LINE-5CV-DALI

User Manual

Made in Italy



FEATURES

- DALI LED DIMMER
- WHITE, MONOCHROME, RGB, RGB+W, RGB+TW and RGB+WA Light Control
- Power supply (DC IN): 12-24-48 Vdc (SELV)
- Output (L, L1 to L5): constant voltage outputs (= DC IN), modulated for Resistive loads LED-strips and LED-modules
- Remote control via opto-isolated BUS (DALI2)
- PWM modulation, frequency settable from 307 to 4000 Hz
- Device configuration via Dalcnet LightApp mobile application and via DALI, settable parameters:
  - DALI Address
  - PWM Frequency
  - Dimming Curve
  - Minimum, Maximum, Power-ON, and System Failure levels
  - Detection & Protection Features
  - Transition Parameters (Fade)
  - Groups and Scenarios
- Short-circuit detection and protection on output channels
- ON/OFF and brightness soft dimming
- Suitable for use in Dry locations
- UL Features (see Table 5 for detailed technical specifications):
  - "UL Recognized" certified unit
  - Class 2 supply Input and Outputs (use Class 2 power supply only)
- Extended temperature range
- 100% Functional test - 5 years warranty

PRODUCT DESCRIPTION

LINE-5CV-DALI is a 5-channel LED dimmer, PWM (Pulse Width Modulation) modulated at Constant Voltage (CV) and controllable via DALI (Digital Addressable Lighting Interface) protocol. LINE-5CV-DALI can be supplied by a SELV constant voltage (12 ÷ 48) Vdc power supply and is suitable for driving loads such as White/Monochrome, RGB, RGB+W, RGB+TW (Tunable White) or RGB+WA (White Amber) constant voltage LED-strips and dimmable LED-modules. The dimmer can deliver an output current of up to 12 A (total) and has the following protections: short-circuit detection and protection on output stages, open-circuit detection, over-voltage and under-voltage protections, reverse polarity protection and input fuse protection.
Through the Dalcnet LightApp mobile application and smartphone equipped with Near Field Communication (NFC) technology, you can configure multiple parameters when the device is powered OFF, including PWM frequency, dimming curve and max/min brightness levels. Dalcnet LightApp can be downloaded free of charge from the Apple APP Store and Google Play Store.

⇢ For the most up-to-date manual, please visit our website www.dalcnet.com or scan the QR code on the product.

PRODUCT CODE

CODE	POWER SUPPLY	LED OUTPUTs	REMOTE CONTROL	APP CONFIG.
LINE-5CV-DALI	12-24-48 VDC	5 x 5A (tot. max 12A) [1,2]	DALI	LightApp

Table 1: Product Code

PROTECTION AND DETECTION

The following table shows the types of incoming and outgoing protection/detection present on the device.

ACRONYM	DESCRIPTION	TERMINAL	PRESENT
IFP	Input Fuse Protection[3]	DC IN	✓
OVP	Over Voltage Protection[3]	DC IN	✓
UVP	Under Voltage Protection[3]	DC IN	✓
RVP	Reverse Voltage Polarity[3]	DC-IN	✓
SCP	Short-Circuit Protection	L, L1, L2, L3, L4, L5	✓
SCD	Short-Circuit Detection	L, L1, L2, L3, L4, L5	✓
OCD	Open-Circuit Detection	L, L1, L2, L3, L4, L5	✓

Table 2: Detection and Protection features

REFERENCE STANDARDS

LINE-5CV-DALI complies with the regulations shown in the table below.

STANDARD	TITLE
EN 55015	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
EN 61547	Equipment for general lighting purposes – EMC immunity requirement
EN 61347-1	Lamp Controlgear – Part 1: General and safety requirement
EN 61347-2-13	Lamp controlgear - Part 2-13: Particular requirement for d.c. or a.c. supplied electronic Controlgear for LED modules
IEC 62386-101 ED2	Digital addressable lighting interface – Part 101: General requirements – System components
IEC 62386-102 ED2	Digital addressable lighting interface – Part 102: General requirements – Control gear
IEC 62386-209 ED2	Digital addressable lighting interface – Part 207: Particular requirements for control gear – Colour control (device type 8)
UL 1310	Standard for Safety. Class 2 Power Units.
UL 8750 & CSA C22.2 No. 250.13-17	Standard for Safety. Light Emitting Diode (LED) Equipment for Use in Lighting Products.

Table 3: Reference standards

[1] The maximum total output current depends on the operating conditions and ambient temperature of the system. For the correct configuration, check the maximum power that can be delivered in the §Technical Specifications and in the §Thermal Characterization sections.
[2] For specifications in a UL certified plant, refer to Table 5.
[3] Protections refer to the control logic of the board.

TECHNICAL SPECIFICATIONS

CE TECHNICAL SPECIFICATIONS

Description	Acronym	Values			Unit of Measure	Note
		Min		Max		
POWER SUPPLY INPUT (DC IN terminal)						
Rated supply voltage[4]	V_{IN}	12	24	48	Vdc	-
Power Supply Range	V_{IN-RNG}	10.8	÷	52.8	Vdc	-
Efficiency at full load	E_{FF}		> 95		%	-
Standby power consumption	P_{STBY}		< 0.5		W	-
OUTPUTS (L, L1 to L5 terminals)						
Output voltage	V_{OUT}		= V_{IN}		-	-
Output current (max)	I_{OUT-CH}	-	-	5	A	For each channel
	$I_{OUT-TOT}$	-	-	12	A	Total
Nominal power output	-	@12V	@24V	@48V	-	-
	P_{OUT-CH}	60	120	240	W	For each channel
	$P_{OUT-TOT}$	144	288	576	W	Total
Load type	L_{TYPE}		Resistive (LED)		-	Defined by design
DIMMING						
Dimming Curves	C_{DIM}		Linear, Logarithmic		-	Selection via Dalcnet LightApp
Dimming Method	M_{DIM}		PWM		-	Pulse Width Modulation
PWM Modulation Frequency	f_{PWM}		307, 667, 1333, 2000, 4000		Hz	Selection via Dalcnet LightApp
Dimming Resolution	Res_{DIM}		16		bit	Defined by design
Dimming Range [5]	RNG_{DIM}	1	÷	100	%	-
ENVIRONMENTAL						
Storage Temperature	T_{STORE}	-40	÷	+60	°C	Minimum values defined by design
Working Environment Temp.	T_A	-10	÷	+50	°C	Minimum values defined by design
Max Temperature at T_C point	T_C	-	-	+90	°C	-
Working Environment type	ENV_{TYPE}		Dry location		-	-
Connector type	C_{TYPE}		Push-in terminals		-	-
Wiring Section	WS_{SOLID}	0.5	÷	1.5	mm^2	Defined by design
	WS_{STRAND}	20	÷	16	AWG	
Stripping	WS_{STRIP}		10		mm	-
Protection Class	IP_{CODE}		IP20		-	-
Enclosure Material	MC		PC/ABS		-	Polycarbonate/ABS
Packaging Unit (Piece/Unit)	PU		1		pcs	-
Dimensions	-	L	H	D	-	-
	MD	186	29	21	mm	Enclosure
	PD	197	34	29	mm	Packaging
Weight	W		80		g	Including packaging

Table 4: CE Technical specification

[4] The product shall be supplied only by LED controlgear with SELV output at constant voltage V_{OUT} < 60 Vdc certified according to IEC/EN 61347.
[5] Measured on a 4 kHz linear dimming curve. Value dependent on the type of load connected.

UL Technical Specifications

If installing in a UL certified plant, please refer to the values in Table 5. These values are binding to ensure UL compliance within the system, which the installer must strictly adhere to.

Description	Acronym	Values			Unit of Measure	Note
		Min		Max		
UL Certification						
Product type	UL_{TYPE}	c UL us			-	UL Recognized certified device
Manufacturer certification file	UL_{FILE}	E514299			-	-
POWER SUPPLY INPUT (DC IN terminal)						
UL Input type	$TYPE_{IN}$	CLASS 2			-	-
Power Supply restrictions	SUP_{LIM}	CLASS 2 input only			-	Use Class 2 power supplies only
Nominal supply voltage [4]	V_{IN_UL}	12	24	48	Vdc	-
Power Supply Range	V_{IN-RNG}	10.8	÷	52.8	Vdc	-
Current absorption (max)	I_{IN_UL}	5	4.16	2	A	While respecting the limits on I_{OUT_UL} and P_{OUT_UL}
Nominal Power absorption	P_{IN_UL}	60	100	100	W	
Efficiency at full load	E_{FF}	> 95			%	-
Standby power consumption	P_{STBY}	< 0.5			W	-
OUTPUTS (L, L1 to L5 terminals)						
UL Output type	$TYPE_{OUT}$	CLASS 2			-	-
Output voltage	V_{OUT}	= V_{IN}			-	-
	-	@12V	@24V	@48V	-	-
Output current (max)	I_{OUT_UL}	5	4.16	2	A	For each channel and total
Nominal power output	P_{OUT_UL}	60	100	100	W	
Load type	L_{TYPE}	LED ARRAY			-	Resistive LED loads only
DIMMING						
Dimming Curves	C_{DIM}	Linear, Logarithmic			-	Selection via Dalcnet LightApp
Dimming Method	M_{DIM}	PWM			-	Pulse Width Modulation
PWM Modulation Frequency	f_{PWM}	307, 667, 1333, 2000, 4000			Hz	Selection via Dalcnet LightApp
Dimming Resolution	Res_{DIM}	16			bit	Defined by design
Dimming Range [5]	RNG_{DIM}	1	÷	100	%	-
ENVIRONMENTAL						
Storage Temperature	T_{STORE}	-40	÷	+60	°C	Minimum values defined by design
Working Environment Temp.	T_A	-10	÷	+40	°C	Minimum values defined by design
Max Temperature at T_C point	T_C			+60	°C	Measured under Q10 and U3
Working Environment type	ENV_{TYPE}	Dry location			-	-
Connector type	C_{TYPE}	Push-in terminals			-	-
Wiring Section	WS_{SOLID}	0.5	÷	1.5	mm^2	Defined by design
	WS_{STRAND}	20	÷	16	AWG	
Stripping	WS_{STRIP}	10			mm	-
Protection Class	IP_{CODE}	IP20			-	-
Case Material	MC	PC/ABS			-	Polycarbonate/ABS
Packaging Unit (Piece/Unit)	PU	1			pcs	-
Dimensions	-	L	H	D	-	-
	MD	186	29	21	mm	Plastic case
	PD	197	34	29	mm	Packaging
Weight	W	80			g	Including packaging

Table 5: UL Technical specification

T_C Point Positioning

The following figures show the positioning of the maximum temperature point (*Tc point*, highlighted in red) reached by the electronics inside the enclosure for CE and UL standards, located on the front (Top) and on the back (Bottom) sides.



Figure 1: Position of the CE T_c point



Figure 2: Position of the UL T_c point

INSTALLATION

ATTENTION! *Installation and maintenance must always be carried out in the absence of voltage. Before proceeding with the connection of the device to the power supply, make sure that the voltage of the power source is disconnected from the system.*

The device should only be connected and installed by qualified personnel. All applicable regulations, legislation, standards, and building codes must be adhered to. Incorrect installation of the device may cause irreparable damage to the device and connected loads.

The following paragraphs show the diagrams of the dimmer's connection to the remote control, the load and the supply voltage. It is recommended to follow these steps to install the product safely:

1. Safety first: ensure the DC Power Supply is disconnected from the Mains Voltage before starting the installation.
2. Load wiring: connect the LED strip wires to the "LED OUT" terminal block, wiring the positive wire to the "L+" terminal, and the negative wires to the "L1-", "L2-", "L3-", "L4-" and "L5-" terminals.
3. Remote Control wiring: connect the DALI bus wires to the "DA" terminals of the "DALI" terminal block.
4. Power Supply wiring: connect a 12 Vdc, 24 Vdc, or 48 Vdc constant voltage SELV power supply (depending on the nameplate data of the LED load) to the "V+" and "V-" terminals of the "DC IN" terminal block.
5. Check the connections: verify that all connections are tightly secured and that there are no exposed wires.
6. Final check: reconnect the DC Power Supply to the Mains Voltage to power ON the device. Perform a test to ensure that the device is functioning correctly and that all connections are secure.
   Note: the installer is responsible for verifying the installation.

Load Wiring

LINE-5CV-DALI has 5 output channels that can be driven independently (e.g. for monochrome LED strips) or depending on the RGB value and/or white light temperature (e.g. for RGB, RGB+W, RGB+TW[6] and RGB+WA[7] LED modules). Each type of load can be configured using the §DT8 - RGBWA and §DT6 - 5 channels profiles.

White or Monochrome LED Loads diagram

The following connection diagram allows you to drive up to 5 white or monochrome LED loads, from output channel L1 to L5.

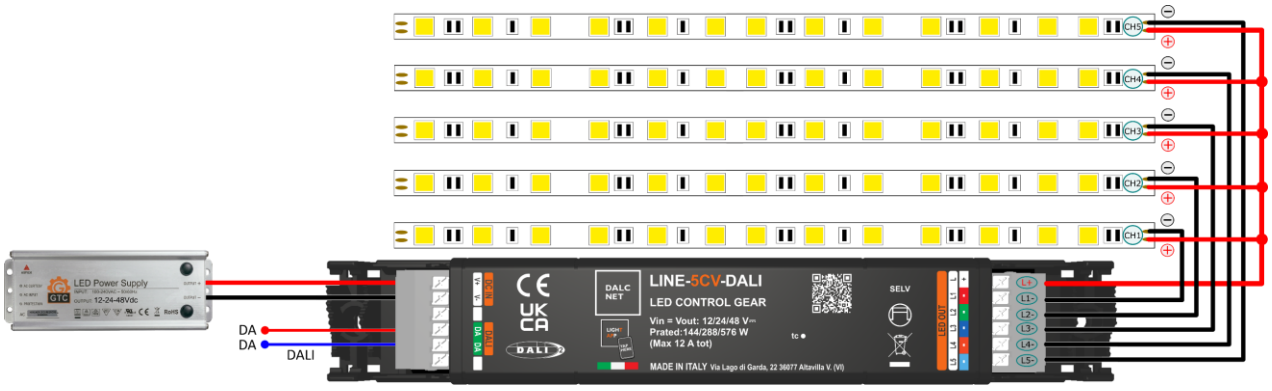


Figure 3: Wiring diagram for White or Monochrome LED loads

[6] "Tunable-White" refers to the ability of a lighting fixture to vary the colour temperature of white independently of its light intensity.
[7] "White-Amber" refers to a particular type of LED module capable of mixing the shade of white light with amber light. This type of load is also known as a subset of the WAF (White Amber Free-color) type.

RGB LED LOAD DIAGRAM

Figure 4 shows the connection diagram suitable for driving a single RGB LED load. The output channels used in this configuration are L1 (Red), L2 (Green), and L3 (Blue).

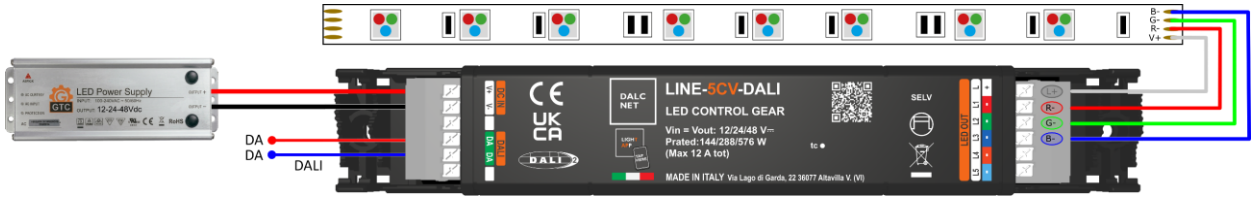


Figure 4: Wiring diagram for RGB load

RGB+W LED LOAD DIAGRAM

Figure 5 shows the connection diagram indicated to drive a single RGB+W LED load. The output channels used for this load are L1 (Red), L2 (Green), L3 (Blue), and L4 (White).



Figure 5: Wiring diagram for RGB+W LED load

RGB+TW AND RGB+WA LED LOAD DIAGRAMS

The connection diagrams in Figure 6 and Figure 7 are indicated to drive a single RGB+TW (Tunable White) or RGB+WA (White Amber) LED load. The channels used for this configuration are L1 (Red), L2 (Green), L3 (Blue), L4 (Warm White/White), and L5 (Cool White/Amber).

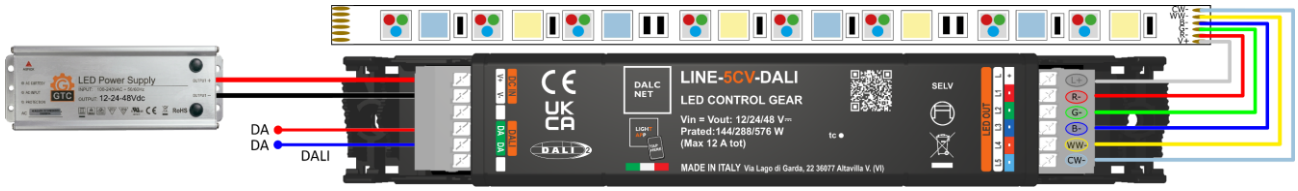


Figure 6: Wiring diagram for RGB+TW LED load

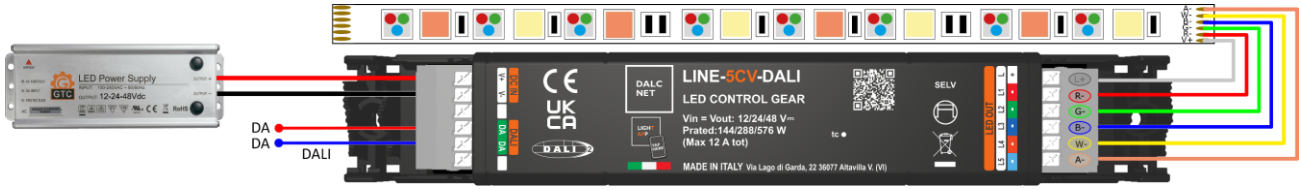


Figure 7: Wiring diagram for RGB+WA LED load

REMOTE CONTROL WIRING

LINE-5CV-DALI can be controlled remotely via DALI digital bus by means of a simple two-wire cable (untwisted and unshielded). The control is carried out by means of a DALI Master, which provides commands to the devices in the DALI network and, if necessary, power supply[8] to the network itself.

To connect LINE-5CV-DALI to the DALI network, simply connect the bus cables to the "DA" terminals of the "DALI" terminal block: as different topologies are possible, it is not necessary to observe the polarity of the "DA+" and "DA-" signals of the bus when connecting.

DALI WIRING TOPOLOGIES

The DALI-2 protocol supports up to 64 Control Gear slave devices (e.g. LINE-5CV-DALI) connected with different wiring topologies shown in Figure 8: Bus-wiring, Star-wiring, Tree-wiring, or Line-wiring. Other topologies are excluded.

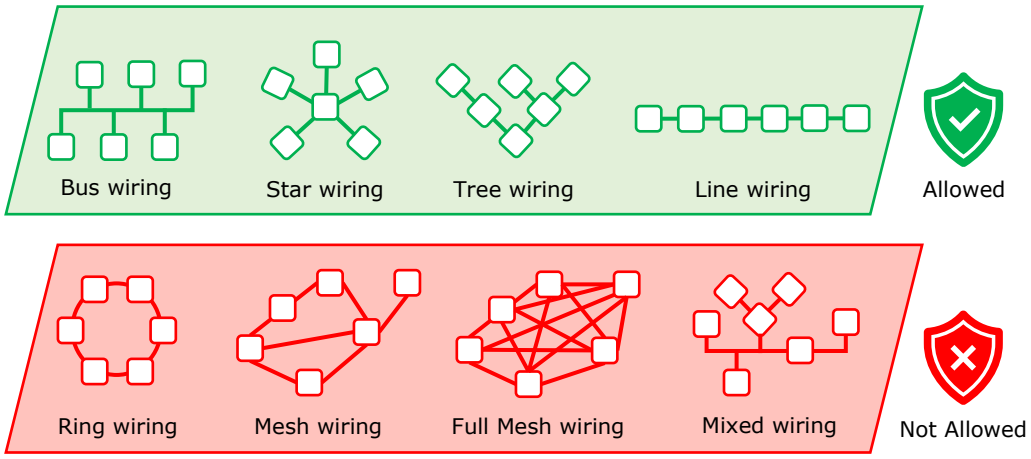


Figure 8: DALI wiring Topologies

LINE-5CV-DALI supports all the cabling topologies allowed by the DALI-2 protocol, including the Bus-wiring shown as an example in Figure 9.

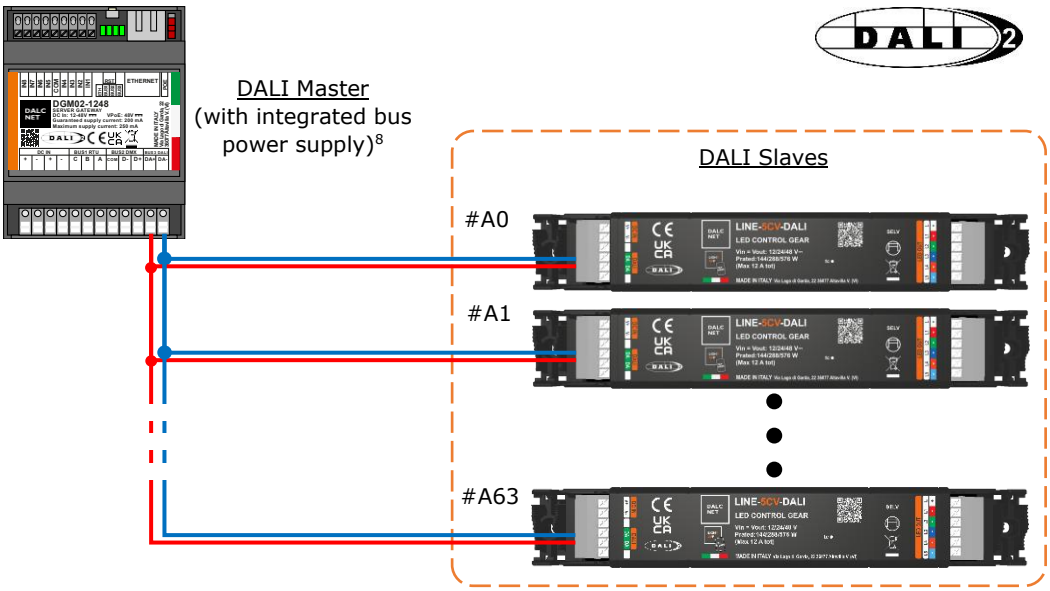


Figure 9: Remote Control Bus-wiring Topology

[8] The bus power supply can be supplied by an external 16 Vdc power supply (or within the range of 12 ÷ 20 Vdc) or by a DALI Master with integrated bus power supply. For more information, please visit our website: www.dalcnet.com.

POWER SUPPLY WIRING

LINE-5CV-DALI can be powered by a 12 Vdc, 24 Vdc or 48 Vdc constant voltage SELV (and Class 2 if installed within a UL certified plant) power supply and supplies the same voltage (dimmed) to the output. Once load and remote control (DALI bus) are wired, connect the power supply respecting the polarity conventions to the "+" and "-" labels of the DC IN terminal.



Figure 10: Power Supply wiring Diagram

FLICKER PERFORMANCE

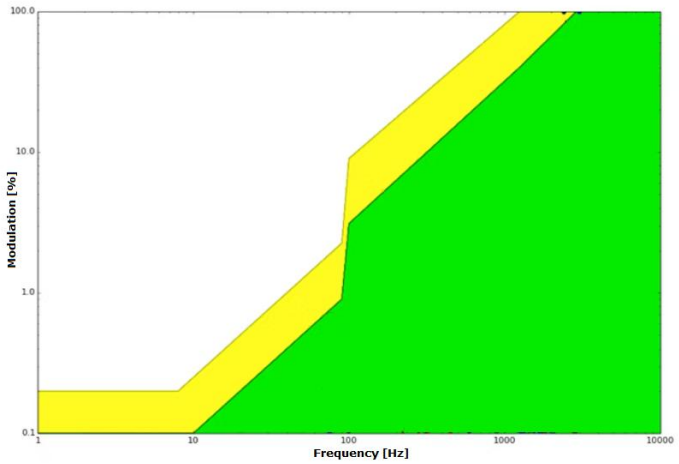


Figure 11: Flickering Perception Threshold

Thanks to its 4kHz dimming frequency, the LINE-5CV-DALI effectively reduces the occurrence of the Flicker phenomenon. Depending on an individual's sensitivity and the nature of their activities, flickering can impact one's well-being, even if the changes in luminance are beyond the threshold detectable by the human eye.

The graph shows the phenomenon of Flickering in function at the frequency, measured throughout the dimming range.
The results show the low-risk zone (yellow) and the no-effect zone (green). Defined by IEEE 1789-2015[9].

THERMAL CHARACTERIZATION

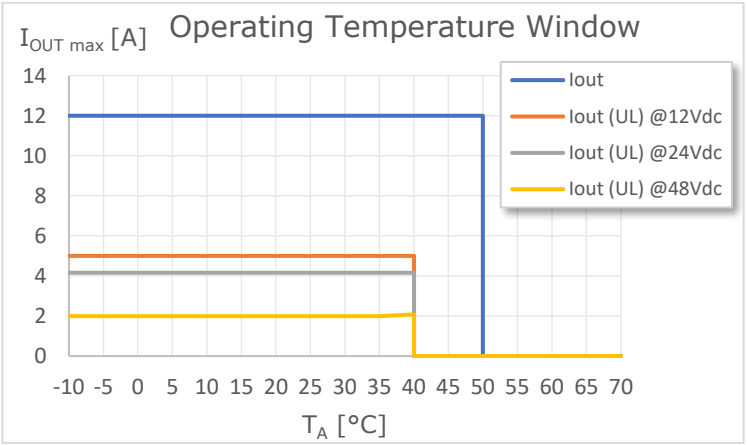


Figure 12: Operating Temperature Window

Figure 12 shows the maximum output current values that can be provided by the LINE-5CV-DALI as a function of the operating temperature[10] (or ambient temperature, T_A) of the operation, summarized below:

- T_A = (-10 ÷ +50) °C ⇢ $I_{OUT} \leq 12$ A
- T_A = (-10 ÷ +40) °C ⇢ $I_{OUT_UL@12V} \leq 5$ A
- T_A = (-10 ÷ +40) °C ⇢ $I_{OUT_UL@24V} \leq 4.16$ A
- T_A = (-10 ÷ +40) °C ⇢ $I_{OUT_UL@48V} \leq 2$ A

These maximum current (total) values can only be applied under suitable ventilation conditions.

[9] Institute of Electrical and Electronics Engineers (IEEE). *IEEE std 1789: Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers.*
[10] If the product is installed inside an electrical panel and/or junction box, TA refers to the temperature inside the panel/box.

DIMMING CURVES

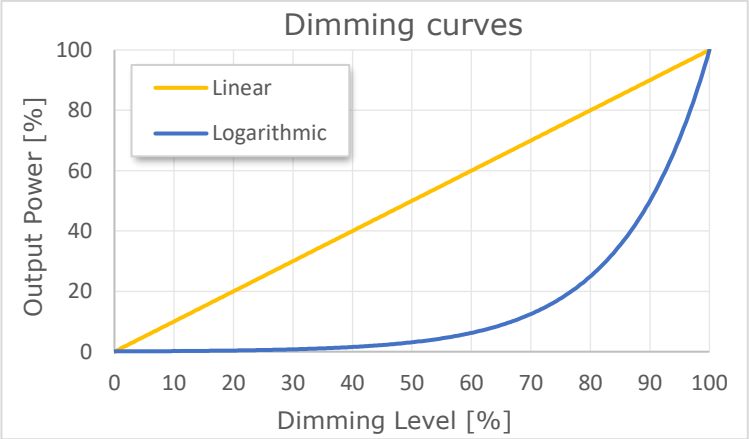


Figure 13: Dimming Curves

Figure 13 shows the dimming curves supported by the LINE-5CV-DALI dimmer. Curve selection can be done using the Dalcnet LightApp (see §Control Settings section of this manual).

MECHANICAL DIMENSIONS

Figure 14 details the mechanical measurements and the overall dimensions [mm] of the outer casing.

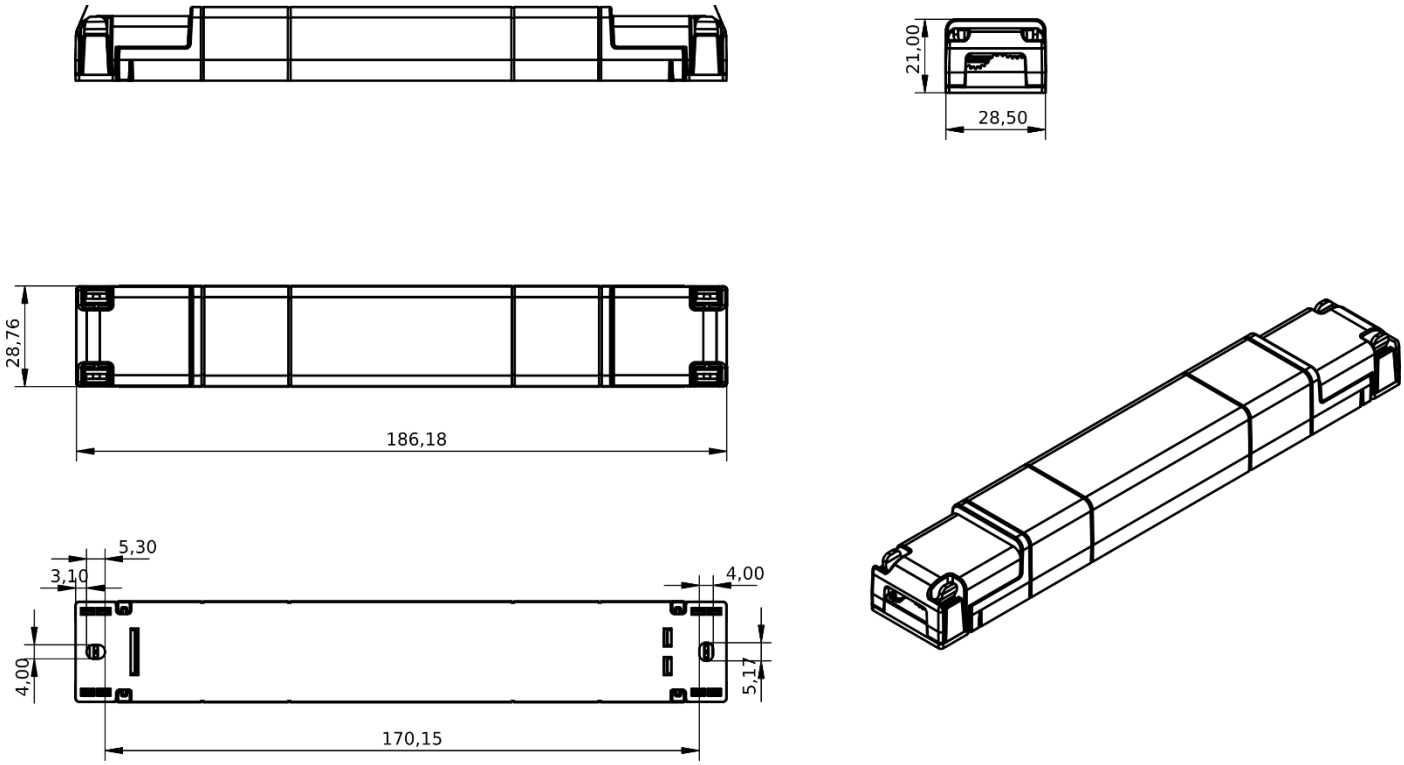


Figure 14: Mechanical dimensions

TECHNICAL NOTES

INSTALLATION

WARNING! Installation and maintenance should always be performed in the absence of DC voltage.
Before proceeding with the installation, adjustment, and connection of the device to the power supply, make sure that the voltage is disconnected from the system.

WARNING! Risk of fire or electric shock. Do not interconnect the output terminations. *Risque d'incendie ou de décharge électrique. Ne pas interconnecter les terminaisons de sortie.*

The device should only be connected and installed by qualified personnel. All applicable regulations, legislation, standards, and building codes in force in the respective countries must be adhered to. Incorrect installation of the device may cause irreparable damage to the device and connected loads.

Maintenance must only be carried out by qualified personnel in compliance with current regulations.

The product must be installed inside an electrical panel and/or junction box that is protected against surges/overvoltage.

The product is suitable for use in dry places, away from sources of moisture. Installation and use must take place in a dry environment.

The external power supply must be protected. The product must be protected by a properly sized circuit breaker with overcurrent protection.

Keep 230 Vac (LV) circuits and non-SELV circuits separate from SELV safety ultra-low voltage circuits and any product connections. It is strictly forbidden to connect, for any reason, directly or indirectly, the 230 Vac mains voltage to the product (BUS terminals included).

The product must be installed in a vertical or horizontal position, i.e. with the faceplate/label/top cover facing up or vertically. No other positions are allowed. The bottom position, i.e. with the faceplate/label/top cover facing downwards, is not allowed.

During installation, it is recommended to reserve adequate space around the device to facilitate its accessibility in case of future maintenance or updates (e.g. via smartphone, NFC).

Use in thermally harsh environments may limit the output power of the product.

For devices embedded within luminaires, the T_A ambient temperature range is a guideline to be carefully observed for the optimal operating environment. However, the integration of the device within the luminaire must always ensure proper thermal management (e.g. correct mounting of the device, proper ventilation, etc.) so that the temperature at the T_C point does not exceed its maximum limit under any circumstances. Proper operation and durability are only guaranteed if the maximum temperature of the T_C point is not exceeded under the conditions of use.

POWER AND LOAD

The device must be powered only with SELV type power supplies (and Class 2 if installed within a UL certified plant) with limited current at constant voltage, short circuit protection and power suitably sized according to the specifications indicated in the product data sheet. No other types of power are allowed.

Size the power of the power supply respect to the load connected to the device. If the power supply is oversized compared to the maximum current drawn, insert an overcurrent protection between the power supply and the device.

Connecting to an unsuitable power supply may cause the device to operate outside of the specified design limits, voiding its warranty.

In the case of power supplies equipped with earth terminals, it is mandatory to connect ALL the protection earth points (PE= Protection Earth) to a state-of-the-art and certified earthing system.

The power cables of the device must be correctly sized with reference to the connected load and must be isolated from any wiring or equal to non-SELV voltage. It is recommended not to exceed 10m of connection between the power source and the product. Use double-insulated cables. If you want to use connection cables between the power source and the product longer than 10m, the installer must ensure the correct operation of the system. In any case, the connection between the power supply and the product must not exceed 30m.

The manufacturer recommends ensuring a cumulative leakage current of less than 3.5 mA on the control circuit.

The device has been designed to work with Resistive LED loads only. Connecting and powering unsuitable loads may cause the device to operate outside of the specified design limits, voiding its warranty. In general, the operating conditions of the device should never exceed the specifications indicated in the product data sheet.

Observe the intended polarity between the LED module and the device. Any polarity reversal results in no light emission and can often damage the LED modules.

It is recommended that the connection cables between the product and the LED module be less than 3m long. Cables must be properly sized and should be insulated from any non-SELV wiring or parts. It is recommended to use double-insulated cables. If you want to use connection cables between the product and the LED module longer than 3m, the installer must ensure the correct operation of the system. In any case, the connection between the product and the LED module must not exceed 30m.

It is not allowed to connect different types of loads in the same output channel.

The interconnection of the output channels has not been evaluated. The acceptability of the interconnection of these outputs (and associated circuits) must be considered as part of the evaluation of the final installation. In case of installation in a UL certified plant, please refer to the evaluation of the final system.

REMOTE CONTROL

It is absolutely forbidden to connect, for any reason, directly or indirectly, the 230 Vac mains voltage to the DALI terminals.

The length and type of bus cables must comply with the specifications of the respective protocols and the regulations in force. They must be isolated from any wiring or non-SELV live parts. It is recommended to use double-insulated cables.

All devices and control signals connected to the bus must be of the SELV type (the connected devices must be SELV or otherwise provide a SELV signal) and supplied by a Class 2 power supply (if installed within a UL certified plant).

NFC (Near Field Communication) Warnings



The NFC antenna is located inside the device, the contact surface of which is indicated with the symbol

Position your smartphone so that its NFC antenna is in contact with the symbol on the device.

The location of the NFC sensor on the smartphone is dependent on the make and model of the smartphone itself. Therefore, it is recommended to refer to your smartphone's manual or the manufacturer's website to accurately determine where the NFC sensor is located. In most cases, the NFC reader is located on the back side near the top of the smartphone.

NFC technology works optimally with non-metallic materials. Therefore, it is not recommended to place the device near metal objects or reflective surfaces when using NFC.

For reliable communication, make sure that the contact surface is not covered or that it is free of metal objects, wiring, or other electronic devices. Any impediments could affect the quality of communication.

NFC technology works at a short distance, generally within a few centimeters. Make sure your device and smartphone are close enough to allow communication.

During firmware update and configuration, you should maintain stable contact (possibly without movement) between your smartphone and the device for the entire duration of the process (typically between 3 and 60 seconds). This ensures that the update goes smoothly and that the device is ready to use after the process is complete.

LEGAL NOTES

Terms of Use

Digimax Srl (hereinafter referred to as "the Company") reserves the right to make changes to this device, in whole or in part, without prior notice to the customer. Such changes may affect technical aspects, functionality, design, or any other element of the device. The company is not required to notify you of such changes and that your continued use of the device will constitute your acceptance of the changes.

The company is committed to ensuring that any changes do not compromise the essential functionality of the device and that they comply with applicable laws and regulations. In the event of substantial changes, the company undertakes to provide clear and timely information on the same.

The customer is advised to periodically consult the www.dalcnet.com website or other official sources to check for any updates or changes to the device.

SYMBOLS

CE	All products are manufactured in compliance with European Regulations, as reported in the Declaration of Conformity.
UK CA	All products are manufactured in compliance with UK Regulations and conform to UK safety, health, and environmental requirements for products sold in the UK, as reported in the UK Conformity Assessed.
	Independent lamp Controlgear: lamp controlgear consisting of one or more separate elements so designed that it can be mounted separately outside a luminaire, with protection according to the marking of the lamp controlgear and without any additional enclosure.
CLASS 2	UL Class 2 device: product compliant to UL1310 standard, designed to ensure that that the device's outputs are safe to touch and does not necessitate additional safety protections at the level of outputs. Essentially, the device is designed to minimize the risk of electric shock or overheating, thereby ensuring its safety for use in various contexts.
c US	UL Recognized certified unit for Canadian and U.S. markets: see technical specifications in Table 5.
SELV	"Very Low Safety Voltage" in a circuit isolated from the mains supply by insulation not less than that between the primary and secondary circuits of a safety isolation transformer according to IEC 61558-2-6.
	At the end of its useful life, the product described in this data sheet is classified as waste from electronic equipment and cannot be disposed of as unsorted municipal solid waste. **Warning!** Improper disposal of the product may cause serious harm to the environment and human health. For proper disposal, inquire about the collection and treatment methods provided by the local authorities.

Table 6: Device's symbols

LIGHTAPP

LightApp is the official Dalcnet application through which it is possible to configure, in addition to the functions of the LINE-5CV-DALI, also all the different Dalcnet products equipped with NFC technology.

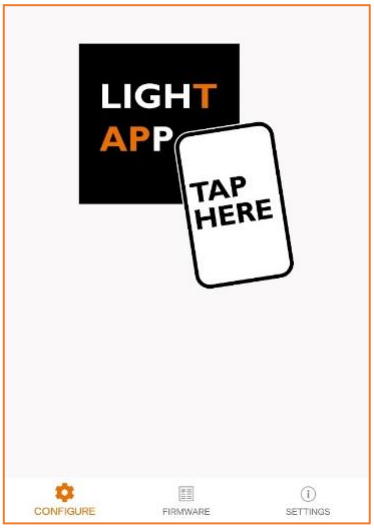
Dalcnet LightApp can be downloaded free of charge from the Apple App Store and Google Play Store.

GET IT ON Google Play

Available on the App Store

START-UP AND APP OVERVIEW

START SCREEN - CONFIGURE

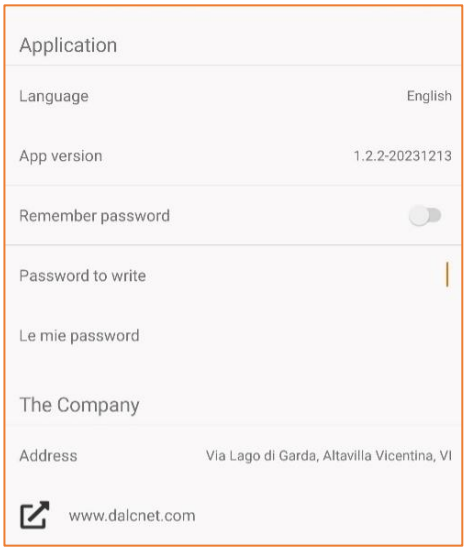


On this screen, the app waits for the device parameters to be read.

To read the parameters, simply bring the back of the smartphone close to the device's label. The read-sensitive zone of the smartphone may vary depending on the model.
Once the connection is established, a quick loading screen will appear. You must remain in position with your smartphone until the parameters are fully loaded.

iOS variant: To read the parameters, you need to press the SCAN button at the top right. A pop-up will appear indicating when your smartphone is ready to scan. Move the smartphone closer to the device and remain in place until the parameters are fully loaded.

SETTINGS



On the Settings page, you can:

- Setting the language of the app (Italian or English)
- View the app version
- Enable password saving on your smartphone
- Setting the Password for Writing Parameters
- View your saved passwords
- View the references of the distribution company (Dalcnet Srl)

FIRMWARE UPLOAD



On the firmware page, you can update the firmware of your device.

The requested file must be of type *.bin*.

Once the file has been uploaded, simply follow the on-screen instructions.

ATTENTION:

- **The upload procedure is irrevocable. Once the upload has started, it will not be possible to pause it.**
- **If the procedure is interrupted, the firmware will be corrupted and you will need to repeat the loading procedure.**
- **At the end of the firmware load, all previously set parameters will be reset to factory defaults.**

If the update is successful and the loaded version is different from the previous one, the device will flash 10 times on the connected load.

HOW TO LOAD DEVICE PARAMETERS

IMPORTANT: The parameters must be written when the device is switched OFF (without input power).

READ



With the app in READ mode, the smartphone will scan the device and show its current configuration on the screen.

WRITE

In WRITE mode, the smartphone will write the parameter configuration set on the screen to the device.



In normal mode (*Write All* switched OFF) the app writes only the parameters that have changed since the previous read. In this mode, the write will only be successful if the serial number of the device matches the one previously read.



In *Write All* mode, all parameters are written. In this mode, the write will only be successful if the device model matches the one previously read.
It is recommended to activate the *Write All* mode only when you need to replicate the same configuration on many examples of the same model.

WRITE PROTECTION



By means of the padlock button it is possible to set a lock when writing parameters. A screen will appear for entering a 4-character password. Once this password has been written into the device, all subsequent parameter changes can only be made if the correct password is written on the app's Settings page.

To remove the password lock, simply press the lock key and leave the Password field blank.

WRITE ERROR

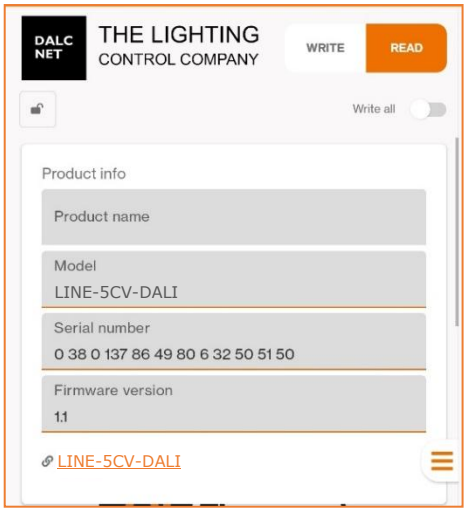
After writing the parameters, if the load connected to the device flashes continuously at a frequency of 2 times per second when it is turned ON again, it means that the writing was not successful. Therefore, you will need to perform the following steps:

1. Turn OFF the device.

2. Perform a parameter rewrite.
3. Wait for the write to be successful or for no error messages to appear.
4. Turn the device back ON.

If that doesn't work, you can perform a factory reset by quickly turning the device OFF and ON 6 times.

PRODUCT INFORMATION



On the *Product Information* screen, you can view a variety of information about the product you are about to configure.

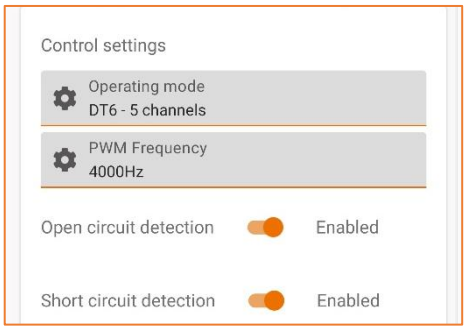
Product Name: User-settable field for easy identification (e.g. Office, Meeting Room, Lobby, etc.). By default, the product name is the same as the Model field.

Model: the model of the device (non-editable field).

Serial Number: uniquely identifies the device (non-editable field).

Firmware Version: identifies the firmware version currently loaded on the device (non-editable field).

CONTROL SETTINGS



On the *Control Settings screen,* you can configure the different parameters for the driver's operation mode.

Operating mode: allows you to select the DALI profile (see next paragraph).

PWM Frequency: sets the frequency[11] of the PWM modulation of the output.

Open Circuit Detection: enables or disables output open-circuit detection (refer to the following section).

Short-Circuit Detection: enables or disables output short-circuit detection (refer to the following section).

OPEN-CIRCUIT AND SHORT-CIRCUIT DETECTION

By the Lamp-Failure command, the DALI protocol allows you to detect situations in which the LED load connected to the output of the LINE-5CV-DALI may not work as expected, such as an incorrect connection (detecting it as an Open Circuit error) or a defect in the LED load (detecting it as a short circuit).

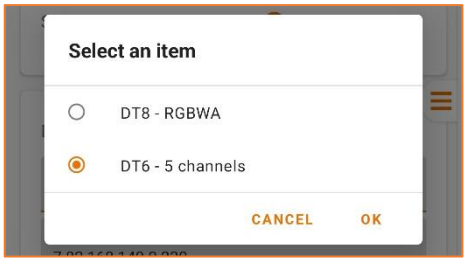


Enable/Disable the Open Circuit function: if a very small load is connected to the output of the dimmer, false open-circuits may be detected in some cases. In this case, it is recommended to disable the Open Circuit detection function.

Enable/Disable the Short Circuit function: if a load with a high in-rush current is connected to the dimmer output, in some cases false short-circuits may be detected. In this case, it is recommended to disable the Short Circuit detection function.

[11] In the case of applications under severe thermal conditions, it is advisable to lower the PWM frequency to a minimum (307 Hz).

CONTROL TYPES



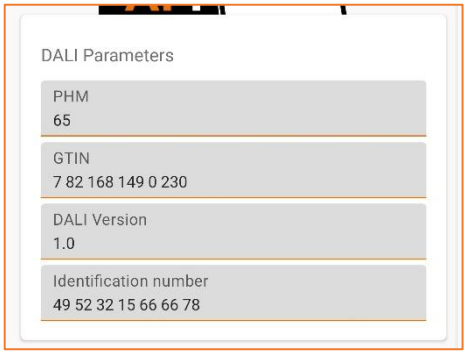
Within the "Operating Mode" configuration, you can select the profiles available for LINE-5CV-DALI

- DT8 - RGBWA
- DT6 - 5 channels

The parameters that can be set for each type of control are shown in the following paragraphs.

DALI PARAMETERS

The following information can be viewed via LightApp.



PHM: indicates whether the switched-ON device is switchable only (PHM=254) or dimmable (PHM<254) (non-editable field).

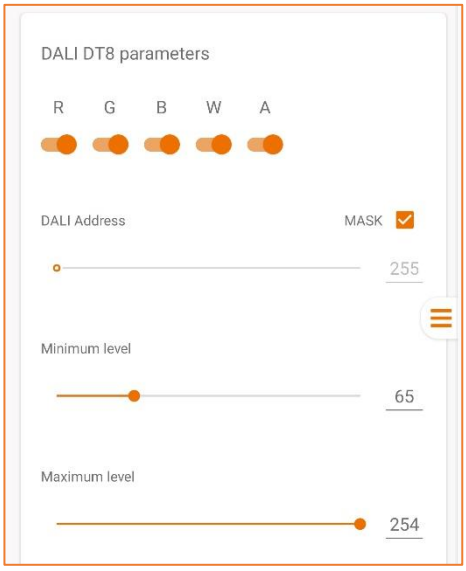
GTIN: the unique DALI code of the product (non-editable field).

DALI Version: identifies the DALI firmware version currently loaded on the device (non-editable field).

Identification Number: serial number of the microcontroller (non-editable field).

DT8 - RGBWA

In DT8 mode, it is possible to configure and display the following parameters for the type of RGB, RGBW or RGBWA load connected to the outputs depending on the lighting effect to be obtained.



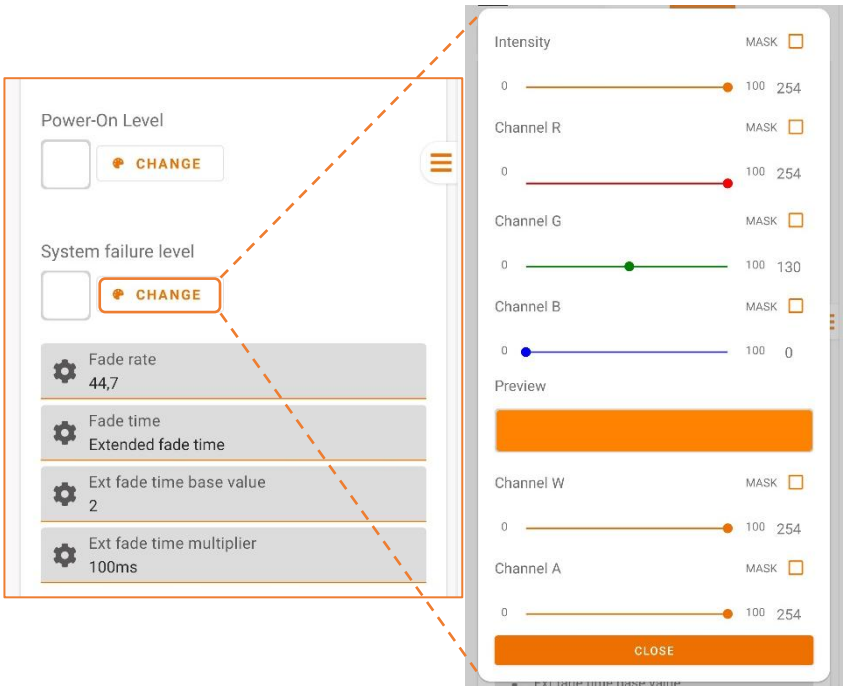
RGBWA Channel Selection: individually enable dedicated channels for RGB, RGBW, or RGBWA loads. Depending on the type of load connected to the output, the user can enable the channels used by the LED load.

DALI Address: Sets the address associated with the device in the DALI network.

Mask: Enables or disables control.

Minimum Level: sets the minimum level of light intensity that can be reached via remote control (default value = 1).

Maximum Level: sets the maximum level of light intensity that can be reached via remote control (default value = 254).



Power-On Level: sets the levels of light intensity, RGB, white light, and amber light to which the output is brought as soon as the device is powered. The parameters can be set using the "Change" submenu.

System Failure Level: sets the light intensity, RGB, white light, and amber light levels to which the output is brought when a system error is detected. The parameters can be set using the "Change" submenu.

Fade rate: indicates the rate (in steps/second) at which the output changes in brightness when the UP and DOWN commands are received.

Fade time: sets the time it takes for the output to make a transition from one light intensity level to another.

Ext fade time base value – Sets the minimum time for the extended transition from one light intensity level to another.

Ext fade time multiplier: Sets the multiplication factor for the extended transition.

CHANGE submenu: you can set the RGB colour values in its Red-Green-Blue components, the light intensity of the RGB part (Intensity), the white light intensity (only for RGBW LEDs) and amber light intensity (only for RGBWA LEDs).



Group 0-15: allows to associate the device address with one or more groups.

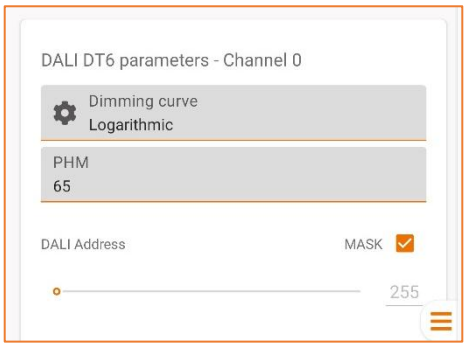
Scene 0-15: allows to pair the device with one or more scenes. The levels of light intensity, RGB, white light and amber light can be set via the "Change" submenu.

Mask: Enables or disables control.

CHANGE submenu: it is possible to set the RGB colour values in its Red-Green-Blue components, the light intensity of the RGB part (Intensity), the white light intensity (only for RGBW LEDs) and amber light intensity (only for RGBWA LEDs).

DT6 - CHANNEL 1…5

In DT6 mode, the following parameters can be configured and displayed for each output (channel 1 to 5) independently.

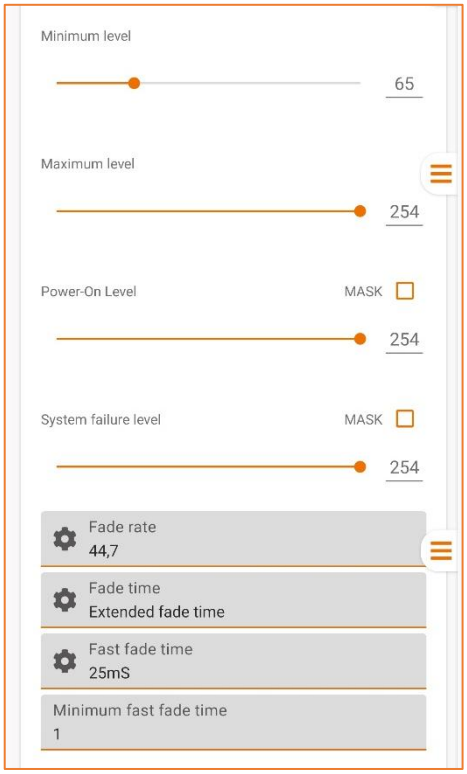


Dimming Curve: Sets the dimming curve of the device for operation with remote control. For details on the different curves that can be set, see the §Dimming Curves section of this manual.

PHM: Indicates whether the switched-on device is switchable only (PHM=254) or dimmable (PHM<254) (non-editable field).

DALI Address: Sets the address associated with the device in the DALI network.

Mask: Enables or disables control.



Minimum Level: sets the minimum level of light intensity that can be reached via remote control (default value = 1).

Maximum Level: sets the maximum level of light intensity that can be reached via remote control (default value = 254).

Power-On Level: this is the intensity value to which the output is brought as soon as the device is powered.

Mask: Enables or disables control.

System Failure Level: this is the intensity value to which the output is brought when a system error occurs.

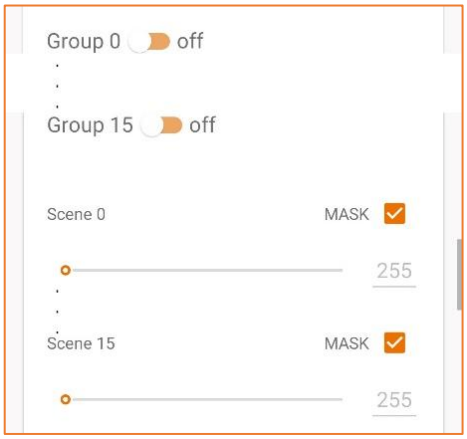
Mask: Enables or disables control.

Fade rate: indicates the rate (in steps/second) at which the output changes in brightness when the UP and DOWN commands are received.

Fade time: sets the time it takes for the output to make a transition from one light intensity level to another.

Fast fade time: sets the amount of time it takes for the output to make a *quick* transition from one light intensity level to another.

Minimum fast fade time: Shows the minimum time for the fast transition (non-editable field).



Group 0-15: allows to associate the device address with one or more groups.

Scene 0-15: allows to pair the device with one or more scenes.

Mask: Enables or disables control.

PROFILE MAPPING: ADDRESSING

The DALI protocol provides two configurations depending on the light characteristics to be obtained through the LED module connected to the outputs.
Each profile is composed of a defined number of 8-bit channels, whose values can be set in the range (0 ÷ 255), each of which represents a light characteristic (e.g. brightness, colour, temperature, etc.) to be modulated on the LED load.

DT8 - RGBWA

With the DT8-profile[12] it is possible to adjust the Tonality value (RGB), the temperature adjustment and the intensity of white and/or amber light. The suitable load for this configuration is an RGB+TW or RGB+WA LED module, the connection diagram of which is given in the paragraph § RGB+TW and RGB+WA LED Load diagrams. It is also possible to use this configuration for other types of loads, such as RGB and RGB+W (whose connection diagrams are shown in the paragraphs §RGB LED Load diagram and § RGB+W LED Load diagram), by configuring the device appropriately in the dedicated LightApp section (see paragraph §DT8 - RGBWA).

Address	Function	Level
A0	RGB	LEVEL 0…254
	WHITE	LEVEL 0…254
	AMBER	LEVEL 0…254

DT6 - 5 CHANNELS

The "DT6" profile allows you to adjust the light intensity for each channel independently. In the §Load wiring section, it is possible to find details on the type of load and the most suitable connection diagram for this operating mode. It is understood that this profile can be used with all the other types of load proposed in this document by configuring the device in the dedicated LightApp section (see §DT6 - Channel 1…5).

Address	Function	Level
A0	DIMMER CH1	LEVEL 0…254
A1	DIMMER CH2	LEVEL 0…254
A2	DIMMER CH3	LEVEL 0…254
A3	DIMMER CH4	LEVEL 0…254
A4	DIMMER CH5	LEVEL 0…254

[12] In case of installation in a UL certified plant, please refer to the evaluation of the final system.