PHILIPS

Xitanium

SR Bridge

Design-in Guide

Reliable SR technology for connected lighting applications

September 2020

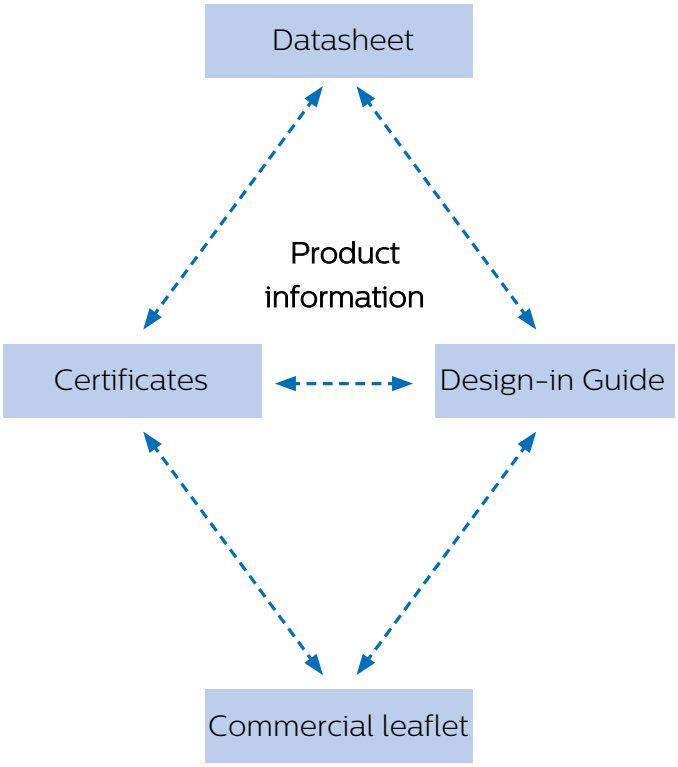
Contents

Introduction to this guide

Xitanium SR Bridge

Thank you for choosing the Philips Xitanium Sensor Ready Bridge ("SRB"). In this guide you will find the information needed to integrate these devices into a luminaire or lighting system.

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



Applications

Philips Xitanium SR Bridge allows existing DALI drivers to become part of wireless connected lighting systems for indoor lighting such as offices, public buildings, industrial applications and retail environments.

Information and support

Please consult your local Signify office or visit:
www.philips.com/oem
www.philips.com/multione

Design-in support

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

Document overview

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

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

All these documents can be found on the download page of our OEM website www.philips.com/oem. If you require any further information or support please contact your local Signify representative.

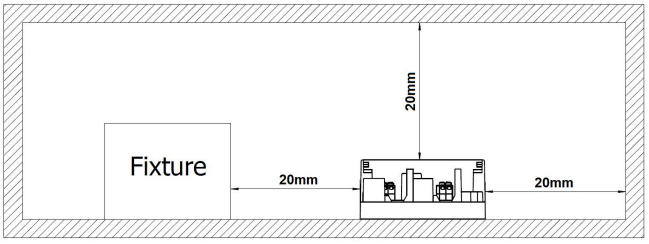
Warnings and instructions

Safety warnings:

- Avoid touching live parts!
- Do not use the SR Bridge with damaged housing and/or connectors!
- Do not service the SR Bridge when the mains voltage is connected; this includes connecting or disconnecting wires and cables.

Safety warnings and installation instructions

- Do not use damaged products.
- Do not short SR Bridge output wires.
- SR Bridge output wire is a live mains part when switched on.
- The luminaire manufacturer is responsible for his own luminaire design and has to comply with all relevant safety standards.
- The Xitanium SR Bridges are suitable for built-in Class I and Class II and independent Class I and Class II applications; they must not be exposed to the elements such as snow, water and ice or to any other chemical agent which can be expected to have an adverse effect on the driver (e.g. Corrosive environments). It is the responsibility of both luminaire manufacturer and installer to prevent exposure.
- Do not service the SR Bridge and connected driver(s) when the mains voltage is connected, this includes connecting or disconnecting loads.
- SR Bridge and connected driver(s) must be installed in accordance with national and local electrical codes.
- Please provide adequate earth and/or equipotential connections whenever possible or applicable.
- In case the SR Bridge is used in the independent application the SR Bridge must be protected against ingress of and exposure to including but not limited to water, oil, fat, acids 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 SR Bridge (e.g. use in wet /corrosive / dusty environments). It is the responsibility of both luminaire manufacturer and installer to prevent ingress and exposure. Common sense needs to be used in order to define the proper ingress protection of the SR Bridge for the intended application.
- Independent application: for thermal reasons the SR Bridge must be mounted in such a way that distance between the SR Bridge and adjacent objects (excluding the mounting surface) is at least 20mm, see the illustration on the left. Do not exceed the maximum specified ambient temperature (t_a) as specified for the SR Bridge.



Introduction to the Xitanium SR Bridge

Xitanium SR Bridge

The Xitanium SR Bridge is designed to connect existing or new DALI indoor lighting systems to SR (wireless) connected systems. Applications include offices, public buildings, industrial applications and retail environments. With Xitanium SR functionality, flexibility in luminaire design is assured and with the SR interface it is simpler than ever to connect to SR certified sensors.

Xitanium SR Bridge versions

The Xitanium SR Bridge described in this guide is available in 2 versions; a built-in and an independent version. Detailed specifications can be found in the Xitanium SR Bridge datasheets which can be downloaded at www.philips.com/oem.

Programmable Interface

The Xitanium SR Bridge is programmable. Seveal features and parameters can be set via the SR Interface or SimpleSet using the Philips MultiOne Configurator software and tool.

SimpleSet

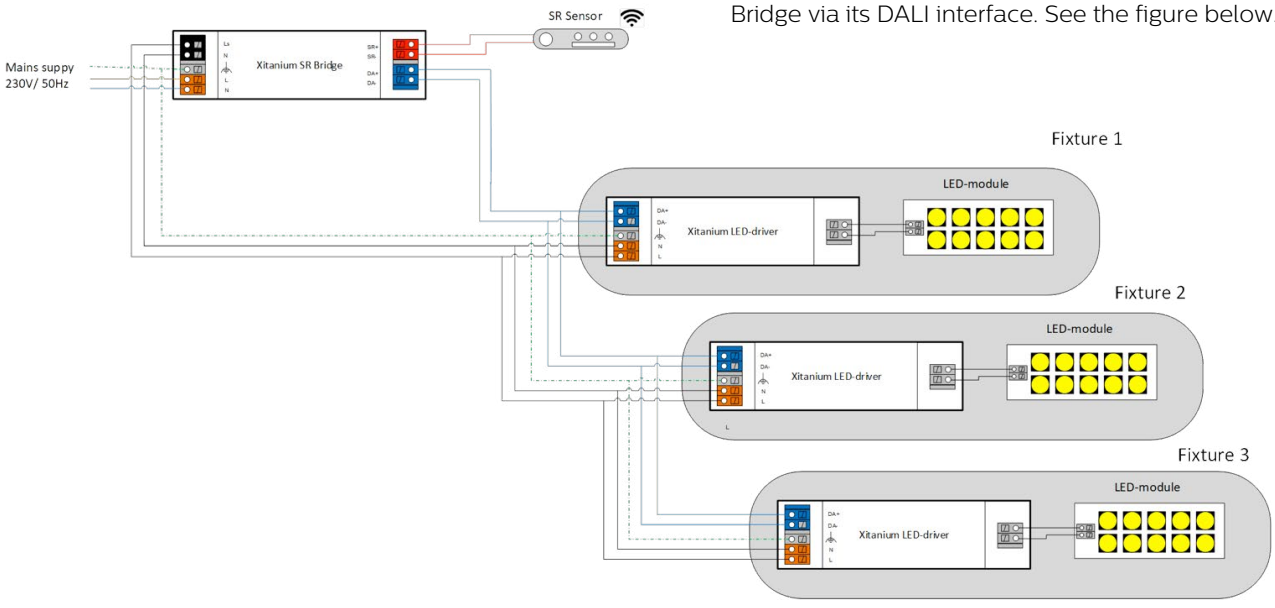
Philips SimpleSet NFC wireless programming technology allows luminaire manufacturers to quickly and easily program the Xitanium SR Bridge in any stage during the manufacturing process, without a connection to mains power, offering great flexibility.

For more information on MultiOne or SimpleSet, please visit www.philips.com/multione or contact your local Philips representative.

SR BridgeWiring diagram

A typical application for the Xitanium SR Bridge is to connect the SR Bridge to one or more Philips Xitanium DALI drivers and a SR Certified sensor,e.g. Philips EasyAir. Up to twenty DALI drivers can be controlled by a single Bridge via its DALI interface. See the figure below.

Wiring diagram



Features of the Xitanium SR Bridge

Mains input range
The AC input voltage ranges for performance and operational safety can be found in the SR Bridge datasheet. DC input voltage operation is not supported.

Switched output using zero crossing detection
The output of the Xitanium SR Bridge can be switched on/off using its internal relay. Switching is based on advanced zero crossing technology to reduce inrush current. This allows for higher loads to be switched on/off by the SR Bridge (up to 400W max).

Note: The internal SR Bridge relay can be bypassed by connecting drivers to permanent mains voltage and using DALI on/off commands instead to turn on/off the driver output.

Note: For DALI identification, the SET POWER ON LEVEL command will result in momentary blinking of the light. This blinking cannot be avoided.

Programmable Interface
The Xitanium SR Bridge is programmable. A number of features and parameters can be set via either MultiOne Configurator or SimpleSet. Items that can be programmed can be found in the section Controllability.

SR (Sensor Ready) interface
The Xitanium SR Bridge features a digital interface (SR interface) to enable direct connection to any suitable SR Certified sensor. Communication is based on DALI 2 protocol

Energy metering
The Xitanium SR Bridge has built in energy and power measurement capability. Given its limited accuracy, this information cannot be used for billing purposes.

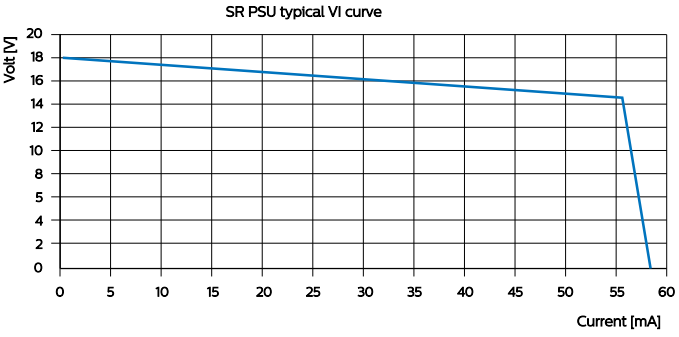
Multiple DALI drivers on a single SR Bridge
Up to twenty DALI drivers can be connected to a single SR bridge via its DALI interface. Please refer to the datasheet for more details.

SR bus power supply unit (SR PSU)
The SR Bridge has an internal power supply which can be used to power the connected sensor via the SR bus.

A single EasyAir sensor connected to multiple SR Bridges
It is possible to use one EasyAir sensor to control multiple luminaires. One sensor can control up to ten SR Bridges with up to four SR Bridges having their SR PSUs enabled. To minimize unnecessary losses, it is recommended to turn on only two SR Bridge SR PSUs. Each SR PSU can supply 52 mA supply current.

More details about EasyAir can be found in the Design-in Guide for the EasyAir sensors at www.philips.com/oem.

SR (Sensor Ready) interface



Sensor Ready Interface

The Xitanium SR Bridge features a digital SR interface to enable direct connection to any suitable SR Certified sensor. The simple two-wire SR interface supports these key functions:

- Switchable built-in SR PSU to provide power to the connected sensor
- Two-way digital communication between the SR Bridge and sensor, using DALI 2 protocol
- Standard DALI dimming, on/off and control functions
- Power and energy reporting, utilizing the power monitoring integrated in the SR Bridge
- Diagnostic information

SR PSU:

The SR Bridge has the ability to supply the SR bus with a built-in SR PSU that can be turned on/off. By factory default the SR PSU is turned on and ready to be used with an external sensor. The SR PSU should in principle be turned off if used in SR networks with multiple SR Bridges to avoid that wrong polarity can lead to very high currents on the SR bus.

The SR PSU can be turned on/off with the MultiOne configuration software. The SR PSU is capable of delivering a minimum current of 52mA (ISR) to the SR bus and the connected device(s) and will never supply more than 60mA (ISR_MAX). The SR bus voltage will be between 12V and 20V depending on the connected sensor load and the amount of SR PSUs connected in parallel. See the figure on the left for the typical VI curve for one SR PSU. When the SR PSU is switched off the SR Bridge will extract a maximum of 2mA from the SR bus.

Sensors

Most SR certified sensors intended to be used in an SR system will be powered from the SR bus. When communication is present on the SR bus, the bus gets pulled down by the data packages. This reduces the average current available for the sensor. When communicating the average available current can drop with 50%. This should be taken into account when designing the sensor. The extracted peak current (ISR_ EXTRACTED) should be limited by the sensor.

Rules for building an SR system:

- Respect SR bus polarity when more than one SR PSU is connected in parallel.The total maximum SR bus current(ISR_MAX_TOTAL) must be ≤ 250mA. This current can be determined by adding ISR_MAX of all SR PSUs. As a consequence a maximum of four SR PSUs can be connected in parallel.
- The total current delivered to the SR bus (ISR_DELIVERED) can be determined by adding ISR of all SR PSUs. The total current extracted from the SR bus (ISR_ EXTRACTED) can be determined by adding up consuming devices like SR drivers with switched off SR supply, other DALI gear and control devices.
- To guarantee good communication, a margin of 8mA is needed to drive the SR bus itself (ISR_MARGIN).
- The following rule should be respected: ISR_EXTRACTED + ISR_MARGIN ≤ ISR_DELIVERED.

Caution:

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

Typical examples:

1: One SR Bridge is connected to a sensor. The SR PSU of this Bridge is switched on. The specification of the sensor states that the extracted peak current is 40mA. Will this SR system have good communication?

- One SR supply is involved, so BUS polarity is irrelevant.
- ISR_MAX_TOTAL = 60mA. This is ≤ 250mA
- ISR_DELIVERED = 52mA
- ISR_EXTRACTED = 40mA
- ISR_MARGIN = 8mA
- 40 + 8mA ≤ 52mA

Conclusion: this system will function properly.

2: Is it allowed to add an SR Bridge with switched-off SR PSU to this SR system?

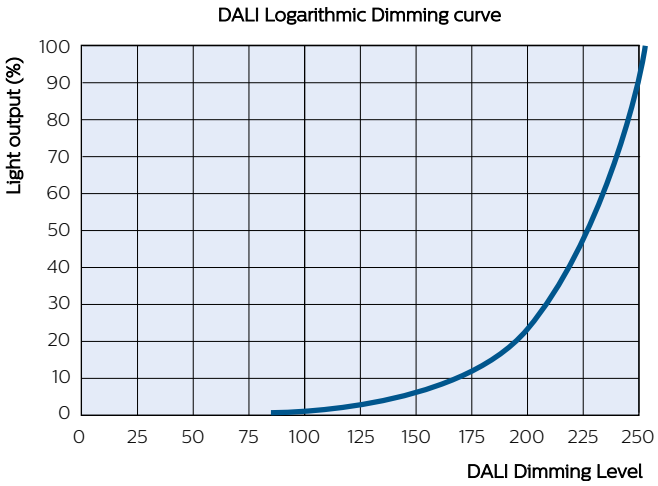
- Yes, an SR Bridge with switched-off SR PSU extracts 2 mA from the SR bus.
- ISR_EXTRACTED = 40 + 2 = 42mA.
- 42 + 8 mA ≤ 52mA

Conclusion: this system will function properly.

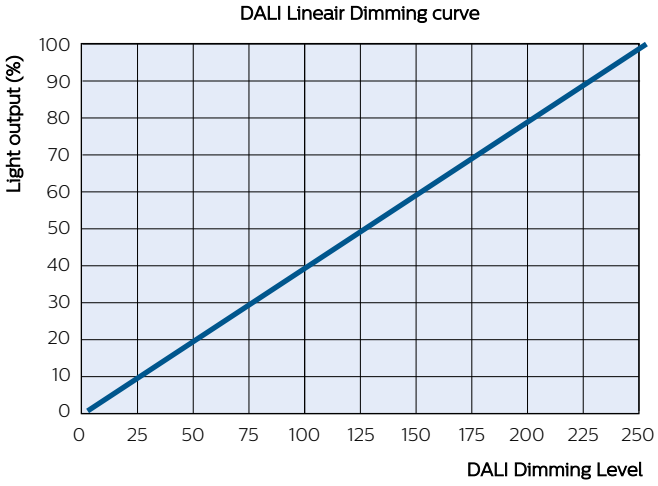
3: Can this SR supply in example 2 also be switched on?

- Yes, but polarity of both SR PSUs must be observed.
- ISR_TOTAL = 2 * 60 = 120mA. This is ≤ 250mA.

Conclusion: this system will function properly.



DALI Logarithmic dimming curve



DALI Linear dimming curve

Digital communication:

Dimming is possible through the standard digital interface based on DALI 2 protocol. Dimming range is 1%-100%. Dimming curves can be either logarithmic or linear (see the figures on the left).

- Note that the output current at 1% and 100% level is determined by the connected driver.
- The SR Bridge has built-in energy measurement capability and can report energy and actual power consumption. Accuracy of power measurement is higher of following two values: 0.5W or +/-4 % measured input power. This feature stores parameters in the non- volatile memory bank provision specified in the DALI 2 standard and the SR Certified specification.
- The SR Bridge also supports many diagnostic features/ parameters which can be accessed via the SR interface. Although the SR interface supports DALI commands, it is **not** a DALI interface as such since the interface is polarity-sensitive and its cable lenght is limited to 15m. We do not advise use of the SR bus in wired DALI networks.

Other considerations for the SR interface

- Length of cabling, using 0.75mm^2 wires: the maximum SR bus cable length wiring must not exceed 15m.
- The SR control interface is SELV-classified.

Basic SR Bridge use case

The basic use case for the SR Bridge is to connect one or more Xitanium DALI drivers and a SR Certified sensor to the SR Bridge. The maximum load that the SR Bridge relay can switch is 400W while its DALI interface can control max. twenty DALI drivers.

SR Bridge fault detection use case

The SR Bridge is measuring the power/energy consumption of the connected loads constantly. This feature can be used to monitor the connected loads and determine whether one (or more) of the loads have failed. During normal operation (at full output) the connected loads/drivers draw a certain amount of power. If one (or more) connected loads fail then the power consumption will be reduced. The SR Bridge has the capability to set an (alarm) message flag based on a trigger point that the load has been reduced. The fault detection accuracy depends on the trigger point and minimum detection dim level, which can be configured by MultiOne.

Mechanical Design-in

SRB-built in Version

SRB-independent Version

LCN9620 SimpleSet interface tool

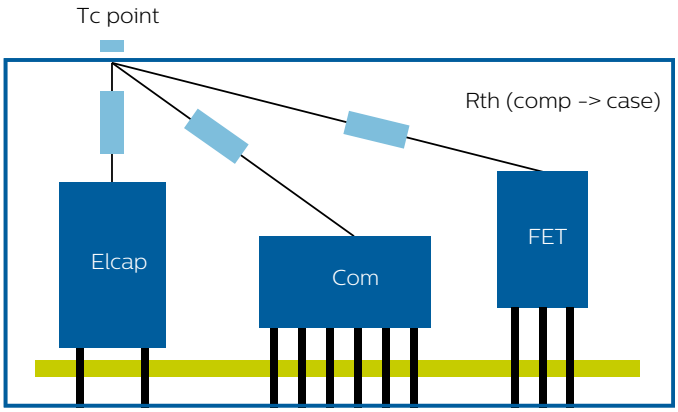
Sizes

The Xitanium SR Bridge is available in two different versions: Built-in and Independent. See the pictures on the left. The SRB-built-in version is for mounting inside a luminaire. The SRB-independent version has strain reliefs for input and output cabling and can be placed outside the luminaire. The specific dimensions can be found in the SR Bridge datasheet.

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

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

Thermal Design-In



Schematical representation of internal thermal paths to the SR Bridge t_c point

Introduction

The following section covers the critical thermal management point to facilitate design-in. Taking thermal considerations into account will ensure optimal performance and lifetime of the system. The maximum case temperature (t_c max) of the SR Bridge should not be exceeded. It is mandatory to keep the SR Bridge t_c max within specification to meet SR Bridge lifetime and failure rate specifications. Please refer to the product datasheet for specific values.

Case Temperature Point (t_c) point

To achieve optimal lifetime and reliability, it is critical that the temperature of the components in the SR Bridge remains within its rating. During design, all precautions are taken to ensure that the internal components are at the lowest possible temperatures.

Initial thermal analysis is performed via IR scans at room temperature to identify the hottest components of the SR Bridge. Subsequently, detailed temperature measurements of the critical components are performed under various input/output conditions at worst case operating temperatures.

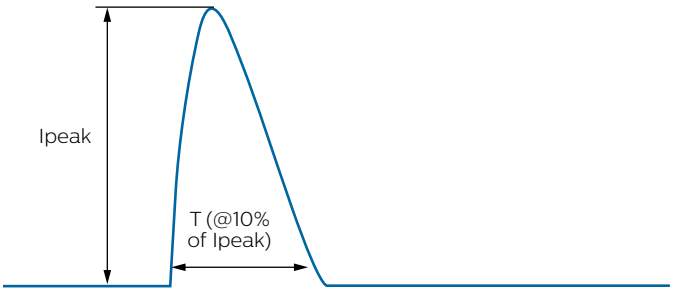
The temperature measurements are then correlated to a case point t_c on the SR Bridge as shown in the figure on the left. The t_c temperature is a proxy for the temperatures of the critical internal SR Bridge components.

The location of the t_c point is identified on the product type plate and is marked by a * or ○ symbol.

The specified t_a min-max and t_c max values of the SR Bridge must not be exceeded.

Note: In order to ensure accurate t_c test results, the case temperature should not vary by more than 1°C for a period of at least 30 minutes after a stable temperature has been achieved. The t_c point should not be obstructed when mounted in the luminaire/enclosure, neither must its temperature be artificially lowered as a means to use the SR Bridge above the maximum specified ambient temperature t_a.

Electrical Design-In



Graphical representation of Inrush current

Inrush current

Inrush current refers to the brief high input current that flows into a load during the moment of connection to mains; see the figure on the left. Typically, the amplitude is much greater than the steady-state input current.

The SR Bridge is using advanced zero crossing technology by turning on the load only when the sinusoidal mains voltage is near its zero crossing point. This reduces the inrush current of the connected load flowing through the SR Bridge and its relay to a minimum.

The SR Bridge itself has its own inrush current when connected to mains voltage. Details can be found in the datasheet.

What does inrush current do? A high inrush current can cause miniature circuit breakers (MCB) or melting fuses to open (nuisance tripping) or relay contacts to become overloaded if not designed to handle this current (accelerated wearout). Thus it will limit how many drivers can be connected to an MCB, melting fuse or relay. In case of the SR Bridge, the max. amount of drivers which can be switched is defined by the internal relay.

Surge immunity

The Xitanium SR Bridge has limited built-in surge immunity. Please refer to the datasheet for the applicable differential-mode and common-mode immunity levels.

In case higher immunity levels are required it is recommended to use an external Surge Protection Device (SPD).

Electromagnetic compatibility (EMC)

The Xitanium SR Bridge meets EMC requirements per CISPR 15. These tests are conducted with a reference setup. To maintain good EMC performance at the luminaire level, the input, output and control wires should be kept separated as much as possible and the FE terminal must be connected to the luminaire housing and/or Protective Earth. Mains wires should not be routed directly over or next to either side of the SR Bridge housing.

Electrical insulation

Please refer to the datasheet for a detailed insulation overview. The Xitanium SR Bridge meets IEC61347-1 for electrical safety. The SR interface is classified as SELV while the DALI interface is classified as FELV.

Controllability

How to configure the Xitanium SR Bridge features is explained in the Philips MultiOne User Manual guide; see the Help function of MultiOne or download it from www.philips.com/multione. In this section the SR Bridge features will be explained in more detail.

Load Fault Indicator Threshold (LFIT)

Factory default setting: 1W and 1%

This diagnostic feature enables the threshold setting below which a lamp failure error will be flagged. Both the absolute level in W can be set (lamp failure power level) as well as the configured minimum dimming level of the driver in % (minimum driver dim level) to avoid a dimming situation being improperly flagged as an error. Recommend value for the lamp failure power level is total load power x 0.9.

Luminaireinformation

Each Xitanium SR Bridge can be assigned a unique number (GTIN1/EAN13) with an additional 42-character line for more unique information as part of asset management

Minimum dim level

Factory default setting: enabled at 1%

This feature enables the setting of the dimming level in % below which the light cannot be dimmed. This feature can be enabled/disabled.

Relay Switched Output (RSO)

Factory default setting: switches with SR commands The internal relay can be configured such that it either remains always open (Ls terminal not live) or is switching the load on and off in correspondance with the incoming SR on/off commands.

SR PSU

Factory default setting: enabled

The Xitanium SR Bridge is equipped with an integrated Power Supply Unit (PSU) to power a sensor 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.

Miscellaneous

In addition, the consumed energy of the switched load can be read out. A diagnostic tab is included as well for (field) service purposes. A test tab allows the testing of the SR Bridge.

Compliance and approval

Xitanium SR Bridge compliances and approvals can be found in the published Declarations of Conformity (DoC) and ENEC/CB certificates as published on www.philips.com/oem. For further questions please contact your local Signify sales representative.

System Disposal

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

Disclaimer

Note that the information provided in this document is subject to change at any time without prior notice.

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