



This dimmer drives up to 24 LEDs using a constant output current. The unit is intended for DIN rail mounting.

Power supply is 12-48VDC. The dimmer and the output loads are protected from short-circuits and reverse polarity. The power supply must be at least 2V above the maximum LED forward voltage.

Output connections and ratings

LED connections are via 5.08mm pluggable terminal blocks e.g. Camden CTB9208/4(supplied) Outputs are grouped into 8 sets of 3 outputs. Each group has a common positive/anode connection; for fixtures with separate anode & cathode connections, connect all three anodes to the + terminal. All of the + terminals are connected together internally*, so a fixture may span connectors, e.g. when using RGBW.

* Each connector has its own polyfuse protection, however this is only likely to act in the case of the +ve output being shorted to the negative supply, in which case all outputs from that connector will turn off.

Current is factory-configured to 350,450,620 or 700mA, as indicated on the front panel. Other values are available to special order. An option is also available to limit the total current within an RGB group to a total of this nominal current. This limiting is achieved by adjusting the PWM values, the peak current is the same as normal mode.

DMX input

The dimmer takes standard DMX512 at 250kbaud. In addition to standard DMX, extended frames up to 649 channels are supported. Note all DMX channels in the dimmer's address range must be sent regardless of how many are used. e.g. for dimmer number 1, a minimum of 24 channels must be sent.

The DMX interface is not galvanically isolated from the supply – DMX ground is connected to supply negative via an internal polyfuse to avoid powering down the data ground in the case of the negative supply becoming disconnected

The DMX-in sockets are connected directly to DMX out for loop-through to additional dimmers. RJ45 pinout is ESTA standard, as shown on the front panel. Note that there are several DMX RJ45 pinout conventions that differ from the standard, e.g. Color Kinetics and E:Cue.

In addition to the RJ45 connectors, 3.5mm pluggable terminal blocks are provided as an alternate connector. Mating connector Camden CTB92HD/3 or similar (supplied).

DIP switch settings

SW1-5 : Address/test mode

Dimmer Number	Addr 16	Addr 8	Addr 4	Addr 2	Addr 1	Start address Note : if smoothing mode 3 (ch1 smoothing) selected, all addresses start one channel higher
0	OFF	OFF	OFF	OFF	OFF	Factory test mode
1	OFF	OFF	OFF	OFF	ON	1
2	OFF	OFF	OFF	ON	OFF	25
3	OFF	OFF	OFF	ON	ON	49
4	OFF	OFF	ON	OFF	OFF	73
5	OFF	OFF	ON	OFF	ON	97
6	OFF	OFF	ON	ON	OFF	121
7	OFF	OFF	ON	ON	ON	145
8	OFF	ON	OFF	OFF	OFF	169
9	OFF	ON	OFF	OFF	ON	193
10	OFF	ON	OFF	ON	OFF	217
11	OFF	ON	OFF	ON	ON	241
12	OFF	ON	ON	OFF	OFF	265
13	OFF	ON	ON	OFF	ON	289
14	OFF	ON	ON	ON	OFF	313
15	OFF	ON	ON	ON	ON	337
16	ON	OFF	OFF	OFF	OFF	361
17	ON	OFF	OFF	OFF	ON	385
18	ON	OFF	OFF	ON	OFF	409
19	ON	OFF	OFF	ON	ON	433
20	ON	OFF	ON	OFF	OFF	457
21	ON	OFF	ON	OFF	ON	481
22	ON	OFF	ON	ON	OFF	505*
23	ON	OFF	ON	ON	ON	529*
24	ON	ON	OFF	OFF	OFF	553*
25	ON	ON	OFF	OFF	ON	557*
26	ON	ON	OFF	ON	OFF	601*
27	ON	ON	OFF	ON	ON	625*
28	ON	ON	ON	OFF	OFF	USB Playback mode
29	ON	ON	ON	OFF	ON	Test mode : Bank check
30	ON	ON	ON	ON	OFF	Test mode : Channel check
31	ON	ON	ON	ON	ON	Test mode : Power check

* settings only valid in Extended DMX (>512 channels) mode

SW8 : OFF : Normal mode. ON : RGB Limit mode.

When RGB Limit mode is enabled, each group of 3 channels will have its PWM brightness values limited as necessary to maintain a maximum total of the nominal rated current across all 3 channels. e.g. for a DMX setting of 255,255,255, the channels will be set to 85,85,85. A DMX setting of 255,255,0 will result in 127,127,0.

The data LED will flash cyan instead of green if any limiting is taking place.

Note that limiting will not operate correctly if gamma-corrected mode is active, as limiting is on the incoming DMX data. Therefore SW9 should always be set ON when SW8 is ON

SW9 : ON : Linear brightness curve (use for RGB) , OFF : gamma corrected brightness curve (use for monochrome)

SW10 : DMX termination : ON = terminated (must be ON for the last device on the cable, OFF for all others).

Smoothing

The dimmer incorporates an internal intensity-smoothing function, which can provide significant improvement of the aesthetic appearance of a lighting installation when displaying dynamic content, especially where the source frame rate is low or erratic.

The smoothing is effectively a crossfade between successive DMX frames, the speed of this crossfade being selectable either from fixed values via the DIP switch, or set by the control system via an extra DMX channel. The latter mode is controlled globally across all dimmers from DMX channel 1.

Setting	SW6	SW7	Smoothing value	Approx time constant
0	OFF	OFF	0	0
1	OFF	ON	192	50ms
2	ON	OFF	220	100mS
3	ON	ON	Global smoothing on DMX Channel 1	

The best way to determine the optimum smoothing value is visually on the final installation, as it is a very subjective function, and will be a tradeoff between smoothness and speed of fast changes. It will usually be fairly obvious where the ‘sweet spot’ setting is with some experimentation.

Creative use of smoothing can also simplify the task of content creation and reduce data bandwidth requirements. Content can be simplified as transitions as crude as a simple on/off can become a smooth fade with a suitably high smoothing value.

Reduction of bandwidth (by reducing frame rate) can be useful in large installations to reduce overall data processing workload, or where DMX data is passing through an IP network or wireless link, which may have variable bandwidth or latency limitations. For slow-moving content, source frame rates as low as 10 frames per second can produce perfectly fluid results with no visible jerkiness with careful choice of smoothing value.

Linear/gamma mode

Due to the non-linear relationship between LED input power and perceived brightness, dimming LEDs using the conventional 0 to 255 DMX brightness range to control power linearly will result in a somewhat “steppy” appearance at the lower end of the range, where small steps produce large changes in perceived brightness.

To compensate for this, a nonlinear (gamma-corrected) dimming curve function is available, which maps the 256-level DMX channel range to a non-linear range of power values which better represents the perceived brightness, giving a much more even range of brightnesses (greyscale), and virtually eliminates visible stepping even at very slow transition speeds.

A consequence of this is that where accurate colour mixing is required, the proportions of each colour required to produce a desired shade may be different to what would normally be expected (e.g. on screen). For situations where this is an issue, an option is provided to select a linear brightness curve.

Data timeout

All outputs will be switched off if there is no DMX signal for 10 seconds. The LED will light continuously yellow in this mode.

The timeout is reset when any DIP switch setting is changed.

In USB playback mode, outputs will blank 10 seconds after USB stick is removed or a file read error occurs.

Status LED indications

(very) Dim white : power on, no DMX data

Green flash : Complete DMX data frame received. The LED will only flash if sufficient channels for the dimmer have been received, taking into account the DMX start address.

Yellow : DMX timeout

Magenta : Mounting/reading USB device.

Flashing Magenta /red indicates USB error.

White flash : DIP switch change.

Red : USB error

Cyan flash : RGB Limiting active on at least one output

Test modes

Test modes allow testing & fault-finding of installations without DMX data (or overriding any data being received).

In all test modes, the test pattern cycles automatically.

If a button is pressed, it stops cycling and can be stepped up or down manually using the Ch- and Ch+ buttons. Pressing both buttons together resets the cycle to the start. Changing any DIP switch restarts the auto-cycling.

Bank check mode

All channels within each RGB connector are turned on at 25% in the sequence <off>,1,2,3,4,5,6,7,8 to verify that the R,G,B connections to each fixture are correct

Channel check mode

Each of the RGB outputs on each connector is set to 25% white in turn, In the sequence <off>, R,G,B to verify that each fixture is connected to the correct output. To select a specific channel, press both buttons together to reset to the “off” state, then count button presses up/down

Power check mode

This mode is used for testing of heating, measuring power supply load, and burn-in testing.

All outputs are initially set off, then increase in 15 steps to maximum.

Note if RGB limiting is enabled, power in this mode will also be limited, so the upper 8 power levels will all appear the same

Factory test mode

All LED outputs, and the status LED cycle r/g/b off

Any DIP switch change will flash the status LED white

NOTE : This mode transmits data and will cause interference on a running system!

Firmware updates

The dimmer's internal software can be updated using a USB memory stick.

Copy file “firmware.bin” to a memory stick

Press and hold either button. Insert memory stick while button is pressed

Release button when LED turns blue

LED sequence should show violet, blue, yellow then green. (Approx 5 seconds), and then the dimmer will restart.

DO NOT remove the USB stick or disconnect power until the LED has gone to green.

To determine the current firmware version, press and hold either button, then insert a memory stick which does NOT contain a file called “firmware.bin”.

The LED should flash violet briefly. Wait 2 seconds then remove the memory stick.

The memory stick should now contain a text file “version.txt” containing firmware version information.

Differences between LDRV24 and LDRV32		
	LDRV24	LDRV32
Channels	24, 8 banks of 3	32, 4 banks of 8
Connectors	5.08mm pluggable terminal block Common Anode	16 pin JST XAD Individual anode/cathode
Interface	DMX	DMX or RS485
RGB limit function	Yes	No
Current setting	350,450,620,700mA Factory configured.	250, 350,425,500,600,700mA User settable per bank of 8 channels
Supply Must be at least 2V above LED Vf	12-48V	12-24V
PWM frequency	250Hz (500Hz with special firmware)	250Hz (500Hz with special firmware)

USB playback

** Only basic test functionality at present – contact WWL if you require this **

RGB file formats are not currently supported.

Standalone playback from USB stick allows standalone operation. The dimmer can also act as a master to control additional slave dimmers for increased channel count.

The USB stick must be formatted as FAT16 or FAT32.

The following files must be present. Both are text files, which must have <CR><LF> at the end of each line.

1) Config.txt

Sample file : some values are not relevant to this version.

```
; config file for player
; parameter type, value
;
*      ; start of data marker, looks for this and then numerics
1,1   ; config file version
2,250 ; baud rate, kbaud. only 250 and 333 supported
3,0   ; protocol : 0=DMX
4,1   ; Number of buses (universes) ignored used in this version
5,24  ; Nodes per universe = length of DMX frame
6,0   ; options : b0: warning only on out-of-range mappings, b1: error on unmapped nodes
7,96  ; AVI X pixel size, MUST be multiple of 4
8,1   ; AVI Y pixel size
9,0   ; mapping type 0 = use csv mapping file
0,0   ; end marker - must be present
```

2) mappable.csv

Pixel mapping is determined by the “mappable.csv” file. This file contains 4 fields per line :

<dmx universe> , <dmx channel>,<x co-ordinate> , <y co-ordinate>

Sample :

```
1,1,0,0
1,2,1,0
1,3,2,0
1,4,3,0
1,5,4,0
```

Entries may be in any order. <dmx universe> will always be 1 in this version. DMX channels start at 1, X/Y co-ordinates start at 0. 0,0 is top-left corner.

The above example shows the start of a simple 1:1 channel mapping for a 1 pixel high AVI.

Error reporting

If there is a problem with the config.txt or map.csv files, the LED will light red and magenta after card insertion

A diagnostic log file can be written to the card to trace problems. To enable this, press the Ch- button while inserting the USB stick. A log file LOG.TXT will be written, which should indicate the cause of the error, as well as listing the configuration values being used.

Typical errors may include duplicate mappings, pixel addresses outside the frame size, or no files found with valid AVI format or size.

Warning : Logging has been seen to occasionally corrupt a USB drive, requiring reformatting, so be sure to keep copies of all files! If you see odd things happening when logging has been enabled, reformat the USB drive.

AVI files and behaviour

Current functionality just loops a single file, and buttons can select other files. Files are named F01.AVI, F02.AVI etc. Future versions will allow external triggers via the remote connector to change files.

<To be completed>

AVI file format

AVI files must be in the following exact format : Uncompressed, 8bpp monochrome, Width and height as specified in the config.txt file.

They will be played at the framerate indicated in the AVI file where possible (up to approx. 100fps)

It is strongly recommend that virtualdub (<http://www.virtualdub.org/>) is used to process content down to the final display resolution as this is known to create files in the correct format, and very easy to use.

Use the following settings XX and YY are the X/Y pixel size specified in config.txt:

Audio->no audio

Video->compression : uncompressed

Video->colour depth : Luminance only (Y8)

Video->Filters->add resize filter. Aspect ratio disabled, absolute size, XX x YY pixels.

Video->Frame rate : Change frame rate to 45fps for maximum speed (faster rates will display at 45fps)

Optional tweaks :

Use video->filters->resize->cropping if required to select area of source frame to use.

Select in/out time points with markers if required

File->save as AVI

Note that monochrome AVI files from Virtualdub do not use intensity values 0-15 or 240-255. The player maps the used range of 16-239 to the full 0-255 intensity range of the display.