luxCONTROL

basicDIM Wireless

Technical Design-In Guide

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Scope of documentation

1. Validity

These operating instructions are valid for the basicDIM Wireless system. The system consists of different components that belong to either the luminaire or the entire system. If a reference is made to one of the components, the descriptions are only valid for these components.

TRIDONIC GmbH & Co KG is constantly striving to develop all its products. This means that there may be changes in form, equipment and technology.
Claims cannot therefore be made on the basis of information, diagrams or descriptions in these instructions.
The latest version of these operating instructions is available on our home page.

1.1. Copyright

We are always open to comments, corrections and requests. Please send them to info@tridonic.com

1.2. Imprint

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General safety instructions

2. General safety instructions

The instructions in this section have been compiled to ensure that operators and users of the basicDIM Wireless system from Tridonic are able to detect potential risks in good time and take the necessary preventative measures.
The operator must ensure that all users fully understand these instructions and adhere to them. These devices may only be installed and configured by suitably qualified personnel.

2.1. Intended use

2.1.1. Proper use

Operation and control of basicDIM Wireless via Bluetooth. The system may only be used for this intended purpose.

2.1.2. Improper use

Outdoor use. Extensions and modifications to the product.

⚠ WARNING!

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

2.2. Dangers associated with the operation of the system

⚠ DANGER!

Danger of electrocution
Disconnect the power to the entire lighting system before working on the lighting system!

2.3. Environment

⚠ DANGER!

Not to be used in corrosive or explosive environments.

General safety instructions

⚠ CAUTION!

Risk of damage caused by humidity and condensation

_ Only use the system components in dry rooms and protect them against humidity!

_ Prior to commissioning the system, wait until the control device is at room temperature and completely dry!

2.4. Additional instructions

⚠ CAUTION!

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

Installation notes

3. Installation notes

NOTICE

The cabling, wiring and mounting for a basicDIM Wireless luminaire varies depending on the LED module and the operation mode (analog/digital).
The following description should therefore not be viewed as comprehensive installation instructions but merely as important general information.

To obtain further information, proceed as follows:

_ Read the documentation provided by the driver manufacturer. Follow the guidelines and instructions of the driver manufacturer!

_ Observe all relevant standards. Follow the instructions given in the standards!

3.1. Safety information

WARNING!

_ Comply with the general safety instructions (see General safety instructions, p. 5) !

_ To avoid failures due to ground faults protect the wiring against mechanical loads from sharp-edged metal parts (e.g. cable penetrations, cable holders, metal frames, etc.)

_ Electronic LED Driver from Tridonic are protected for a maximum of 48 hour against overvoltage of up to 320 V.

_ Make sure that the LED Driver is not exposed to overvoltages for long periods!

Setup and wiring of a basicDIM Wireless luminaire

4. Setup and wiring of a basicDIM Wireless luminaire

4.1. Setup of a basicDIM Wireless luminaire

This chapter describes different wiring variants of a basicDIM Wireless luminaire.

⚠ CAUTION!

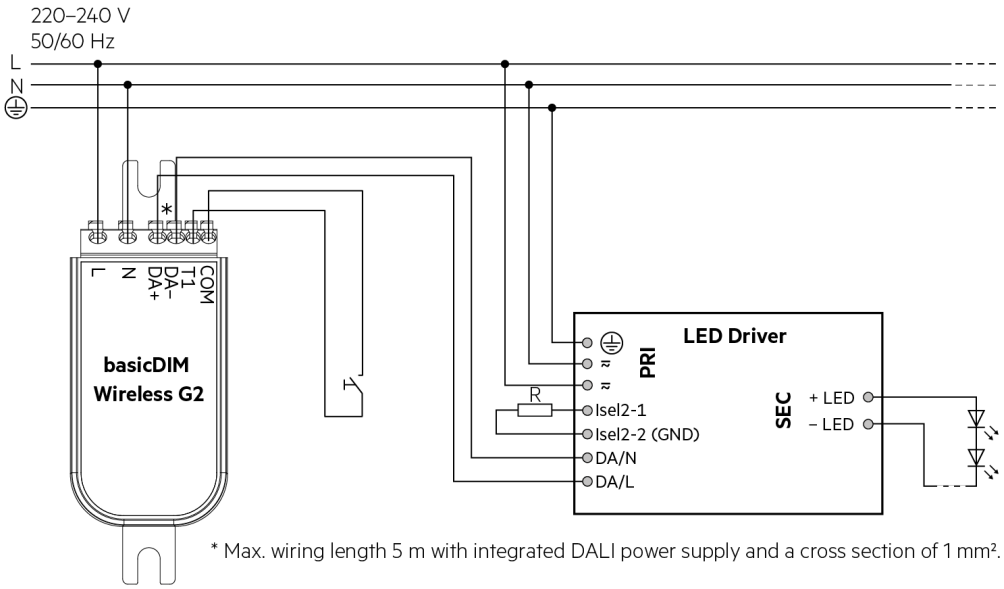
_ The max. permissible cable length of the outgoing bus must not be exceeded

_ Always observe the installation guidelines for LED Drivers!

4.1.1. basicDIM Wireless Module G2

Wiring DALI

The LED Driver and the basicDIM Wireless Module G2 are connected via 2-wire bus line.
The power cables are connected to the basicDIM Wireless G2.



* Max. wiring length 5 m with integrated DALI power supply and a cross section of 1 mm².

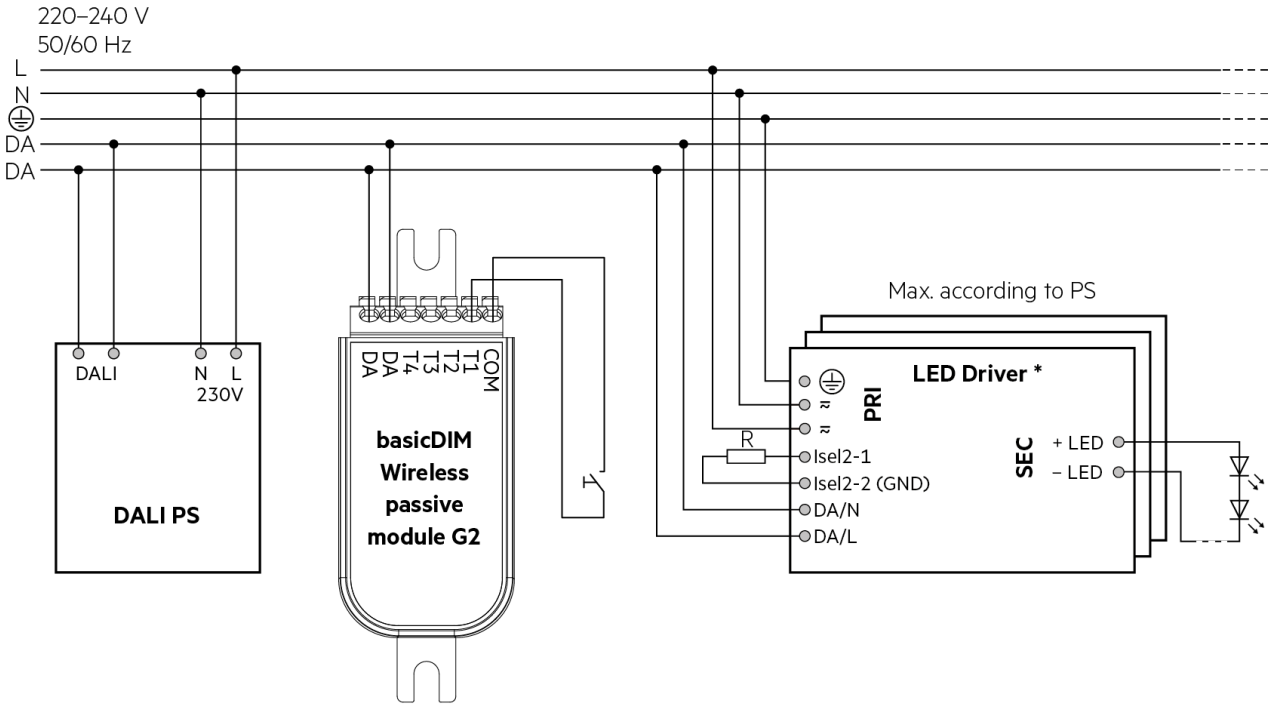
4.1.2. basicDIM Wireless Passive Module G2

Wiring diagram with external PS

The LED Driver and the basicDIM Wireless Passive Module G2 are connected to the DALI PS with a 2-wire bus line.

Setup and wiring of a basicDIM Wireless luminaire

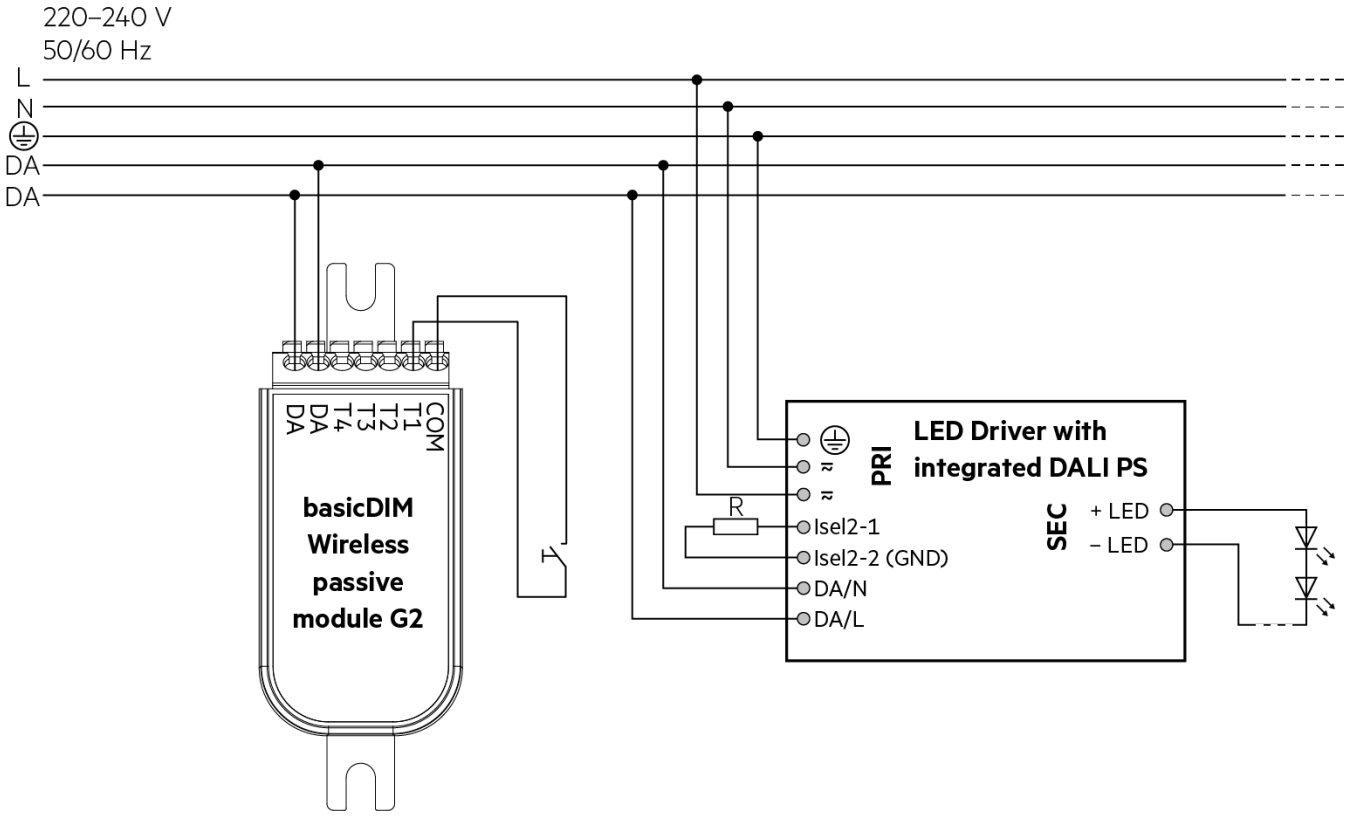
The power cables are connected to the DALI PS and the LED Driver.



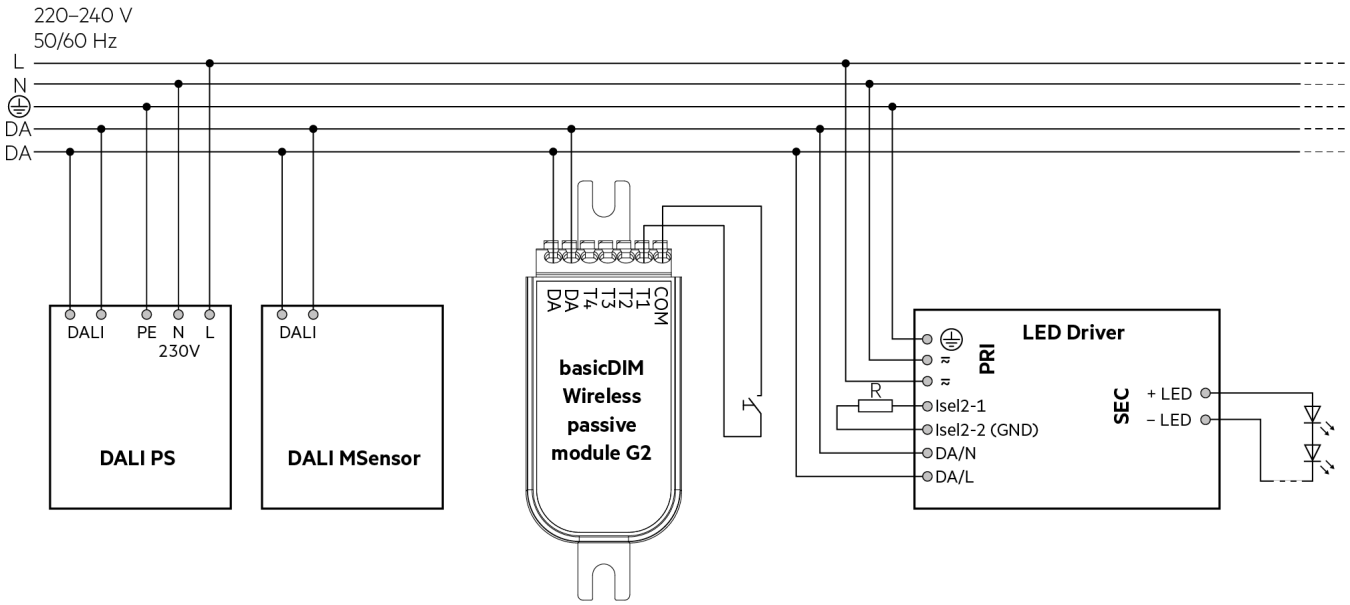
* Max. 4 DALI single / group addresses (A0 … A3 / G0 … G3) controllable,
depending on the device profile of the basicDIM Wireless module.
The rest of the connected drivers can be controlled via broadcast – depending on the device profile.

Setup and wiring of a basicDIM Wireless luminaire

Wiring diagram with integrated DALI PS



Wiring diagram with DALI Sensor and DALI PS

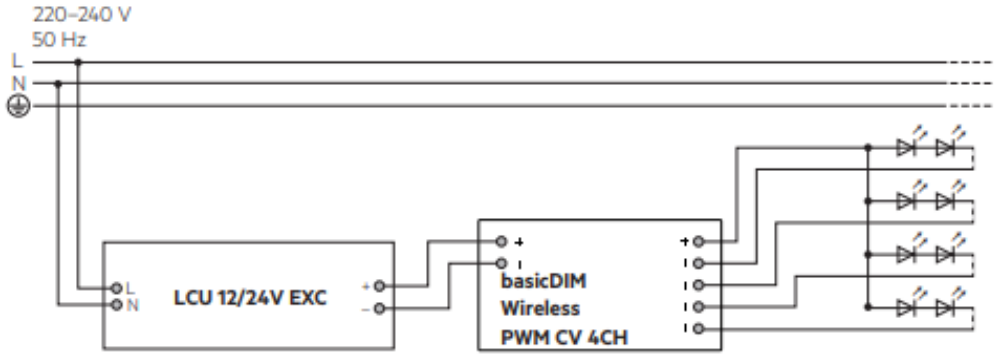


Setup and wiring of a basicDIM Wireless luminaire

4.1.3. basicDIM Wireless PWM CV 4ch

The basicDIM Wireless PWM CV 4CH module has a common positive output terminal (+) and each of the four channels has its own negative terminal (-).

This is the most common case of multi-channel LED strips. Connect the LED load cables accordingly.



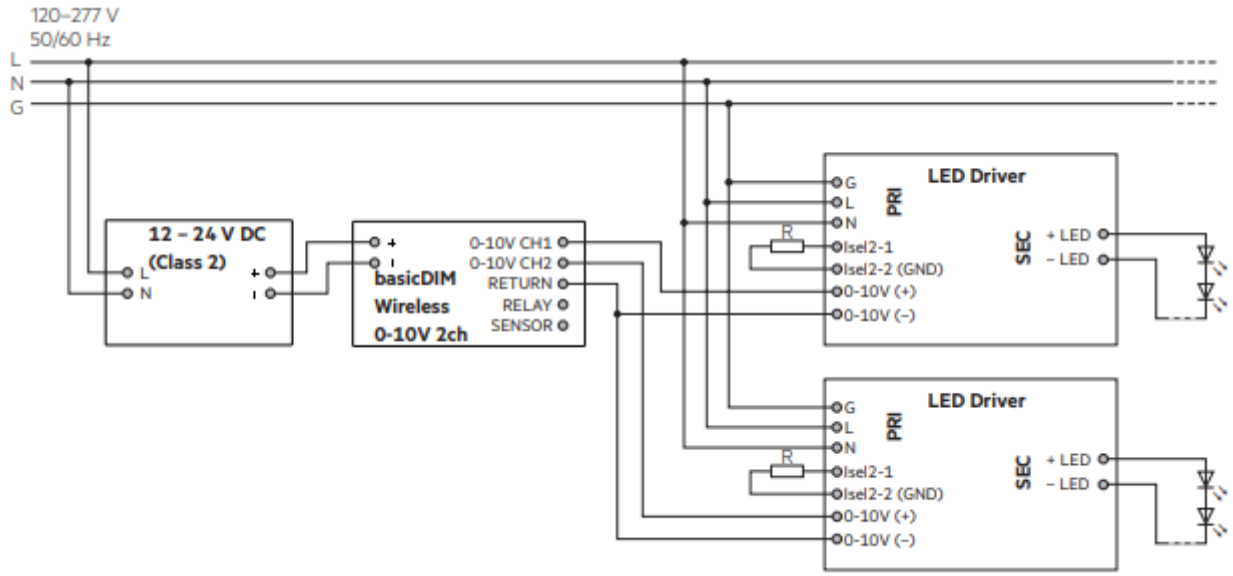
4.1.4. basicDIM Wireless 0-10V 2ch

Connect a Class 2 power supply with an output voltage of 12-24 V DC to the input terminal of the basicDIM Wireless 0-10V 2CH module.

The module has a common return port which is split between the two 0-10V outputs, the relay control output and the sensor input.

The device also has a control port for an external relay and a 0-24V DC analog input which can be used with various types of sensors.

Setup and wiring of a basicDIM Wireless luminaire



Setup and wiring of a basicDIM Wireless luminaire

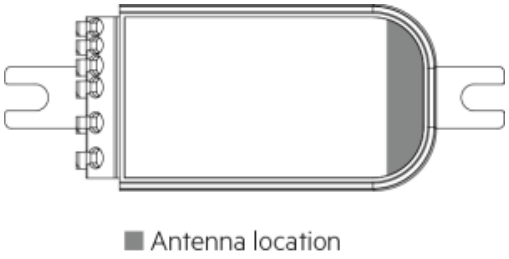
4.2. Placement

4.2.1. Foreword

basicDIM Wireless units form a mesh network where the units communicate with each other. The communication is done via 2,4 GHz radio signal (RF signal). Any high frequency RF signal is very sensitive to the environment. With poor placement and bad selection of surrounding materials the unit can be rendered practically useless. This is why a careful planning and vigorous testing is required to achieve a good performance when a basicDIM Wireless unit is integrated into a product.

Each basicDIM Wireless product has an internal antenna. The surroundings of the antenna dictate how good the performance, i. e. range, will be. All metal, including non-magnetic metals such as aluminum, close to the antenna is bad. The antenna should be placed as far away from any metal as possible. If some metallic structure has to be placed close to the antenna, there will have to be large openings near the antenna.

For more details, please refer to document: https://www.tridonic.com/com/en/download/technical/AaG_Basics_of_radio_technology_en.pdf



4.2.2. Testing

It is extremely important to make various tests in each step of the whole design and prototyping process. The worst that can be done is to design the product and take it into production without sufficient testing. Usually in these kinds of cases the end user will be the first one to notice the product's poor range and then it is too late to do anything about it. The importance of testing cannot be emphasized enough. Also it is not enough to just test the range between a mobile phone and the product, but one should also test the range between two products. Usually the range between two products is much less than it is between the product and a mobile phone. Testing should be done in multiple directions. The RF signal is heavily influenced by the surrounding structures and the radiation pattern varies in different direction. For this reason, also the range varies in different directions and therefore the product will have to turned in different angles to see the real life performance. The testing should be done in every step of the product design process, even before the first prototype is being built. When the basic structure of the product is decided, a mock-up model should be fabricated. This can be a very simple structure which shares the same material and basic form of the intended product. The desired basicDIM Wireless unit is placed into its intended place and tested there. The product does not have to be operational. Instead the basicDIM Wireless unit can be powered by running power cable from outside the product housing. This kind of test gives a preliminary idea of the RF signal performance in the intended product. If the range seems promising, an actual product prototype can be made which is tested again thoroughly. This gives a good foundation for the actual production version. It will be difficult to do any major changes once the production version is finished. This is why thorough preproduction testing is irreparable.

Setup and wiring of a basicDIM Wireless luminaire

Basic testing procedure

The following testing procedure should be done in every step of the product design process. It is not possible to overtest when it comes to RF signals.

To test the range between two units, follow the steps below:

1. Prepare two test samples (Unit A and Unit B). Create a test network with a mobile phone (or a tablet) consisting of these two units.
2. Turn the power off from both units.
3. Switch power on to Unit A. Wait until the 4remote BT notices this unit and it becomes controllable. The basicDIM Wireless 4remote BT is now connected to this particular unit.
4. Switch power on to unit B. Unit B is now controlled though Unit A and the range between the two units can be tested.
5. Take Unit B further away from Unit A. Switch both units continuously on and off by tapping “All lamps” icon on the 4remote BT while slowly moving Unit B further away from Unit A.
6. The mobile phone will stay connected to Unit A the whole time. Unit B goes offline on the 4remote BT when it goes beyond its range from Unit A. This will tell you the maximum range between the two units.
7. Turn the units 90 degrees in different directions and repeat the test routine described above. Test all different angle combinations.
8. It is advisable to test also in different locations and surroundings, such as corridors, large halls and open field.

Routing the wires

4.3. Routing the wires

4.3.1. Tests

NOTICE

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

Insulation and dielectric strength testing of luminaires

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

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

As an alternative to measuring the insulation resistance, IEC 60598-1 Annex Q describes a dielectric strength test at 1500 V AC (or 1.414 x 1,500 V DC). To avoid damaging electronic LED Driver, this dielectric strength test should be performed exclusively for type testing. This test should certainly not be used for routine testing.

NOTICE

Tridonic recommends performing an insulation test because a dielectric strength test may damage the device irreparably.

Type testing

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

The wiring for protection class 1 luminaires is tested at a voltage of 2xU + 1,000 V. In order not to overload the LED Driver all the inputs and outputs of the LED Driver are connected to one another.
U_{out} is used for measuring the voltage for luminaires with LED Driver with U_{out} > 250 V:

For U_{out} 480 V the voltage for the type test is 2000 V. (Routine testing is always performed at 500 V DC)

4.3.2. Wiring

NOTICE

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

Routing the wires

Wiring guidelines

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

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

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

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

Wiring the plug-in terminal

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

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

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

_ Insert the bare end into the terminal

Components

5. Components

5.1. basicDIM Wireless G2

5.1.1. Description

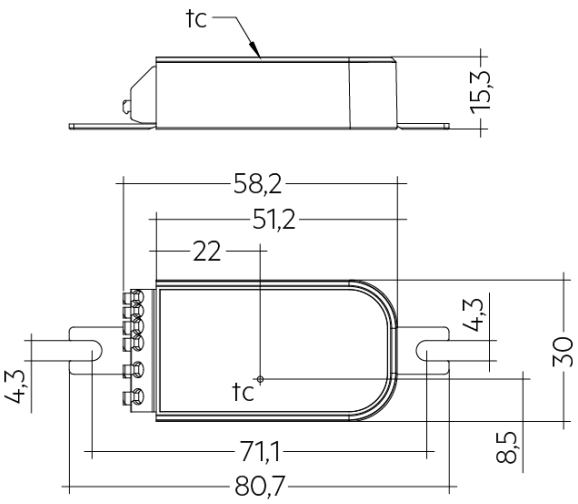
basicDIM Wireless G2 is a wireless control unit for DALI dimming interface.
The device is intended to be integrated into a luminaire. The control output can be configured either as analog or digital Standalone DALI control interface.

When the output is configured as Standalone DALI, basicDIM Wireless G2 acts both as a controller and as a power supply making it possible to connect directly to an LED Driver with DALI interface without the need for an external DALI power supply. This so called Standalone DALI makes it possible to implement multi-channel luminaires with adjustable colour (RGB) or colour temperature, while keeping the wiring and number of components at their minimum.

basicDIM Wireless G2 does not comply with IEC 60929 and therefore is not designed to be connected to an existing DALI network. The module can be used only in a closed system, i.e. inside a luminaire which does not have an external DALI interface. basicDIM Wireless G2 is controlled wirelessly by a smartphone or tablet with control app.
Devices form automatically a secure wireless mesh network so that a large number of fixtures can be controlled from any point. No external gateway module is needed. basicDIM Wireless G2 can be controlled also from standard on/off wall switches.

5.1.2. Technical data

Parameter	Value
Rated supply voltage	220 - 240 V
Mains frequency	50 / 60 Hz
Radio transceiver operating frequencies	2.4 - 2.483 GHz
Max. output power radio transceiver	+4 dBm
Bus voltage DC DALI output	12 V
Shortcircuit current DALI output	10 mA
Max. DALI wiring length	5 m at 1 mm² cross section
Operating temperature	-20 ... +70 °C
tc point	80 °C
Storage temperature	-25 ... +75 °C
Dimensions L x W x H	80.7 x 30 x 15.3 mm
Type of protection	IP20



Components

5.1.3. Ordering data

Type	Article number	Packaging, carton	Weight per pc.
basicDIM Wireless G2	28003540	60 pc(s).	0.020 kg

Components

5.2. basicDIM Wireless Passive Module G2

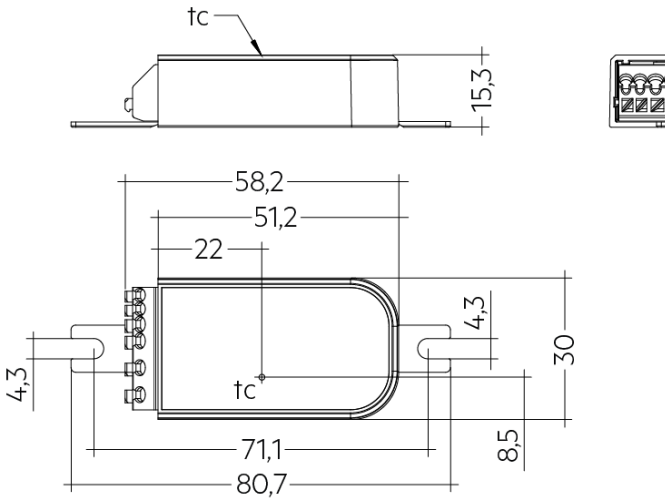
5.2.1. Description

The basicDIM Wireless Passive Module G2 is a Bluetooth controllable DALI controller.

The module is powered directly via the DALI bus, no additional mains supply is required. The typical use case for the basicDIM Wireless Passive Module G2 is to act as a DALI-to-Bluetooth gateway for an existing DALI network, or to be connected to a DALI sensor, or to be used directly with a DALI-controlled LED driver with integrated or external DALI Power Supply.

5.2.2. Technical data

Parameter	Value
Supply voltage DC	9.5 – 22.5 V
Current consumption of DALI	4 mA (30 mA at start)
Max. DALI bus current	250 mA
Typ. power input on stand-by	< 0.09 W
Radio transceiver operating frequencies	2.4 – 2.483 GHz
Max. output power radio transceiver	+4 dBm
Operating temperature	-20 ... +70 °C
tc point	75 °C
Storage temperature	-25 ... +75 °C
Dimensions LxWxH	80.7 x 30 x 15.3 mm
Type of protection	IP20



5.2.3. Ordering data

Type	Article number	Packaging, carton	Weight per pc.
basicDIM Wireless Passive Module G2	28003541	60 pc(s).	0.017 kg

Components

5.3. basicDIM Wireless PWM CV 4CH

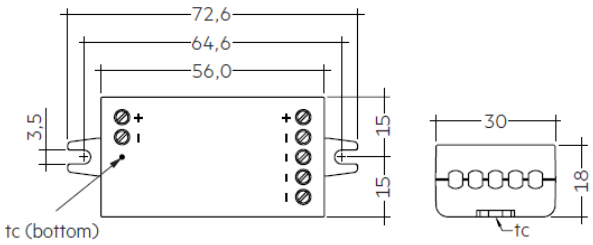
5.3.1. Description

The basicDIM Wireless PWM CV 4CH module is a Bluetooth controllable four-channel PWM dimmer for constant voltage LED loads, such as LED strips and constant voltage LED modules.
The basicDIM Wireless PWM CV 4CH is powered with 12-24V DC. The LED load is connected to the output.

The basicDIM Wireless PWM CV 4CH module can control up to four channels, making it an ideal partner for RGBW and Tunable White (TW) applications.
The maximum combined output current is 6 A, which can be divided freely between 1-4 channels.

5.3.2. Technical data

Parameter	Value
Supply voltage DC	12 – 24 V
Max. input current	6 A
Typ. power input on stand-by	< 0.3 W
Output voltage DC	12 – 24 V
Output power (24 V DC)	144 W
Output power (12 V DC)	72 W
Max. output current (free allocation to channels)	6 A
Radio transceiver operating frequencies	2.4 – 2.483 GHz
Max. output power radio transceiver	+4 dBm
Operating temperature	-20 ... +45 °C
tc point	75 °C
Storage temperature	-25 ... +75 °C
Dimensions L x W x H	72.6 x 30 x 18 mm
Type of protection	IP20



5.3.3. Ordering data

Components

Type	Article number	Packaging, carton	Weight per pc.
basicDIM Wireless PWM CV 4CH	28002575	120 pc(s).	0.023 kg

Components

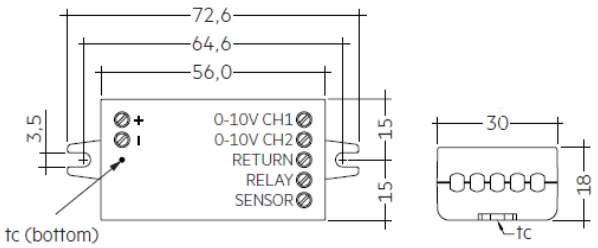
5.4. basicDIM Wireless 0-10V 2CH

5.4.1. Description

The basicDIM Wireless 0-10V 2CH module is a Bluetooth enabled, 2-channel control unit for dimmable 0-10V LED loads and luminaires. Power is supplied by an external 12-24V DC Class 2 power supply.
The basicDIM Wireless 0-10V 2CH module can control two channels, making it an ideal partner for Tunable White (TW) applications. Both channels can be configured individually.

5.4.2. Technical data

Parameter	Value
Supply voltage DC (Class 2)	12 – 24 V
No-load input current	30 mA
Output voltage DC (0-10V)	0 – 10 V
Max. output current (0-10V)	5 mA
Output voltage DC (relay)	12 – 24 V
Max. output current (relay)	100 mA
Input voltage range DC (sensor)	0 – 24 V
Input resistance (sensor)	81.5 kΩ
Radio transceiver operating frequencies	2.4 – 2.483 GHz
Max. output power radio transceiver	+4 dBm
Operating temperature	-25 ... +45 °C
tc point	75 °C
Storage temperature	-25 ... +75 °C
Dimensions L x W x H	72.6 x 30 x 18 mm
Type of protection	IP20



Components

5.4.3. Ordering data

Type	Article number	Packaging, carton	Weight per pc.
basicDIM Wireless 0-10V 2CH	28002576	120 pc(s).	0.022 kg