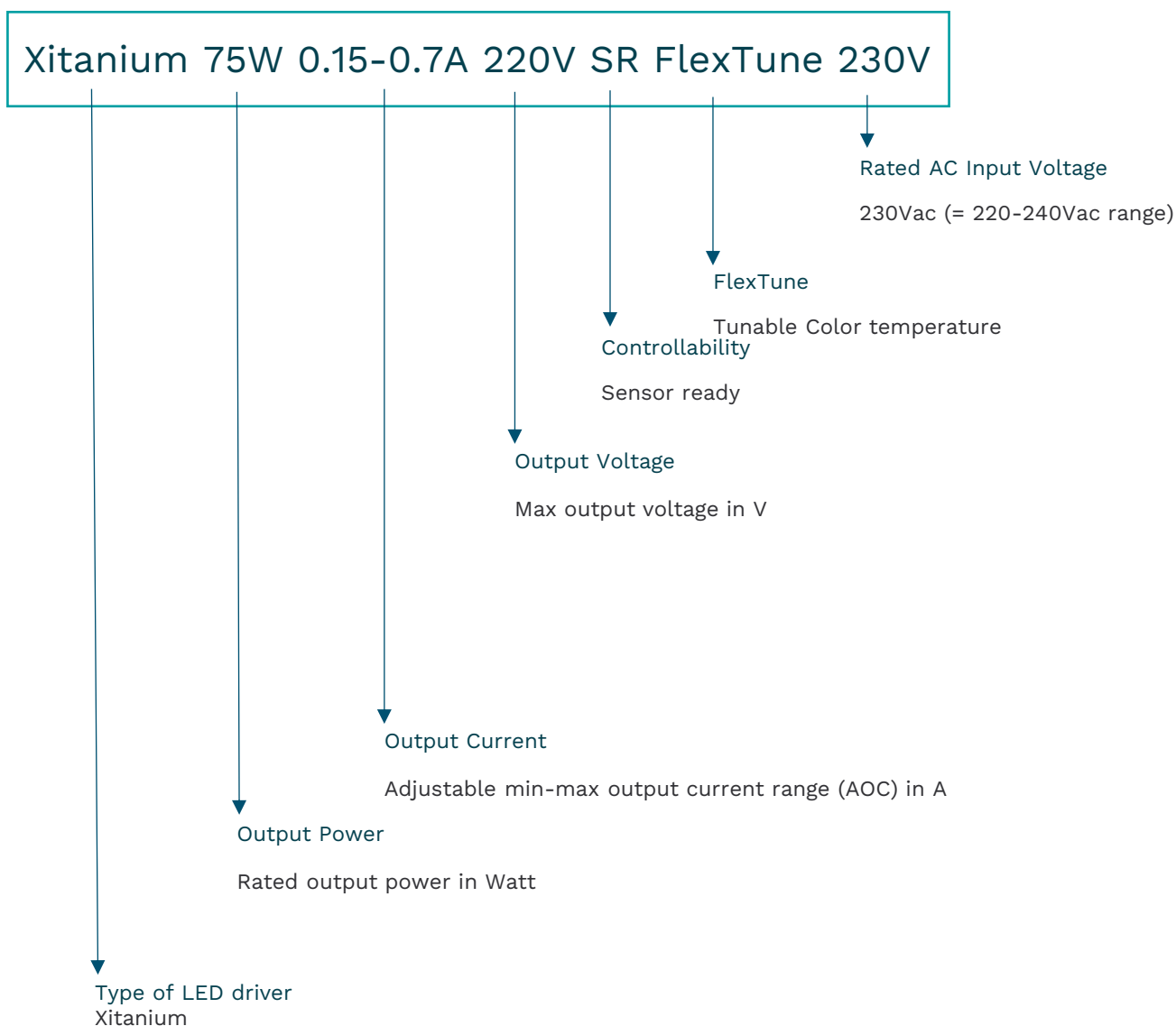


Use in hazardous areas

Warning: the use of lighting control gear in hazardous areas is bound to very strict safety regulations. Xitanium LED SR drivers are not certified per standard IEC/EN 60079 and latest EU directive ATEX for use in hazardous areas in which there is risk of explosion. Therefore, Xitanium LED SR drivers do not directly support application in luminaires and lighting systems in such environments.

Driver naming

Xitanium LED SR drivers are part of a specific naming system. See the example below.



Mechanical Design-in

Dimensions

Xitanium LED SR drivers are available in different housing dimensions. The specific dimensions can be found in the driver datasheet. 3D CAD files are available to verify fit and can be found at <https://www.lighting.philips.com/prof/led-electronics>.

It is recommended to build in drivers such that the driver housing and the driver input and output connectors are not affected by potential water ingress in the luminaire (e.g. due to luminaire sealing malfunction or condensation).

It is highly recommended to mount the driver by using all available mounting feet in order to achieve maximum mechanical robustness against shocks and vibration. The recommended mounting torque is 1.5Nm for drivers with plastic mounting feet. This value should not be exceeded in order to prevent deformation of the mounting feet.

Note: The use of rivets is not recommended since mounting torque cannot be controlled. Damage to the mounting feet and loose mounting may result.



Mounting screw dimensions should be based on the specified fixing hole diameter in the driver datasheet. Oversized and undersized screws should not be used in order to prevent damage to the mounting feet or loose mounting.

Allow for sufficient free space around the driver SimpleSet antenna if the driver is to be configured after mounting in the luminaire. The minimum recommended space is depending on the type of SimpleSet configuration tool. Using SimpleSet tool LCN9620, the minimum recommended distance is 19 mm (+/-1mm).

Depending on the application and the use in development, factory or field, another configuration tool can be selected. Please go to www.philips.com/multione to find the correct type. Every published interface tool is officially approved for use with the MultiOne software. The tool type number can be found by checking the LCN label on the tool itself.

Note: the use of an unapproved tool may result in impaired driver- tool communication and configuration malfunctioning.



Thermal Design-in

Introduction

This section describes the following aspects of the thermal design-in of the Xitanium LED SR drivers:

- The LED driver and the relationship between the tc point temperature and lifetime of the LED driver.
- The LED driver and its non-adjustable response to driver overheating (ThermalGuard).
- The LED driver and configurable Driver Temperature Limit(DTL) to maximize driver and possibly LED module lifetime in the application.

In order to facilitate thermal design-in of a LED driver, the critical thermal management points of the LED driver are set out in this section. Please familiarize yourself with the following key aspects to achieve optimal thermal design-in of the driver.

1: Driver case temperature point (t_c point)

The driver case point temperature (tc) is the only reference for the temperatures of the critical internal driver components. The location of the tc point is identified on the driver type plate and is marked by a * or O symbol. Please use only the tc point as reference to define thermal suitability of a driver in the application. Its temperature can be measured using a thermocouple that is firmly glued to the tc point surface on the driver housing. For a representative measurement the temperature of the tc point must be stable before any reliable data can be obtained (typically > 3 hours or when the temperature difference is less than 1°C within one hour).

2: Driver T_{c_life} value

The specified full driver lifetime and corresponding failure rate will apply as long as the tc point temperature remains between the lower ta_min and upper tc_max limits.

3: Driver Tc_max value

The driver supports running at a higher temperature than the specified tc_max temperature, up to the tc_max temperature. Keep in mind that doing so will be at the expense of the driver lifetime and failure rate. A graphical representation thereof can be found in the driver datasheet. Running the driver above the specified tc_max temperature is not supported and will negatively affect driver lifetime and void driver warranty. The only way to verify whether either tc_life or tc_max is exceeded in the application is by using a thermocouple.

4: Driver minimum ambient temperature (ta_min)

This lower limit value as specified in the driver datasheet stipulates the minimum luminaire ambient temperature at which the driver can be used, e.g. in frozen storage warehouses or (sub)arctic areas. Using the driver below its specified minimum ta_min value is not supported and will negatively affect driver performance and lifetime. Driver warranty will then be void.

5: Driver minimum ambient temperature (ta_min)

Typically, the driver tc point will reach its specified tc_max value at the specified driver ambient ta_max temperature inside the luminaire. However, if the driver is not running at full output power, then the actual tc point temperature may be lower than the tc_max value. In that case a higher driver ta is supported up to the point when the specified tc_max value is reached.

6: Driver temperature readout in MultiOne Diagnostics



The "Driver temperature" readout via the Diagnostics function in MultiOne software represents the temperature of a driver-internal thermal sensor. Please do not use this readout to define thermal suitability of a driver for a given luminaire; this temperature readout does not represent the tc point temperature and does not correspond 1:1 with the tc point temperature. It is therefore not suitable as a reference for thermal design-in.

The thermal design-in of the driver inside the luminaire also influences the relation between the driver ta temperature and tc temperature. E.g. mounting the driver on an effective heatsink or placing it further away from LED modules will lower the tc value at a given ta. The tc point temperature is always leading with respect to tc_life or tc_max.

In general, lowering the overall driver temperature will increase the driver lifetime since the temperature of critical components inside the driver will be lower. However, applying only local heatsinking of the driver -e.g. to lower the tc point temperature or any other surface hotspot- will not necessarily lower the temperature of critical components. Do not apply local heatsinking to improve intended thermal driver performance and/or to artificially lower the temperature of the tc point.

Electrical Design-In

Xitanium driver operating window

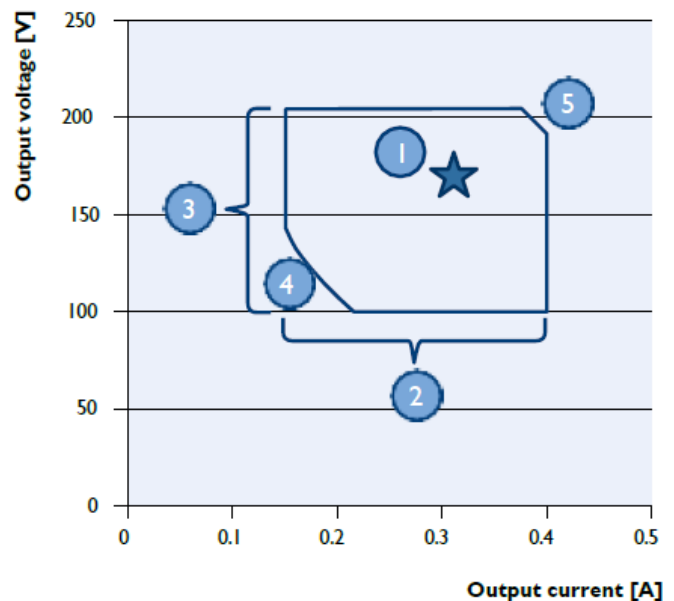
LED technology is rapidly evolving. The use of more efficient LEDs in a next generation means the same light output can be achieved with lower currents. At the same time, LEDs can be driven at different currents levels based on the application requirement. Typically, LED drivers are available in discrete current levels, e. g. 350 mA, 700 or 1050 mA. It is often necessary to replace a driver when more efficient LEDs or different LED modules become available.

One of the key features of the Xitanium LED SR drivers is the adjustable output current (AOC) feature, offering flexibility and future-proof luminaire design. The Xitanium drivers can operate in a certain “operating window”. This window is defined by the maximum and minimum voltage and current that the driver can deliver. An example of an operating window is shown on the left. The area indicates the possible current/voltage combinations. The current selected will depend on the type and manufacturer of the LEDs or the specific LED configuration of the PCB design. The voltage is the sum of the LEDs used (total V_f string) and dependent on LED drive current and temperature. The operating window of every driver can be found in the driver datasheet.

The output current of these drivers can be set in two ways:

1. SimpleSet: output current can be set using the Philips MultiOne software and SimpleSet interface.
2. D4i interface: output current can be set using the USB2DALI interface LCN8600.

Warning: the forward voltage V_f of the connected LED module must remain within the specified driver operating window voltage boundaries under all application conditions. Otherwise, reliable luminaire operation cannot be guaranteed.



Example Operating Window of a Xitanium driver

1. Required set point for the LED solution
2. Current can be set to needs within range (incl. dimming)
3. Driver adapts to required LED module voltage V_f , given it fits range
4. Driver minimum power limit
5. Driver maximum power limit



Electrical Design-In

How to select an appropriate driver

Depending on application requirements, several drivers may fit a specific application. The following steps will help in selecting the appropriate driver(s). For a complete overview of suitable driver(s) for your application, please use the Easy Design-in Tool (EDIT) at www.easydesignintool.philips.com as starting point.

Determine the required driver current (I_{drive}) and voltage (V_f)

1. Calculate the required power (P_{drive}) where $P_{drive} = V_f \times I_{drive}$ (W)
2. Select the datasheets from the website mentioned above based on the driver having a higher power than required.
3. Does the required current fit the current range of the driver? The current range of the driver can be seen in the name itself. For example, for driver Xi CR 75W 0.2 – 1.05A SDMP C123 sXt, the minimum programmable driver current is 0.2A and maximum is 1.05A.
4. Does the required LED voltage fit the voltage range of the driver? The exact value can be found in the datasheet.
5. Does the required power fit the power range of the driver? In the naming of the driver, you can see the maximum possible output power. For example, for driver Xi CR 75W 0.2 – 1.05 SDMP C123 sXt, the maximum output power is 75W.
6. Choose the preferred dimming method. Please refer to the section Driver naming to verify dimming options.

Programming the output current

The Xitanium LED SR drivers offer an extensive range of controls, enabling customizable luminaire design and performance. It is possible to control light output levels, preset dimming protocols and set system specifications in the factory and even in the complete installations.

This can be done with the Philips MultiOne configurator. The MultiOne configurator is a versatile tool that unlocks the full potential of all programmable drivers from Philips, ensuring that the driver performance matches the needs of the lighting solution. It offers unprecedented flexibility, before, during and after the product installation.

Programming of new Xitanium LED SR drivers can be done either by using the SimpleSet or the DA interface.

For more information on MultiOne please refer to the section Driver Configuration or visit: www.philips.com/multione. This site contains detailed information on how to install the software and how to program the driver.

Connectors

Philips Xitanium LED SR drivers are equipped with push-in type connectors. Connectivity specifications (wiring connection diagram, supported wire cross section range in mm², strip length range in mm and wire type) can be found in the driver datasheet.

Notes:

For currents between 1.0 and 1.5A (rms/DC) per connector, a minimum cross section of 0.75mm² is recommended.

In certain luminaire wiring scenarios two wires may have to be connected to one connector terminal. In that case, the pairing has to be done outside the driver, resulting in only one wire going into the connector terminal. Two wires into one connector terminal are not supported.

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

Mains operating conditions

Xitanium LED SR drivers support operation on power sources or grids providing a clean and symmetrical sinusoidal AC voltage wave form, a clean DC voltage or rectified sinewave input voltage ("joker voltage").

Operation on power sources including but not limited to having e.g. a square-wave voltage form or a "modified sinewave" is not supported.

Low and High mains voltage

Xitanium LED SR drivers are designed to be operated at mains under- and overvoltage per IEC requirements for performance and operational safety with respect to specified rated input voltage range.

The applicable lower limit for driver performance is lowest rated voltage - 8% while -10% applies for driver operational safety.

The applicable upper limit for driver performance is highest rated voltage +6 % while +10 % applies to driver operational safety.

The actual limit values can be found in the driver datasheet.

For optimal luminaire performance it is always recommended to operate drivers within the specified voltage performance range.

Electrical Design-In

Output open-load and short-circuit conditions

Xitanium SR LED drivers can withstand output open- load and short-circuit conditions. These are to be considered abnormal driver conditions. Consequently, it is not recommended to use drivers as such. Neither is it recommended to switch the driver output by means of e.g. relays ("hot switching") to connect or disconnect LED modules.

Excessive high mains voltage

An excessive high mains voltage will stress the driver and will have an adverse effect on the lifetime. Xitanium LED SR drivers will survive an input overvoltage of 264... 320Vac for a period of max. 48 hours and 320... 350Vac for a period of max. 2 hours.

A loose neutral condition has to be avoided as this may reduce the lifetime dramatically. Immediate driver failure may occur if the driver is connected to 400Vac as a result of a connection error in a 3-phase 230/400Vac grid.

DC Emergency Operation (DcemDim)

Depending on driver type, the driver may be certified acc. IEC 61347-2-13 Part J for operation on a DC input voltage. As a result, the driver enables application in emergency luminaires in compliance with IEC 60598-2-22 excluding high-risk task areas. These drivers support operation both a flat DC input voltage as well as operation on rectified sinewave "joker" input voltage.

On Xitanium SR drivers, the DC Emergency Dim feature DCemDim is available. This feature allows a pre-defined dim level of the driver output to which the driver will switch over automatically once connected to a DC input voltage. The default setting when connected to a DC input is 15% of the defined output current.

The mains input of DC-rated drivers is not polarity-sensitive for DC input voltage and the driver is fully CISPR15 EMC-compliant when operated on a DC grid. Specific DC input voltage values can be found in the driver datasheet.

Depending on driver type, EL marking may apply. For those drivers the corresponding Emergency Output Factor EOFx range can be found in the driver datasheet.

Xitanium LED SR drivers are equipped with an internal fuse rated for AC & DC voltage operation. Therefore, the use of an external DC voltage rated fuse is not required in case of DC (emergency) operation.

More on setting parameters of DCemDim can be found in the user manual of MultiOne. Specific DC input requirements can be found in the driver datasheet.

Note: The allowed DC input voltage range accepted by the driver is stated in the driver datasheet. Values outside that range will have an adverse effect on the driver performance and reliability and should be avoided.

Electrical Design-In

Power grids

Xitanium LED SR drivers are suitable for direct connection to TN, TT and IT grids. Depending on driver type, a luminaire-based fuse in the driver neutral connection may be required in case both feeding phases are “hot”.

Note: certain restrictions apply for use in IT grids. Direct connection of Xitanium LED SR drivers is only permitted in delta connection with a phase-to-phase voltage of 230Vac. In case the drivers are connected in star connection in a 230V/400Vac IT grid, the use of a separate 1:1 insulation transformer with sufficient power rating is required to power the drivers. The secondary output of the transformer must be connected to earth.

Power Factor (PF)

Xitanium LED SR drivers have a high- power factor (PF) which is inherently capacitive. Its capacitive nature cannot be compensated for. The output power dependent PF graph can be found in the driver datasheet. By design, the driver will maintain a high-power factor also under dimming conditions.

Inrush Current

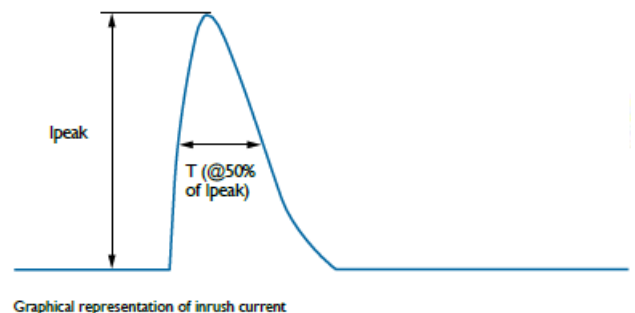
The term inrush current refers to the briefly occurring high input current which flows into the driver during the moment of connection to mains; see the illustration on the left. Typically, the amplitude is much greater than the steady-state input current. The cumulative inrush current of a given combined number of drivers may cause a Miniature Circuit Breaker (MCB) to trip. In such a case, either one or a combination of the following measures need to be taken to prevent nuisance tripping:

- Replace existing MCB for a less sensitive type
- Distribute the group of drivers over multiple MCB or phases
- Power up drivers sequentially instead of simultaneously.

Inrush parameters are driver specific and can be found in driver datasheet.

Notes:

- The amplitude and pulse width time of the inrush current are not in any way affected by the driver feature Adjustable Startup Time (AST, see section Control Features).
- Xi SR driver s are not equipped with an internal inrush current limiter.
- The use of an external inrush limiting device (e.g. EBN-OS or Camtec ESB) or a zero-voltage switching relay (e.g Finder 77 series) may enable a larger number of drivers to be connected to a MCB or fuse. Signify has not tested the compatibility or effectiveness of such third-party devices in the actual application. It is the responsibility of both luminaire manufacturer and installer to ensure compliance with national electrical codes when either device is used in the application.



Electrical Design-In

How to Determine the Number of Drivers per MCB

The maximum recommended number of drivers connected to a Miniature Circuit Breaker (MCB) from inrush current perspective can be calculated with the help of the conversion table shown on the left. In this table the stated amount for a 16A B type MCB is used as reference (100%). The maximum recommended number of drivers for different types of MCB can be calculated by this formula:

Max. number of drivers = reference x relative number in %

This table only applies for drivers without the IntelliStart feature.

Example:

If the datasheet states a max. amount of 20 drivers on a 16A B type, then for a 13A C type the max. amount is $20 \times 135\% = 27$ drivers.

Note: Keep in mind that in case a D type MCB is used that the steady-state current loading may be the limiting factor instead!

How to determine the number of drivers on a melting fuse

The maximum recommended number of drivers on a melting fuse is defined either by the aggregate inrush current or the aggregate steady-state input current.

The number of drivers can be calculated, using the specified values in the datasheet of the maximum input current and inrush current (I_{peak} and T_{width}) as well as the melting integral I_2t value of the applied fuse as specified by the fuse manufacturer.

The melting integral value I_2t of the aggregate inrush current must be 50% below the specified melting integral value I_2t of the fuse in order to prevent melting of the fuse when the drivers are connected to mains voltage simultaneously. And the aggregate steady-state input current loading shall remain below 80% of the fuse rating to prevent overheating of the fuse.

The following formula can be applied to calculate the I_2t value of the driver inrush current:

$$I_2t = (I_{peak})^2 \times (0.8 \times T_{width})$$

MCB type	Rating (A)	Relative number of LED drivers (%)
B	4	25
B	6	40
B	10	63
B	13	81
B	16	100 (reference)
B	20	125
B	25	156
B	32	200
B	40	250
C	4	42
C	6	63
C	10	104
C	13	135
C	16	170
C	20	208
C	25	260
C	32	340
C	40	415
D	4	80
D	6	130
D	10	210
D	13	280
D	16	350
D	20	470
D	25	550
D	32	700
D	40	940
L, I	16	108
L, I	10	65
G, U, II	16	212
G, U, II	10	127
K, III	16	254
K, III	10	154

The max. recommended number of drivers in the table above is based on inrush current and only serves as guidance. The actual maximum amount in the application may differ; it is dependent on steady-state current, MCB brand/type and inherent MCB tolerances.

Notes: Specified maximum number of drivers is based on simultaneous switch-on, e.g. by a central switch or relay.

For multiple MCBs in one cabinet the de-rating of the MCB manufacturer for steady-state load needs to be followed. If the actual de-rating is unknown, then it is recommended to use a steady-state current de-rating of 0.8 by default. No de-rating is needed in respect to inrush current as this is not part of the thermal properties of the MCB cabinet.

The maximum number of drivers that can be connected to one 30mA Residential Current Device (RCD) is typically 30. However, the actual maximum amount depends on RCD brand and type so the actual number may vary and will have to be defined on-site.

Electrical Design-In

Surge Immunity

Xitanium LED SR drivers have elevated differential-mode and common-mode surge immunity levels which by far surpass the requirements as defined by IEC. By design, the high immunity levels do not only safeguard reliable driver operation in the field but also provide high immunity for the connected LED modules, thus enabling a high surge immunity on system level. The driver immunity levels can be found in the driver datasheet. In order to achieve these high immunity levels, the driver EQUI terminal must be connected to the metal parts of the luminaire and LED module heatsink in all cases (Insulation Class I: also, to earth). Doing so will guarantee the specified surge immunity levels and will protect the driver and LED module against surge damage. Depending on the local conditions, additional protection against excessive high surge voltages may be required by adding an external Surge Protection Device in the luminaire and/or at installation level (column/distribution cabinet).

Protective Conductor current

Xitanium LED SR drivers are designed to meet safety requirements per IEC 61347-1 standard. The specified value of the protective conductor current can be found in the driver datasheet. The test is done on driver level only. In a luminaire, this current may be higher, since the LED module may introduce additional current due to its inherent parasitic capacitance. Therefore, precautions may be required on luminaire level. In a luminaire, the cumulative protective conductor current may be higher, since the LED module may introduce additional current. Precautions may be required on the luminaire level if multiple drivers are used in a single luminaire.

Electro-Magnetic Compatibility (EMC)

Electromagnetic compatibility (EMC) is the ability of a device or system to operate satisfactorily in its electromagnetic environment without causing unacceptable interference with other systems or being too susceptible for external emissions from other systems. Xitanium LED SR drivers meet EMC requirements per CISPR15 for conducted and radiated emissions. This test is conducted with a reference setup that includes a driver and an LED module + heat sink combination mounted on a metal plate and verified in Insulation Class I and II configurations.

Cable Length/Remote Mounting and EMC

Xitanium LED SR drivers are designed for built-in use only and do not support remote mounting. Signify has successfully performed CISPR15 EMC compliance tests on systems with a standard LED output cable length of 60cm as reference. For longer CISPR15-compliant cable lengths please check the driver datasheet for the maximum specified length.

If a longer distance beyond the maximum specified distance is required, then the EMC performance needs to be verified separately. The use of shielded LED output wires is not recommended.

Warning: the driver EQUI terminal must be connected to the luminaire chassis as well as to Protective Earth (Class I) for optimal EMC performance and surge immunity. Doing so for Class II luminaires is in safety compliance with IEC61347-1, IEC60598-1 and IEC61140 regarding the relation between the driver EQUI terminal and live parts with respect to:

- Maximum allowable touch current
- Minimum required insulation resistance
- Minimum required creepage distances and clearances
- Minimum required electric strength

The purpose of the driver EQUI terminal is purely for functional performance reasons by establishing equipotential bonding; the EQUI terminal does **not** have a safety function.

Signify has successfully performed EMC tests for a total output cable length of 0.6m (cable length between driver and Philips Fortimo LED Line modules). Select drivers may allow for a longer length; please refer to the driver datasheet to look up the applicable maximum value. Since EMC performance of the luminaire is heavily dependent on the wiring itself, we advise for lengths exceeding the maximum specified length to repeat EMC

Electrical Design-In

EMC Performance Precautions

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

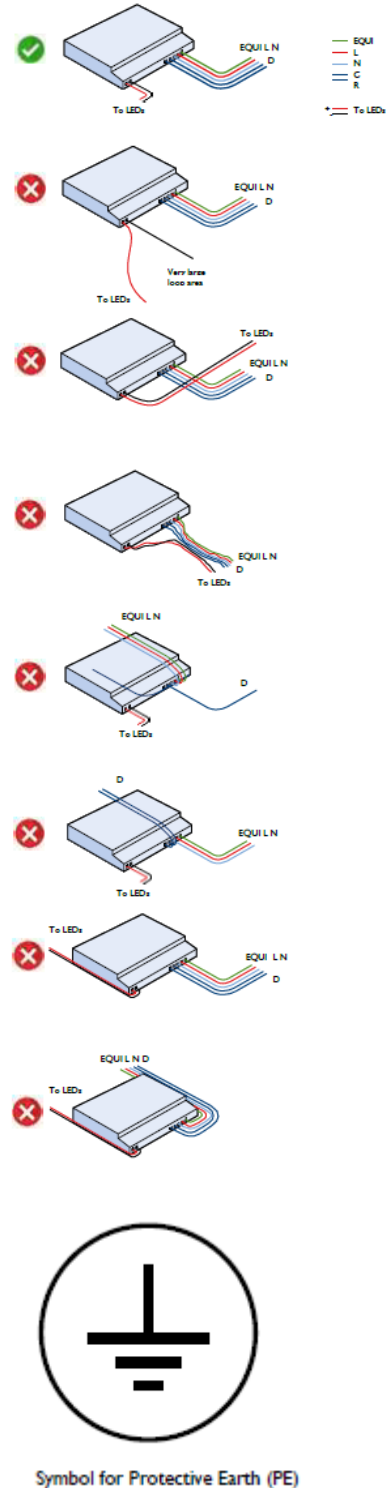
- Minimize the loop area of the LED output wires going from the driver to the LED module by keeping the output wires close together (bundling).
- Minimize the parasitic capacitive coupling of the LED output wiring towards earth by keeping the wiring length as short as possible.
- Keep the length of the incoming mains wire inside the luminaire as short as possible.
- Keep mains wires, DALI control wires and LED output wires separate. Do not bundle or cross the wires.
- Do not route any wiring over and/or along the driver enclosure to avoid any noise coupling/crosstalk with internal driver circuitry.

Xitanium LED SR drivers have no insulation between the mains input and the LED output. Therefore, all internal driver parts are live. Basic insulation is present between all internal live parts and the metal driver chassis; therefore the driver housing must be connected to Protective Earth as indicated by the Protective Earth (PE) symbol as shown on the left.

Non-isolated drivers are designed for use in Class I luminaires and do not support use in Insulation Class II applications without further additional safety measures on luminaire level.

Warning: all output connections of non-isolated drivers (incl. LEDset) are live and thus not safe to touch; therefore all live parts must be made inaccessible by luminaire design. The (unpainted) bottom part of the driver chassis can be used to create a protective earth contact to the luminaire housing, as the earth connector is internally connected to the driver housing. An intermitting earth contact should be prevented, as this is potentially unsafe and can cause degraded luminaire performance.

Adhering to these rules will help to achieve EMC compliance. For further questions and/or design-in support please contact your local Signify representative.



Electrical Design-In

Sensor Ready Interface

The simple two-wire DALI interface supports these key functions:

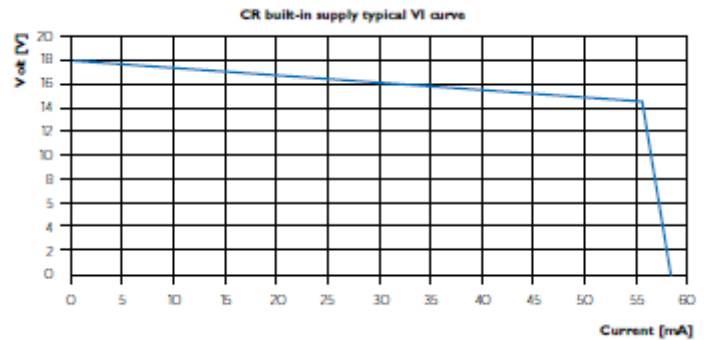
- Switchable built-in DALI bus Power Supply Unit (D4i PSU) to provide power to the connected controller (DALI Part 250)
- Memory Bank 1 Extension to store luminaire data (DALI Part 251)
- Two-way digital communication between the D4i driver(s) and luminaire controller(s), using standard DALI protocol via a polarized DALI bus:
 - Standard DALI dimming and on/off switching
 - Actual power consumption and energy data, utilizing the power monitoring integrated in the driver (DALI Part 252)
- Diagnostic and Maintenance information (DALI Part 253)

Built-in D4i bus Power Supply Unit (D4i PSU)

- Xitanium SR drivers have the ability to supply the CR bus with a built-in D4i PSU. This PSU can be disabled and enabled. By factory default, the D4i PSU is enabled and ready for use with an external control device. The D4i PSU is compliant per DALI Part 250.
- The D4i PSU is capable of delivering a minimum current of 52mA (ICR) to the CR bus and the connected device(s).
- The D4i PSU will never supply more than 60mA (ICR_MAX).
- The D4i bus voltage is depending on the controller load and the amount of D4i PSUs connected in parallel. See the graph on the left for the typical VI curve for one D4i PSU.
- When the internal D4i PSU is switched OFF, the CR driver will extract a maximum of 2mA from the D4i bus (like standard DALI gear).

Luminaire control devices

- Most luminaire controllers intended to be used in an D4i system will be powered from the driver D4i bus or the auxiliary power supply.
- When communication is present on the D4i bus, the bus gets pulled down by the data packages. This reduces the average current available for the power consuming control device. When communicating the average available current can drop with 50%. This should be taken into account when designing the control device.
- The extracted peak current (ICR_EXTRACTED) should be limited by the control device.



Electrical Design-In

Rules for building an D4i system

- D4i (DA+/DA-) bus polarity must be respected when more than one CR interface is connected in parallel.
- The total available D4i bus current (ISR_MAX_TOTAL) must not exceed 250mA. This current can be determined by adding up ISR_MAX of all connected D4i PSUs. As a consequence, a maximum of four enabled D4i PSUs are allowed to be connected in parallel. The total current delivered to the D4i bus (ISR_DELIVERED) can be determined by adding up the ICR of all connected enabled D4i PSUs.
- The total current extracted from the DALI bus (ISR_EXTRACTED) can be determined by adding up consuming devices like D4i drivers with disabled D4i PSU, other DALI gear and controllers (max. 2mA/device).
- To guarantee good communication, a margin of 8mA is needed to drive the D4i bus itself (ISR_MARGIN).
- The following rule should be respected: $ISR_EXTRACTED + ISR_MARGIN \leq ISR_DELIVERED$.
- It is not allowed to connect multiple +24V auxiliary supplies in parallel.

Typical examples

1. One SR driver is connected to a control device. The SR PSU of this driver is enabled. The specification of the control device states that the extracted peak current is 40mA. Will this SR system have good communication? One D4i PSU is involved, so D4i BUS polarity is irrelevant.

- $ISR_MAX_TOTAL = 60mA$. This is $\leq 250mA$
- $ISR_DELIVERED = 52mA$
- $ISR_EXTRACTED = 40mA$
- $ISR_MARGIN = 8mA$
- $40 + 8mA \leq 52mA$

Conclusion: this system will function properly.

2. Is it allowed to add an SR driver with disabled D4i supply PSU to this SR system?

Yes, an SR driver with disabled D4i PSU extracts max. 2mA from the D4i bus.

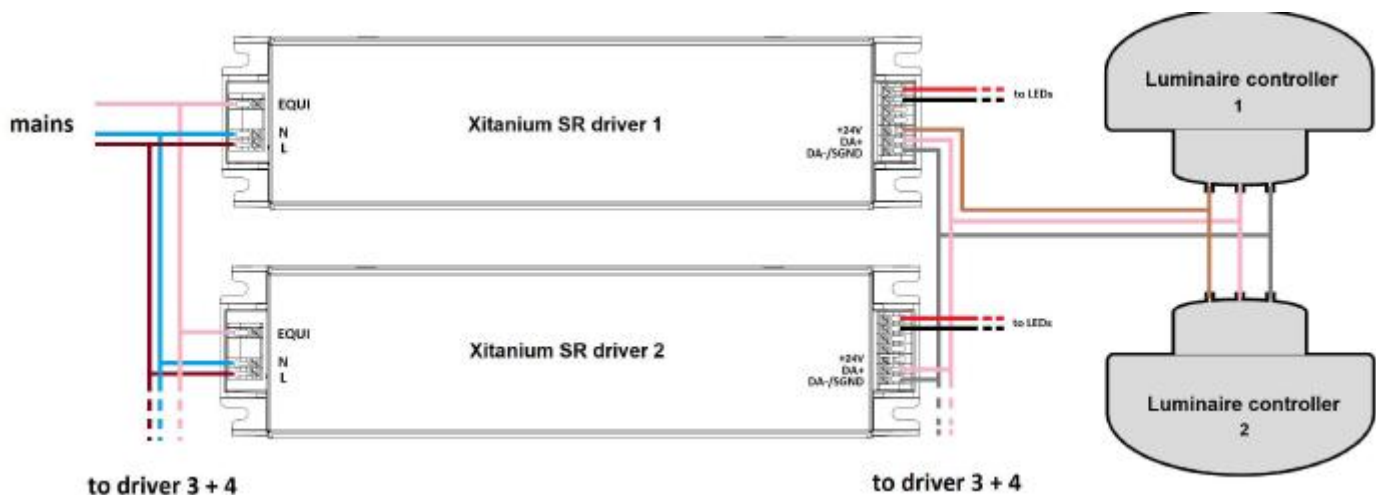
- $SR_EXTRACTED = 40 + 2 = 42mA$.
- $42 + 8mA \leq 52mA$

Conclusion: this system will function properly.



Warning

When the above rules are not taken into account, communication cannot be guaranteed and damage to components may occur.

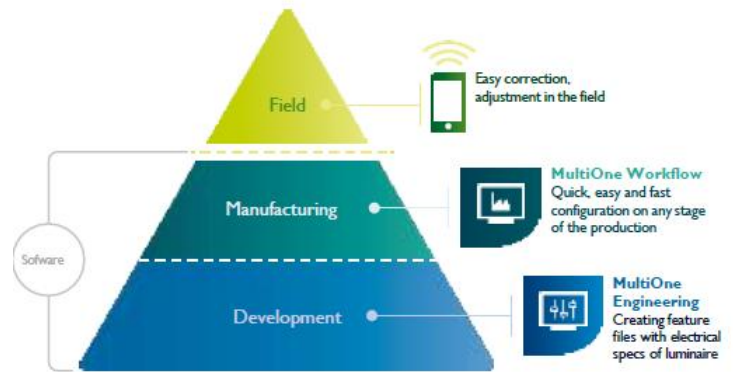


Driver Configuration

Introduction

The Xitanium LED SR drivers offer a tailored range of controls, enabling customizable luminaire design and performance. It is possible to control light output levels, preset dimming protocols and set system specifications in the factory and even in the complete installations. This can be done with the Philips MultiOne configurator. The MultiOne configurator is an intuitive tool that unlocks the full potential of all configurable drivers from Signify, ensuring that the driver performance matches the needs of the lighting solution. It offers unprecedented flexibility, before, during and after the product installation. Programming of new Xitanium LED SR drivers can be done either by SimpleSet or via the DALI interface with the USB2DALI interface.

For more information on MultiOne installation – software and programming: go to www.signify.com/oem



Control Features

Adjustable output current (AOC)

AOC limits the driver output current to match the application requirement. The limited output current is then dimmable over the full user controllable dim range; the AOC level [mA] being the 100% light level. The default AOC value can be found in the driver datasheet.

Adjustable Light Output (ALO)

ALO limits the light output of the driver to match the application requirement. The limited light output is then dimmable over the full user controllable dim range; the ALO level [%] being the 100% light level. Setting an ALO minimum level prevents the light from dropping below the set level during dimming conditions. This is a useful feature if a minimum light level needs to be maintained under all conditions.

ALO can also be used to permanently set the AOC value at a level below the minimum programmable AOC level. E.g. if the min. programmable AOC value of a driver is 200mA while the required AOC value is 160mA then the ALO feature must be enabled and set at 80%.

Depending on driver type, there are two ALO versions available: one version with and one without the option to set the ALO minimum level. Please check the driver datasheet to find out which ALO version is supported.

SR PSU

Xitanium LED SR drivers are equipped with an integrated Power Supply Unit (PSU) to power controller and nodes via the SR communication bus. This PSU can be disabled if power is not needed. The PSU must be disabled if more than four SR PSUs are connected in parallel in order to prevent SR bus current exceeding 250mA.

DC emergency dimming operation (DCemDim)

Xitanium LED SR drivers are equipped with an auto-detect DC voltage feature. As soon as a DC input voltage is detected, the driver will automatically set the output current to a predefined (15%) configurable emergency dimming level.

The driver will ignore all SR commands when operated at DC input voltage unless the optional checkbox "Allow dimming" in the DC Emergency tab is selected.

Output Current dependencies

The actual output current in the application depends on configuration of those driver features which influence output current and which are enabled or activated, like ALO, SR dim level and DCemDim.

The reference for output current is defined by the configured AOC value in mA. The actual output current then follows the values as configured for the several enabled features.

In formula, the actual output current is:

$$I_{out} = AOC \times ALO \times SR \text{ dim level}$$

Example:

Driver AOC = 500mA, ALO = 80%, SR dim command = 242 (70%). Actual output current is then $500 \times 0.8 \times 0.7 = 280\text{mA}$.

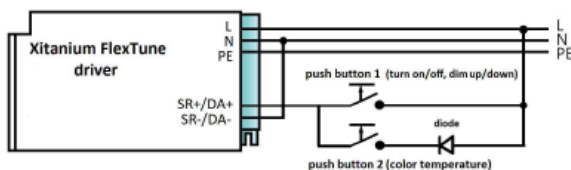
The following applies for DCemDim-equipped drivers while running on DC input voltage:

$$\text{Maximum output current} = \text{rated AOC} \times 0.6$$

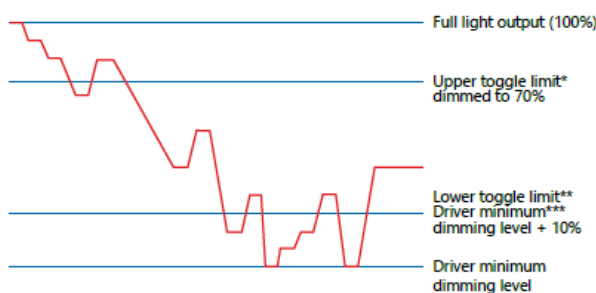
Control Features

Touch and Dim (SR FlexTune Only)

Xitanium SR FlexTune drivers are equipped with the Touch and Dim feature (TD). This feature is based on applying momentary mains voltage by means of two momentary push buttons to the SR-DA interface. These push buttons can be used to turn on/off and dim up/down the light (push button 1) and to change the color temperature (push button 2). See the connection diagram on the left. Mains voltage is permanently present at the LED driver mains input (even when the light is switched off) and light can be switched on or dimmed by momentarily applying mains voltage to the SR/DA interface via push button 1. A short push will switch the light on or off, depending on the previous situation. In order to tune the color temperature with push button 2 a series diode must be connected in series with push button 2. This diode must have a voltage rating of at least 700V. It is recommended to use a general-purpose diode, e.g. 1N4007. Alternatively, any DALI 209 compliant control module can be used.



Appropriate connection of the Xitanium SR FlexTune driver, using the Touch and Dim protocol



- * Always dim down above the upper toggle limit
 ** Always dim up under the lower toggle limit
 *** Examples:
 - a driver with a minimum dimming level of 10% leads to lower toggle level of $10\% + 10\% = 20\%$
 - a driver with a minimum dimming level of 1% leads to lower toggle level of $10\% + 1\% = 11\%$

Touch and Dim action	Contact duration	Driver response
Ignore	< 40 ms	Ignore
Short push	40ms to 0.5s	Toggle on/off
Long push	0.5s to 10s	Dim up or down
Reset push	>10s	Driver synchronization



Touch and Dim behavior

When the light is turned off (short push on push button 1), the driver will store the current light level and color temperature. As soon as the driver is turned back on again (short push) the driver will recall these stored values.

If push button is pushed for a longer period of time then, the light will dim up or down, depending on what is opposite from the last dimming direction. See the graph and timing table on the bottom left for details. Once the mains power returns after a power failure, the driver will activate the power-on level according to IEC 62386: 102.

Note: the driver SR PSU of all drivers must be disabled in case the Touch and Dim feature is used!

Control Features

OEM Write Protection (OWP)

By enabling the OWP feature the OEM can prevent unauthorized changes of crucial driver settings. The OWP feature is based on password protection that will be set in the driver so the preconfigured data of OEM write-protected driver features can only be modified by providing the correct password. Depending on the type of driver the OEM can protect the following:

- A set of features (fixed)
- A selection of individual features (free selection)

In order to indicate which features are locked, you will see a small lock symbol on each feature while trying to write the driver.

How to program this feature is described in the user manual of MultiOne Engineering at www.philips.com/multione.

WEEE Disposal Instructions

- EN** Please inform yourself about the local waste disposal, separation and collection system for electrical and electronic products and packaging. Please act according to your local rules and do not dispose your old product and packaging with your normal household waste. The correct disposal of the packaging, your product and/or batteries will help prevent potential negative consequences for the environment and human health. Batteries should be disposed separately from the municipal waste stream via designated collection facilities. When disposing a product that contains non-user replaceable batteries, the non-user replaceable batteries shall be removed by a professional.
- DE** Bitte erkundige Dich nach dem örtlichen Entsorgungs-, Trenn- und Sammelsystem für elektrische und elektronische Produkte und Verpackungen. Richte Dich bitte nach den geltenden Vorschriften in Deinem Land und entsorge Deine Altgeräte nicht über Deinen Haushaltsabfall. Durch die korrekte Entsorgung der Verpackung, Deines Produkts und/oder der Batterien/Akkus werden Umwelt und Menschen vor möglichen negativen Folgen geschützt. Batterien/Akkus müssen separat vom städtischen Abfallsystem über dafür vorgesehene Sammelstellen entsorgt werden. Bei der Entsorgung eines Produkts, das nicht vom Benutzer austauschbare Batterien/Akkus enthält, sollten die nicht vom Benutzer austauschbaren Batterien/Akkus von einer fachkundigen Person entfernt werden. Weitere Informationen über die Entsorgung Ihres Produktes und der Batterien finden Sie unter www.signify.com/de-de/sustainability.
- FR** Veuillez vous informer sur le système de collecte local, et sur la procédure de tri et de collecte des produits électriques et électroniques, et des emballages. Veuillez vous conformer aux consignes locales, et ne jetez pas votre ancien produit et son emballage avec les ordures ménagères. En respectant ces consignes pour mettre au rebut l'emballage, le produit et/ou les piles, vous contribuez à respecter l'environnement et la santé des personnes. Les piles ne doivent pas être mêlées aux ordures ordinaires, mais jetées sur des sites séparés prévus à cet effet. Lorsque vous mettez au rebut un produit contenant des piles non remplaçables, celles-ci doivent être retirées par un professionnel.
- NL** Houd rekening met het lokale systeem voor afvalscheiding en -inzameling wanneer u elektrische en elektronische producten of verpakkingen weggooit. Neem de lokale regelgeving in acht en gooi je oude producten en verpakkingen niet weg met het normale huishoudelijke afval. Het correct wegwerpen van de verpakking, het product en/of batterijen helpt mogelijke negatieve gevolgen voor het milieu en de menselijke gezondheid te voorkomen. Batterijen moeten gescheiden van huishoudelijke afvalstromen worden ingeleverd bij speciale inzamelpunten. Wanneer je een product weggooit met batterijen die niet door de gebruiker kunnen worden vervangen, moeten die batterijen door een professional worden verwijderd.
- ES** Infórmese sobre el sistema local de eliminación, separación y recogida de residuos de productos y envases eléctricos y electrónicos. Actúe de acuerdo con las normas locales y no tire el producto antiguo y su embalaje a la basura doméstica normal. La eliminación correcta del embalaje, de su producto y/o de las pilas contribuirá a evitar posibles consecuencias negativas para el medio ambiente y la salud humana. Las pilas deben eliminarse por separado del flujo de residuos municipales en las instalaciones de recogida designadas. Cuando deseche un producto que contenga pilas no sustituibles por el usuario, un profesional deberá retirar las pilas no sustituibles por el usuario.
- PT** Informe-se sobre o sistema local de eliminação, separação e recolha de resíduos de embalagens e produtos elétricos e eletrônicos. Proceda em conformidade com as regras locais e não elimine a produto antigo e a respetiva embalagem juntamente com os resíduos domésticos normais. A eliminação correta da embalagem, do seu produto e/ou das pilhas ajudará a prevenir potenciais consequências negativas para o ambiente e para a saúde humana. As pilhas devem ser eliminadas em separado do fluxo de resíduos urbanos através das instalações de recolha designadas. Quando se elimina um produto que contém pilhas não substituíveis pelo utilizador, estas devem ser removidas por um profissional.
- IT** Si prega di informarsi sul sistema locale di smaltimento, separazione e raccolta dei rifiuti per prodotti elettrici ed elettronici e imballaggi. Si prega di agire secondo le regole locali e di non smaltire il vecchio prodotto e l'imballaggio con i normali rifiuti domestici. Il corretto smaltimento dell'imballaggio, del prodotto e/o delle batterie aiuterà a prevenire potenziali conseguenze negative per l'ambiente e la salute umana. Le batterie dovrebbero essere smaltite separatamente dal flusso di rifiuti urbani tramite strutture di raccolta designate. Quando si smaltisce un prodotto che contiene batterie non sostituibili dall'utente, le batterie non sostituibili dall'utente devono essere rimosse da un professionista.
- DA** Hold dig orienteret om den lokale affaldsordning, -sortering og -indsamling for elektriske og elektroniske produkter og emballage. Følg de lokale regler, og bortskaft ikke dine udtjente produkter og emballage sammen med almindeligt husholdningsaffald. Korrekt bortskaftelse af emballagen, produktet og/eller batterier er med til at forhindre negative konsekvenser for miljøet og menneskers sundhed. Batterier skal bortskaftes separat fra den kommunale affaldsstrøm via særskilte indsamlingsordninger. Ved bortskaftelse af et produkt, der indeholder batterier, der ikke kan udskiftes af brugeren, skal batterierne fjernes af en fagperson.
- FI** Ota selvää paikallisesta sähkö- ja elektroniikkatuotteiden sekä pakkausten hävitys-, erottelu- ja keräysjärjestelmästä. Noudata paikallisia määräyksiä, äläkä hävitä vanhoja tuotteita ja pakkauksia tavallisen kotitalousjätteen mukana. Pakkauksen, tuotteen ja/tai paristojen asianmukainen hävittäminen auttaa ehkäisemään mahdollisia haittoja ympäristölle ja ihmisten terveydelle. Paristot on hävitettävä yhdyskuntajätteestä erillään määritettyjen keräyspisteiden kautta. Muuta kuin käyttäjän vaihdettavissa olevia paristoja sisältäviä tuotteita hävitettäessä muiden kuin käyttäjän vaihdettavissa olevien paristojen poistaminen on jätettävä ammattilaisen tehtäväksi.
- SV** Se till att skaffa dig kunskap om de lokala systemen för bortskaftande, sortering och insamling av avfall gällande elektriska och elektroniska produkter och förpackningar. Ågera i enlighet med lokala regler och släng inte bort din gamla produkt och förpackning tillsammans med vanligt hushållsavfall. Korrekt bortskaftande av förpackningen, din produkt och/eller batterier hjälper till att förebygga potentiella negativa konsekvenser för miljön och för människors hälsa. Batterier ska slängas separat från det kommunala avfallsflödet via särskilda insamlingsanläggningar. När du slänger en produkt som innehåller batterier som inte kan bytas ut av användaren ska de batterier som inte kan bytas ut av användaren avlägsnas av en yrkesperson.
- NO** Vennligst informer deg selv om det lokale avfallshåndterings-, separerings- og innsamlingssystemet for elektriske og elektroniske produkter og emballasje. Opptre i henhold til lokale regler og ikke kast det gamle produktet og emballasjen sammen med vanlig husholdningsavfall. Riktig avhending av emballasjen, produktet og/eller batteriene vil bidra til å forhindre potensielle skadelige følger for miljøet og personers helse. Batterier bør avhendes separat fra kommunalt avfall via anvisete innsamlingssteder. Ved kassering av et produkt som inneholder batterier som ikke kan skiftes ut av brukeren, skal batteriene som ikke kan byttes av bruker fjernes av en fagperson.
- EL** Ενημερωθείτε για το τοπικό σύστημα διάθεσης, διαχωρισμού και συλλογής αποβλήτων για ηλεκτρικά και ηλεκτρονικά προϊόντα και συσκευασίες. Ενεργείτε σύμφωνα με τους τοπικούς σας κανόνες και μην απορρίπτετε το παλιό σας προϊόν και τη συσκευασία του μαζί με τα συνήθη οικιακά απορρίμματα. Η σωστή απόρριψη της συσκευασίας, του προϊόντος σας ή/και των μπαταριών και η συμβάλει στην αποφυγή πιθανών αρνητικών συνεπειών που μοι με τη περιβάλλον και την ανθρώπινη υγεία. Οι μπαταρίες θα πρέπει να απορρίπτονται χωριστά από το ρεύμα των αστικών απορριμμάτων μέσω των καθορισμένων εγκαταστάσεων συλλογής. Κατά την απόρριψη ενός προϊόντος που περιέχει μπαταρίες που δεν αντικαθίστανται από τον χρήστη, αυτές πρέπει να αφαιρούνται από επαγγελματία.
- TR** Lütfen elektrikli ve elektronik ürünler ve ambalajları için yerel atık atma, ayrıca ve toplama sistemleri hakkında bilgi edinin. Lütfen bulunduğunuz bölgedeki yerel kurallara uygun hareket edin ve eski ürün ve ambalajınızı normal ev atıklarınızla birlikte atmayın. Ambalajın, ürününüzün ve/veya pillerin doğru şekilde atılması çevre ve insan sağlığı için olası olumsuz sonuçların önlenmesine yardımcı olur. Pillerin özel toplama tesisleri aracılığıyla belediye atık kolundan ayrı bir şekilde atılması gerekir. Kullanıcı tarafından değiştirilemeyen pil bulunan bir ürünü atarken pilin bir profesyonel tarafından çıkarılması gerekir.
- BG** Моля, запознайте се с местната система за изхвърляне, разделяне и събиране на отпадъци от електрически и електронни продукти и опаковки. Моля, действайте в съответствие с местните правила и не изхвърляйте стария продукт и опаковката заедно с обикновените битови отпадъци. Правилното изхвърляне на опаковката, на Вашия продукт и/или батерии ще помогне да се предотвратят потенциални негативни последици за околната среда и човешкото здраве. Батериите трябва да се изхвърлят отделно от потока на битовите отпадъци чрез определените за целта събирателни пунктове. При изхвърляне на продукт, който съдържа батерии, които не могат да се заменят от потребителя, същите трябва да бъдат отстранени от специалист.
- HU** Érdeklődjön az elhasznált elektromos és elektronikus termékek és csomagolásuk helyi szelektív gyűjtéséről és ártalmatlanításáról. Kövesse a helyi szabályozást, és ne helyezze az elhasználatott terméket háztartási hulladék-gyűjtőbe. A csomagolás, valamint az elhasználatott termék és/vagy akkumulátorok megfelelő ártalmatlanítása segít megelőzni a környezet és emberi egészség károsodását. Az akkumulátorokat külön, a helyi önkormányzat által megjelölt helyen kell gyűjteni, és nem szabad a háztartási hulladék közé keverni őket. A nem cserélhető akkumulátorokat tartalmazó termékek ártalmatlanításakor a nem cserélhető akkumulátorokat szakembernek kell eltávolítania.
- SL** Seznanite se z lokalnim sistemom odstranjevanja, ločevanja in zbiranja električne in elektronske opreme ter embalaže. Upoštevajite lokalno zakonodajo ter starega izdelka in embalaže ne odložite med običajne gospodinjske odpadke. S pravilnim odlaganjem embalaže, izdelka in/ali baterij med odpadke boste preprečili morebitne negativne posledice na okolje in zdravje ljudi. Baterij ne smete odložiti med gospodinjske odpadke, temveč na namenskih zbirnih mestih. Če odlagate izdelek, ki vsebuje baterije, ki jih uporabnik ne more zamenjati sam, bo takšne baterije odstranila strokovna oseba.

WEEE Disposal Instructions

- HR** Informirajte se o lokalnom sustavu za odlaganje, odvajanje i prikupljanje električnih i elektroničkih proizvoda i ambalaža. Postupajte u skladu s lokalnim propisima i ne odlažite stare proizvode i ambalaže s uobičajenim kućanskim otpadom. Ispravno odlaganje ambalaže, proizvoda i/ili baterija pomoći će u sprječavanju mogućih negativnih posljedica za okoliš i zdravlje ljudi. Baterije je potrebno odlagati odvojeno od komunalnog otpada na za to predviđenim odlagalištima. Kada odlažete proizvod koji sadrži baterije koje korisnik ne može samostalno zamijeniti, te će baterije ukloniti stručnjak.
- MK** Informirajte se za lokalni sistem za frlaње, одделување и собирање отпад од електрични и електронски производи и пакувања. Постапувајте во согласност со вашите локални прописи и немојте да ги фрлате стариот производ и пакувањето во обичниот отпад од домаќинството. Правилното фрлање на пакувањето, производот и/ли батериите ќе помогне да се спречат потенцијалните негативни последици за животната средина и човечкото здрање. Батериите треба да се фрлаат одделно од општинскиот систем за отпад преку назначени собирни објекти. Кога фрлате некој производ што содржи батерии што не може да се заменат, тие ќе се отстрануваат од страна на стручно лице.
- SR** Informišete se o lokalnom sistemu za odlaganje, odvajanje i sakupljanje otpada za električne i elektronske proizvode i ambalažu. Postupajte u skladu sa lokalnim pravilima i ne odlažite svoj stari proizvod i ambalažu sa uobičajenim kućnim otpadom. Pravilno odlaganje ambalaže, proizvoda i/ili baterija će pomoći u sprečavanju potencijalnih negativnih posledica po životnu sredinu i zdravlje ljudi. Baterije treba odlagati odvojeno od toka komunalnog otpada putem određenih objekata za prikupljanje. Kada odlažete proizvod koji sadrži baterije koje ne može zameniti korisnik, te baterije će ukloniti profesionalac.
- CZ** Informujte se o místním systému likvidace a tříděného sběru elektrických a elektronických výrobků a balení. Postupujte v souladu s místními předpisy a nevyhazujte staré výrobky do běžného komunálního odpadu. Správná likvidace produktů a baterií přispívá k ochraně případných nežádoucích vlivů na životní prostředí a zdraví osob. Baterie je třeba zlikvidovat samostatně mimo veřejné skládky prostřednictvím specializovaných sběrných míst. Při likvidaci výrobku obsahujícího baterie, které nejsou uživatelsky vyměnitelné, musí uživatelsky nevyměnitelné baterie vyjmout odborník.
- SK** Zistite si informácie o miestnej likvidácii odpadu, systéme separovaného zberu elektrických a elektronických výrobkov a obalov. Postupujte v súlade s miestnymi predpismi a nevyhadzujte staré výrobky do bežného komunálneho odpadu. Správna likvidácia produktov a batérií prispieva k zabráneniu prípadným nežiaducim vplyvom na životné prostredie a zdravie osôb. Batérie treba zlikvidovať samostatne mimo verejnej skládky prostredníctvom špecializovaných zberných miest. Pri likvidácii výrobku obsahujúceho batérie, ktoré nemôže vybrať používateľ, musí výber nevymeniteľných batérií vykonať odborný technik.
- PL** Należy we własnym zakresie sprawdzić informacje o lokalnych placówkach odbierających zużyte produkty elektryczne i elektroniczne oraz opakowania po nich. Należy bezwzględnie przestrzegać lokalnych przepisów zakazujących wyrzucania urządzeń i opakowań razem z odpadami komunalnymi. Właściwe usunięcie zużytego opakowania, produktu i/lub baterii pomoże uniknąć potencjalnych szkodliwych skutków dla środowiska naturalnego i zdrowia ludzi. Baterii nie wolno wyrzucać wraz z odpadami komunalnymi. Należy je zanościć do wyznaczonych punktów zbiórki. W przypadku utylizacji produktu zawierającego baterie niepodlegające wymianie przez użytkownika, powinny one zostać usunięte przez specjalistę.
- RO** Informați-vă cu privire la sistemul local de colectare, separare și eliminare a deșeurilor pentru produsele electrice și electronice și ambalajele acestora. Acționați în conformitate cu regulile locale și nu eliminați produsele vechi și ambalajele împreună cu deșeurile menajere obișnuite. Eliminarea corespunzătoare a ambalajelor, a produsului și/sau a bateriilor va ajuta la prevenirea consecințelor potențiale negative pentru mediu și sănătatea umană. Bateriile trebuie eliminate separat de sistemul municipal de gestionare a deșeurilor prin intermediul unităților de colectare desemnate. Atunci când eliminați un produs care conține baterii ce nu pot fi înlocuite de utilizator, aceste baterii trebuie îndepărtate de către un specialist.
- SQ** Informohuni për sistemin lokal të hedhjes së mbeturinave, ndarjes dhe grumbullimit për produktet elektrike dhe elektronike dhe paketimin. Veproni në përputhje me rregullat lokale dhe mos e hidhni produktin e vjetër dhe paketimin me mbeturinat e zakonshme të shtëpisë. Hedhja e duhur e paketimit, produktit dhe/ose baterive do të ndihmojë në parandalimin e pasojave të mundshme negative për mjedisin dhe shëndetin njerëzor. Bateritë duhet të hidhen veçmas nga rryma e mbeturinave urbane nëpërmjet pikave të autorizuar të grumbullimit. Kur hidhni një produkt që përmban bateri që nuk ndërrohen nga përdoruesi, këto bateri duhet të hiqen nga një profesionist.
- LV** Lūdzu, iepazīstieties ar informāciju par vietējo atkritumu likvidēšanas, nošķiršanas un savākšanas sistēmu elektriskām un elektroniskām precēm un iepakojumiem. Rīkojieties atbilstoši vietējiem noteikumiem un nelikvidējiet nolietotos izstrādājumus un iepakojumus kopā ar parastajiem sadzīves atkritumiem. Izstrādājuma un/vai bateriju pareiza likvidēšana palīdzēs novērst iespējamu nelabvēlīgu ietekmi uz vidi un cilvēku veselību. Baterijas jālikvidē atsevišķi no pašvaldību atkritumu plūsmas ar šim nolūkam īpaši paredzētu savākšanas uzņēmumu starpniecību. Likvidējot produktu, kas satur baterijas, kuras lietotājs nevar nomainīt, profesionālim ir jāizņem šīs baterijas.
- LT** Susipažinkite su vietinė elektros ir elektroninių gaminių bei pakuočių atliekų šalinimo, rūšiavimo ir surinkimo sistema. Laikykites vietinių taisyklių ir neišmeskite seno gaminio bei pakuotės kartu su įprastomis buitinėmis atliekomis. Tinkamas pakuotės, gaminio ir (arba) baterijų išmetimas padės išvengti galimų neigiamų pasekmių aplinkai ir žmonių sveikatai. Baterijos turi būti išmestos atskirai nuo komunalinių atliekų srauto tam skirtais surinkimo įrenginiais. Išmetant gaminį, kuriame yra naudotojo nekeičiamų baterijų, naudotojų nekeičiamas baterijas turi išimti profesionalas.
- ET** Viige ennast kurssi kohaliku elektri- ja elektroonikatoodeete ning pakendite kasutusest kõrvaldamise, sorteerimise ja kogumise süsteemiga. Järgige kohalikke eeskirju järgi ning ärge visake vana toodet ega pakendeid olmejäätmete hulka. Pakendi ja vana toote ja/või akude nõuetekohane kasutusest kõrvaldamine aitab vältida võimalikke negatiivset mõju keskkonnale ja inimeste tervisele. Akud tuleb kasutusest kõrvaldada olmejäätmetest eraldi ning viia selleks ette nähtud kogumiskohta. Kui kõrvaldate kasutusest toote, mis sisaldab akusid, mida kasutaja ei saa vahetada, peab need akud tootest eemaldama kvalifitseeritud spetsialist.
- RU** С информацией о местных системах раздельного сбора и утилизации таких отходов, как электрическое и электронное оборудование, а также упаковка, рекомендуется ознакомиться самостоятельно. Соблюдайте региональные нормативные требования и не выбрасывайте отслужившее изделие вместе с обычным бытовым мусором. Правильная утилизация отслужившего изделия и/или батарей поможет уменьшить негативные последствия для окружающей среды и здоровья людей. Батареи следует утилизировать отдельно от бытовых отходов через специальные пункты сбора. Если изделие оснащено батареями, не предназначенными для самостоятельной замены, их должен извлечь специалист.
- UA** Рекомендуємо самостійно ознайомитися з інформацією про місцеві системи сортування й утилізації відходів електричного та електронного обладнання і їхнього пакування. Дійте відповідно до місцевих правил і не викидайте старий виріб і його упаковку разом зі звичайними побутовими відходами. Правильна утилізація упаковки, виробу та/або акумуляторів допоможе запобігти потенційним негативним наслідкам для довкілля та здоров'я людей. Акумулятори слід утилізувати окремо від потоку комунальних відходів через спеціальні місця для збору. Під час утилізації виробу, що містить акумулятор, який не може замінювати користувач, такий акумулятор має вилучати професіонал. УВАГА: Нижче ви знайдете всі пояснення з числовими посиланнями на значки, відповідно, перед цими інструкціями з безпеки:

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