



LED-CV4

DINrail Mount

Constant Voltage 4 Channel

LED Dimmer/Driver

User Manual

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1 Introduction

1.1 Overview

LED-CV4 is a DINrail-mounted constant voltage 4 channel LED dimmer/driver. The intensity of each channel can be individually controlled via DMX or RDM (Remote Device Management). The output channels can supply 5 Amps each with a 100% duty cycle at either 12V or 24V. The output voltage is dependent upon the input power supply. Each output is independently monitored for load and automatically shut down in the event of an overload.

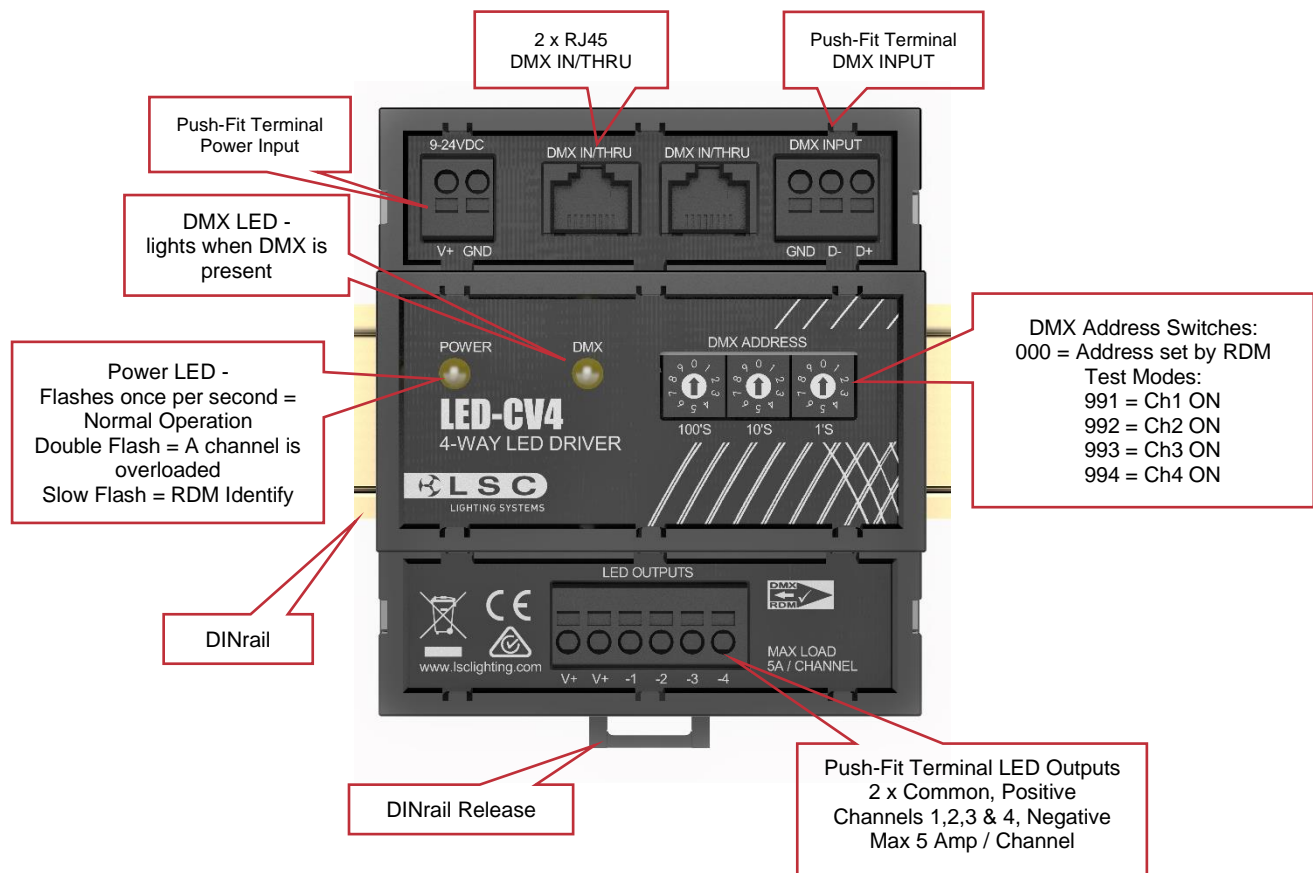
1.2 Features

Full device configuration and monitoring is available over RDM and software updates can also be rolled out over RDM using the standard DMX cabling infrastructure. Control by LSC's HOUSTON X allows remote monitoring, configuration, fault reporting, system logging and auditing of the LED-CV4 on Windows and Mac computers as well as Android and iOS tablets.

8-bit or 16-bit control is selectable via RDM. A proprietary algorithm provides stepless dimming across the entire range from 0% to 100%, even when controlled by an 8-bit DMX512 controller. See section 1.9.

When the LEDs are dimmed there is no flickering visible to the human eye however, some flickering might be visible on a camera looking at the LEDs. Flickering can be minimised or eliminated by changing the Pulse Width Modulation (PWM) frequency. See section 3.5.

The LED-CV4 should be installed and serviced by a qualified person.



2 Installation

2.1 Power Supply Input

The LED-CV4 requires an external power supply.

2.1.1 Power Supply Voltage

The voltage of the external power supply must match the specified voltage of the LEDs connected to the outputs. The LED CV4 has an input voltage range of 9-24V DC. LED strips are usually rated as either 12V or 24V.

2.1.2 Power Supply Current

The LED-CV4 can supply a maximum of 5 Amps per channel and there are four channels. The external power supply must therefore be capable of supplying at least 20 Amps (4 x 5 Amps per channel). LSC recommends that you choose a power supply that can deliver a current 50% higher than the maximum to prolong the life of the power supply.

Note: If you have a small load connected, you can set the upper current limit of each output channel via RDM and hence use a lower current power supply that matches your load requirements. LSC still recommends that the supply can deliver a current 50% higher than the maximum.

2.2 Output Polarity

LEDs must be connected with the correct polarity. The LED-CV4 has a +ve common connection and a -ve connection for each individual channel. Therefore, LED strips used with a LED-CV4 must have a +ve common.

2.3 Mounting

Mount the LED-CV4 on a standard TS35 DINrail. Allow adequate ventilation and do not expose the LEDCV4 to direct sunlight or moisture.

2.4 Connections

Connect a suitable power supply (see section 2.1) to the 9-24V DC push-fit terminals observing the correct polarity.

Connect the DMX512 input using either the RJ45 sockets or the push-fit terminals. The two DMX IN/THRU RJ45 sockets and the DMX INPUT push-fit terminals are all internally connected in parallel. This allows you to loop the DMX signal to other devices.

- When using RJ45 sockets, use one DMX IN/THRU socket as the input and the other as the loop output.
- When using the push-fit terminals, connect the input and output cables in parallel to the same terminals.

Only one looped DMX output connection is allowed from each device. If you need multiple DMX feeds, use a DMX splitter such as LSC's MDR-DIN.

If this LED-CV4 is the last device at the end of the DMX512 line, connect a 120 ohm resistor across the DMX INPUT connector push-fit terminals or across pins 1 and 2 of the DMX IN/THRU RJ45 socket.

Connect the LEDs to the LED OUTPUTS push-fit terminals. There are four negative terminals (-1, -2, -3 and -4), one for each of the four output channels and two positive terminals (V+ and V+) to be shared amongst the four output channels.

2.5 Push-Fit Terminals

The following cables are suitable for use with the push-fit terminals:

- 2.5mm² stranded wire
- 4mm² solid wire

Stripping length is 8mm.

Insert a small screwdriver into the slot adjacent to the cable hole. This releases the spring inside the connector. Insert the cable into the round hole then remove the screwdriver. Solid wires or wires fitted with ferrules can often be pushed directly into the connector without the use of the screwdriver. When connecting multiple cables to a single terminal the wires must be twisted together to ensure a good connection to both legs. Non-insulated bootlace ferrules can also be used for stranded cables. Ferrules are not recommended for solid cables. Insulated bootlace ferrules can also be used allowing stranded cables to be easily inserted without the need of a tool to actuate the spring release.

The maximum ferrule outer diameter is 4mm.

2.6 DMX Cables

Only use specific DMX data cable. The data cable must conform to the EIA485 cable requirements by providing the following specifications:

- Low capacitance
- One or more twisted pairs
- Foil and braid shielded
- Impedance of 85-150 ohms, nominally 120 ohms
- 22AWG gauge for continuous lengths over 300 metres

If you want to make your own cables LSC recommends using Beldon 9842 (or equivalent).

Never use audio cable.

The end of the DMX line must be terminated (120 Ω) to prevent the signal reflecting back up the line and causing possible errors.

2.7 DMX Pin Outs

RJ45	
Pin Number	Function
1	+ Data
2	- Data
3	Not Used
4	Not Used
5	Not Used
6	Not Used
7	Ground
8	Ground

5 pin XLR	
Pin Number	Function
1	Ground
2	- Data
3	+ Data
4	Not Used
5	Not Used

3 Pin XLR	
Pin Number	Function
1	Ground
2	- Data
3	+ Data

3 Operation

Apply power to the LED/CV4. See section 2.1

- The POWER LED flashes once per second (heart-beat) when input power is present.
- The POWER LED double flashes if any of the outputs are overloaded.
- The POWER LED slow flashes when an RDM Identify request is received.
- A continually lit POWER LED indicates an internal fault condition. Contact LSC service.

Connect a DMX controller.

- The DMX512 data LED lights when DMX data is present.

3.1 Test Mode

The four LED OUTPUTS can be manually switched ON (without DMX connected) for testing purposes by setting the DMX Address switches as follows:

DMX Address Setting	Channel Number ON
991	1
992	2
993	3
994	4

3.2 DMX Address

There are two methods for setting the DMX address:

- The DMX address can be manually set using the rotary switches on the front of the unit. For example, in 8-bit mode (default), if the address switches are set to 010, Output 1 responds to the DMX address 10, Output 2 responds to address 11, Output 3 to address 12 and Output 4 to address 13.
- The DMX address can be remotely set the via RDM. Set the switches on the front to address 000 then use your RDM controller to set the address. When using RDM it is also possible to individually set each output channel to any DMX Address. See section 3.4.2

3.3 Overload Reset

The maximum current for each output channel is 5 Amps. Each output is independently monitored and automatically shuts down in the event of an overload. If any output channel is overloaded the POWER LED on the front will double flash. The overload is also reported over RDM. You can use RDM to set a lower overload current level per channel if you require. See section 3.4.2

To restore the output to normal operation, reduce the load or remove the short circuit then either:

- Set the DMX level for the overloaded channel to zero then back to the required level
- Remove the DMX input then reconnect it
- Use RDM to reset the channel

3.4 RDM Control

Advanced functions can be accessed by RDM (Remote Device Management). LSC's RDM controller is HOUSTON X. It is a software application that can be connected to your DMX line

using an LSC QX1 USB to DMX node. HOUSTON X Lite RDM software is available as a free download from Iscontrol.com. and the QX1 USB to DMX node is available from your LSC agent. If you connect an RDM controller to the DMX input, the following functions can be accessed via RDM:

- Get Comms Status
- Set Comms Status
- Get Supported Parameters
- Get Device Info
- Get Device Model Description
- Get Manufacturer Label
- Get Device Label
- Set Device Label
- Get Factory Defaults
- Set Factory Defaults
- Get Software Version Label
- Get Boot Software Version
- Get Boot Software Version Label
- Get Identify
- Set Identify
- Set Reset Device

3.4.1 Global Settings

- Read or set Device Name
- Read Input Voltage
- Read Presence of DMX
- Read DMX Address (if address has been manually set on the rotary switches)
- Set DMX Address. The DMX Address rotary switches must be set to 000 to allow the address to be set via RDM. This sets the first channel and the other three channels are set to the next three addresses. Channels can also be individually addressed. See section 1.9.2.
- Set 8-bit or 16-bit dimming. When 16-bit dimming is selected your DMX controller must also be configured for 16-bit control and each output channel of the LED-CV4 uses two DMX addresses. For example, if the address switches are set to 001, Output 1 responds to the DMX address 1, Output 2 responds to DMX address 3, Output 3 to address 5 and Output 4 to address 7.
- Set PWM (Pulse Width Modulation) frequency. 1 to 4 kHz, Default is 1kHz. See section 1.10 for more details.
- Read and change the DMX Loss timeout. When the DMX signal is lost, the LED-CV4 will hold the current levels on the outputs until the DMX Loss timeout has expired. The default time is 60 seconds.
- Reset to factory defaults
- Software update

3.4.2 Per Channel Settings

- Read or set Channel Name
- Set maximum current. Exceeding this will turn off the channel. Setting a new maximum current limit automatically clears any overload condition on that channel.
- Reset channel (from overload)
- Patch DMX. Sets the DMX Address for the selected channel
- Read channel current draw
- Detect short-circuit and no-load conditions
- Set dimming curve, linear, square or cube. Curve selection is currently only available in 8-bit mode
- Read current drive level in %

3.5 PWM (Pulse Width Modulation)

The intensity of the LEDs is controlled by switching their current off and on at a high frequency. The width (duration) of the On pulse determines the intensity. This is known as Pulse Width Modulation (PWM). This high frequency switching of the current is not visible to the naked eye but might be visible on some cameras and is seen as flickering. If flickering is visible on your camera you can change the frequency of the switching using an RDM controller. See section 3.4. The available frequencies are 1kHz (default), 2 kHz, 3 kHz or 4 kHz. Choose a PWM frequency that does not exhibit flickering on your camera.

3.6 DMX Explained

DMX512-A is the industry standard for the transmission of digital control signals between lighting equipment. It utilises just a single pair of wires on which is transmitted the level information for the control of up to 512 DMX slots (addresses or channels).

The information for each slot is sent sequentially. The level of slot 1 is transmitted, then the level of slot 2, then 3, etc., up to a maximum of 512 slots. This stream of data containing the levels for all 512 DMX slots is repeated a minimum (generally) of 44 times per second. This provides sufficient updates of channel information for smooth fade transitions.

DMX allows a controller to communicate with a device. It does not allow the device to communicate with the controller.

3.7 RDM Explained

RDM allows RDM based controllers and devices to communicate with each other in bi-directional mode over the DMX cable, interleaved with the DMX512-A signal.

4 Feature History

The new features added to LED CV4 in each software release are listed below:

Release: v1.04 Date: 22-December-2020
No new features.

Release: v1.03 Date: 30-September-2020
No new features.

Release: v1.02 Date: 13-August-2020
No new features.

Release: v1.01 Date: 23-July-2020
New Features (only accessible via RDM or HOUSTON X):

- Current Limit per Channel can now be set.
- Curve control added. Each channel can be set to a different curve if desired namely Linear (default), Square Law or Cube Law.
- Resolution can now be changed. Setting the CV4 into 16-bit is now possible
- Frequency Selection. The PWM frequency can now be changed to be 1kHz, 2kHz or 4kHz. Note that in 16-bit mode only 1kHz is possible.
- The front panel Address Selection has changed for manual control. Address 991 now sets the first output to 100%, 992 the second, etc. The addresses in the previous version were 996-999.

Release: v1.00 Date: 17-May-2019
First public release.

5 Specifications

Mounting	Standard TS35 DINrail-mounting
Power Requirements	9-24V DC, push-fit terminals
Reverse Polarity Protected	Yes
Output Current per Channel	5 Amps, automatically shuts down in the event of an overload
DMX Input and Thru Connectors	2 x RJ45 and push-fit terminals
Output Connectors	Push-fit terminals
Number of Outputs	4
DMX Protocol	ANSI DMX512A Standard E1.11:2008 (R2013)
RDM Protocol	ANSI RDM Standard E1.20:2010
DMX512 Data LED	Yes (lights when DMX data is present)
Power LED	Yes. See section 3
Conformity	CE (European) and RCM (Australian) approved
Warranty	Two years

6 Compliance Statements

The LED CV4 from LSC Control Systems Pty Ltd meets all required CE (European) and RCM (Australian) standards.

CENELEC (European Committee for Electrotechnical Standardization).



Australian RCM (Regulatory Compliance Mark).



WEEE (*Waste Electrical and Electronic Equipment*).



The WEEE symbol indicates that the product should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling.



For more information about how to recycle your LSC product, contact the dealer where you purchased the product or contact LSC via email at info@lsccontrol.com.au

You can also take any old electrical equipment to participating civic amenity sites (often known as 'household waste recycling centres') run by local councils. You can locate your closest participating recycling centre using the following links.

- AUSTRALIA <http://www.dropzone.org.au>.
- NEW ZEALAND <http://ewaste.org.nz/welcome/main>
- NORTH AMERICA <http://1800recycling.com>
- UK www.recycle-more.co.uk.

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