FEATURES

- LED DIMMER
- WHITE and MONOCHROME Light Control
- Power Supply (DC IN): 12-24-48 Vdc (SELV)
- Output (LED): constant voltage output (= DC IN) modulated for Resistive loads LED-strips and dimmable LED-modules [1]
- PWM modulation, frequency settable via PUSH MENU from 300 to 1200 Hz
- Synchronization (SYNCH): Master/Slave functionality
- Local Control (INPUT): Analogic Automatic Detection of the Local control, recognizes up to 4 different types of input
  - Normally Open (N.O.) push-button
  - 0-10 V signal
  - 1-10 V signal
  - 10 kΩ potentiometer
- Device configuration via PUSH MENU, parameters that can be set:
  - Minimum value of dimming
  - Fade IN/OUT time
  - PWM Frequency
- Memory function: stores the last brightness level set
- ON/OFF and brightness soft dimming
- Optimized output dimming curve
- Suitable for use in Dry locations
- Extended temperature range
- 100% Functional Test - 5 Years warranty

PRODUCT DESCRIPTION

MICRO-1CV is a 1-channel Pulse Width Modulation (PWM) Constant Voltage (CV) LED dimmer. It can be powered from a constant voltage (12 ÷ 48) Vdc SELV power supply and is suitable for driving a load such as Strip LED and White/Monochrome LED modules at constant voltage. The dimmer can be controlled via Normally Open (N.O.) push-button, analog input 0/1-10V, or via a 10 kΩ potentiometer; the automatic detection of the local control that ensures the proper functionality related to the type of the connected control.
MICRO-1CV can deliver a maximum output power up to 78 W (@12V) or 150 W (@24/48V) and has the following protections: over-voltage and under-voltage protections, reverse polarity protection, input fuse protection and open-circuit protection.

Through the Push Menu are possible to configure multiple parameters including dimming frequency, Fade In/Out time values and minimum brightness level.

⇢ For the up-to-date manual, please consult our website www.dalcnet.com or scan the QR Code from your smartphone

[1] If operating with L-C loads, contact us for technical support.

PRODUCT CODE

CODE	POWER SUPPLY	OUTPUT LED [2]	N° OF CHANNEL	AUTO-DETECTED LOCAL CONTROL
MICRO-1CV	12-24-48 Vdc	1 x 6.5 A (max) @12V 1 x 6.25 A (max) @24V 1 x 3.1 A (max) @48V	1	N°1 N.O. push-button, 0-10V signal, 1-10V signal, or 10 kΩ potentiometer

Table 1: Product Code

DETECTION AND PROTECTION

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

ACRONYM	DESCRIPTION	TERMINAL	PRESENT
OTP	Over Temperature Protection	-	✗
OVP	Over Voltage Protection[3]	DC IN	✓
UVP	Under Voltage Protection[3]	DC IN	✓
IFP	Input Fuse Protection[3]	DC IN	✓
RVP	Reverse Voltage Polarity[3]	DC-IN	✓
SCP	Short-Circuit Protection	-	✗
OCP	Open-Circuit Protection	LED	✓
CLP	Current Limit Protection	-	✗

Table 2: Detection and Protection functionalities

REFERENCE STANDARDS

MICRO-1CV 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
IEC 60929-E.2.1	Control interface for controllable ballasts - control by d.c. voltage - functional specification
ANSI E 1.3	Entertainment Technology - Lighting Control Systems - 0 to 10V Analog Control Specification

Table 3: Reference standards

[2] 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.
[3] Protections refer to the control logic of the board.

TECHNICAL SPECIFICATIONS

Description	Name	Values			Unit of Measure	Note
		Min		Max		
INPUT (DC IN terminal)						
Nominal Supply Voltage	V_{IN}	12	24	48	Vdc	-
Supply Voltage range	V_{IN-RNG}	10.8	÷	52.8	Vdc	-
Efficiency at full load	E_{FF}		> 95		%	-
Standby power absorption	P_{STBY}		< 0.5		W	-
OUTPUT (LED terminal)						
Output Voltage	V_{OUT}		= V_{IN}		-	-
Output Current (max) [4]	-	@12V	@24V	@48V		-
	$I_{OUT-max}$	6.5	6.25	3.1	A	-
Rated Power Output	P_{OUT}	78	150	150	W	-
Load type	L_{TYPE}		LED		-	Defined by design
LOCAL CONTROL (INPUT terminal)						
Command supply current	I_{CMD}		0.5		mA	For 1-10V input type
Command required current (max)	$I_{CMD-MAX}$		0.1		mA	For 0-10V input type
SYNCHRONIZATION (SYNCH terminal)						
Type of synchronization	$SYNC_{TYPE}$		Master/Slave		-	-
Number of Master/Slave devices	-	Master		Slave	-	-
	MS_{SIZE}	1	+	9	-	
Master/Slave distance (max)	MSD_{MAX}	-	-	3	m	-
DIMMING						
Dimming Curve	C_{DIM}		Linear		-	-
Dimming Method	M_{DIM}		Pulse Width Modulation (PWM)		-	-
Dimming Frequency (PWM)	F_{DIM}	300	600	1200	Hz	Default value set to 600 Hz
Dimming Resolution	Res_{DIM}		16		bit	Defined by design
Dimming Range	RNG_{DIM}	0.1	÷	100	%	-
ENVIRONMENTAL						
Storage temperature	T_{STORE}	-40	÷	+60	°C	Minimum values defined by design
Working Ambient temperature	T_A	-10	÷	+60	°C	
Max Temperature @T_c point	T_C	-	-	+70	°C	-
Connector Type	CON_{TYPE}		Push-in terminals		-	-
Wiring Section	WS_{SOLID}	0.2	÷	1.5	mm^2	Defined by design
	WS_{STRAND}	24	÷	16	AWG	
Strip length	WS_{STRIP}		10		mm	-
Protection class	IP_{CODE}		IP20		-	-
Casing Material	MC		PC/ABS		-	PolyCarbonate/ABS
Mechanical Dimensions	-	L	H	D		-
	MD	71.7	21	15.5	mm	
Net Weight	W_N		14		g	-

Table 4: Technical specification

[4] Depends on the ventilation conditions. This value is measured at 40°C, it is maximum ambient temperature.

T_C Point Positioning

The figure below shows the positioning of the maximum temperature point (*T_c point*, highlighted in red) reached by the electronics inside the enclosure. It is located on the front side (Top) near the LED output connector.

Figure 1: T_c point position

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 load, the local/sync control, and the supply voltage. It is recommended to follow these steps to install the product safely:

1. Load wiring: connect the LED load positive wire to the LED red terminal with the "+" symbol, and the LED load negative wire to the LED black terminal with the "-" symbol.
2. Local Control wiring: connect the Local Control to the "COM" and "IN" terminals of the INPUT terminal block.
3. Synch wiring: wire the TX/RX signals to the SYNCH terminal block depending to the Master/Slave functionality you want assign to the device: wire the TX terminal from MICRO-1CV (Master) to the RX terminal of all other MICRO-1CV Slaves.
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 "+" (red) and "-" (black) slots of the DC IN terminal.

Load wiring

Diagram for White or Single-Color LED Loads

MICRO-1CV has 1 output channels that can drive single-color LED strips or white light temperature. The following connection diagram (Figure 2) allows you to drive white or single-color LED load.

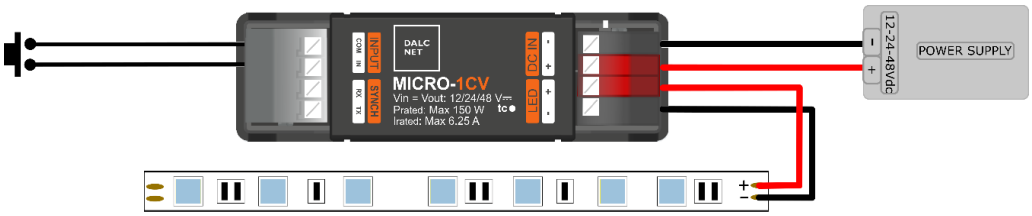

Figure 2: White or Single-Color LED loads wiring diagram

Local Control wiring

MICRO-1CV can be controlled via Local Control with three different modes, automatically detected at startup: Normally Open (N.O.) push-button, 0-10V or 1-10V analog signals, and 10 kΩ potentiometer.
At the first power ON, the device is set by default to N.O push-button control.

Diagram for N.O. Push-button

MICRO-1CV can be controlled via Local Control with Normally Open (N.O.) push-button or voltage-free dry contact. The N.O. push push-button will be identified after 5 quick presses. In push-button mode, function memory is always active.

To connect the MICRO-1CV to local control, simply connect the push-button to the INPUT terminal. The following image shows the indicated connection diagram for short distances (<10 m).

To access the settings menu (see §Push Menu) during the first installation, it is advisable to use the connection diagram for short distances.

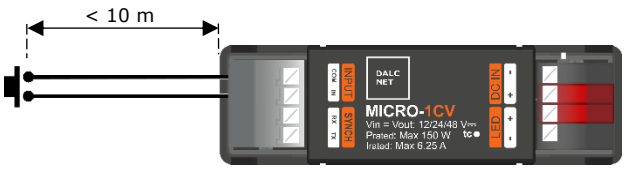

Figure 3: Push-button wiring diagram recommended for Short Distances

For longer distances (>10 m), it is recommended to use an N.O. dry contact relay module, connected between the "Input" terminal of the MICRO-1CV and the power source (e.g. mains voltage 230 Vac). Figure 4 shows an example of a Local Command wiring diagram recommended for long distances. Note that this diagram works only for push-button input.

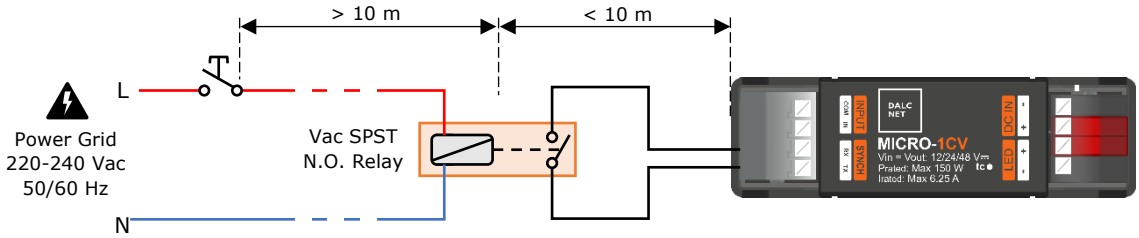

Figure 4: Push-button wiring diagram recommended for Long Distances

Diagram for 0-10V and 1-10V analog signals

MICRO-1CV can also be controlled via 0-10 V and 1-10 V voltage signals. The automatic detection of 0/1-10V analog signal starts when a value between 3V and 7V is sent to INPUT terminal. The following wiring diagram (Figure 5) allows you to connect analog signals to the INPUT terminal.

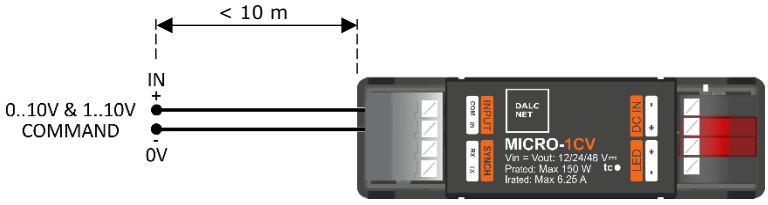

Figure 5: 0-10V and 1-10V analog signals wiring diagram

Diagram for Potentiometer

MICRO-1CV can be controlled through a 10 kΩ potentiometer, wired to the INPUT terminal as shown in Figure 6. The automatic detection of potentiometer starts with a value between 30% and 70%.

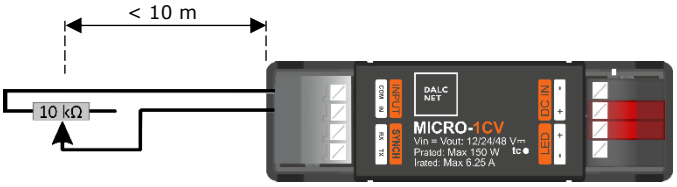

Figure 6: Potentiometer wiring diagram

Sync wiring

It is possible to connect multiple devices of MICRO-1CV family among them in Master/Slave mode: connect the local control (push-button, 0/1-10V signal or potentiometer) to the INPUT terminal of device that will be used as Master, then wire the "TX" signal from SYNC-TX terminal of Master to the SYNC-RX terminal on Slave devices.
Following diagrams shows two different sync wiring configurations, depending to the Power Supply connection.

During maintenance or installation, take care of shutting down to the Slave units first and then to the Master device.

When power to the Master unit is missing, the Slave set up automatically to the default ex-factory settings (power on 100%) or to the settings previously saved.

It is possible to configure Master & Slave system up to 10 total devices, with maximum cable length of 3m between each device.

Diagram with Single Power Supply

In case of single Power Supply that powers all the MICRO-1CV devices, use the following diagram.

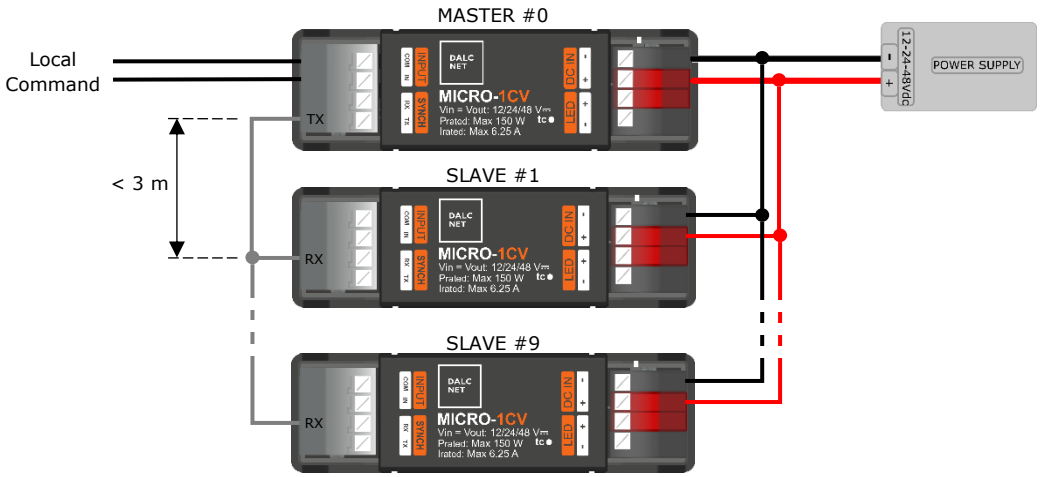

Figure 7: Sync wiring diagram with single Power Supply

Diagram with one Power Supply for each dimmer

In case of one Power Supply for each MICRO-1CV device use the following diagram, wiring together all the COM signals of Input terminal.

Using one power supply for each dimmer, firstly power ON the Master device then power ON the Slaves.

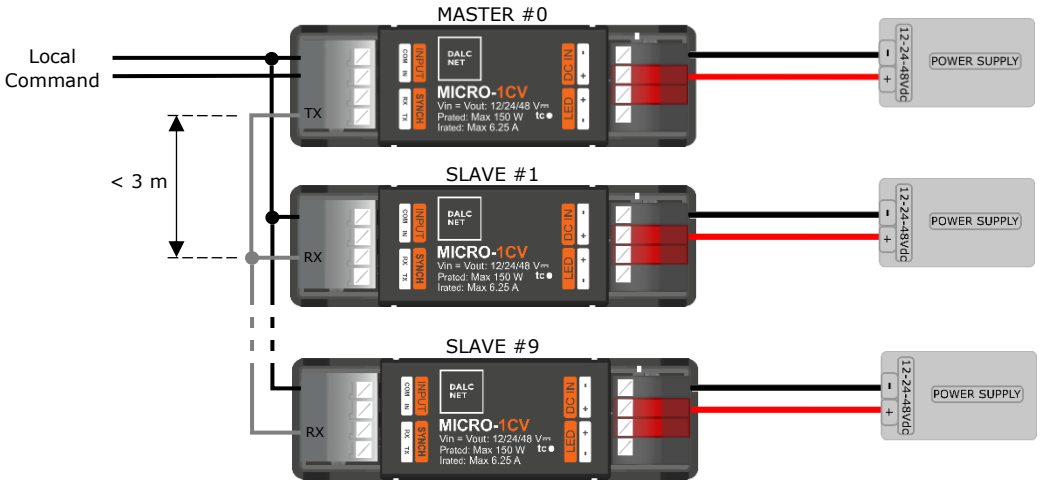

Figure 8: Sync wiring diagram with one Power Supply for each dimmer

Power Supply wiring

MICRO-1CV can be powered by a 12 Vdc, 24 Vdc or 48 Vdc constant voltage SELV power supply, depending on the operating voltage of the LED load. Once the load and Local Control are connected, connect the power supply to the "+" and "-" terminals of the DC IN terminal.

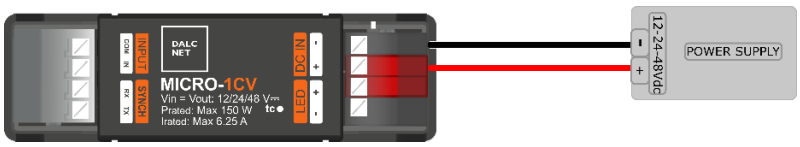

Figure 9: Power Supply wiring diagram

PUSH MENU

MICRO-1CV has one input for Local Control through which the following operating parameters can be managed (functionality available only with N.O. push-button):

1. Minimum value of Dimming
2. Power-ON ramp time (Fade-IN)
3. Power-OFF ramp time (Fade-OUT)
4. PWM Frequency

To access to the Push Menu, perform 15 quick presses in 5 seconds time range. When LED load flashes, the Menu N.1 is loaded. Each action on the push-button activates a specific function detailed in the tables below.

MENU #1: MINIMUM VALUE OF DIMMING

In this menu it is possible to configure the minimum dimming value.
Note: if you set the minimum level to 100%, once the setting is confirmed, the device automatically exits the Push Menu.

ACTION	FUNCTION
Quick press	Minimum dimming value selection. The selection will follow the following sequence: 0.1% → 1% → 5% → 10% → 20% → 30% → 100% ⮌ The output is set to the selected intensity to simulate the minimum attenuation.
Long press	Confirms the value selected. A double flash confirms the setting saved and the Menu N.2 will be opened.

Table 5: Push Menu functionality for "Menu #1"

MENU #2: POWER-ON RAMP TIME (FADE-IN)

In Menu #2 you can configure the Power-ON ramp time (Fade-IN).

ACTION	FUNCTION
Quick press	Power-ON ramp time (Fade-IN) selection. The selection will follow the following sequence: Instantaneous (0s) → 1s → 2s → 3s → 6s ⮌ The output gradually lights up to simulate the selected ramp time.
Long press	Confirms the value selected. A triple output flash confirms the setting saved and the Menu N.3 will be opened.

Table 6: Push Menu functionality for "Menu #2"

MENU #3: POWER-OFF RAMP TIME (FADE-OUT)

Here it is possible to configure the Power-OFF ramp time (Fade-OUT).

ACTION	FUNCTION
Quick press	Power-OFF ramp time (Fade-OUT) selection. The selection will follow the following sequence: Instantaneous (0s) → 1s → 2s → 3s → 6s ⮌ The output gradually shuts off to simulate the selected ramp time.
Long press	Confirms the value selected. A quadruple output flash confirms the setting saved and the Menu N.4 will be opened.

Table 7: Push Menu functionality for "Menu #3"

Menu #4: PWM Frequency

In Menu #4 you can configure the PWM frequency.

ACTION	FUNCTION
Quick press	PWM frequency value selection. The selection will follow the following sequence: 300Hz → 600Hz → 1200Hz ⮐ Output flashes 1, 2 or 3 times every 2 seconds to visualize the selected value.
Long press	Confirms the value selected. A quadruple output flash confirms the setting saved and the dimmer will exit the Push Menu. The output turns ON at the minimum level of dimming previously set. Normal operation (see §Local Control and Dimming functionality) will run.

Table 8: Push Menu functionality for "Menu #4"

LOCAL CONTROL AND DIMMING

During the normal use of MICRO-1CV, the light intensity and the status change (ON/OFF) of load connected can be controlled by the connected Local Control as listed in the following tables.

Push-Button dimming

When N.O. push-button is connected to the INPUT terminal, the light intensity and the status (ON/OFF) can be set from the push-button by the following action.

ACTION	FUNCTION
Quick press	Output ON/OFF with Fade time set (refer to Menu #2 and #3 of §Push Menu) with intensity memory function active by default.
Double quick press	Output ON with Maximum intensity 100% (without fade).
Long press (>1s) from OFF	Output turns ON at 1% (Nightly time) and then dim UP (to 100%) and DOWN.
Long press (>1s) from ON	Output dimming DOWN and UP (to 100%). If the 50% threshold is reached and the push-button is released, a second long press cause an inversion of dimming direction (DOWN to UP and viceversa).
SPECIAL COMMANDS	
Quick press sequence	5 quick presses: sets the N.O. push-button as local control. 15 quick presses: enters to the §Push Menu.

Table 9: Push-button dimming functionality

0/1-10V & Potentiometer dimming

When 0-10V, 1-10V signal or 10 kΩ potentiometer is connected to the INPUT terminal, the light intensity and the status (ON/OFF) can be set by the input voltage variation.

ACTION	FUNCTION
Voltage signal variation	Signal 0-10V: input voltage variation from 0V (output OFF) to 10V (output ON, light intensity 100%). Signal 1-10V: input voltage variation from 1V (output OFF) to 10V (output ON, light intensity 100%).
Cursor rotation	Potentiometer: cursor rotation from position 0% (output OFF) to 100% (output ON, light intensity 100%).

Table 10: 0/1-10V & Potentiometer dimming functionality

THERMAL CHARACTERIZATION

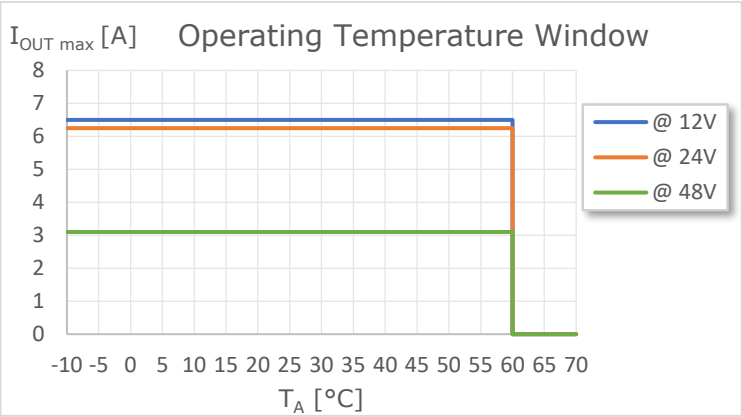

Figure 10: Operating Temperature Window

Figure 10 shows the maximum output current values that can be provided by the MICRO-1CV as a function of the operating temperature[5] (or ambient temperature, T_A), summarized below:

- T_A = (-10 ÷ +60)°C ⇢ $I_{OUT_@12V}$ ≤ 6.5A
- T_A = (-10 ÷ +60)°C ⇢ $I_{OUT_@24V}$ ≤ 6.25A
- T_A = (-10 ÷ +60)°C ⇢ $I_{OUT_@48V}$ ≤ 3.1A

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

DIMMING CURVES

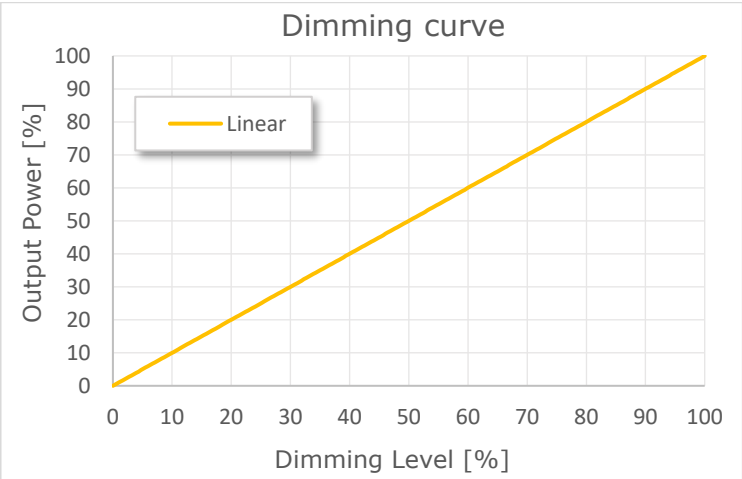

Figure 11: Dimming Curve

The MICRO-1CV only supports the Linear dimming curve shown in Figure 11. No other curves are available.

[5] 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.

MECHANICAL DIMENSIONS

Figure 12 details the mechanical measurements and the overall dimensions [mm] of the outer casing.

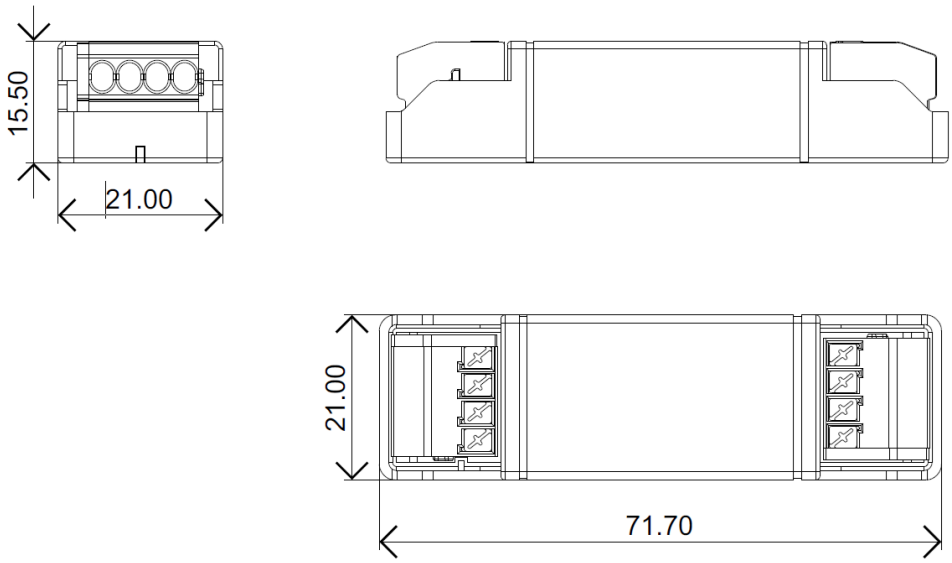

Figure 12: Mechanical dimensions

TECHNICAL NOTES

INSTALLATION

ATTENTION! Installation and maintenance should always be carried out 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.

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 protected against surges/overvoltages.

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 (control 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 upgrades.

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 & LOAD

The device must be powered only with SELV power supplies with limited current at constant voltage, short-circuit protection and suitably sized power according to the specifications indicated in the product data sheet. No other types of power supply are permitted.

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 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.

LOCAL & SYNC CONTROLS

The length of the connection cables between the local control (N.O. Push-button, 0-10V, 1-10V, or Potentiometer) and the product must be less than 10m. For longer lengths (and limited to the N.O. Push-button functionality) it is recommended the use of an N.O. Dry Contact Relay module, connected between the "Input" terminal of the device (dry contact side of the relay) and the power source (coil side of the relay) as shown in the connection example in Figure 4.

The cables must be sized correctly. Depending on the connection used, they must be isolated from any wiring or non-SELV voltage parts. It is recommended to use double-insulated and twisted cables, if deemed appropriate, also shielded.

All devices and control signals connected to local commands (N.O. buttons or other) must be of the SELV type (the connected devices must be SELV or in any case provide a SELV signal).

It is absolutely forbidden to connect, for any reason, directly or indirectly, the 230 Vac mains voltage to the SYNCH terminal block.

The length and type of the connection cables at the bus SYNCH must be less than 3m and they should be isolated from every wiring or parts at voltage not SELV. To improve disturbance immunity of this connection, it is suggested to use double insulated shielded and twisted cables with one end of the shield connected to a grounding point.

All devices and control signals connected to the buses must be of the SELV type (the connected devices must be SELV or otherwise provide a SELV signal).

LEGAL NOTES

Terms of Use

Dalcnet (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.
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.