LINE-5CV-DMX

User Manual

Made in Italy



FEATURES

- DMX LED DIMMER
- WHITE/MONOCHROME, DIM-TO-WARM/TUNABLE-WHITE, RGB, RGB+W/RGB+WW, and RGB+TW Light Control
- Power supply (DC IN): 12-24-48 Vdc (SELV)
- Output (L, L1 to L5): constant voltage output (= DC IN), modulated for Resistive loads LED-strips and LED-modules
- Remote control via opto-isolated BUS (DMX512-A+RDM)
- PWM modulation, frequency settable from 307 to 4000 Hz
- Device configuration via Dalcnet LightApp mobile application and via RDM, settable parameters:
  - DMX Start Address
  - PWM Frequency
  - Dimming Curve
  - Minimum, Maximum, and Power-ON levels
  - DMX Personality
- Indication of operating hours and ignition cycles
- Short-circuit 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-DMX is a 5-channel LED dimmer, PWM (Pulse Width Modulation) modulated at Constant Voltage (CV) and controllable via DMX (Digital Multiplex) protocol. LINE-5CV-DMX can be supplied by a SELV constant voltage (12 ÷ 48) Vdc power supply and is suitable for driving loads such as White/Monochrome, Tunable White (TW), RGB, RGB+W/RGB+WW (Warm White), RGB+TW constant voltage LED-strips and dimmable LED-modules. The dimmer can deliver an output current up to 12 A and has the following protections: short-circuit protection on the LED outputs, 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-DMX	12-24-48 VDC	5 x 5A (tot. max 12A) [1,2]	DMX512-RDM	LightApp

Table 1: Product Code

PROTECTIONS AND DETECTION

The following table shows the types of ingress and egress 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	✓

Table 2: Protection and Detection features

REFERENCE STANDARDS

LINE-5CV-DMX 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
ANSI E1.11	Entertainment Technology - USITT DMX512-A - Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories
ANSI E1.20	Entertainment Technology-RDM-Remote Device Management over USITT DMX512 Networks
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 § 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 Min		Values Max	Unit of Measure	Note
POWER SUPPLY INPUT (DC IN terminal)						
Nominal 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, Quadratic, Exponential		-	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 Specifications

[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 Min		Values Max	Unit of Measure	Note
UL Certification						
Product type	UL_{TYPE}	c UL us			-	UL Recognized certified device
Manufacturer certification file	UL_{FILE}	E514299			-	-
INPUT (DC IN)						
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	$V_{IN\text{-}RNG}$	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	
Standby power absorption	P_{STBY}		< 0.5		W	-
Efficiency at full load	E_{FF}		> 95		%	-
OUTPUT (Channels L, L1 to L5)						
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						
Curve	C_{DIM}	Linear, Quadratic, Exponential			-	Selection via Dalcnet LightApp
Method	M_{DIM}	Pulse Width Modulation (PWM)			-	-
PWM Frequency	f_{PWM}	307, 667, 1333, 2000, 4000			Hz	Selection via Dalcnet LightApp
Resolution	Res_{DIM}	16			bit	Defined by design
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}	PC/ABS			-	Polycarbonate/ABS
Case Material	MC	Plastic			-	-
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 Specifications

POSITION OF THE TC POINT

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 connecting 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 building regulations, legislation, rules, and codes must be complied with. Incorrect installation of the device may cause irreparable damage to the device and connected loads.

The following paragraphs show the diagrams of the connection of the dimmer to the remote control, the load and the supply voltage. It is recommended that you 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 DMX bus DATA+, DATA-, and COM signals to the "D+" (Data positive), "D-" (Data negative), and "COM" (Common) terminals of the "DMX" 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-DMX provides 5 output channels, 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+WW, RGB+TW, Dim-to-Warm and Tunable-White LED modules).
The DMX protocol provides for different configurations called *Personalities*[6]: each *Personality* has a dedicated wiring diagram, depending on LED load type. LINE-5CV-DMX supports up to 11 *Personalities* distributed over 5 connection diagrams, shown below.

WHITE OR MONOCHROME LED LOADS DIAGRAM

The following connection diagram (Figure 3) is suitable for the §Dimmer and §Macro Dimmer Personalities and allows you to drive up to 5 white/monochrome LED loads.

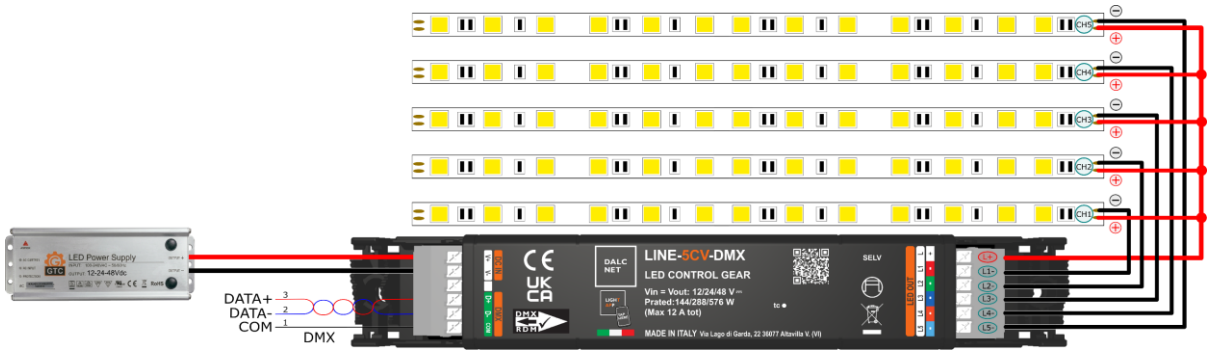


Figure 3: Wiring diagram for White or Single-colour LED loads

[6] "*Personality*" refers to a specific set of channels and functions that a DMX device can support. Each *Personality* defines a configuration of channels and functions for the device. This allows light operators to select the configuration that best suits their needs.

TUNABLE-WHITE LED LOAD DIAGRAM

This connection diagram is suitable for driving up to 2 *Tunable-White*[7] *LED loads*, configurable through §Tunable White or §Dim-to-Warm[8] Personalities. The output channels used in this configuration are L1 (Warm White), L2 (Cool White), L3 (Warm White), and L4 (Cool White).

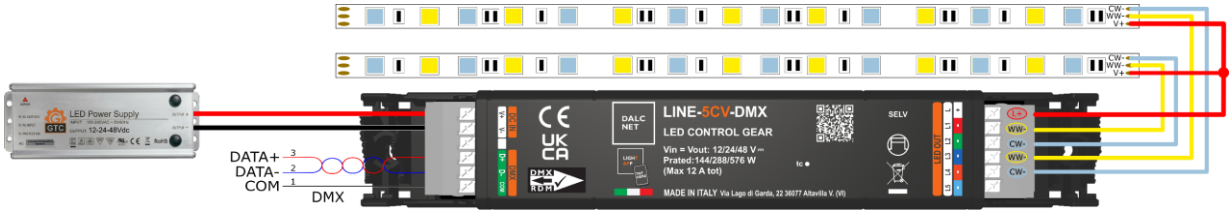


Figure 4: Wiring diagram for Tunable-White LED loads

RGB LED LOAD DIAGRAM

Figure 5 shows the connection diagram suitable for driving a single RGB LED load, configurable through the §RGB, §M+RGB+S, and §Smart HSI RGB Personalities. The output channels used in this configuration are L1 (Red), L2 (Green), and L3 (Blue).

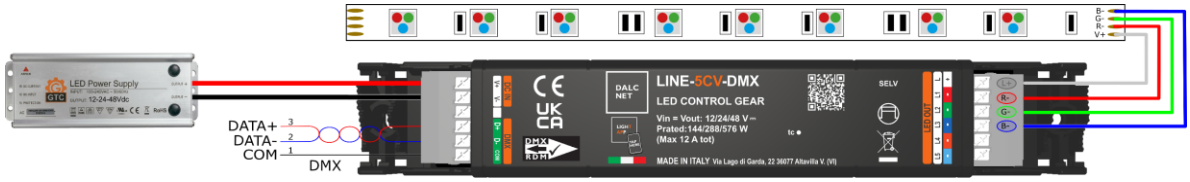


Figure 5: Wiring diagram for RGB load

RGB+W / RGB+WW LED LOAD DIAGRAM

Figure 6 shows the connection diagram indicated to drive a single RGB-W or RGB-WW LED load, whose parameters are configurable through the Personalities §RGBW, §M+RGBW+S, §Smart HSI RGBW. The output channels used for this load are L1 (Red), L2 (Green), L3 (Blue), and L4 (White).

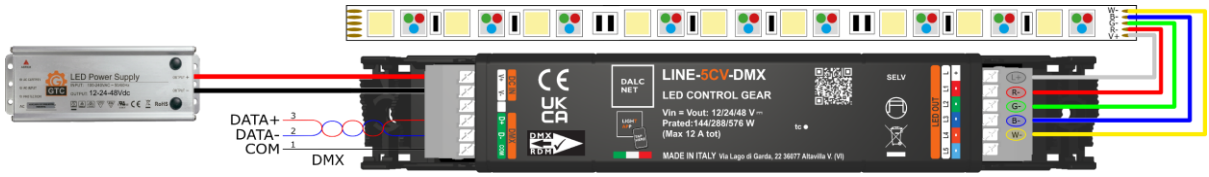


Figure 6: Wiring diagram for RGB-W/RGB-WW LED load

RGB+TW LED LOAD DIAGRAM

The connection diagram in Figure 7 is indicated to drive a single RGB-TW LED load, whose light parameters can be configured by means of the §Smart HSI RGBTW Personality. The channels used for this configuration are L1 (Red), L2 (Green), L3 (Blue), L4 (Warm White), and L5 (Cool White).

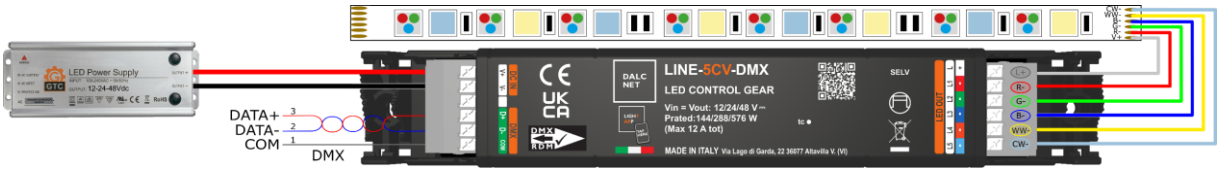


Figure 7: Wiring diagram for RGB-TW LED load

[7] "Tunable-White" refers to the ability of a lighting fixture to vary the colour temperature of white independently of its light intensity.
[8] "Dim to Warm" refers to a particular dimming technology that allows the colour temperature of a lighting fixture to be reduced when the light intensity is decreased.

REMOTE CONTROL WIRING

LINE-5CV-DMX can be controlled remotely via DMX512-RDM digital bus by means of a two-wire, twisted and shielded cable, with a nominal impedance of 110 Ω. The control is done by means of a DMX512-RDM Master that provides commands to the devices in the DMX network and receives response messages from the Slave devices if they support the RDM (Remote Device Management) functionality.

To connect LINE-5CV-DMX to the DMX network, simply connect the bus cables to the terminals of the "DMX" terminal: since no other topologies other than Bus-wiring are possible, the polarity of the "COM", "D+" and "D-" signals must be respected during connection.

The most commonly used connectors are 3 and 5 pole XLR, where one pin is the cable shield (ground) and 2 pins are used for DMX signal transmission. In the case of 5-pole XLR, the other 2 pins are reserved for a secondary DMX balanced line[9].

Signal Description	Pin# (3-Pin XLR)	Pin# (5-Pin XLR)	DMX512 Function
Common Reference	1	1	Data-Link Common
Primary Data-Link	2	2	Data 1-
	3	3	Data 1+
Secondary Data-Link[9]	-	4	Data 2-
	-	5	Data 2+

Table 6: 3 and 5 pin XLR connector pinouts



Figure 8: Remote Control Connection Pin-out and XLR Connectors

DMX WIRING TOPOLOGY

DMX protocol requires a single wiring topology, Bus-wiring, which is shown as an example in Figure 9.

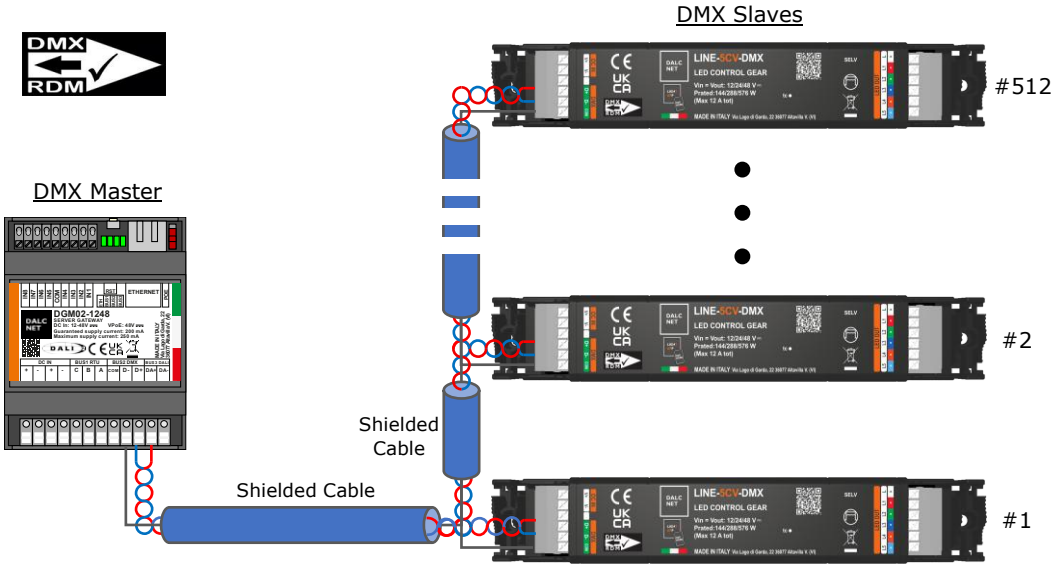


Figure 9: Remote Control Bus-wiring Topology

[9] Optional, refer to chapter §4.8 of ANSI E1.11.

POWER SUPPLY WIRING

The LINE-5CV-DMX 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, depending on the operating voltage of the LED load. Once the load and remote control (DMX bus) are connected, connect the power supply to the "+" and "-" terminals of the DC IN terminal.



Figure 10: Power Supply wiring Diagram

REMOTE CONTROL: DMX512+RDM

The DMX512 (or DMX) protocol, is a digital communication standard used primarily for stage lighting control in the entertainment industry and allows numerous lights and effects to be controlled from a control room console. Recently, it has also been introduced in architectural lighting. The DMX512 is based on the RS-485 physical protocol: an industrial RS485 line, i.e. a shielded bipolar cable with a nominal impedance of 110Ω, is therefore used to connect a DMX512 controller to compatible equipment; the data is transmitted in differential form at 5 V, with a transmission rate of 250 kb/s.

RDM FEATURES AND PARAMETERS

The Remote Device Management (RDM) extension offers a significant improvement by introducing two-way communication between lighting controllers and connected compatible RDM devices. It therefore allows devices to be controlled and communicated in both directions, facilitating the installation and configuration of devices as well as enabling intelligent management from the control console through the information sent by RDM devices. Benefits of RDM include:

- Remote access to driver address settings from the command console (or DMX controller)
- Automatic device search: the controller can search the DMX universe for all connected devices and automatically direct them
- Status communication, faults, temperature, etc.: RDM devices can send information about their operating status and any faults to the console

LINE-5CV-DMX natively supports the RDM functionality of the DMX protocol with the following commands.

Std.	RDM Parameter ID	PID	Required	Supported	Get/Set/Disc
E1.20	DISC_UNIQUE_BRANCH	0x0001	✓	✓	D
	DISC_MUTE	0x0002	✓	✓	D
	DISC_UN_MUTE	0x0003	✓	✓	D
	SUPPORTED_PARAMETERS	0x0050	✓	✓	G
	PARAMETER_DESCRIPTION	0x0050	✓	✓	G
	DEVICE_INFO	0x0060	✓	✓	G
	PRODUCT_DETAIL_ID_LIST	0x0070	-	✓	G
	DEVICE_MODEL_DESCRIPTION	0x0080	-	✓	G
	MANUFACTURER_LABEL	0x0081	-	✓	G
	DEVICE LABEL	0x0082	-	✓	G+S
	SOFTWARE_VERSION_LABEL	0x00C0	✓	✓	G
	BOOT_SOFWARE_VERSION_ID	0x00C1	-	✓	G
	BOOT_SOFWARE_VERSION_LABEL	0x00C2	-	✓	G
	DMX_PERSONALITY	0x00E0	-	✓	G+S
	DMX_PERSONALITY_DECRIPTION	0x00E1	-	✓	G
	DMX_START_ADDRESS	0x00F0	✓	✓	G+S
	SLOT_INFO	0x0120	-	✓	G
	SLOT_DESCRIPTION	0x0121	-	✓	G
	DEFAULT_SLOT_VALUE	0x0122	-	✓	G
	DEVICE_HOURS	0x0400	-	✓	G+S
	LAMP_ON_MODE	0x0404	-	✓	G+S

Std.	RDM Parameter ID	PID	Required	Supported	Get/Set/Disc
	DEVICE_POWER_CYCLES	0x0405	-	✓	G[10]
	IDENTIFY_DEVICE	0x1000	✓	✓	G+S
E1.37-1	DIMMER_INFO	0x0340	-	✓	G
	MINIMUM_LEVEL	0x0341	-	✓	G+S
	MAXIMUM_LEVEL	0x0342	-	✓	G+S
	CURVE	0x0343	-	✓	G+S
	CURVE_DESCRIPTION	0x0344	-	✓	G
	MODULATION_FREQUENCY	0x0347	-	✓	G+S
	MODULATION_FREQUENCY_DESCRIPTION	0x0348	-	✓	G

Table 7: RDM Parameters

FLICKER PERFORMANCE

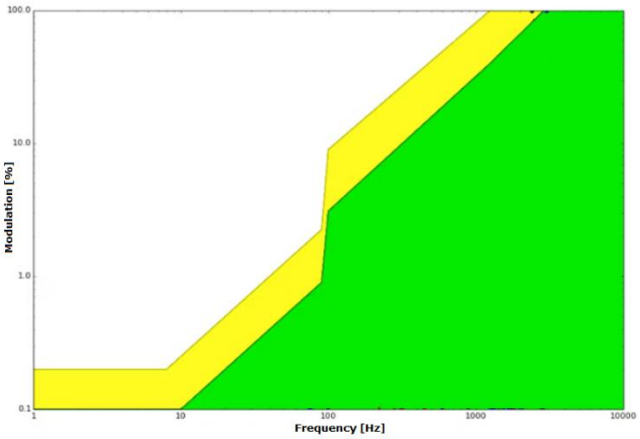


Figure 11: Flickering Perception Threshold

LINE-5CV-DMX, thanks to the 4kHz dimming frequency, allows you to reduce the flicker phenomenon.
Depending on eye sensitivity and the type of activity, Flickering can affect a person's well-being even if the luminance fluctuations are beyond the threshold perceptible to the human eye.

The graph shows the phenomenon of Flickering as a function of frequency, measured over the entire dimming range.
The results reported highlight the low risk zone (yellow) and the no observable effect zone (green), defined by the IEEE 1789-2015 standard[11].

THERMAL CHARACTERIZATION

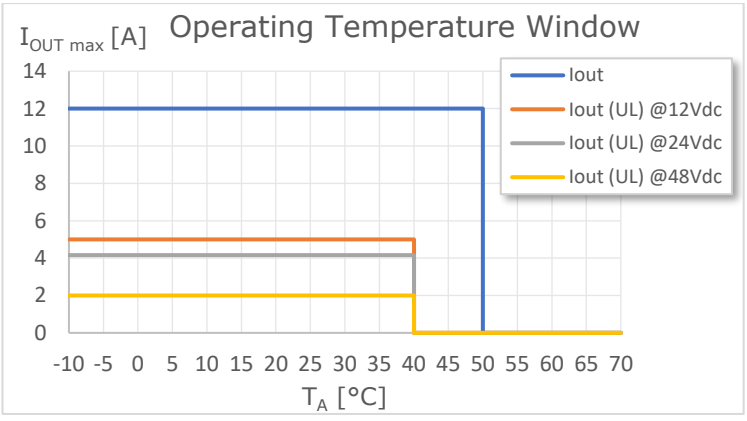


Figure 12: Operating Temperature Window

Figure 12 shows the maximum output current values that can be supplied by the LINE-5CV-DMX dimmer as a function of the operating temperature[12] (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.

[10] For this model, "Set" mode is not supported.
[11] 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*.
[12] In the event that the product is installed inside an electrical panel and/or junction box, TA refers to the temperature inside the panel/box.

DIMMING CURVES

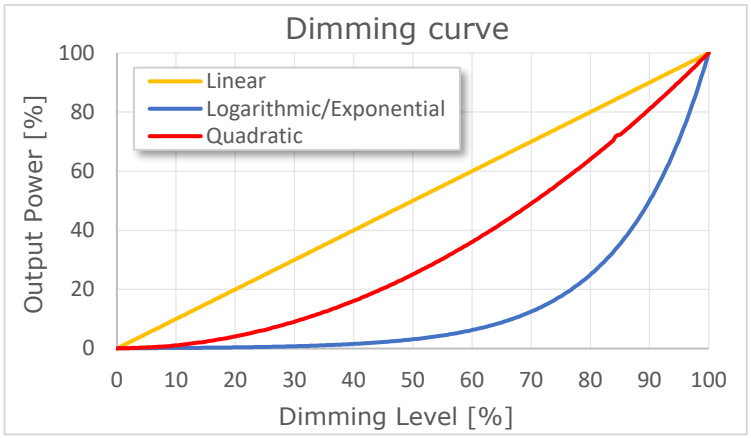


Figure 13: Dimming Curves

Figure 13 shows the dimming curves supported by the LINE-5CV-DMX 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 overall dimensions [mm] of the outer casing.

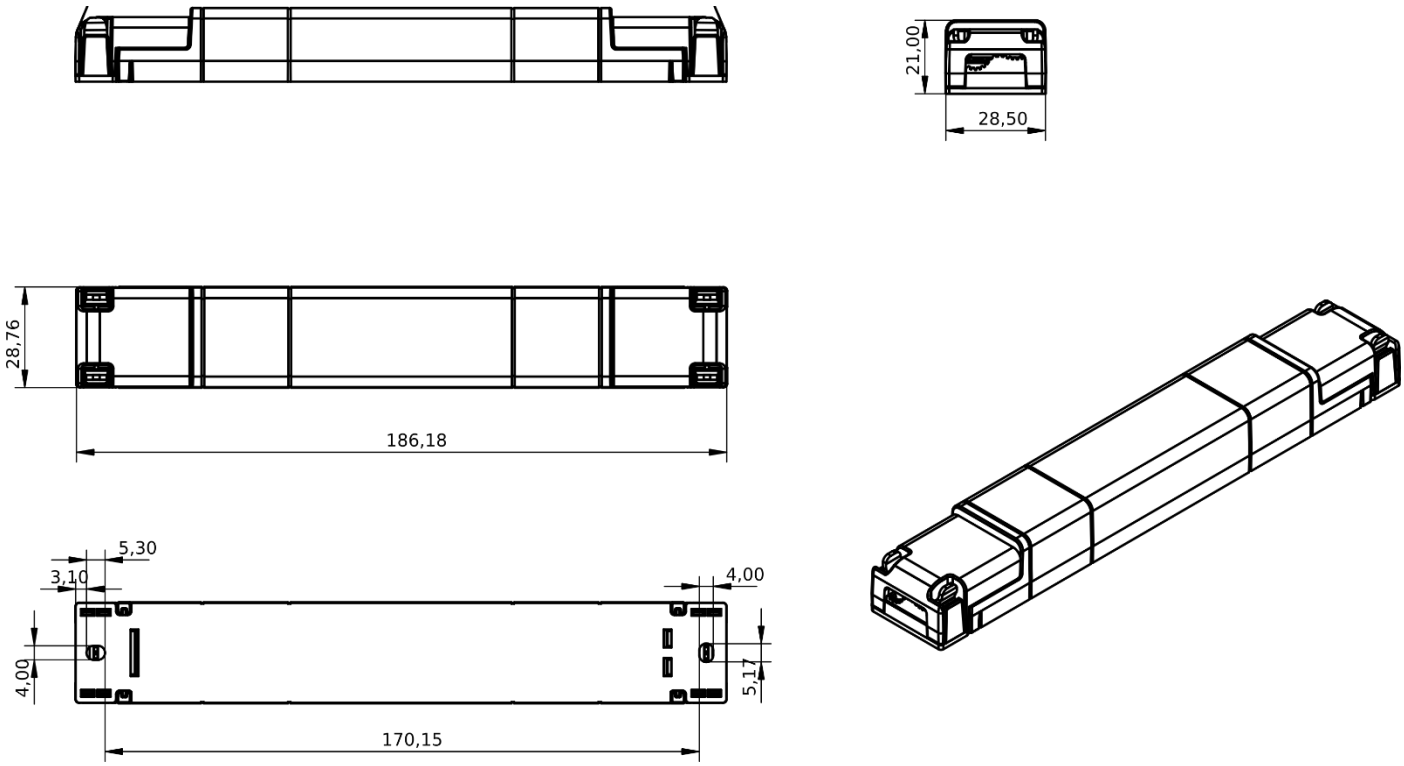


Figure 14: Dimensions and mechanical dimensions

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, rules and building codes in force in the respective countries must be complied with. 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 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 230Vac (LV) circuits and non-SELV circuits separate from SELV safety ultra-low voltage circuits and any product connections. It is absolutely forbidden to connect, for any reason, directly or indirectly, the 230Vac 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 is not allowed, i.e. with the front panel/label/top cover facing downwards.

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 SUPPLY 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 supply with reference to the load connected to the device. If the power supply is oversized compared to the maximum current drawn, insert an overcurrent protector between the power supply and the device.

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

In the case of power supplies equipped with earth terminals, it is mandatory to connect ALL protective earth points (PE= Protection Earth) to a professionally executed 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 the specified design limits, voiding its warranty. In general, the operating conditions of the device should never exceed the specifications stated in the product data sheet.

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

A length of the connection cables between the product and the LED module of less than 3m is recommended. Cables must be correctly sized and must 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 larger 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 DMX terminals.

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

All control devices and signals connected to the buses must be of the SELV type (the connected devices must be SELV or in any case 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 by 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 your smartphone depends on the make and model of your smartphone. 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 near the top of the smartphone.

Please note that NFC technology works optimally with non-metallic materials. Therefore, it is not recommended to place the device near metal objects or reflective surfaces while using with 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 the firmware update and configuration, you must maintain stable contact (possibly motionless) between your smartphone and the device throughout the process (usually between 5 and 60 seconds). This ensures that the update is successful and that the device is ready for use after the process is complete.

LEGAL NOTES

Terms of Use

Digimax (hereinafter "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 relate to technical aspects, functionality, design, or any other element of the device. We are not required to notify you of such changes and that your continued use of the device will constitute your acceptance of such changes.

The company is committed to ensuring that any changes do not impair the essential functionality of the device and that they comply with applicable laws and regulations. In the event of material 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 8: Device's symbols

LIGHTAPP

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

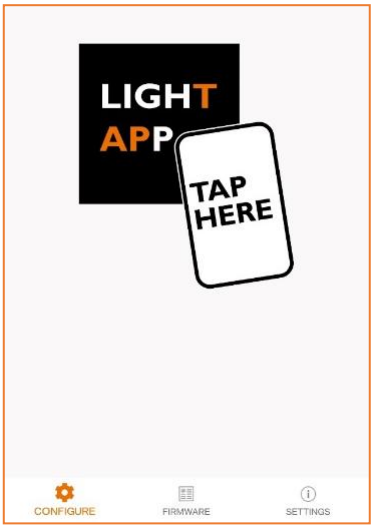
Dalcnet LightApp is free to download from the Apple App Store and Google Play Store.

GET IT ON Google Play

Available on the App Store

START-UP AND APP OVERVIEW

STARTUP SCREEN - CONFIGURE

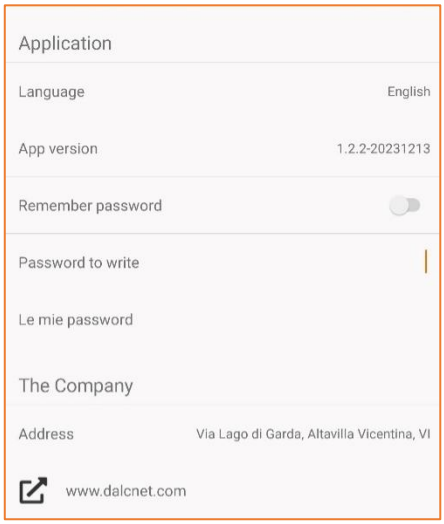


On this screen, the app waits for the device parameters to be read.

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

SETTINGS



On the Settings page, you can:

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

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 instructions on the screen.

ATTENTION:

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

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

HOW TO LOAD DEVICE PARAMETERS

IMPORTANT: The writing of the parameters must be done with the device turned off (without input power).

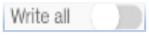
READ



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

WRITE

With the app in WRITE mode, the smartphone will write the configuration of the parameters set on the screen inside the device.



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



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

WRITE PROTECTION



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

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

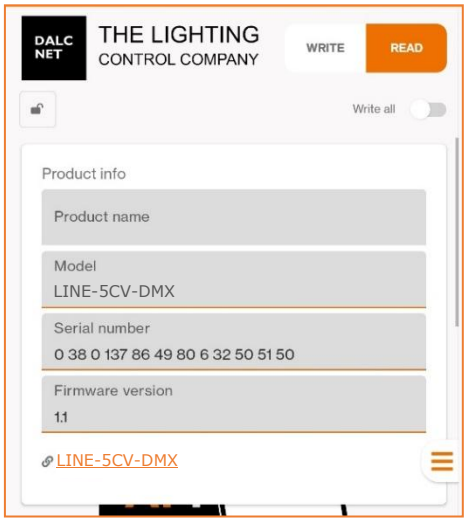
WRITING ERROR

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

1. Turn off the device.
2. Rewrite the parameters.
3. Wait for the write to succeed or for no error messages to appear.
4. Turn the device back on.

If it does not work, you can perform a factory reset by quickly turning the device off and on again 6 times.

PRODUCT INFORMATION



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

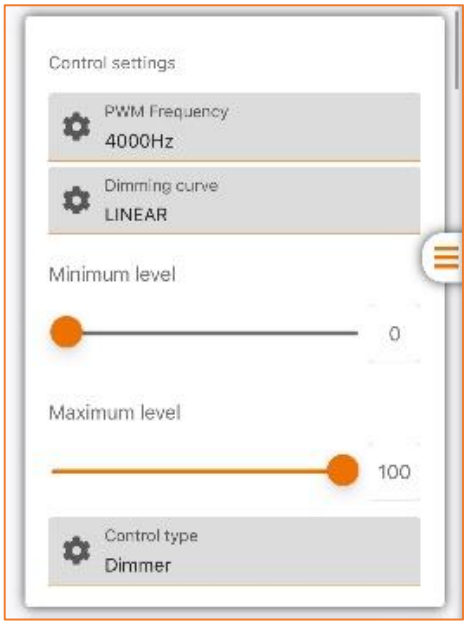
Product name: field can be set by the user for easy identification (e.g. Office, Meeting Room, Entrance, etc.). By default, the product name is the same as the Model field.

Model: Identifies the device model (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 mode of operation.

PWM Frequency: Allows you to set the frequency[13] of the PWM modulation of the output.

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

Minimum Level: sets the minimum level of light intensity that can be reached via DMX remote control.

Maximum Level: sets the maximum level of light intensity that can be reached by DMX remote control.

Control Type: Allows you to select the DMX Control Map (see next paragraph).

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

CONTROL TYPE

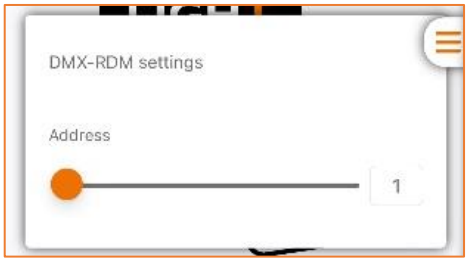


Within the "Control Type" configuration you can select the DMX512+RDM Channel Maps available for LINE-5CV-DMX:

- Macro Dimmer
- Dim-to-Warm
- Tunable White
- Smart HSI RGB
- Smart HSI RGBW
- RGB
- RGBW
- M+RGB+S
- M+RGBW+S
- Dimmer
- Smart HSI RGBTW

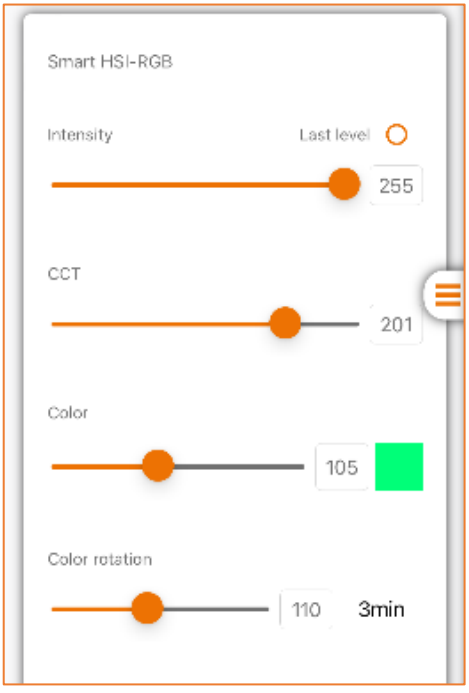
The parameters that can be set for each type of control are shown in the following paragraphs.

DMX ADDRESSING



For each type of control, it is possible to define the DMX address of the device within the range (1 ÷ 512).

POWER-ON SETTINGS



Depending on the type of control selected ("Smart HSI-RGB" in the example image) for each output channel it is possible to set the initial ignition level: during the ignition phase and in the absence of the DMX signal, the device will bring the outputs to the levels set in this section.

It is also possible to set the memory of the last available level during shutdown (e.g. in the absence of power), by selecting the "Last Level" option: in this case, during power-up and in the absence of the DMX signal, the device will bring the outputs to the levels stored during shutdown.

For more information on output channel configurations and levels, refer to the §Channel Mapping: DMX Personality section of this manual.

CHANNEL MAPPING: DMX PERSONALITY

The DMX protocol provides for different configurations called *Personalities*, depending on the light characteristics to be obtained through the LED module connected to the outputs.
Each *Personality* 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, saturation, etc.) to be modulated on the LED load.

DIMMER

The Personality "Dimmer" allows you to adjust the light intensity for each channel independently. For the type of load allowed and the corresponding connection diagram, refer to the paragraph §White or Monochrome LED loads diagram.

DMX Ch.	Function	Level
1	DIMMER CH1	DMX LEVEL 0…255
2	DIMMER CH2	DMX LEVEL 0…255
3	DIMMER CH3	DMX LEVEL 0…255
4	DIMMER CH4	DMX LEVEL 0…255
5	DIMMER CH5	DMX LEVEL 0…255

MACRO DIMMER

The Personality *Macro Dimmer*[14] allows a single intensity adjustment for all 5 channels. The connection diagram and the type of LED load that can be used with this configuration can be found in the paragraph §White or Monochrome LED loads diagram.

DMX Ch.	Function	Level
1	MACRO DIMMER	DMX LEVEL 0…255

DIM-TO-WARM

The Personality "Dim to Warm" allows you to adjust the colour temperature of the Tunable White LED module from a single DMX channel while maintaining almost unchanged light intensity. For the permissible LED load type and the corresponding connection diagram, refer to §Tunable-White LED load diagram.

DMX Ch.	Function	Level
1	DIM TO WARM 1	DMX LEVEL 0…255
2	DIM TO WARM 2	DMX LEVEL 0…255

TUNABLE WHITE

With the Personality "Tunable White", the intensity and temperature values are regulated via two independent DMX channels. The connection diagram and the type of LED load allowed for this Personality can be found in the paragraph §Tunable-White LED load diagram.

DMX Ch.	Function	Level
1	DIMMER 1	DMX LEVEL 0…255
2	COLOUR TEMP. CORRECTION 1	DMX LEVEL 0…255
3	DIMMER 2	DMX LEVEL 0…255
4	COLOUR TEMP. CORRECTION 2	DMX LEVEL 0…255

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

RGB

Through the Personality "RGB" it is possible to adjust the intensity of the primary colours Red-Green-Blue through three independent DMX channels. For the type of load and the connection diagram, refer to the paragraph §RGB LED load diagram.

DMX Ch.	Function	Level
1	DIMMER RED	DMX LEVEL 0...255
2	DIMMER GREEN	DMX LEVEL 0...255
3	DIMMER BLUE	DMX LEVEL 0...255

M+RGB+S

The Personality "M+RGB+S" has 5 DMX channels, one of which is for adjusting the light intensity (Master dimmer), 3 channels for adjusting the three primary colours Red-Green-Blue and one channel for adjusting the Strobe effect. The permissible load type and connection diagram can be found in the §RGB LED load diagram.

DMX Ch.	Function	Level
1	MASTER DIMMER	DMX LEVEL 0...255
2	DIMMER RED	DMX LEVEL 0...255
3	DIMMER GREEN	DMX LEVEL 0...255
4	DIMMER BLUE	DMX LEVEL 0...255
5	STROBO RATE	Fix 0...15 / Blackout 16...31 / 1fps 32...47 / 2fps 48...63 / 3fps 64...79 / 4fps 80...95 / 5fps 96...111 / 6fps 112...127 / 7fps 128...143 / 8fps 144...159 / 9fps 160...175 / 10fps 176...191 / 12fps 192...207 / 14fps 208...223 / 16 fps 224...239 / Fix 240...255

RGBW

Similar to the Personality "RGB", the "RGBW" allows the intensity of the Red-Green-Blue primary colours to be adjusted through three independent DMX channels and in addition the white light adjustment on a dedicated DMX channel. This configuration can be used with an RGBW LED load, the connection diagram of which is defined in the §RGB+W / RGB+WW LED load diagram.

DMX Ch.	Function	Level
1	DIMMER RED	DMX LEVEL 0...255
2	DIMMER GREEN	DMX LEVEL 0...255
3	DIMMER BLUE	DMX LEVEL 0...255
4	DIMMER WHITE	DMX LEVEL 0...255

M+RGBW+S

The Personality M+RGBW+S has 6 DMX channels, one of which is for adjusting the light intensity (Master dimmer), 3 channels for adjusting the three primary colours Red-Green-Blue, a channel for adjusting the amount of white light and a channel for adjusting the Strobe effect. This Personality can be used with an RGBW LED load, the connection diagram of which is defined in the §RGB+W / RGB+WW LED load diagram.

DMX Ch.	Function	Level
1	MASTER DIMMER	DMX LEVEL 0...255
2	DIMMER RED	DMX LEVEL 0...255
3	DIMMER GREEN	DMX LEVEL 0...255
4	DIMMER BLUE	DMX LEVEL 0...255
5	DIMMER WHITE	DMX LEVEL 0...255
6	STROBO RATE	Fix 0...15 / Blackout 16...31 / 1fps 32...47 / 2fps 48...63 / 3fps 64...79 / 4fps 80...95 / 5fps 96...111 / 6fps 112...127 / 7fps 128...143 / 8fps 144...159 / 9fps 160...175 / 10fps 176...191 / 12fps 192...207 / 14fps 208...223 / 16 fps 224...239 / Fix 240...255

SMART HSI RGB

The Personality "Smart HSI RGB", through 6 DMX channels, allows the adjustment of the light intensity (Master dimmer), the correction of the colour temperature, the value of Hue (Hue), the timing of Tone (HUE Rotation Rainbow time), the Saturation (Saturation) and the adjustment of the Strobe effect. The connection diagram and the LED load that can be used with this configuration can be found in the §RGB LED load diagram.

DMX Ch.	Function	Level												
1	MASTER DIMMER	DMX LEVEL 0…255												
2	COLOUR TEMP. CORRECTION	DMX LEVEL 0…255												
3	HUE	DMX LEVEL 0…255												
4	HUE ROTATION (RAINBOW) TIME	Hue Fine 0…15	Hold 16…25	30min 26…51	15min 52…76	6min 77…102	3min 103…127	1min 128…153	30s 154…179	15s 180…204	6s 205…230	3s 231…255		
5	SATURATION	DMX LEVEL 0…255												
6	STROBO RATE	Fix 0…15	Blackout 16…31	1fps 32…47	2fps 48…63	3fps 64…79	4fps 80…95	5fps 96…111	6fps 112…127	7fps 128…143	8fps 144…159	9fps 160…175	10fps 176…191	12fps 192…207	14fps 208…223	16 fps 224…239	Fix 240…255

SMART HSI RGBW

As for the "Smart HSI RGB", the Personality "Smart HSI RGBW" allows through 6 DMX channels the adjustment of the light intensity (Master dimmer), the correction of the colour temperature, the value of Hue (Hue), the timing of the Tone (HUE Rotation Rainbow time), the Saturation (Saturation) and the adjustment of the Strobe effect. The channel maps are therefore identical to the Personality "Smart HSI RGB This configuration can be used with an RGBW LED load, the connection diagram of which is defined in §RGB+W / RGB+WW LED load diagram.

SMART HSI RGBTW

With the Personality "Smart HSI RGBTW" (or RGB+TunableWhite) through 6 DMX channels it is possible to adjust the light intensity (Master dimmer), the Hue value (Hue), the Hue Rotation Rainbow time, the adjustment of the intensity and temperature of the white light and the CCT (Correlated Control Temperature) timing. The suitable load for this Personality is an RGBTW LED module, the connection diagram of which is indicated in §RGB+TW LED load diagram.

DMX Ch.	Function	Level										
1	MASTER DIMMER	DMX LEVEL 0…255										
2	HUE	DMX LEVEL 0…255										
3	HUE ROTATION (RAINBOW) TIME	Hue Fine 0…15	Hold 16…25	30min 26…51	15min 52…76	6min 77…102	3min 103…127	1min 128…153	30s 154…179	15s 180…204	6s 205…230	3s 231…255
4	DIMMER TW	DMX LEVEL 0…255										
5	COLOUR TEMP. CORRECTION	DMX LEVEL 0…255										
6	CCT ROTATION TIME	Hue Fine 0…15	Hold 16…25	60min 26…51	30min 52…76	12min 77…102	6min 103…127	2min 128…153	1min 154…179	30s 180…204	12s 205…230	6s 231…255