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BYTE – SIMPLE INTELLIGENT PIXEL CONTROL USER MANUAL



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Hardware

Byte 1.0

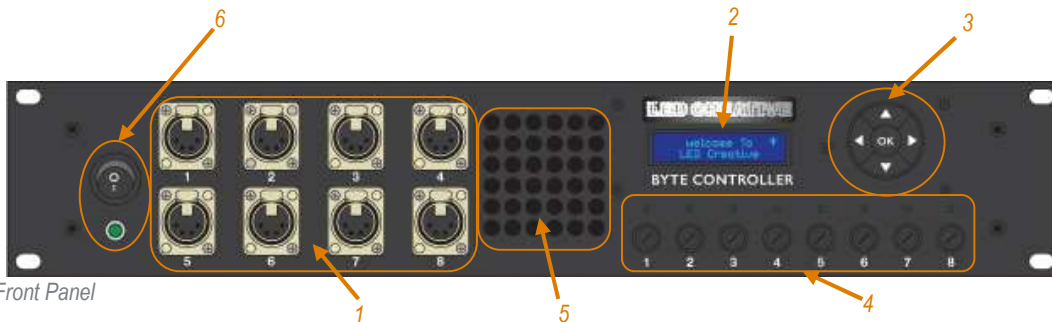


Figure 1 Byte 1.0 Front Panel

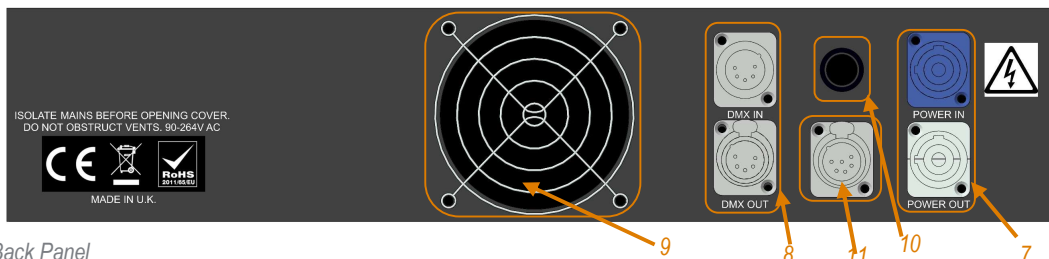


Figure 2 Byte 1.0 Back Panel

Byte 1.0 Front Panel

1	8 x XLR 4 pin Pixel Outputs
2	LCD Screen
3	LCD Navigation buttons
4	Output Fuses & Indicators
5	Controller Ventilation
6	Mains Switch and Indicator

Byte 1.0 Back Panel

7	Neutrik Powercon In & Out
8	5 Pin DMX In & Out
9	Controller Ventilation
10	Power In Fuse (230Vac)
11	N/A

Byte 2.0

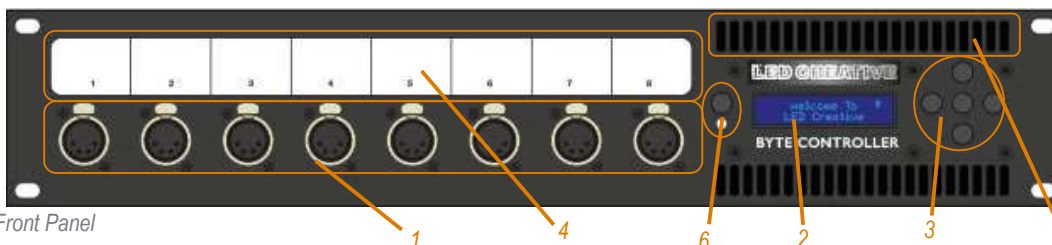


Figure 3 Byte 2.0 Front Panel

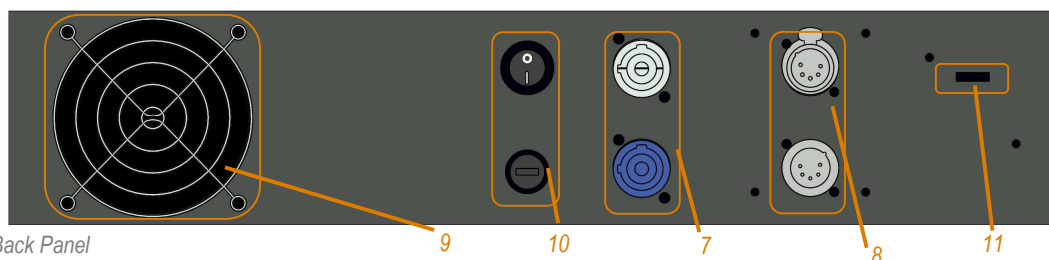


Figure 4 Byte 2.0 Back Panel

Byte 2.0 Front Panel

1	8 x XLR 4 pin Pixel Outputs
2	LCD Screen
3	LCD Navigation buttons
4	Output Labelling Panel
5	Controller Ventilation
6	N/A

Byte 2.0 Back Panel

7	Neutrik Powercon In & Out
8	5 Pin DMX In & Out
9	Controller Ventilation
10	Mains Switch & Power In Fuse (230Vac)
11	N/A

Hardware Dimensions

Byte 1.0

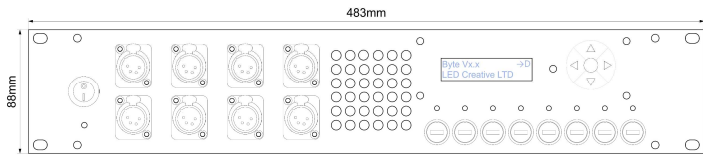


Figure 5 Byte 1.0 Front Panel Dimensions

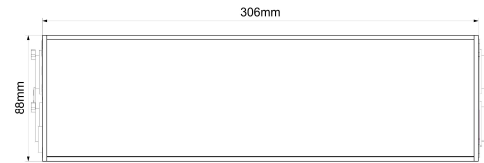


Figure 6 Byte 1.0 Side Panel Dimensions

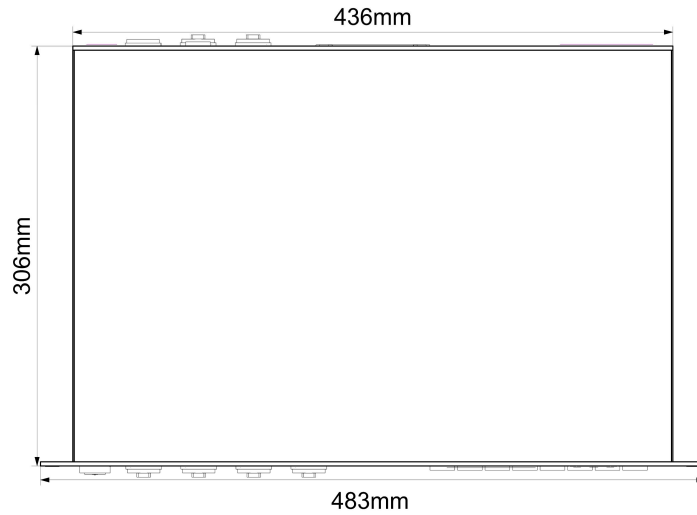


Figure 7 Byte 1.0 Top Panel Dimensions

Byte 2.0

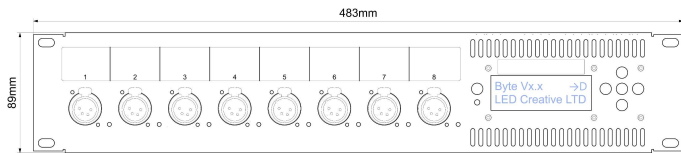


Figure 8 Byte 2.0 Front Panel Dimensions

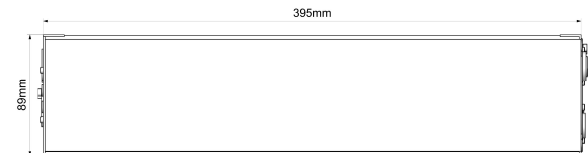


Figure 9 Byte 2.0 Side Panel Dimensions

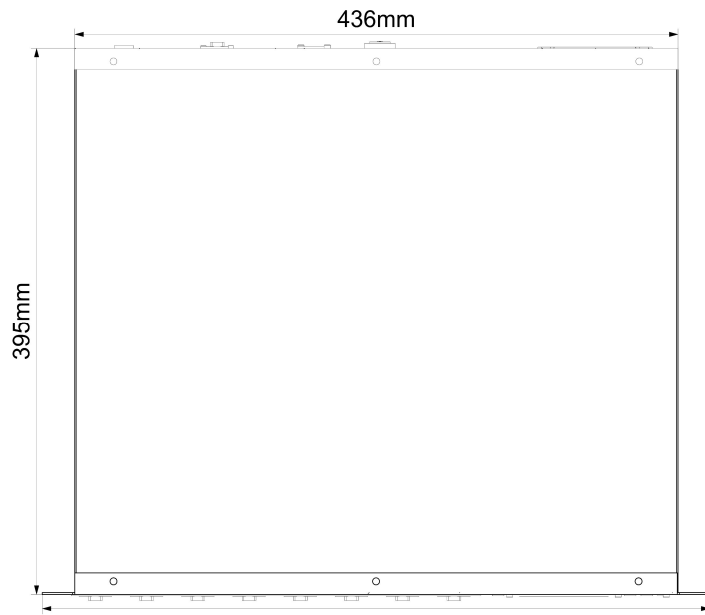


Figure 10 Byte 2.0 Top Panel Dimensions



QuickStart

1. Start by enabling the Rainbow test pattern on each controller and use this to test that each LED fixture functions correctly while installing. The rainbow test pattern illuminates each output of the controller in a distinct colour, with a white block that chases in a continuous loop on each output or group. Using this test pattern, the order in which the LED fixtures have been connected to the controller outputs, as well as the physical orientation of the LED fixtures can be quickly determined. Note that LED should **Always** be used with an extension cable between it and the controller; not having one can cause faults.

The colour displayed on each output of the controller when set to Rainbow test is given in Table 1 below.

Output	OP 1	OP 2	OP 3	OP 4	OP 5	OP 6	OP 7	OP 8
Colour	Red	Green	Blue	Cyan	Magenta	Yellow	Amber	Pink

Table 1 Colour order of rainbow test pattern

2. With the controller still running the “Rainbow” test, set the following parameters in this order:
 - 2.1. **Pixel Direction** – Adjusting this will invert what “start” and “end” are referred to on other parameters.
 - 2.2. **Pixel Count** – Adjusting this will remove/turn off physical pixels from the “end” of the LED. This Inverts with a change to pixel direction
 - 2.3. **Pixel Offset** – Adjusting this is not always required; however, if you have changed pixel count you may be required to use this to align the remaining pixels that are on. If you are required to adjust the LED to the other end of the strip, the following calculation can give you the offset number required. $300 - \text{pixel count} = \text{Pixel Offset}$.

By this point you should find that you have all the required LED switched on moving in the correct direction.

3. Decide if any of the LED requires **Grouping**. If there is no Grouping then skip this step.
If any outputs require grouping, then assign a common group number to the required outputs and unique and consecutive slot numbers that determine the order of the group.
It is very important that different groups on the same controller have different group numbers, and that each slot in a group is consecutive and unique. Not following this is the most common mistake in setting up groups.
4. Decide If any **Virtual Canvases** are required to align/time match the LED. If no virtual canvases are required skip this step.
 - 4.1. If you want to time match the LED calculate the size of your chosen Total Canvas. It is best to do this for the largest one you are trying to match the time of. Add up all the pixels from the group (if in a group) or output. This will give you the full canvas size that the total Pixels and virtual canvas will add up to for the other outputs. Then set the outputs you want to time match with enough virtual canvas to add up to the total canvas number you calculated. This can be added on the start or end or a combination of both if you are aligning it to the Total Canvas you calculated.
 - 4.2. To align LED using the Virtual Canvas calculate the number pixels before the real pixels and add them to the “Virt Canv Start” of the output or the first output of a group.
Then calculate the number of pixels after the real pixels and add them to the “Virt Canv End” of the output or last output of the group.
5. If adjusting settings with a DMX signal present it is a good idea to re-start the controller once all settings have been adjusted and resend the data signal from the lighting console or restart the test pattern.



Power

The Byte controllers are configured as standard for a 230v Ac supply input and 5Vdc on each of the 8 low voltage Outputs. Other versions of the controllers are available that output at either 12Vdc or 24Vdc. Controllers require a blue Neutrik Powercon Connector for Mains input. Controllers also have a mains switch on the power input to allow for no load connection of the blue powercon and power cycle of a specific controller. On start up the LCD display should look like the image below.

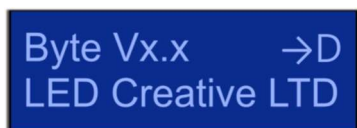


Figure 11 Shows a close up of a byte LCD Screen

LED Pixel types

Byte is capable of driving:

LED Pixel Type	Controller Pixel Type
WS2811	WS2811
WS2812	
WS2812B	
2903	1904
1904	
943	943

Table 2 Pixel Types

Which Product? Which Voltage?

Sigma – all densities of LED strip (up to a max of 300 pixels), RGB and single colour – 5 volts.

Sigma Neon – 12 Volts.

Sigma Fairground – 24 Volts.

For detailed information to check if a product would work with the available voltage or pixel types, please consult either the product technical data sheet for LED Creative products that can be found on our website

www.led-creative.co.uk or

by emailing us on support@led-creative.co.uk.

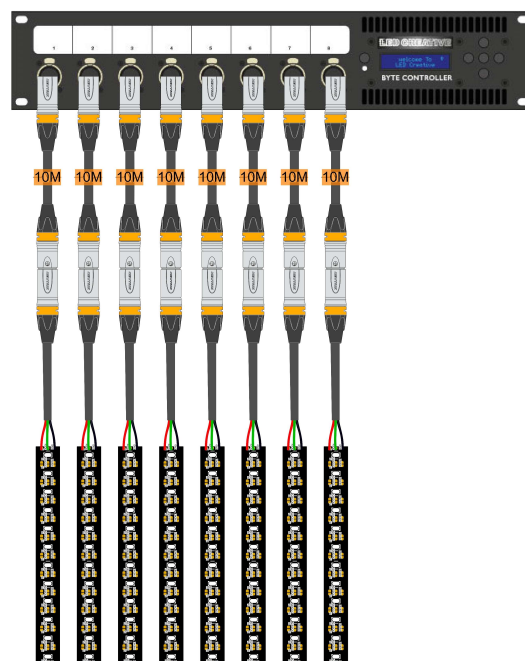


Figure 12 Byte 5 Volt Controller showing Sigma RGB LED Strip connected. Each controller can power up to 40 metres of Sigma 60 Product.



Figure 13 Byte 5 Volt Controller showing Sigma Pulse Wands connected. Each controller can power up to 8 Sigma Fixtures.



Test Mode

To test controller outputs with no DMX present. Active Test Pattern will override DMX signal for that controller.

Settings [Enter]

Test mode is the first submenu item

Left / Right to scroll through options.

None

All white 20%

All white 50%....

Rainbow Outputs

RGB alternating with white chasing pixel.

DMX Presence / Absence

Presence / absence of DMX is indicated in top right corner of LCD screen as:

No DMX detected (→x)

DMX detected (→d)

DMX present & new DMX packet received (→→)

If an active DMX cable is unplugged the last received DMX frame that was received will continue to be output by the LEDs. Power cycling the box (with no DMX data connected) will clear data from all outputs.

Circuit Protection

All Byte Controllers are fused at 4A on the 230Vac input.

Hardware v1.



Each output has an inline 5 x 20mm fuse for short circuit protection with in-line green LED indicator. See the table below for what rating fuse units are fitted with as standard.

Byte Controller Output Voltage (Vdc)	Output Fuse Rating (A)
5V	10A
12V	8A
24V	4A

Table 3 HW1 Fuse Ratings

Hardware v2



Each output has active current monitoring and short circuit protection for quick diagnosis of faults. A LED to the bottom right of each XLR output indicates the status of the output.

Green = Normal function

Amber = Danger of current overload to this controller output.

Red = Presence of overload or short circuit. Removing the excess or faulty load and power cycling or re-applying 230v to the controller will clear the fault.

Navigating Menus

Navigation Layout

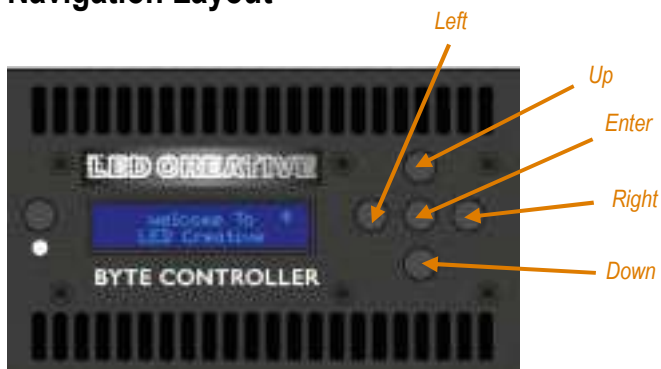


Figure 14 Menu navigation buttons.

ENTER - Press to access sub menus.

UP / DOWN – Used to navigate through menus or to increase/decrease a numerical value.

LEFT / RIGHT - Used to cycle options or for all Digit Menus LEFT/RIGHT buttons can be used to select which digit to change.

Flashing the Colon “:” Symbolises that you are scrolling menus

There is no requirement to press ENTER to confirm user selection. The interface remembers the last value.

When in lowest menu level e.g.

DMX START ADDRESS, pressing ENTER will escape up a level.

To exit from the Main Menu (OUTPUTS 1-8 & SETTINGS), pressing LEFT exits to home screen.

Output Menu Options

Start Address

Sets the DMX start address between 001-highest available address based on footprint for each output.

Total Pixels

Sets the number of pixels to illuminate on the output from 1-300 pixels.

Virtual Canvas Start / End (Virt Canv)

Sets the number of buffer or virtual pixels to add to the start or end of the output.¹

Pixel Offset

Sets the start point of the first pixel to illuminate between the 1st and 290th pixel. Used for Aligning the Lit Pixels on the LED Strip.

Direction

FWD or REV. REV Inverts the numbering of the pixels so that the last pixel is nearest the XLR connector end of the LED fixture. Note that this Flips other Settings that refer to Start and End (Pixel Count, Offset, Virtual Canvas).

Colour Order

Re-orders the RGB values for the output, with options; RGB, RBG, GRB, GBR, BRG, BGR. Default for all products is GRB, except for Sigma Fairground which are RGB.

Footprint

Specifies the number of DMX channels required to control each output or group of outputs from a selection of predefined personalities. Select from: 32, 34, 19, 15, 3. Footprint layout Available from www.led-creative.co.uk/resources.

Master Brightness (Intensity Patch Point)

Allows user to patch the Master Brightness channel of each output to a dedicated channel in the DMX range 1-512. See Table 6 for an example of how to use this.

Group

Assign one or more controller outputs to a group to control as one continuous output. The default for all outputs is to not be assigned to a group.

A controller has a maximum of 8 groups, with 8 slots available in each group. Users can assign individual outputs to any slot within any group. Note that all outputs that are part of the same group must have unique and consecutive slot number to function correctly.

See Groups Concept for more information on how to use grouping.

¹ Note that start and end Virtual Canvases may be only virtual pixels, a combination of virtual and physical pixels is considered as Total Canvas.



Global settings

Quick patch

Addresses All Outputs on the Controller Based on user selectable settings. User can Select: Start Address for Output 1, Whether the outputs are addressed Sequentially (SEQ), or all addressed as a Single Address (SNG) and the Channel Mode that the Outputs are being addressed as (32, 34, 19, 15, 3 Channel modes).

Speed Sync

Sync on – Outputs sync (works across multiple controllers).

Sync off – Outputs do not sync (default).

Speed sync used for accuracy when running FX's. With speed sync set to ON a change in FX speed parameter restarts the FX. This allows for multiple controllers to all run-in sync for pixel accuracy. With sync off it is possible to change the FX speed on the fly without effects restarting, but over time a small amount of pixel drift (1-2 pixels) is possible.

Global offset

Creates a new control channel for the controller [as a separate patch point from lighting console] which offsets the starting point for all FX's on all layers incrementally across each output. The Global offset is not contained within the fixture personality and should be patched as an additional dimmer channel on the lighting console.

DMX Value	Output 1	Output 2	Output 3	Output 8
000	FX start = Pixel 1	FX start = Pixel 1	FX start = Pixel 1	FX start = Pixel 1
001	FX start = Pixel 1	FX start = Pixel 2	FX start = Pixel 3	FX start = Pixel 8
002	FX start = Pixel 1	FX start = Pixel 3	FX start = Pixel 5	FX start = Pixel 15

Table 4 Global Address

See Table 6 for examples of setups where this feature is useful. Note that this feature works per output per controller – there is no link between multiple controllers, and it does not apply to groups.

DMX Snapshot

Takes a snapshot of the incoming DMX universe for replay later. The controller captures only the DMX data relevant to its outputs – it cannot be used for replaying data to other fixtures. A DMX signal is needed to record a snapshot.

Scroll LEFT/RIGHT

SAVE (1-8). Press ENTER to save.

LOAD (1-8) Press ENTER to load.

To revert to live DMX, Select LIVE RX.

Factory defaults

Go to Settings

Restore Factory Settings

Press & hold left and right arrows for 3 secs to restore to defaults.

As shipped from the warehouse default settings for all byte controllers are.

Output 1-8

DMX start address:001

Total Pixels:300

Virt Canv Start:0000

Virt Canv End:0000

Offset:000

Pixel Direction: FWD

Colour order: GRB

Footprint: 32 channels

Master Brightness: Def (Unassigned)

Group: None

Global Settings

Test: None

Patch: 001-032 Sequential is the first option but is uninitialized.

Speed Sync: Off

LED Type: WS2811

Snapshot: Live DMX

Global: Disabled

Uses and Applications

Groups Concept

The controller allows for multiple outputs to be assigned to positions within a group. A group is treated by the controller as if it is a single output, meaning that as much as 2400 individual LED sources may be controlled using just a single Byte fixture profile as if it were a single output.

To set up, choose which outputs you want to assign into a group. Then in order assign them a unique slot number within a group ensuring they are in the order you want the outputs to run.

You can do this multiple times per controller with a maximum of up to 8 Groups per controller

Groups do not interact with other groups with the same number on other controllers. If you want to group across controllers see Virtual Canvas Concept.

It is important that all outputs within a group have the same DMX address allocated within the output settings. All other settings can be unique to each output allowing pieces of LED to be different lengths, directions and more.

An Example of how-to setup 2 groups on a controller can be seen below.

Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Output 7	Output 8
Group 1 Slot 1	Group 1 Slot 2	Group 1 Slot 3	Group 1 Slot 4	Group 2 Slot 1	Group 2 Slot 2	Group 2 Slot 3	Group 2 Slot 4

Table 5 Grouping Example

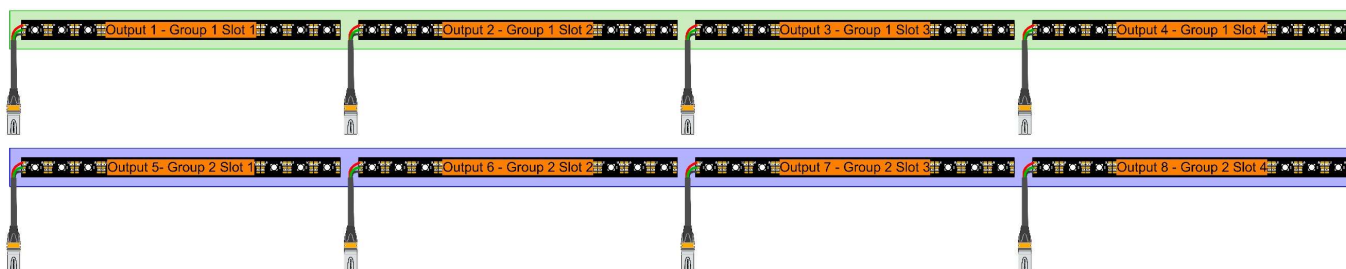


Figure 15 Shows 2 groups setup on a controller

Virtual Canvas Concept

Virtual Canvas was designed to add flexibility to where the group function could not be applied. Unlike grouping the Virtual Canvas can be used with outputs being on different addresses or only needing to be aligned to a section of the LED. It gives the user ultimate combination of flexibility and simplicity.

The Virtual Canvas size as calculated by the user provides the basis for the calculation of the onboard FX's.

Virtual Canvas for individual outputs [not in a group] = **Virt Canv Start + Total Pixels+ Virt Canv End.**

Virtual canvas for a group = **Sum (Virt Canv Start + Total Pixels + Virt Canv End) for all outputs in the group.**

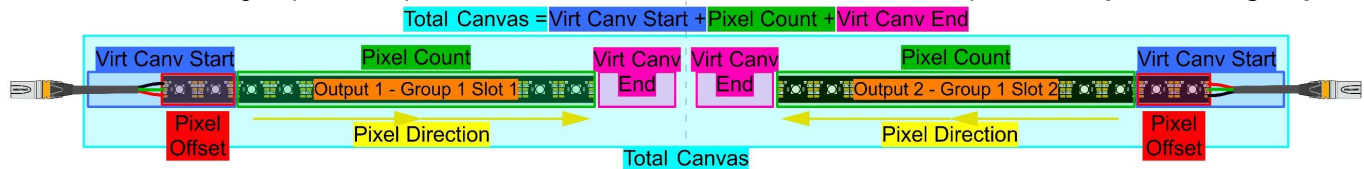


Figure 16 shows how controller settings apply to LED strips

The configuration of each output, or group determines the size of the Total Canvas. This is important to note as setting up several groups with different virtual canvas sizes will result in a difference of how each group displays FX's. For most scenarios it will be necessary to setup all virtual canvas sizes to be the same size. There are 4 main reasons why you may want to set up a virtual canvas:

1. To align 2 or more groups to ensure FX timing is consistent.
2. To "extend" a group across controllers.
3. To align small sections of led with a group
4. To align Multiple lines of physically offset LED

There are several factors to be mindful of when setting up a virtual canvas.

It is important to know that the Start and End are considered relative to pixel direction, so changing pixel direction inverts start and end.

Make sure you have your visible pixels set up correctly before adding virtual canvas as this will make it less likely to cause confusion as it should make it more obvious what is happening when making changes.

When using a Virtual Canvas in a group it is possible to apply virtual pixels between outputs of the group. When creating a virtual canvas to extend a group you only add "Virt Canv Start" Pixels to Slot 1 of a group and "Virt Canv End" pixels to the last slot of your group, see Figure 19 for an example of a simple set up.

Virtual Canvas Setup Guide:

1. Determine what the Total Canvas you are aiming for should be. Formulas at start of section. This may have extra pixels to allow for any virtual space that may be required on either end or in the middle of a group.
2. Set controller(s) to run in rainbow test mode to help keep track of outputs. Alternatively, you can use an FX set via DMX control. Do not adjust your canvas based on the live change to FX or test patten as this must be reset to display accurately. Use numbers calculated based on your total canvas
3. Move output to output adjusting both the Start and End canvases. Do not worry if they do not line up immediately.
4. Once all outputs have been setup on a controller reset the test patten by turning the controller off and back on and reselecting the test patten. This ensures that all the outputs will be outputting accurately with your virtual canvas. If using DMX, then restart the FX on the Console by cycling between FX.
5. At this point it should be obvious if there are any mistakes. If there are then return to step 2 and repeat until all are aligned as required.



Virtual Canvas Examples

Figures below show examples of how to use a Virtual Canvas. In these examples we have given an example of all the settings you might use to successfully create a Virtual Canvas.

In this example below, not only does setting the same Virtual Canvas mean that FX's are displayed consistently, but also that two horizontal groups of outputs can be setup in alignment. The number of total pixels and the size of the start and end canvases can be different values for each output within the group, making this feature truly versatile for any real-world setup that is encountered.

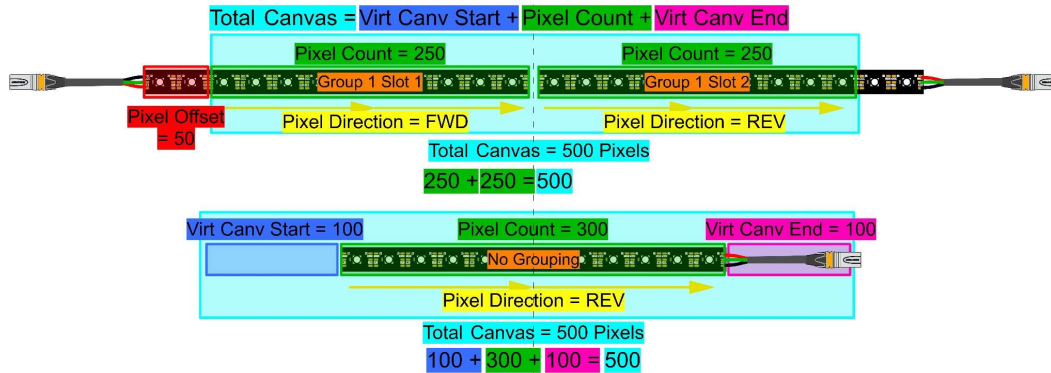


Figure 17 Shows a group and a single output of LED aligned using the Virtual Canvas Setting

In this example below, the outputs have been given virtual canvas to align the FX as if they had been pixel mapped. This Setup would allow the FX to start on the point furthest left (the top strip in this case) then when the FX reaches the second strip that will start in time and so on.

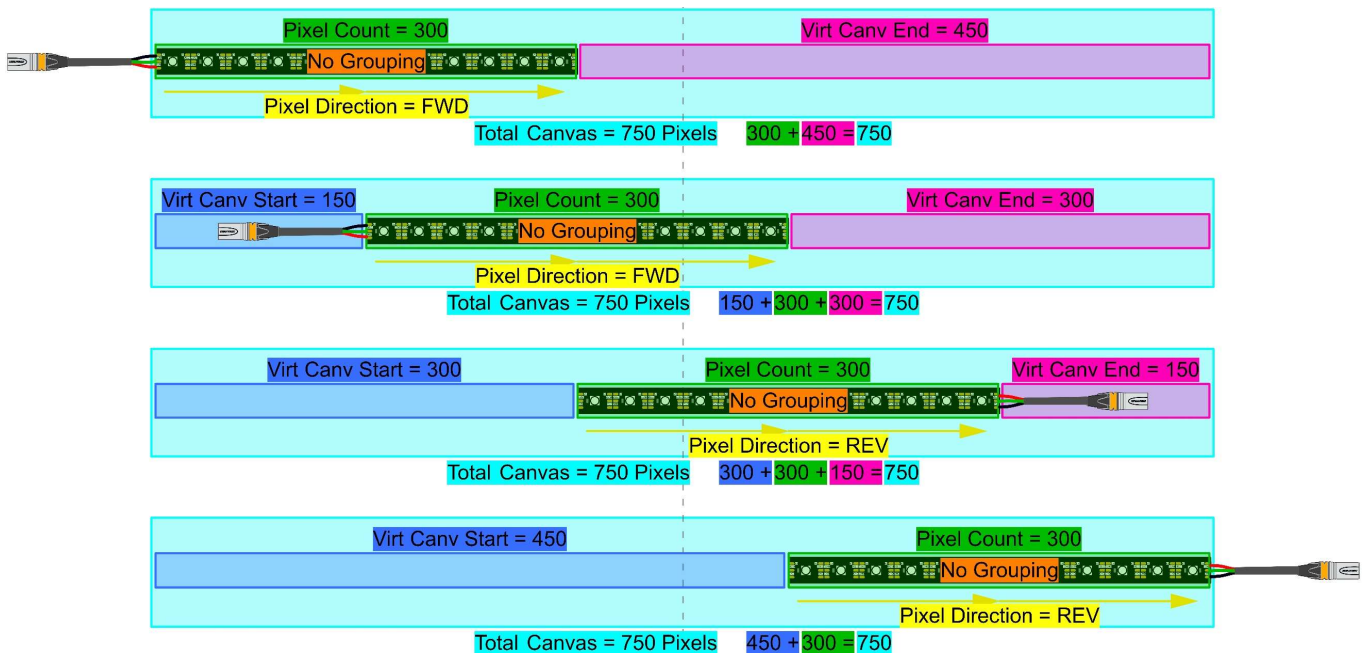


Figure 18 Shows 4 outputs of LED Aligned Using Virtual Canvas Setting

In this example below, Virtual Canvas has been used to create an extension of a group. To create the extension the first controller with a group is given a "Virt Canv End" on its last slot. This virtual canvas end is the total number of pixels that follow the first group on the first controller. Then on the second controller on the next group we add "Virt Canv Start" to the first slot in the group. The Virtual Canvas Start on this output should be the total of all the pixels that have come before it including any virtual ones that may appear at the start or middle of the first controllers group (do not include the Virt Canv End from the first controller last slot).

The limitations for using the product like this is the total number of virtual pixels allowed. This number is 6000 pixels on each the start and the end canvas.

In total this allows for 140M virtually grouped if using standard 60 LEDs/M or more if using lower density LED.

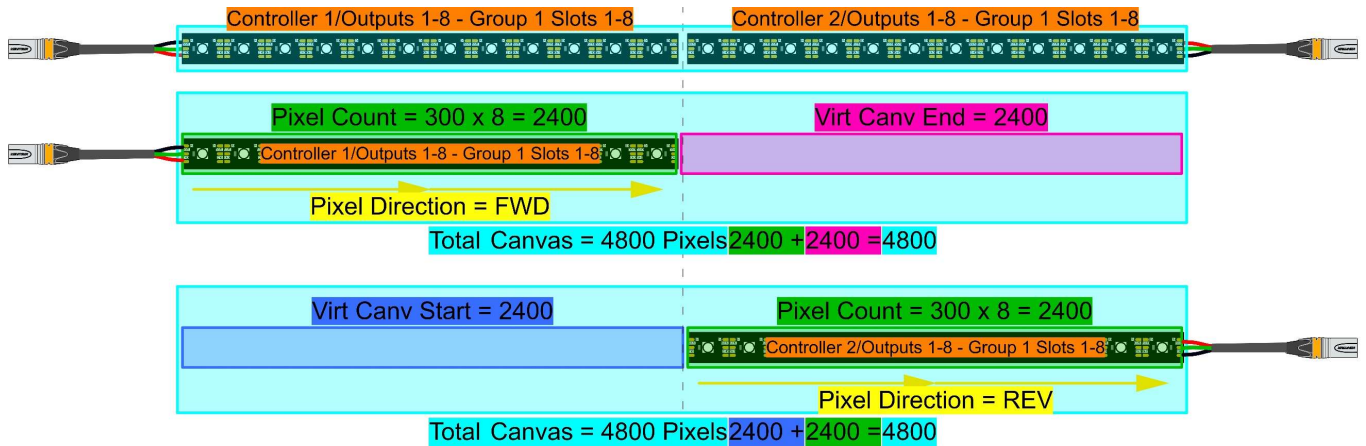


Figure 19 Shows 2 controllers using Virtual Canvas to extend Grouping across them.

Using Master Brightness & Global Offset

To setup the master brightness you should first decide how many different start addresses are needed. This determines how many wands can have separate colour and FX control. In the example below we have used 1 as the only start address.

Next decide how many global offset addresses are needed, this can only have 1 set per controller so you may choose to break these up by controller or assign all controllers the same global address for simplicity.

Finally assign individual master brightness addresses as required. Below we gave each wand an address.



Wand No	DMX Channels Using Master Brightness & Global Offset			DMX Channels Using Individual Addressing Start Address (32 Chan Mode)
	Start Address (32 Chan Mode)	Master Brightness DMX Address	Global Offset DMX Address	
1	1	34	33	1
2	1	35	33	33
3	1	36	33	65
4	1	37	33	97
5	1	38	33	129
6	1	39	33	161
7	1	40	33	193
8	1	41	33	225
9	1	42	33	257
10	1	43	33	289
11	1	44	33	321
12	1	45	33	353
13	1	46	33	385
14	1	47	33	417
15	1	48	33	449
16	1	49	33	481
DMX Channel Footprint	49 DMX Channels Total Pixel Count = 1600			512 DMX Channels Total Pixel Count = 1600

Table 6 Example of Byte Controllers in 32 Channel mode using Master Brightness and Global Patch Point Feature. In this example the intensities are in individual fixtures however these could be grouped to reduce the footprint further.



Troubleshooting

<u>Problem</u>	<u>Possible Cause</u>	<u>Solution</u>
No Power to Unit	Blown Fuse Faulty Power Feed	<ul style="list-style-type: none"> • Check incoming fuse and change if required. • Check power feed • If overheated, disconnect from mains and allow to cool off.
LEDs connected to output flicker	Wrong pixel type Wrong Voltage	<ul style="list-style-type: none"> • Check settings menu that correct pixel type is selected • Ensure there the feed cable to the LED is between 10M-30M • Try using byte receiver • Try stinging power to far end of LED
LEDs Connected to output do not work.	No power to unit Blown output fuse/fuse protection Wrong pixel type Wrong Voltage	<ul style="list-style-type: none"> • Change/reset output fuse • Ensure there the feed cable to the LED is between 10M-30M • Check settings menu that correct pixel type is selected • Try using byte receiver • Try stinging power to far end of LED • Try on known working output to check if LED is broken
Colour order of LEDs does not match lighting console	Pixel type has different order to factory default	<ul style="list-style-type: none"> • Use Colour order setting in output to select correct colour
No control over layers 2 or 3	Wrong channel footprint	<ul style="list-style-type: none"> • Change channel footprint on box to match the console. Can be changed from either the output menu or during sequential patching.