Lucenti

BLACKWAVE PIXLDRIVE1 CONTROLLER

USER MANUAL

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BLACKWAVE PIXLDRIVE1 CONTROLLER USER MANUAL

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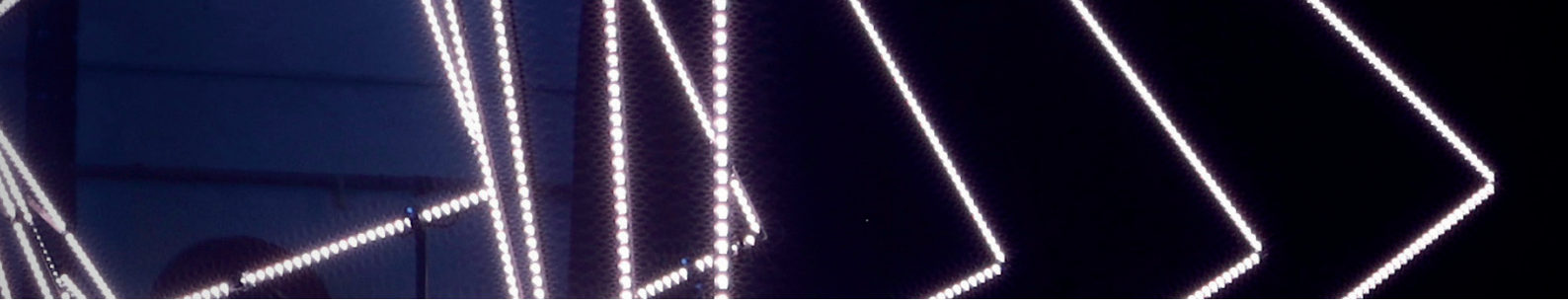


1 YOUR BLACKWAVE COLLECTION PIXLDRIVE1 CONTROLLER

Thank you for purchasing a Lucenti BlackWave Collection PixlDrive1 controller!

The BlackWave Collection pixel system consists of ultra-light, slim, weatherproof RGBW pixel fixtures such as led pixel bars and an easy-to-use controller. These pixel bars contain individually controllable LEDs, can be daisy chained up to 400 pixels and have a variety of interchangeable filters. The controller can receive DMX512 packets through different Ethernet protocols, supporting Art-Net I (broadcast), Art-Net II, 3 & 4 unicast, sACN/E1.31 Multicast and sACN Unicast. It also houses a customizable internal effect engine.

The controller is equipped with dual etherCON network ports connected to a built-in 100Mbit network switch. The controller also contains a Wi-Fi radio allowing it to connect to external Wi-Fi networks or to create its own.

There are two ways to operate the controller and change settings:

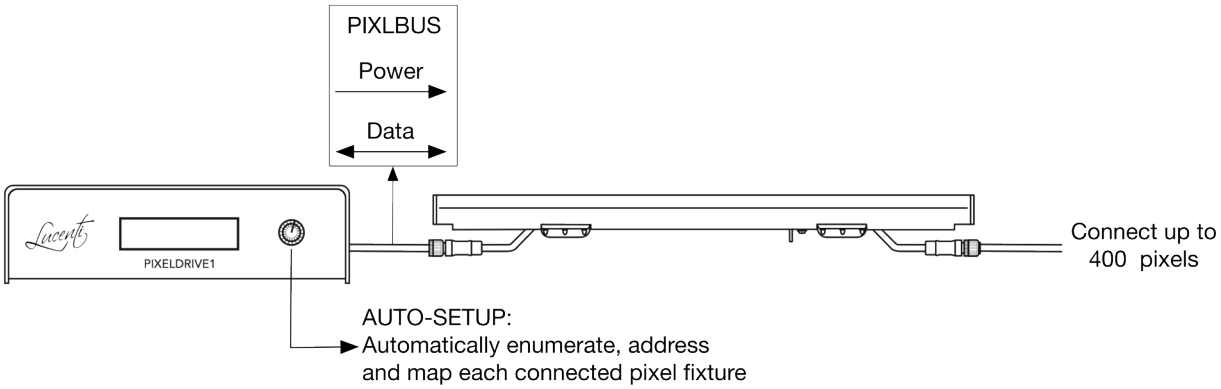
1. Via the built-in website through Ethernet or Wi-Fi, signaled by the icon WEB
2. Via the built-in LCD display and button, signaled by the icon LCD

THE BLACKWAVE COLLECTION TECHNOLOGY 2

The BlackWave controller and pixel products are developed and engineered from the ground up and communicate through a custom digital bus protocol, called ‘PixlBus’. The ‘PixlBus’ protocol allows devices to communicate bi-directionally at high speeds. This enables the controller to send colors to each pixel fixture individually but also to read status or product information from each device. Using the ‘PixlBus’ protocol, the BlackWave Collection technology can enumerate, address and map all connected devices in an automated way. As a result, the system can be easily setup through one button click; dramatically decreasing build-up time.

The ‘PixlBus’ protocol synchronizes all connected pixel fixtures to gain an optimally smooth visual performance.

The electrical bus system that transports the ‘PixlBus’ protocol uses differential wiring resulting in increased cable lengths and better signal quality.



3 SAFETY INSTRUCTIONS & WARRANTY

3.1 Signs and symbols used

Sign/symbol	Description
	Indicates side information about the current subject.
	Indicates an important warning that needs to be read in order to be able to continue.

3.2 Usage instructions

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE THE COVER. THE DEVICE HAS NO USER SERVICEABLE PARTS INSIDE. REFER FOR SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY.

Read Instructions - All the safety and operating instructions should be read before the device is operated.

Cleaning - Do not use cleaning solvents or abrasives for cleaning. Use a soft cloth to wipe the outer surface of the device.

Heat - The device should be situated away from heat sources such as radiators or heating systems.

Power Source - The device should be connected to a power supply complying to the requirements as documented in the technical specifications section of this document.

Servicing - The user should not attempt to service the device. All servicing should be referred to qualified service personnel. Risk of electrical shock exists when opening the device.

Damage Requiring Service - The appliance should be serviced by qualified service personnel when:

- The power cords on the power inlet or output have been damaged
- Liquid has been spilled into the device
- The device does not appear to operate normally

Temperature - The equipment shall be used at a maximum ambient temperature of 45° C / 113° F.

Regular inspection of the products and the mounting is necessary to ensure safety. In case of doubt about the safety of the product and the installation, the customer should immediately contact Lucenti.

3.3 Warranty

Warranty Period - 2 (two) years

This warranty can be provided when the Lucenti products were used in their normal intended use and when due care and compliance with the instructions given by Lucenti was observed. The obligations of Lucenti have been restricted to these warranty terms and conditions and the warranty does not cover losses incurred as a result of damage to other property or persons.

The warranty does not cover defects which are the result of:
- transportation of the Lucenti product
- negligence by the user of the Lucenti product or failure to observe the instructions given by Lucenti or proper care
- circumstances outside the control of Lucenti, such as theft, accidents or acts of vandalism
- failure to observe the installation or operating instructions, or other failures, when installing the Lucenti product
- normal wear and tear

In no event shall the warranty period for any Lucenti products including repaired or replaced parts, extend beyond the original warranty period stated above.

The customer is responsible for the costs and related taxes and duties for shipping of defected products for repair or replacement.
Repair onsite is not covered.

Procedure in case of a defect
Check our website http://lucenti.lighting or contact our support team for more information on how to return a defective Lucenti product.

4 UNBOXING

The PixlDrive1 controller provides both data and power to the connected fixtures through the PixlBus connector.
The specifics of the controller are described in figure 2 and 3. The different components are explained in the following table.

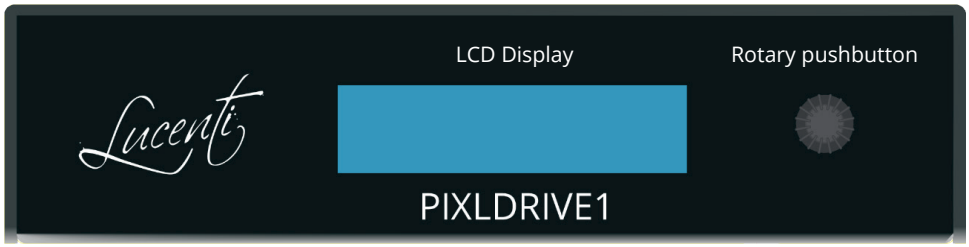


Figure 2: Front of PixlDrive1 controller

Figure 3: Back of PixlDrive1 controller

PixlDrive1 Controller	The PixlDrive1 Controller is the heart of the system. The controller translates incoming Art-Net or sACN/E1.31 to the proprietary 'PixlBus' output. It also features a powerful internal effect engine which allows for creating rich and dynamic light effects on the connected fixtures.
LCD Display	This LCD screen is used to display a menu to the user. The menu and its items can be controlled through the rotary pushbutton.
Rotary pushbutton	This button controls the built-in LCD display.
Network	The controller is equipped with dual Ethernet etherCON network ports and an internal 100Mbit network switch. This allows to daisy-chain multiple controllers together.
PixlBus	The PixlBus provides power and data to all connected fixtures.
Power in	This cable end (powerCON TRUE1) will be connected to an open power outlet. This outlet will provide power to the controller AND all connected fixtures through the internal power supply and PixlBus output.
Power out	The power can be daisy-chained between multiple controllers using interlinking powerCON TRUE1 cables.

Please carefully read the following section to understand the terminology user later on in this manual.

Ethernet connectivity	The controller has a built-in 100Mbit network switch exposed through two etherCON ports. These ports can receive Art-Net or sACN/E1.31 data and are also used to reach the built-in configuration webpage.
Wi-Fi connectivity	The controller is equipped with a built-in Wi-Fi radio. This radio can be configured in two modes: • **Infrastructure Mode:** connect the controller to an existing external Wi-Fi network • **Ad-hoc Mode:** the controller will create its own Wi-Fi network. No external networking hardware is required. Wi-Fi can only be used to reach the built-in configuration web page and NOT to receive Art-Net or sACN/E1.31 data.
PixlBus protocol	The controller communicates with each of the connected fixtures through a proprietary protocol called 'PixlBus'. This high-speed communication protocol allows for sending pixel data at high framerates but also to request product and status information from each of the connected fixtures. It also allows to perform a firmware update of a fixture, even when multiple fixtures are connected.
Ethernet DMX input	The controller can receive DMX512 packets through the following Ethernet DMX protocols: Art-Net I (broadcast), Art-Net II, 3 & 4 unicast, sACN/E1.31 Multicast and sACN Unicast.
Standalone effect engine	The controller has a powerful built-in effect engine that can display colorful animations on the connected fixtures. This engine is standalone, it will loop and keep playing effects until it is instructed otherwise.
Auto Setup	The 'PixlBus' technology allows to enumerate, address and map all connected devices in an automated way. As a result, the system can be easily setup through one button click; dramatically decreasing build-up time.
Pixel Mapping	Performing an auto setup will automatically map all fixtures according to the chosen parameters. The DMX mapping for each fixture can then easily be consulted through the built-in configuration webpage.

6 CABLING & POWERING UP

6.1 Connecting BlackWave pixel bars

A PixlDrive1 controller sits between a power outlet and a collection of fixtures that understand the 'PixlBus' protocol. The PixlBus provides power and data to all connected fixtures. The following figures focus on connecting BlackWave Collection BW-100 and BW-50 pixel bars to the controller.

It is advised against connecting non-Pixlbus devices to the controller

BlackWave pixel fixtures display their PixlBus ID (section 7.2) on startup using white LEDs.

1. First connect all BlackWave pixel bars to each other.

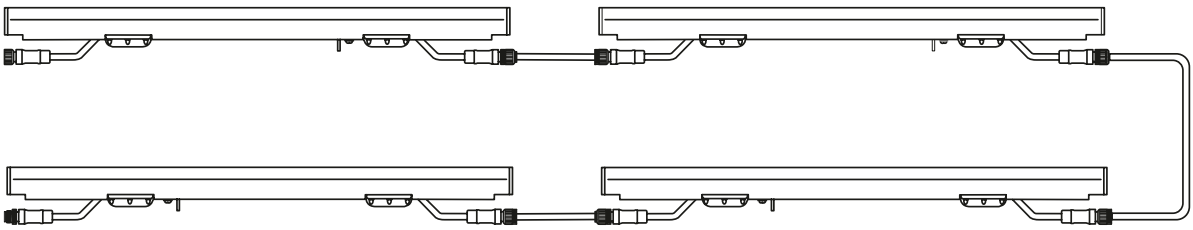


Figure 4: connect pixel bars

2. Connect the first BlackWave pixel bar to the controller.

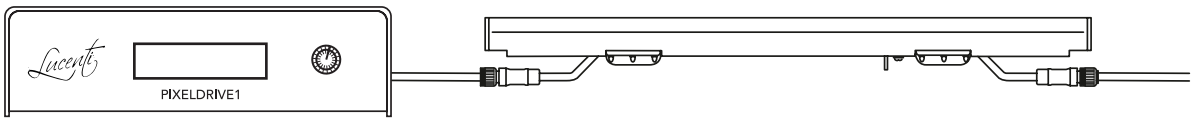


Figure 5: connect pixel bar to controller

3. Connect the PixlDrive1 controller to an available power outlet.

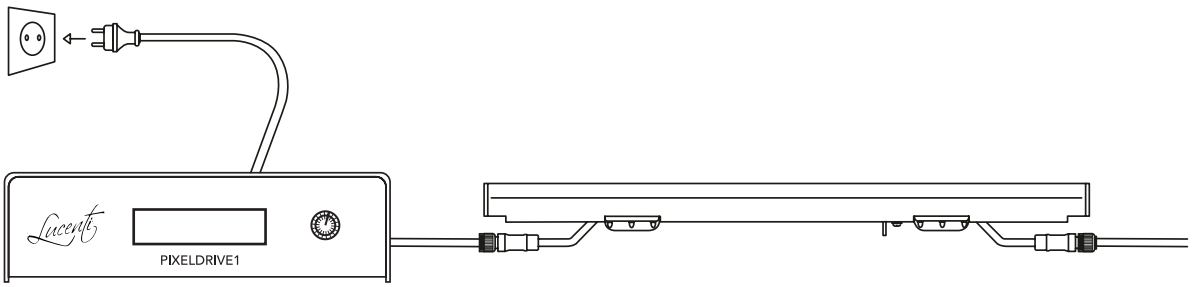


Figure 6: connect the controller to an open power outlet

4. The controller will now boot. The built-in display will display the current firmware version at the bottom.

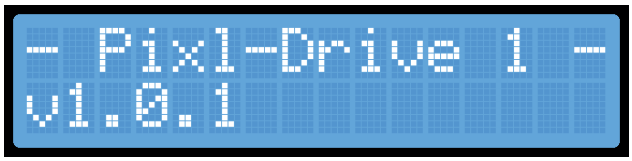


Figure 7: First screen after booting the controller

6.2 Maximum cabling considerations

The following numbers are valid when all color channels (red, green, blue and white) are fully on for the maximum amount of supported BlackWave pixel bars per controller (= maximum power consumption). Less power consuming pixel use will increase the length of allowed extension cabling.
Setups with less connected pixel bars (possibly mixed in different configurations) will also increase the length of allowed extension cabling.

Between controller and first bar and NO extension cable between individual bars:
30M

Between 8x BW-100 bars (= max. of 400 pixels) and NO extension cable between first bar and controller:
10M cable between each bar. Total = 70m.

Between 16x BW-50 bars (= max. of 400 pixels) and NO extension cable between first bar and controller:
5M cable between each bar. Total = 75m.

The cable lengths might be increased when using less bars or not using full output (RGBW@Full) on all bars!

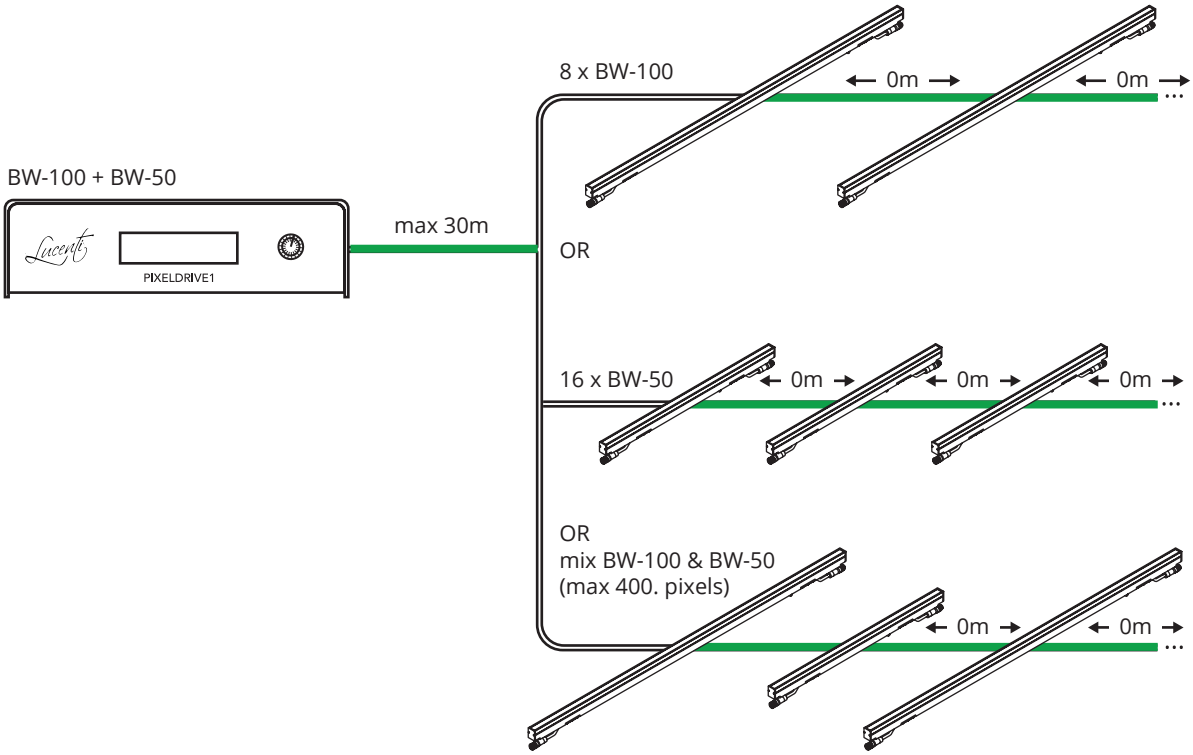


Figure 8: BlackWave cabling considerations

7.1 Connect to controller

The controller has two Ethernet network ports and a Wi-Fi controller on-board. The internal configuration webpage can be approached through both. For optimal operation, it is advised to use a wired Ethernet connection to proceed.

Ethernet and Wi-Fi can be active at the same time.

The following figure displays the default dashboard screen of the web interface, with no configured fixtures. After first time use, the page might look different.

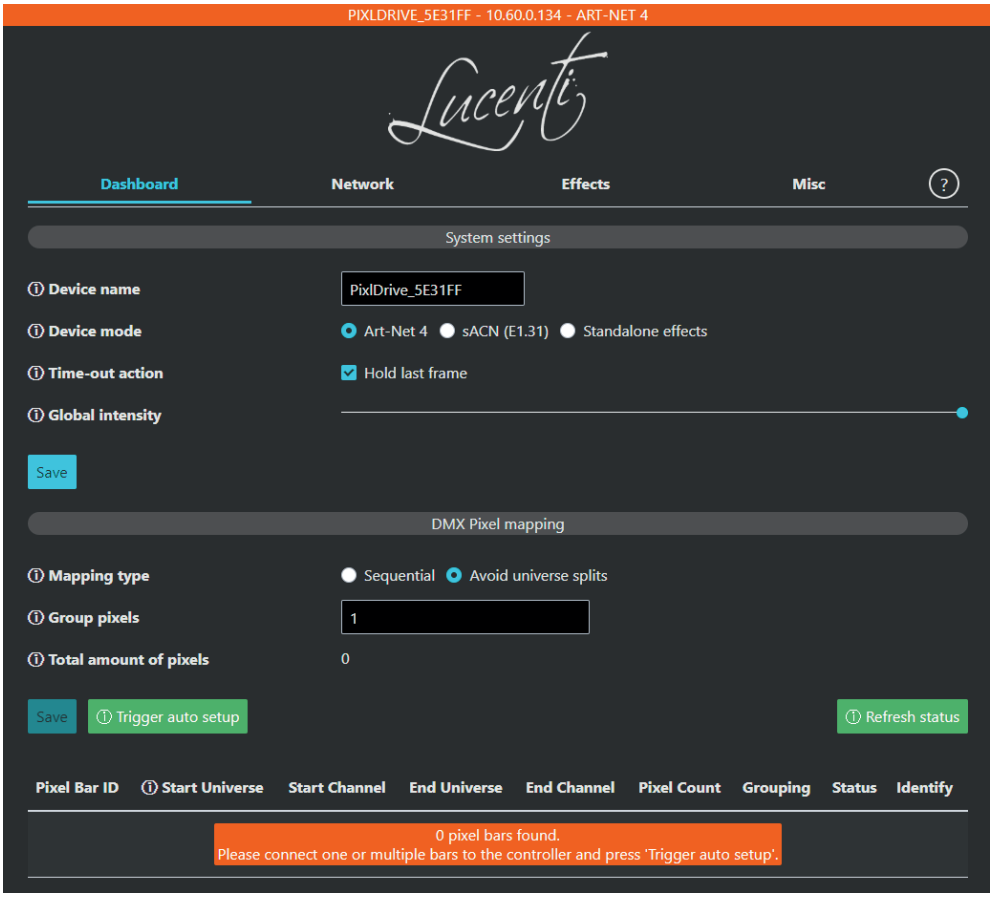


Figure 9: default screen of internal webpage

7.1.1 Ethernet

The controller is equipped with two etherCON network ports which are internally connected to a 100Mbit network switch. As a result, either port can be used to connect to a host (e.g. Art-Net source) and the other can be used to daisy-chain other PixlDrive controllers.

It is advised against daisy-chaining more than 20 devices.

The current Ethernet IP address when successfully connected is shown at the bottom line of the main status display.

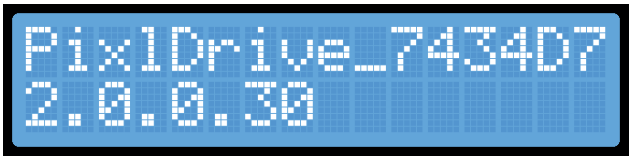


Figure 10: Main status screen with controller name and Ethernet IP address

In its default configuration, the controller is set to the static IP **2.0.0.30** (netmask: **255.0.0.0**).
Make sure your computer or device has a static IP address in that same range (e.g. 2.0.0.10) and uses that same netmask. When completed, point a browser to 2.0.0.30. The webpage should load and display the dashboard page.

Figure 11: Back side of controller with the two etherCON connectors on the left.

7.1.2 In Wi-Fi Ad-hoc mode

In ad-hoc mode, the controller creates its own Wi-Fi network, allowing your Wi-Fi capable device, such as laptop, desktop computer, tablet, smartphone, ... to connect directly to this network. In its default configuration, the network will have the same name/SSID as the controller. It uses the format PixlDrive_XXXXXX where the XXXXXX will contain random alphanumeric digits derived from a unique ID in the controller. This name is also displayed in the top bar of the main window on the LCD display.

When connected, open a browser on your device and point it to **192.168.4.1.** The webpage should load and display the dashboard page.

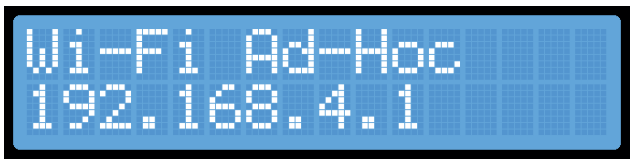


Figure 12: Info menu displaying that controller is in Wi-Fi Ad-Hoc mode

7.1.3 In Wi-Fi Infrastructure mode

When the controller is in Wi-Fi Infrastructure mode, it connects to an external Wi-Fi access point. Note down the IP address from the controller by using the built-in LCD (consult section 8.1). Connect your Wi-Fi capable device, such as laptop, desktop computer, tablet, smartphone, ... to the same network the controller is connected to. Open a browser on your device and point it to the previously noted IP address. The webpage should load and display the dashboard page.

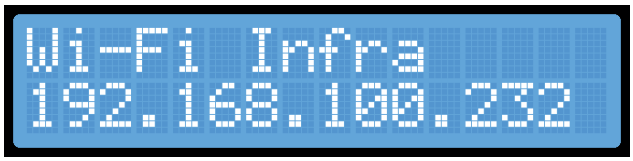


Figure 13: Info menu displaying current IP address 192.168.100.232 in Wi-Fi Infrastructure mode

7.2 Perform auto-setup

The controller features intelligent enumeration and auto-addressing of all connected fixtures through the smart **PixlBus**. It suffices to connect all fixtures together, connect the first to the controller and perform an auto-setup to let the system discover all fixtures and auto configure all necessary parameters. This process can take up to 1.5 seconds.

After an auto setup:

- All connected fixtures receive a unique and incremental PixlBus ID. The first fixture after the controller has ID 1, the second ID 2, ...
- BlackWave pixel fixtures will display their ID on start-up using white LEDs.
- The controller keeps an internal list of all connected devices, with their type and manufacturer, containing all necessary parameters such as pixel type and count.
- A pixel map is automatically generated reserving the necessary DMX universes and channels to drive each pixel of each connected fixture.
- The controller is now ready for use.

WEB:

1. Go to the Dashboard
2. Go to DMX Pixel Mapping
3. Select Trigger auto setup

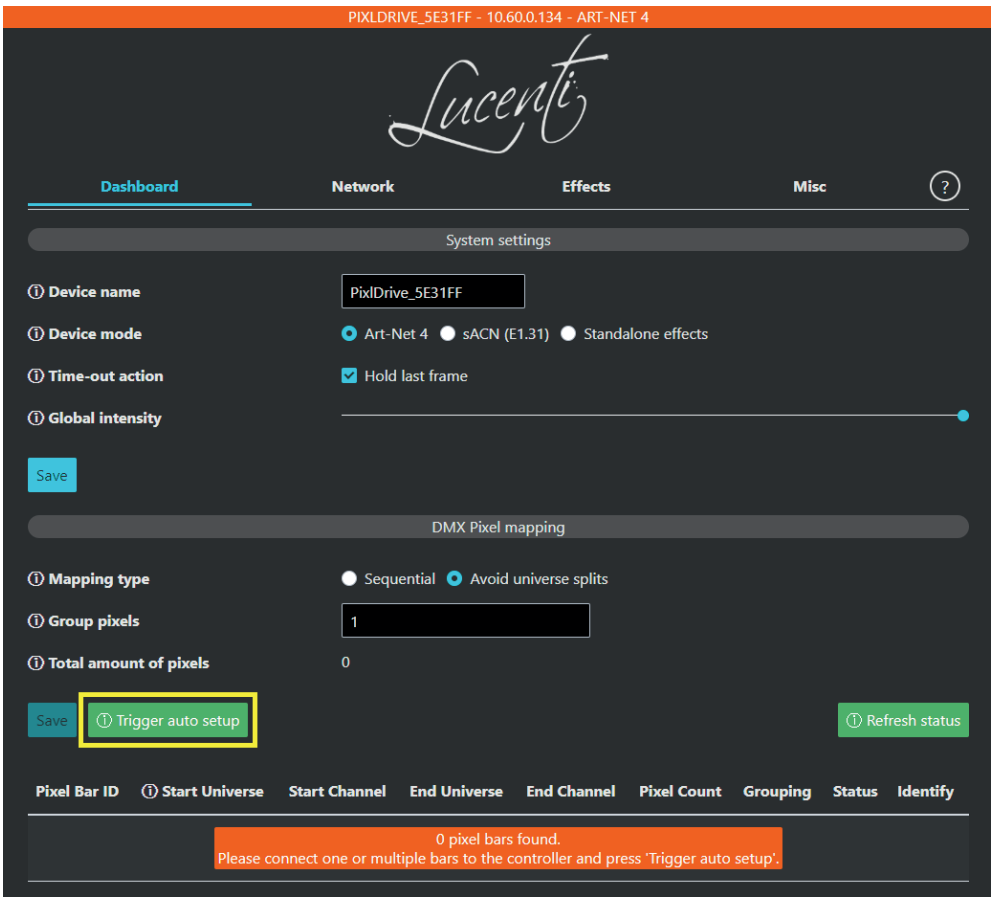


Figure 14: Triggering auto setup

After performing the auto setup, the DMX Pixel Mapping table is automatically populated with all connected fixtures. In this case 4x BW-100 (=50 pixels) pixel bars + 1x BW-50 (=25 pixels) pixel bar were found, as can be seen in the following figure. The DMX mapping was automatically calculated for start universe 1 and start channel 1. The mapping avoids patching a bar over two universes since the Avoid universe splits option was chosen. Bar 2 ends at DMX channel 400 of the first universe. There are 112 channels left to use in this universe, but this is not enough to patch the next fixture, a BW-100 bar consisting of 50 RGBW pixels (=200 channels). Therefor fixture 3 starts at the first channel of universe 2.

Pixel Bar ID	ⓘ Start Universe	Start Channel	End Universe	End Channel	Pixel Count	Grouping	Status	Identify
1	1	1	1	200	50		ONLINE	Identify
2	1	201	1	400	50		ONLINE	Identify
3	2	1	2	200	50		ONLINE	Identify
4	2	201	2	400	50		ONLINE	Identify
5	2	401	2	500	25		ONLINE	Identify

Figure 15: Auto setup discovered and mapped 5 fixtures

LCD:

1. Activate the menu by pressing the button
2. Go to Auto Setup
3. Select Execute
4. The number of discovered fixtures is shown

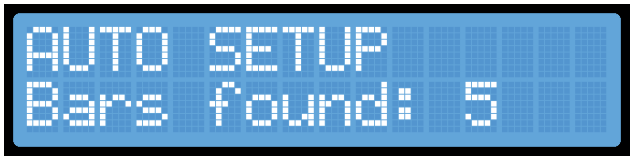


Figure 16: 5 fixtures were found after auto setup

7.3 Choosing the right device operation mode

The controller can be switched to one of 3 different device operating modes. This mode defines whether the controller uses the internal effect engine to generate colors for the connected pixel fixtures or whether external Ethernet DMX input is used.

The controller will store and start up in the selected device mode.

It is advised to switch off Wi-Fi when it is not going to be used for the chosen device operation mode. Refer to section 9.2.2 for more information.

7.3.1 Art-Net

The controller supports receiving Art-Net through wired Ethernet allowing individual pixel control. The controller implements Art-Net version 4 but also supports Art-Net I (broadcast), II and 3. Art-Net is copyright by Artistic License Holdings Ltd.

The controller supports being discovered by an ArtPoll packet allowing for easy configuration.
The controller supports universe synchronization through an ArtSync packet.

It is advised to use unicast network addressing when distributing Art-Net. When using broadcast addressing, high universe counts might result in reduced performance and stuttering.

Receiving Art-Net is only possible through the wired Ethernet interface.

7.3.2 sACN (E.131)

The controller supports receiving sACN/E1.31 (Streaming ACN) through wired Ethernet allowing individual pixel control. The controller implements ANSI E1.31 2018 Multicast but also supports sACN Unicast.

The controller supports universe synchronization through an E1.31 synchronization packet.

Receiving sACN (E.131) is only possible through the wired Ethernet interface.

7.3.3 Standalone FX

The controller is equipped with a powerful internal effect engine that can dynamically generate colors and animations for all connected fixtures. The engine can be controlled and edited through the built-in webpage.

7.3.4 Changing the device operation mode

LCD:

1. Activate the menu by pressing the button
2. Go to Device Mode
3. Navigate to Desired device operation mode
4. Press ENTER to confirm the selection

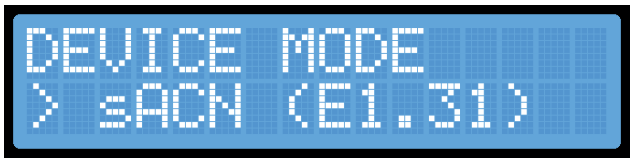


Figure 17: Changing the device operation mode to sACN/E1.31

WEB:

1. Go to the Dashboard
2. Select the desired device mode. Press SAVE to store.

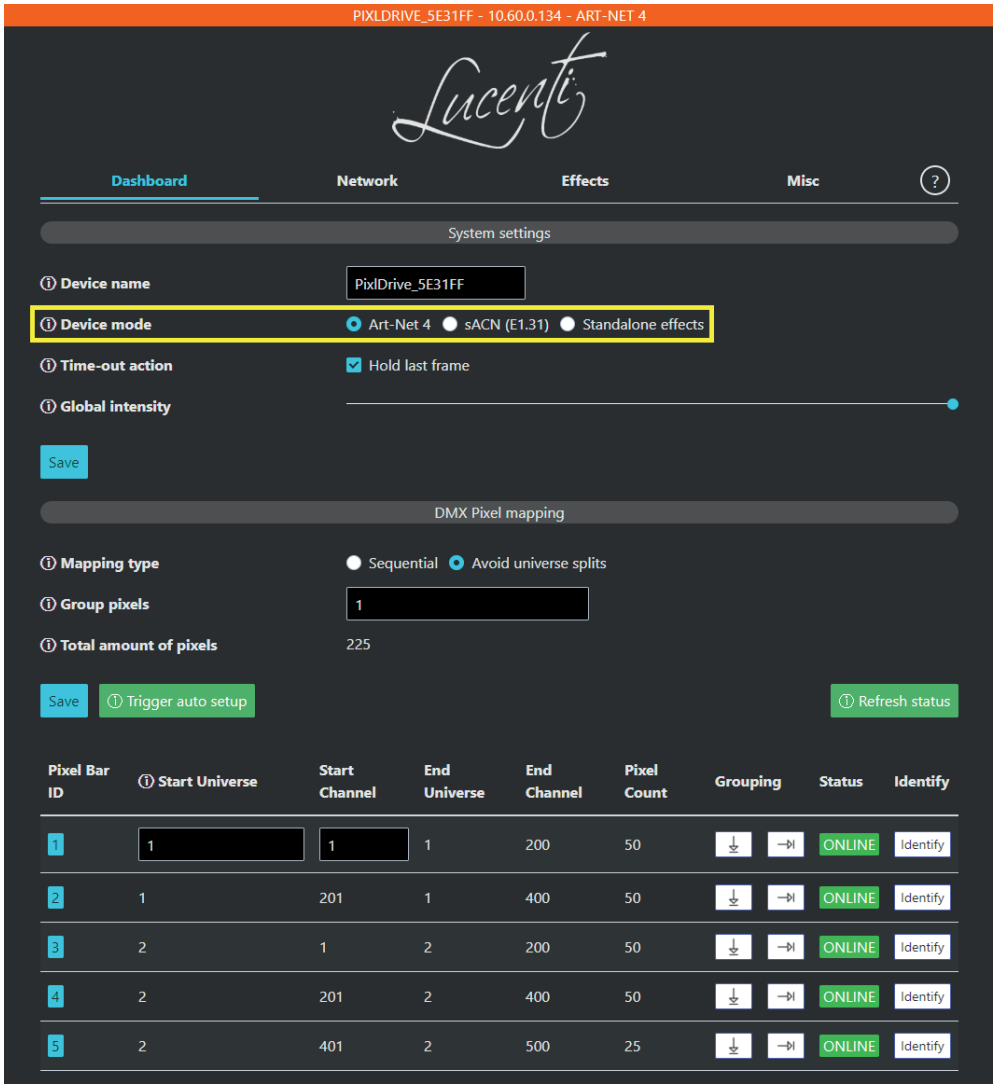


Figure 18: Changing the device operation mode through the web interface

The LCD user Interface of the controller consists of a built-in LCD display and 1 rotary pushbutton. The following figure locates the two elements.

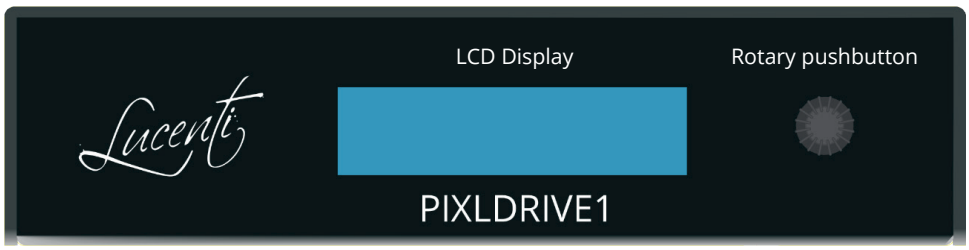


Figure 19: Front LCD UI

8.1 Overview

The LCD display and button allow navigating through a menu and reviewing/changing system parameters. The LCD display also displays status information about the current state of the controller.

The idle window of the UI shows controller status information in three different pages. Scrolling through pages can be achieved by rotating the button.

1. **Page 1:** current controller name and Ethernet status
2. **Page 2:** Ethernet DMX and mapping status
3. **Page 3:** Wi-Fi status

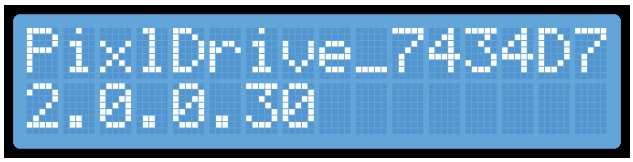


Figure 20: Front UI Page 1

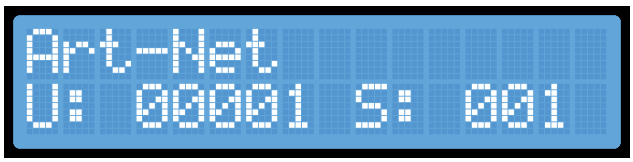


Figure 21: Front UI Page 2

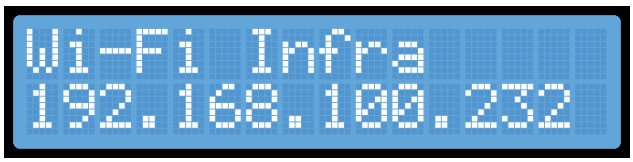


Figure 22: Front UI Page 3

When the main window is active, the top menu can be activated by pressing the button.
The top menu has 6 items: **Auto-Setup, Test Patterns, Device Mode, Mapping, Ethernet** and **Factory Reset**. Each will open a submenu which will present more options. Navigating through the different menu items happens by rotating the button LEFT/RIGHT. Selecting and confirming options happens by pushing the button.

Some menu options include number pickers. First select the digit that needs editing by rotating and pushing the button and then press the button again to start changing the value.

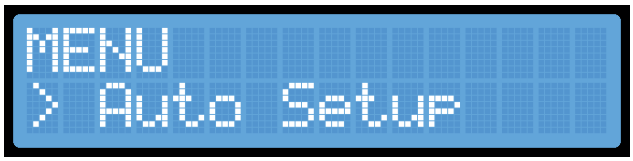


Figure 23: First item (auto setup) of the top menu

8.2 Menu flow-chart

A full overview of all menu items is given in the following flow chart.

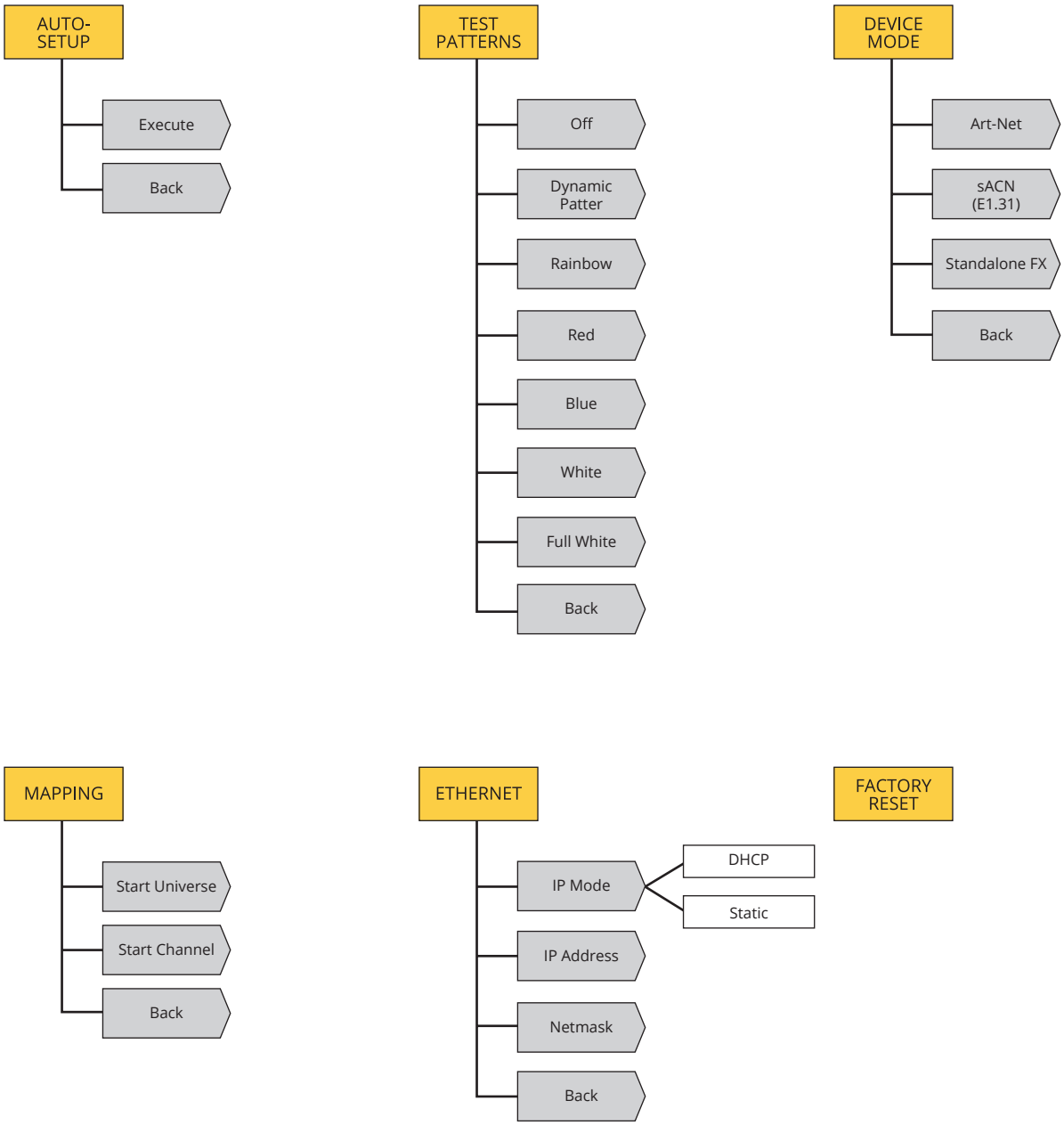


Figure 24: Menu flow-chart

9 USING THE BUILT-IN WEB INTERFACE

The controller can be controlled through an internal responsive HTML5 webpage. The configuration page includes all options from the front LCD menu and adds extra functionality, such as changing specific device parameters, change effects and colors when in Standalone FX mode but also monitoring device operation and updating firmware.

The internal webpage is accessible through both the controllers Ethernet and Wi-Fi connection. It is advised to access the webpage through an Ethernet connection.

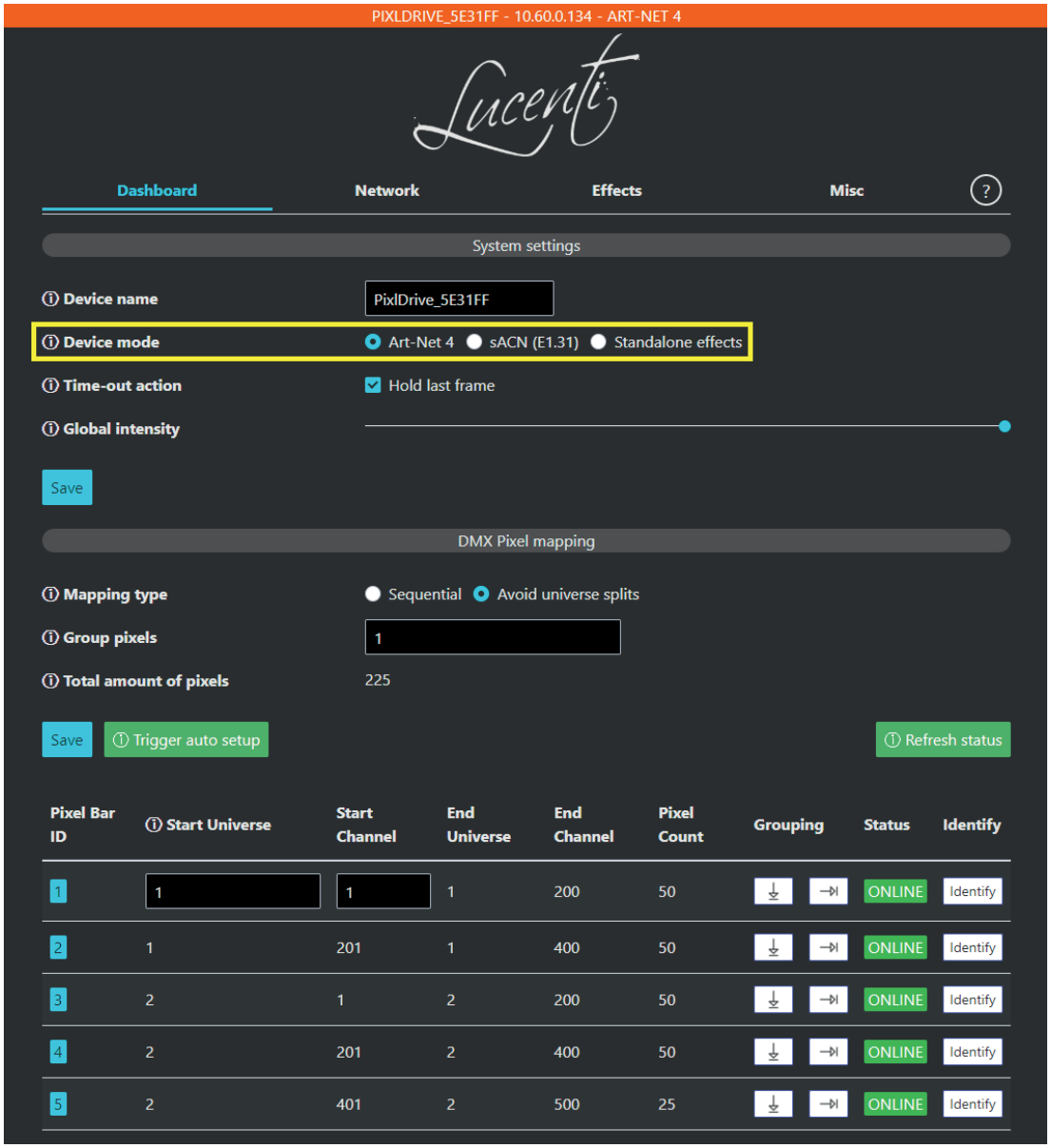
The webpage is responsive and designed to work with all recent browsers and will dynamically fit itself to desktop and mobile screens.

Hovering over the information symbol ⓘ explains that current menu item.

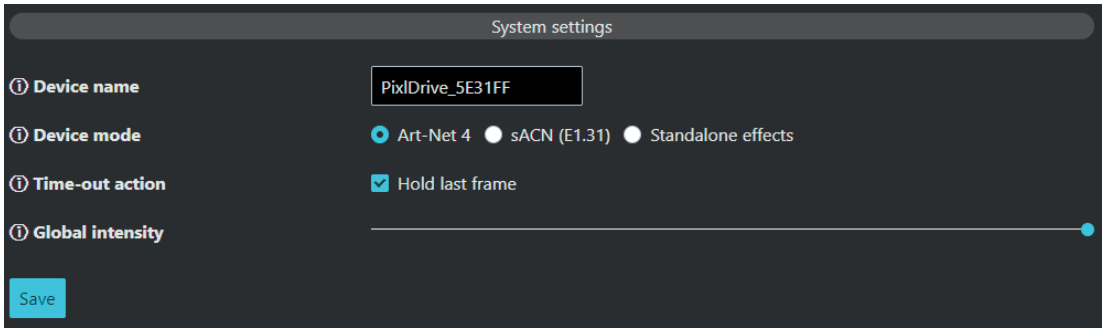
Don’t forget to press SAVE to store any adjustments.

9.1 Dashboard

The dashboard tab gives an overview of the device's configuration and operation mode while also displaying the current pixel mapping and overview of connected fixtures.



9.1.1 System settings



Device Name:
Gives a user-friendly name to the controller. Identical to the Wi-Fi SSID in Ad-Hoc mode.

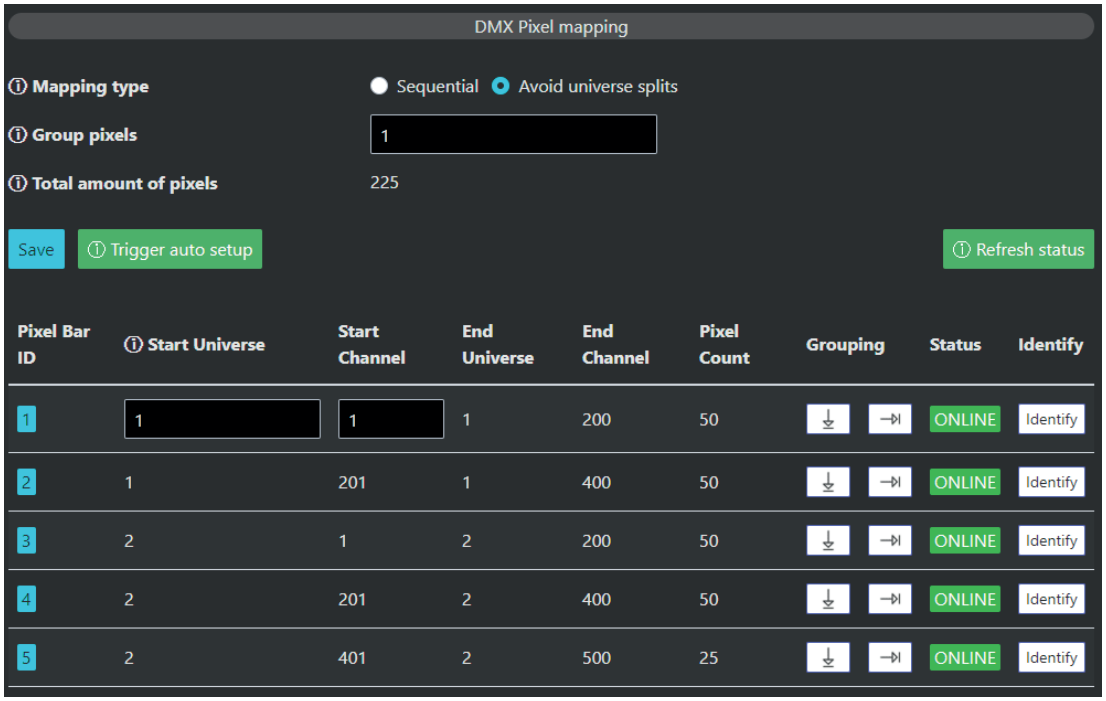
Device Mode:
Choose the active device mode:
- Receive and display Art-Net DMX data
- Receive and display sACN DMX data
- Display colors generated by the internal standalone effect engine.

When saved, the controller will remember and start up in the selected mode.

Time-out action:
Holding last frame will continue to display last received Art-Net/sACN frame when the connection drops (e.g. cable break) or when the Art-Net/sACN sender stops supplying data. If not selected, output will turn black after 2.5 seconds when such connection drop occurs.

Global intensity:
The global intensity of the colors on the pixel output, in percent. This is calculated just before controlling the pixel output and as such affects all colors received by Ethernet DMX sources or generated by standalone FX engine.

9.1.2 DMX Pixel Mapping



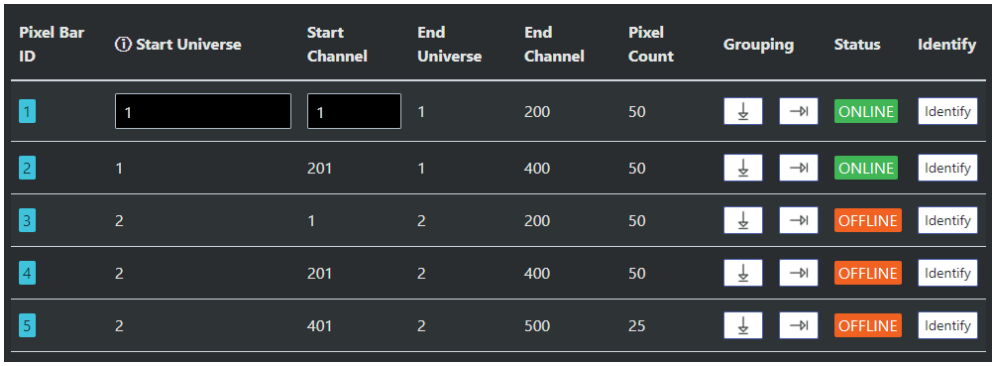
Mapping type:
'Sequential' mapping allows pixel fixtures to be mapped over two universes, with the start channel in one universe and the end channel in the next. Selecting 'avoid universe splits' makes sure that both the start and end channel of a fixture are part of one universe.

Group pixels:
Grouping pixels allows the user to specify how many physical pixels are grouped together and visually treated as one single pixel. Grouped pixels appear as one pixel for the control software/lighting desk, decreasing the total amount of necessary channels to drive the system through Ethernet DMX.

Total amount of pixels:
The total amount of active pixels on this controller (maximum 400). For the BlackWave Collection products, this means a total of 8x BW-100 bars or 16x BW-50 bars can be connected at once, or any other combination that not exceeds the amount of 400.

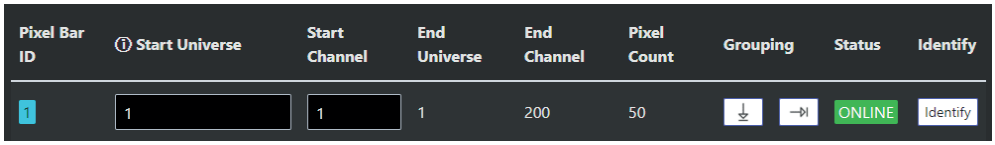
Trigger auto setup:
Auto setup will discover, and auto-address all connected pixel bars and perform the DMX pixel mapping for the given parameters.

Refresh status:
Check for pixel bars that went offline. Offline pixel bars will receive an orange offline status label. This might indicate a cabling issue which should be investigated.



Pixel Bar ID	ⓘ Start Universe	Start Channel	End Universe	End Channel	Pixel Count	Grouping	Status	Identify
1	1	1	1	200	50		ONLINE	Identify
2	1	201	1	400	50		ONLINE	Identify
3	2	1	2	200	50		OFFLINE	Identify
4	2	201	2	400	50		OFFLINE	Identify
5	2	401	2	500	25		OFFLINE	Identify

Pixel mapping per fixture in detail:



Pixel Bar ID	ⓘ Start Universe	Start Channel	End Universe	End Channel	Pixel Count	Grouping	Status	Identify
1	1	1	1	200	50		ONLINE	Identify

Pixel Bar ID:
The incremental PixlBus ID that was issued to the fixture during an auto setup.

Start Universe:
The start DMX universe from where Ethernet DMX input should be captured for this fixture. sACN universe numbering starts with 1, however Art-Net universe numbering starts with 0. To ensure compatibility between the two, the controller regards universe 1 as the first universe for both protocols: 1 for sACN and 0 for Art-Net. Art-Net allows for a maximum of 32767 universes, sACN for 63999.
This value is user editable for the first connected fixture and is automatically calculated for the remaining fixtures.

Start Channel:
The start DMX channel from where Ethernet DMX input should be captured.
This value is user editable, ranging from 1 to 512, for the first connected fixture and is automatically calculated for the remaining fixtures.

End Universe:
The end DMX universe that still contains data that is displayed by this fixture. This value is automatically calculated using the user supplied mapping type, start universe and channel and number of connected fixtures.

End Channel:
The end DMX channel that still contains data that is displayed by this fixture. This value is automatically calculated using the user supplied mapping type, start universe and channel and number of connected fixtures.

Pixel Count:
The number of pixels this fixture consumes. This value is automatically retrieved from each connected fixture during an auto setup.

Grouping:

Shortcut to fill the grouping pixels field with this fixture's pixel count. Press save to store this value.

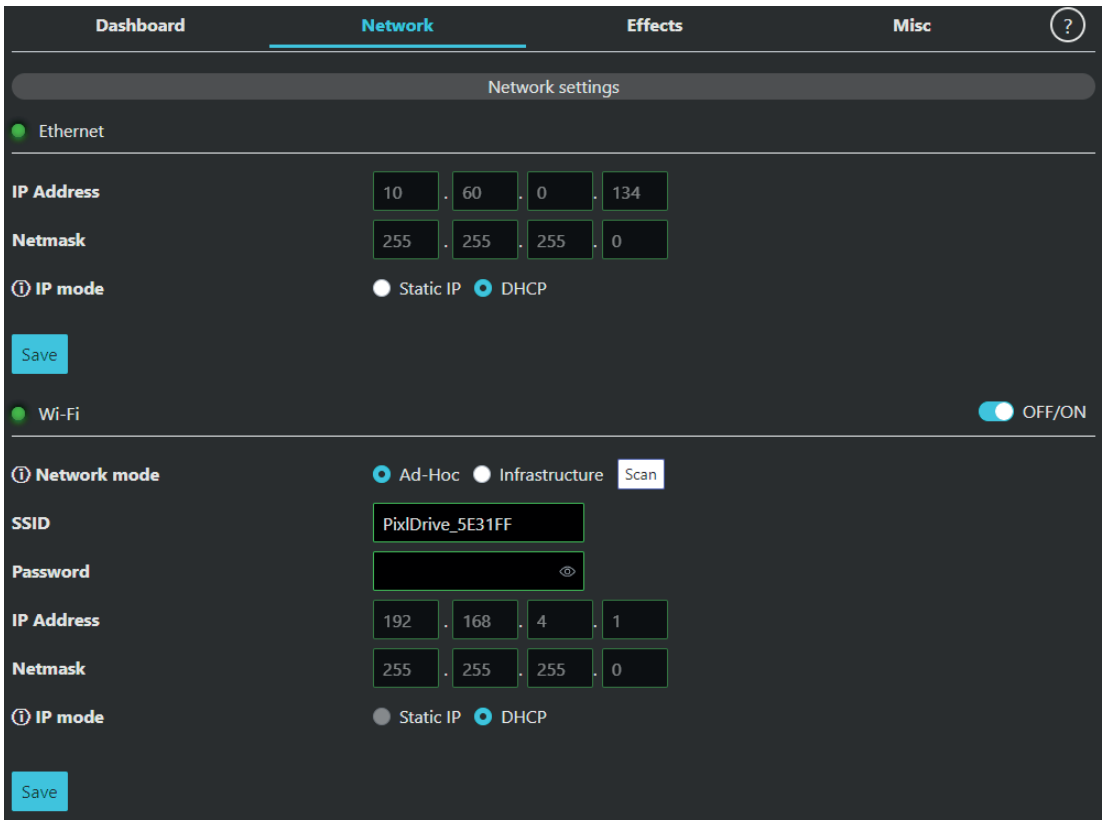
Shortcut to fill the group pixels field with total number of pixels until the end of this fixture. Press save to store this value.

Status:
Displays whether this bar is online or offline. Use the 'Refresh status' button to refresh the status label.

Identify:
Makes this fixture identify itself by displaying a bright color, independent from what is was previously displaying. Toggling this button again makes the fixture continue displaying the previous content.

9.2 Network

The network tab gives an overview of the device's network configuration and allows to edit several network related parameters.



9.2.1 Ethernet

Ethernet status:

Ethernet is in connected state and has a valid IP address.

Ethernet is in disconnected state, due to an unplugged cable or a pending DHCP lease.

IP Address:
The current IP address for the wired Ethernet connection. Only valid when Ethernet is in connected state.

Netmask:
The current netmask address for the wired Ethernet connection. Only valid when Ethernet is in connected state.

IP mode:
The current IP mode for the Ethernet connection.
Static IP: the Ethernet connection is set to a static IP address and static netmask that can be edited through the provided fields. Static is preferred when working with Art-Net, allowing for easy configuration and transparency in large systems.
DHCP: the Ethernet connection is set to receive an IP address and netmask through an active DHCP server in the same network.

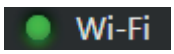
9.2.2 Wi-Fi

The PixlDrive1 controller is equipped with a Wi-Fi module. The module can be switched ON or OFF using the following switch.

Wi-Fi is switched ON. Configuration can be edited in the following fields.

Wi-Fi is switched OFF. Editing configuration is disabled.

Wi-Fi status:



Wi-Fi is in connected state and has a valid IP address.

Wi-Fi is in disconnected state, due to a pending DHCP lease, offline external access point or because Wi-Fi is switched off.

Network mode:
In 'ad-hoc mode', the controller will broadcast its own network allowing easy access through a computer or mobile device.
In 'infrastructure mode', the controller will try to connect to an external access point using the given credentials. This allows multiple controllers to connect to one external Wi-Fi network. Consult section 9.2.2.1 on how to scan for nearby Wi-Fi networks.

SSID:
In 'ad-hoc mode': the name of the controllers own Wi-Fi network. In 'infrastructure mode': the name of the wireless network the controller will try to connect to (red status) or has successfully connected (green status).

Password:
In ‘ad-hoc mode’: the password for the controllers own Wi-Fi network. When set, the controller will use WPA2 as security mechanism.
In ‘infrastructure mode’: the password for the configured external Wi-Fi network.

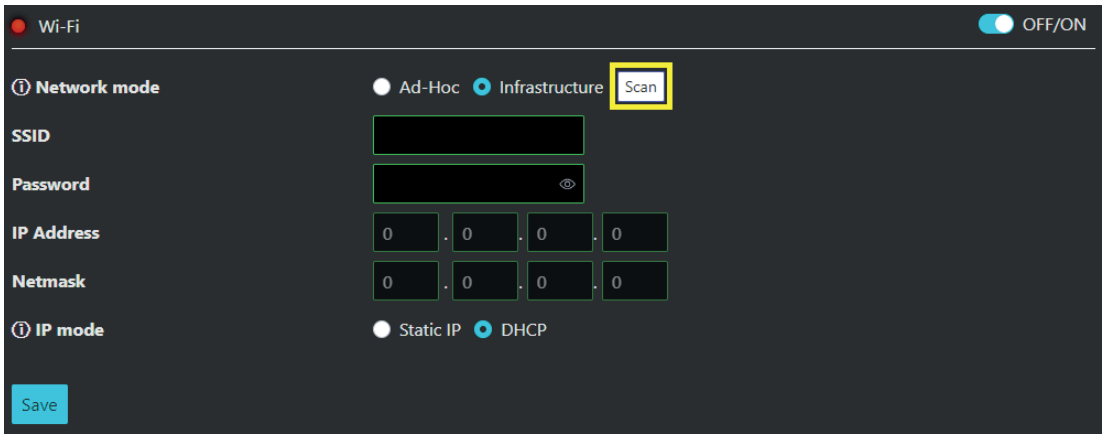
IP Address:
In ‘ad-hoc mode’: the IP address of the controller, always **192.168.4.1.** Use this IP address to reach the configuration webpage. The controller has a built-in DHCP server to hand out IP addresses to connecting devices.
In ‘infrastructure mode’: when using static IP mode, the IP address can be edited. When using DHCP IP mode and when in green connection state, this field displays the IP address received from a DHCP server in the wireless network. Use this IP address to reach the configuration webpage.

Netmask:
The current configured netmask address for the Wi-Fi connection.

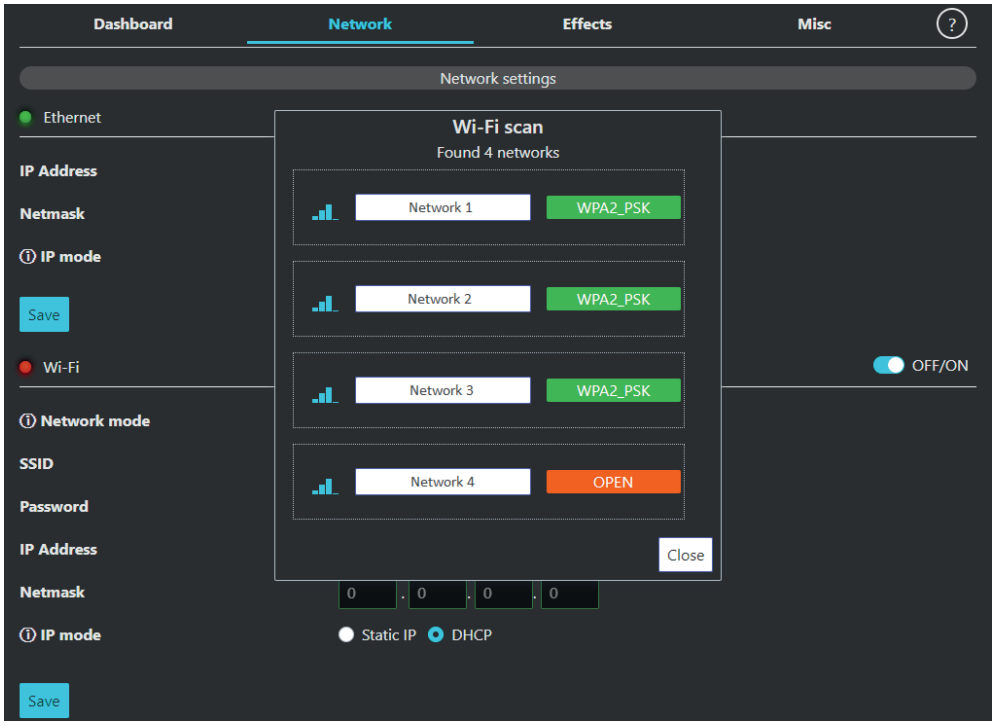
IP mode:
In ‘ad-hoc mode’: always set to DHCP.
In ‘infrastructure mode’:
Static IP: the Wi-Fi connection is set to a static IP address and static netmask that can be edited through the provided fields.
DHCP: the Wi-Fi connection is set to receive an IP address and netmask through an active DHCP server in the same network.

9.2.2.1 Scan for external Wi-Fi networks

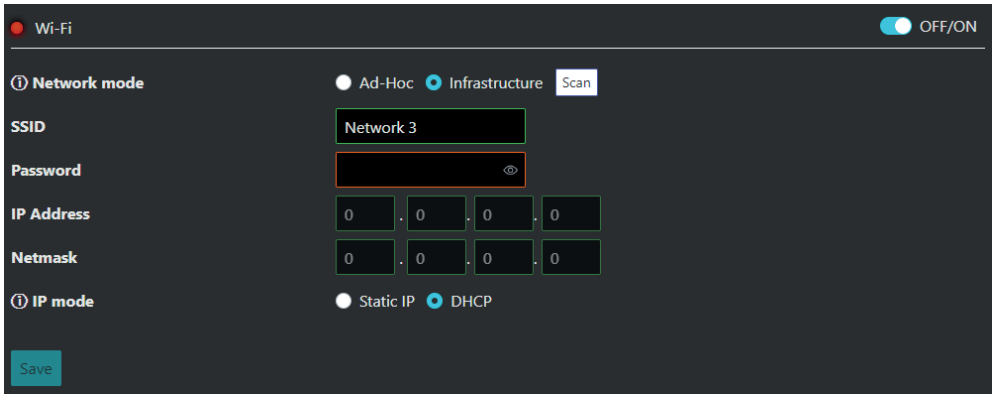
Use the scan button on the Wi-Fi section to search for nearby Wi-Fi networks.



After the scan has completed, a list is presented with all discovered networks and their security. Select the desired network name from the list.



The Wi-Fi form is filled with the selected network name. Enter a password when necessary and press Save to connect to the network.

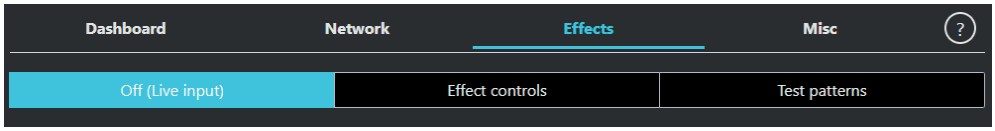


9.3 Effects

The controller is equipped with a powerful internal effect engine composed of multiple built-in patterns. This effect engine can be used to display dynamic and rich colors on all connected fixtures. The engine can run standalone, which avoids the need for external software or lighting desks to control the fixtures. The configuration of the effect engine can be edited through the built-in web interface using the effects tab. Parameters are retained between power cycles. The engine can also be configured to randomize parameters on defined intervals.
The engine furthermore has several test patterns built-in that can be used the assert the correct operation of all connected fixtures and to detect errors.

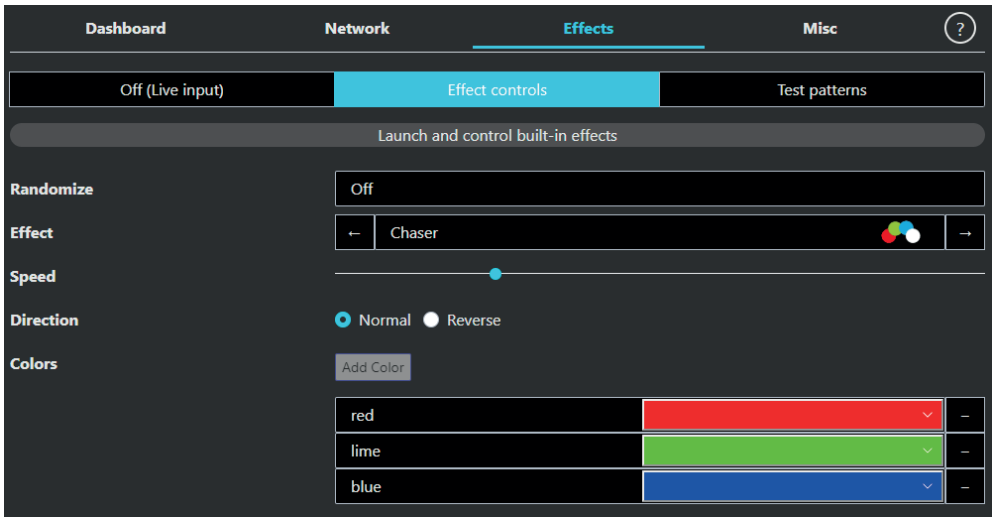
The top bar can be used to toggle between live Ethernet DMX input, effect controls and test patterns.

9.3.1 Off (Live Input)



The effect engine is switched off and the controller receives Ethernet DMX data through the previously configured protocol, Art-Net or sACN/E1.31.

9.3.2 Effect controls



The internal effect engine is active, the controller will not receive data through the previously configured Ethernet DMX protocol anymore. There are several parameters that can be configured to edit the current effect.

Randomize:
This option can be used to randomize the effect engine at defined intervals. When the randomization is set to such interval, editing of effect parameters is disabled. The controller will randomize effect, speed, direction and colors upon reaching the time interval. When set to off, the controller will continue playing the pattern from the last randomization round.

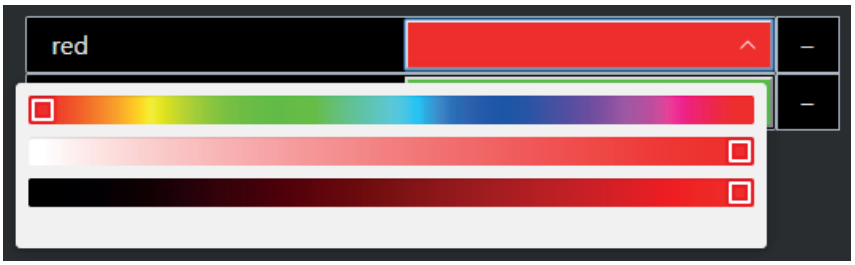
Effect:
The current effect/pattern. Use the menu or left/right buttons to scroll over all built-in patterns.

Speed:
The speed of the current pattern, in the range of 1 to 100.

Direction:
The direction of the current pattern.

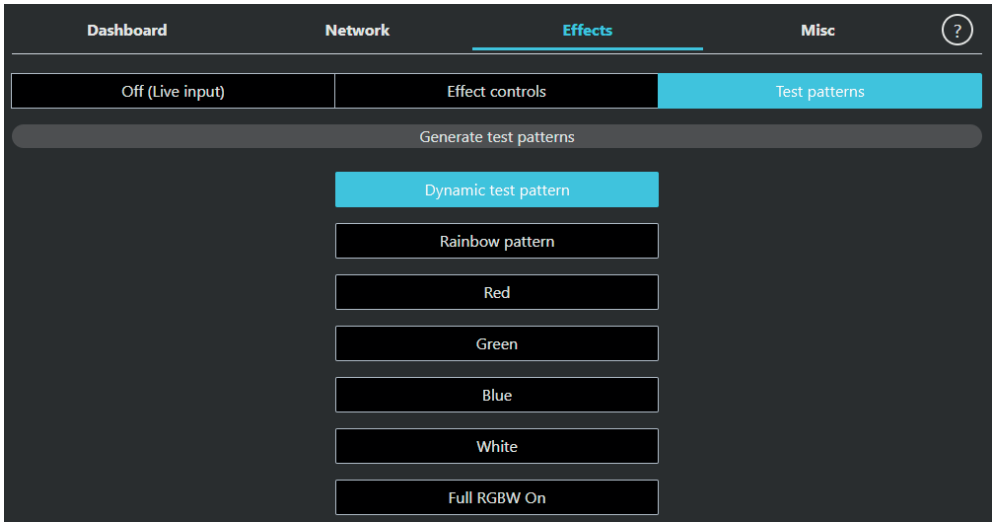
Colors:
The colors that are used in the currently active pattern. Up to 3 colors are supported. Some patterns will randomize colors when no colors are selected.

Use the Add Color button to add a color to the effect



Colors can be edited by clicking on the color label and can be removed by clicking on the minus sign to the right of each color.

9.3.3 Test Patterns

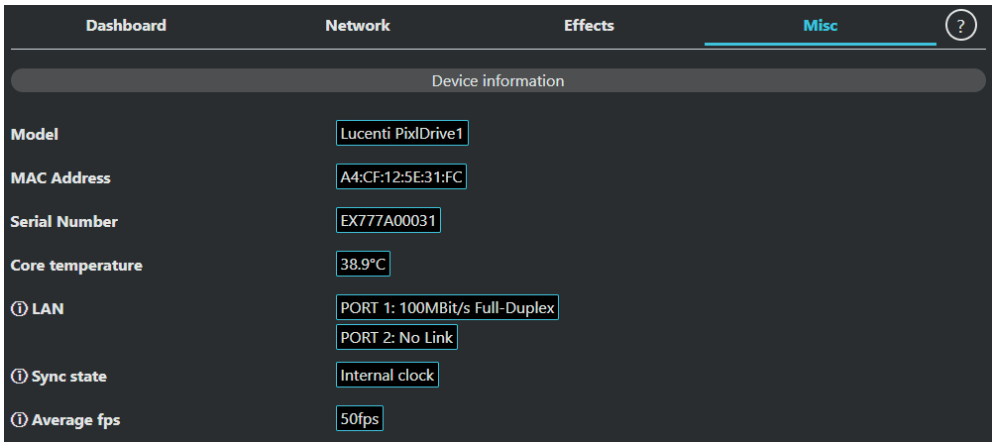


This tab allows to activate different test patterns. Test patterns show pre-defined patterns or colors on all connected fixtures and can be used for demo or troubleshooting purposes.

9.4 Misc.

The misc. tab gives a detailed overview of the device and connected fixtures' state. It also allows to check for new firmware, upload a firmware binary or to perform a factory reset.

9.4.1 Device Information



Model:
The model of this device, Lucenti PixelDrive1.

MAC Address:
The MAC address of the Ethernet interface of the controller.

Serial Number:
The serial number of the controller issued during production.

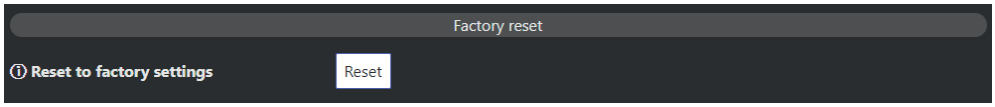
Core temperature:
The core temperature of the controller's microcontroller.

LAN:
The status of the Ethernet ports. Port 1 is located closest to the side of the controller.
Use this when troubleshooting.

Sync state:
The Ethernet DMX synchronization state. When the controller isn't receiving any data, it will be in 'idle mode', transmitting the last received data at regular intervals. When the controller receives DMX without any sync packets, it will be slaved to that incoming DMX rate. However, for optimally smooth playback, valid Art-Net sync (ArtSync) or sACN sync packets should be sent by the control software/ lighting desk; of which the reception can be checked here.
Use this when troubleshooting.

Average fps:
The current average output framerate towards the pixels. Use this when troubleshooting.

9.4.2 Factory Reset



To return the controller to its factory default settings, click on the Reset button.

Doing a factory reset will forget all previously connected fixtures, will reset all parameters to default values while switching Wi-Fi to Ad-Hoc mode to create an open network with no password.

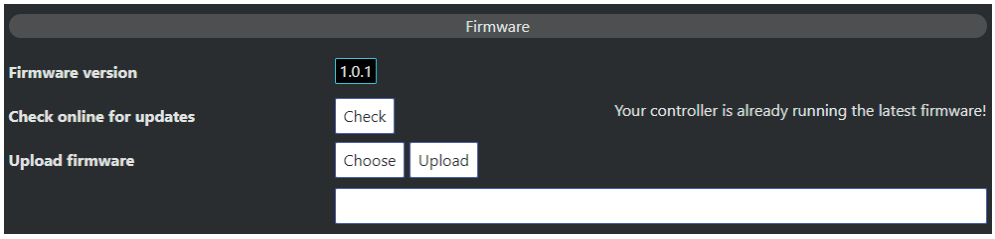
Default state of a controller after a factory reset:

Parameter	State
Device Name	Default unique device name
Device Mode	Art-Net 4
Time-out action	Hold last frame
Global intensity	100
Mapping type	Avoid universe splits
Group pixels	1
DMX pixel mapping	0 fixtures

Ethernet IP	2.0.0.30
Ethernet netmask	255.0.0.0
Ethernet IP mode	Static
Wi-Fi	ON
Wi-Fi Password	Empty
Wi-Fi IP Address	192.168.4.1
Wi-Fi Netmask	255.255.255.0
Wi-Fi IP mode	DHCP

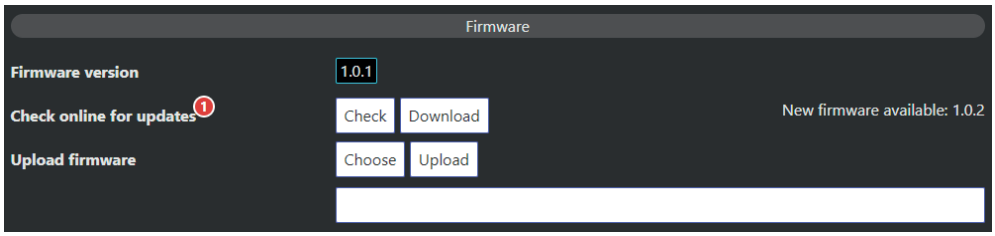
Effects	Off

9.4.3 Firmware

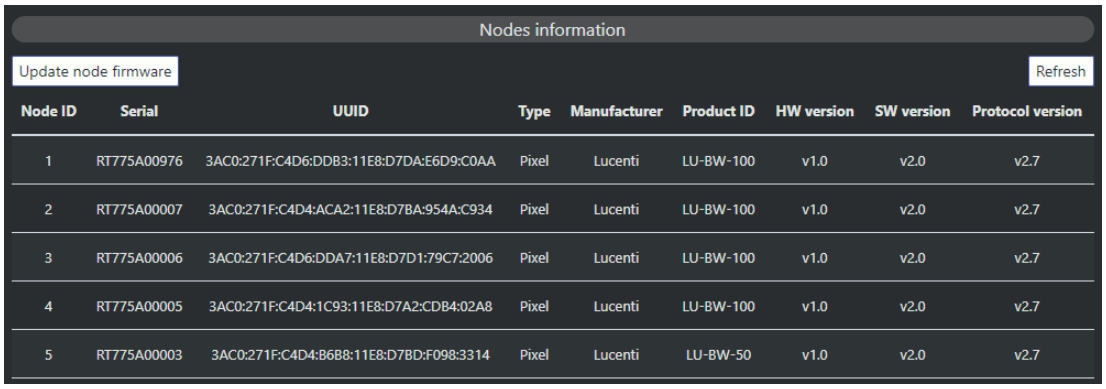


The controller firmware can be updated through the built-in web interface. When connected to Internet through Ethernet or Wi-Fi, the controller will automatically check if a new firmware version is available. The interface will automatically enable a Download button for the user to initiate the update if a newer version than the installed version is available. The currently installed firmware version is displayed by the Firmware version field.

In offline environments, firmware binaries can be uploaded through the Upload firmware button. Please consult http://www.lucenti.lighting for available updates.



9.4.4 Nodes Information



Node ID	Serial	UUID	Type	Manufacturer	Product ID	HW version	SW version	Protocol version
1	RT775A00976	3AC0:271F:C4D6:DDB3:11E8:D7DA:E6D9:C0AA	Pixel	Lucenti	LU-BW-100	v1.0	v2.0	v2.7
2	RT775A00007	3AC0:271F:C4D4:ACA2:11E8:D7BA:954A:C934	Pixel	Lucenti	LU-BW-100	v1.0	v2.0	v2.7
3	RT775A00006	3AC0:271F:C4D6:DDA7:11E8:D7D1:79C7:2006	Pixel	Lucenti	LU-BW-100	v1.0	v2.0	v2.7
4	RT775A00005	3AC0:271F:C4D4:1C93:11E8:D7A2:CDB4:02A8	Pixel	Lucenti	LU-BW-100	v1.0	v2.0	v2.7
5	RT775A00003	3AC0:271F:C4D4:B6B8:11E8:D7BD:F098:3314	Pixel	Lucenti	LU-BW-50	v1.0	v2.0	v2.7

The controller regards each connected fixture as a node.

The nodes information table gives detailed information about each node allowing for fine-grained monitoring and troubleshooting. Use the refresh button to populate or refresh the list.

Node ID:
The incremental ID that was issued to each connected fixture during an auto setup. Identical to the Pixel Bar ID.

Serial:
The serial number of the node/fixture issued during production.

UUID:
The Universally Unique Identifier for this node/fixture.

Type:
PixlBus type of this fixture.

Manufacturer:
Manufacturer of this node/fixture.

Product ID:
Product ID for this node/fixture. Refer to http://www.lucenti.lighting for the complete collection of BlackWave products.

HW version:
The hardware version of this node/fixture.

SW version:
The software version of this node/fixture.

Protocol version:
The PixlBus protocol version this node/fixture implements.

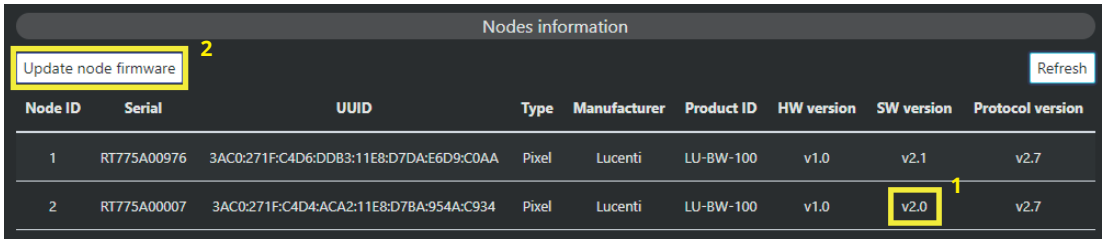
9.4.5 Update node firmware

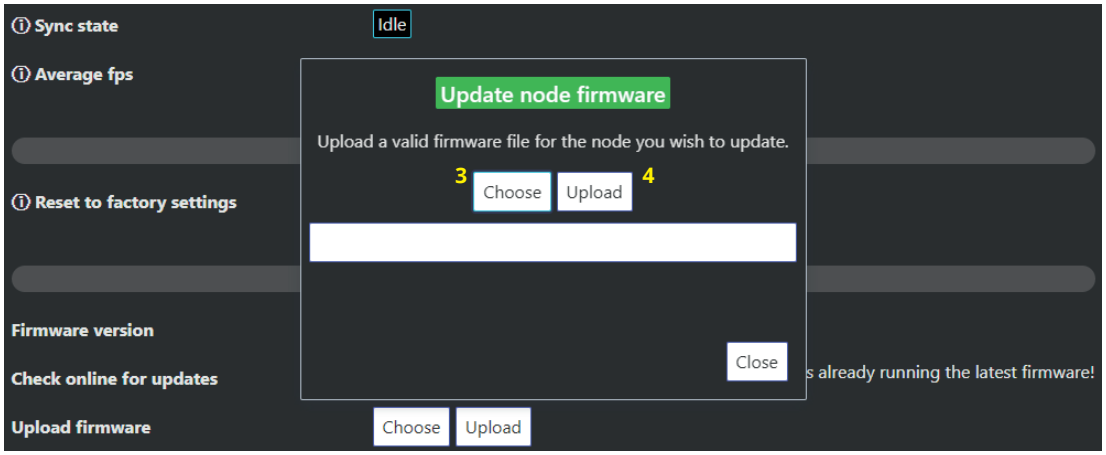
The PixlBus protocol allows to update the firmware of each connected node/fixture. Nodes can be updated using the appropriate firmware file for a specific product.
Please consult http://www.lucenti.lighting for more information.

The procedure goes as follows:

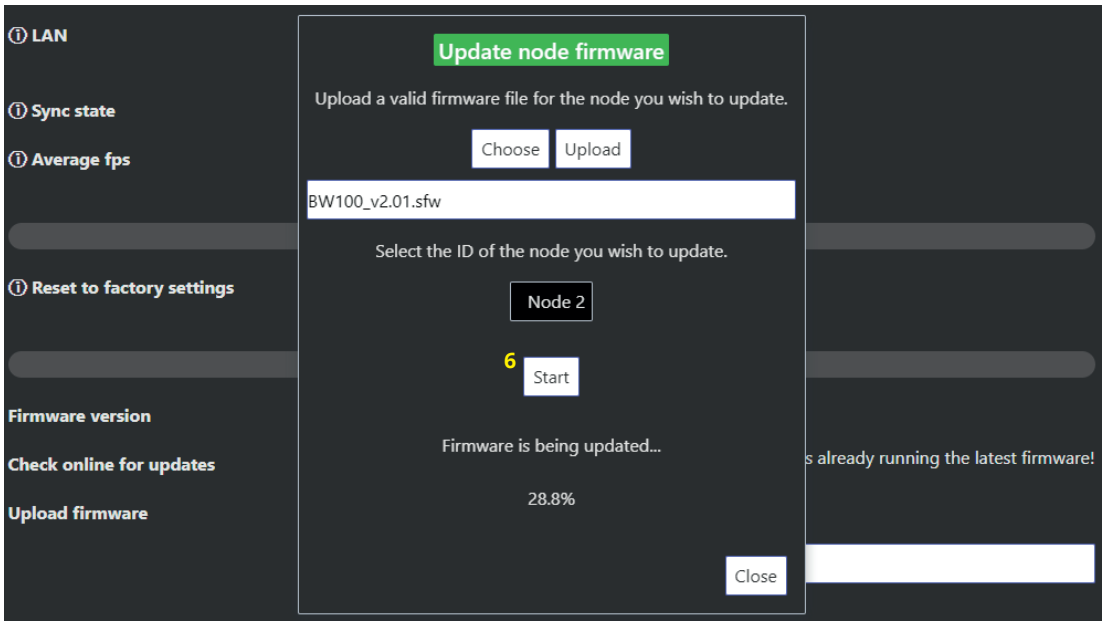
1. Locate the node to update and verify the desired firmware version.
2. Select Update node firmware.
3. Choose a firmware file from your device's local filesystem.
4. Click upload to upload this file to the controller.
5. When the controller has verified this file as a valid firmware file, a node list appears. Select the desired node for updating.
6. Press Start and wait for the update process to complete.
7. When the firmware update was successful, it is advised to perform an extra verification through refreshing the Nodes information list.

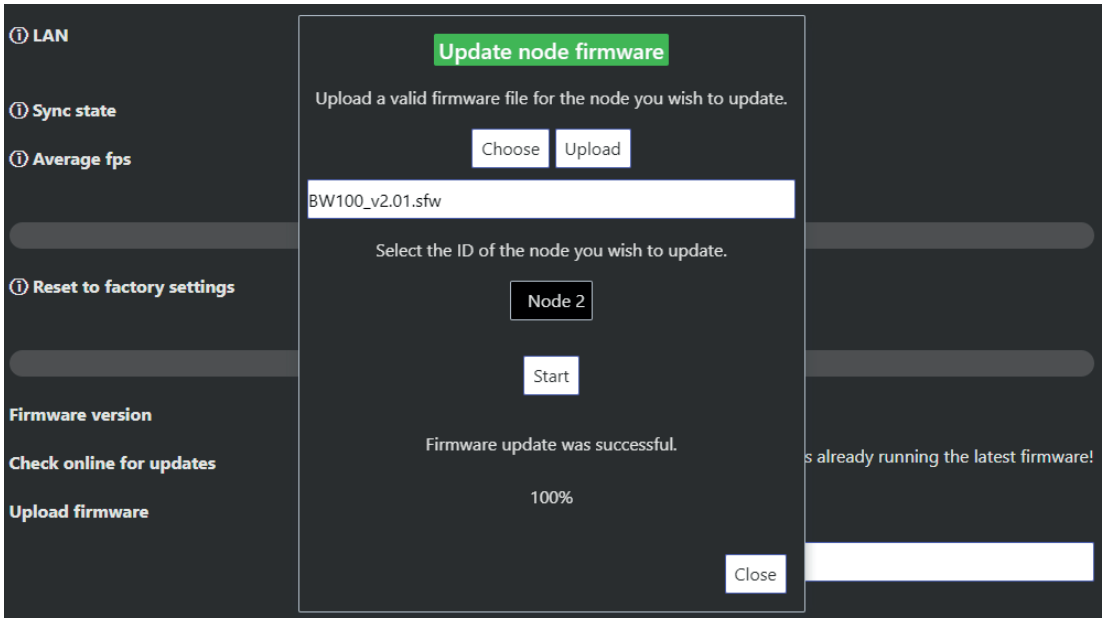
Example:
In the following example, node 2 has an older firmware version than node 1. The following figures show the process of updating node 2 to match the firmware version of node 1.






LAN
PORT 1: 100MBit/s Full-Duplex
Sync state
Average fps
Reset to factory settings
Firmware version
Check online for updates
Upload firmware
Update node firmware
Upload a valid firmware file for the node you wish to update.
Choose
Upload
BW100_v2.01.sfw
Select the ID of the node you wish to update.
Node 1
Start
Firmware upload was successful
Close
s already running the latest firmware!


LAN
Sync state
Average fps
Reset to factory settings
Firmware version
Check online for updates
Upload firmware
Update node firmware
Upload a valid firmware file for the node you wish to update.
Choose
Upload
BW100_v2.01.sfw
Select the ID of the node you wish to update.
Node 2
6
Start
Firmware is being updated...
28.8%
Close
s already running the latest firmware!



Nodes information

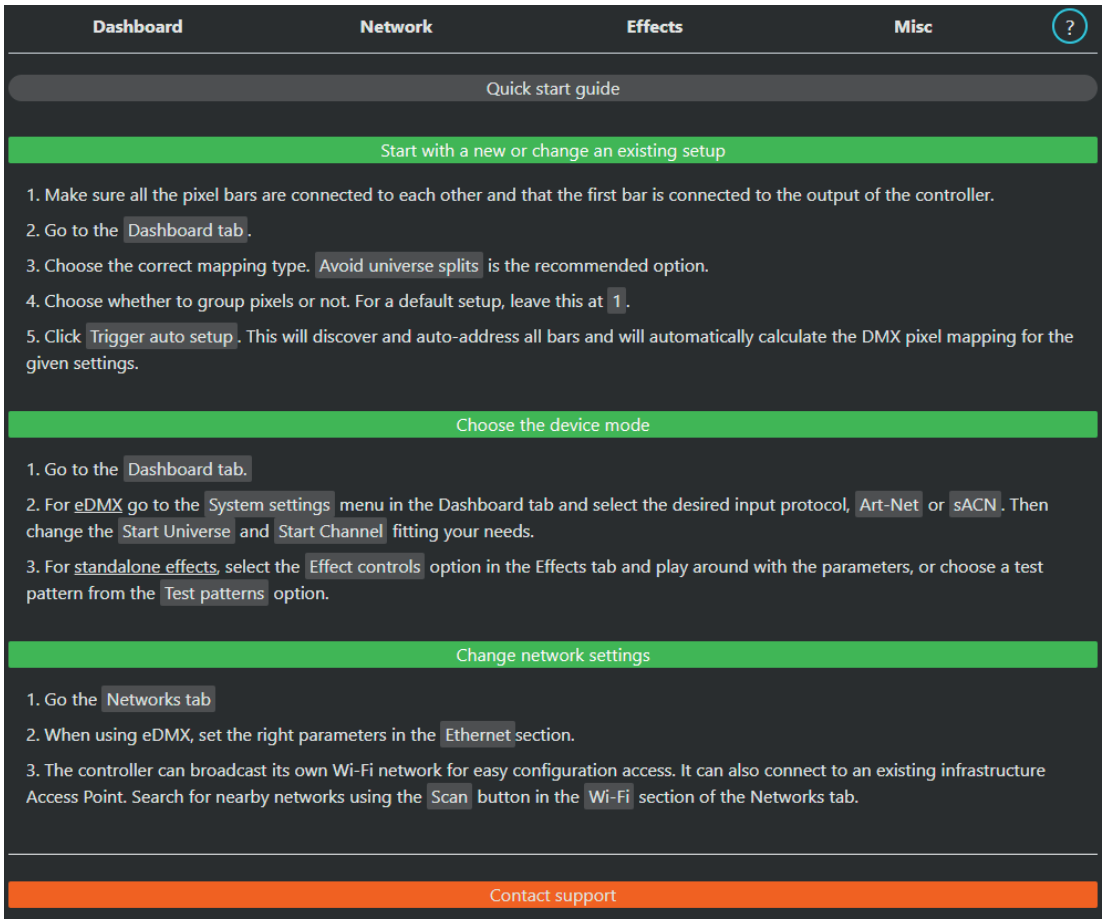
Update node firmware | Refresh

Node ID	Serial	UUID	Type	Manufacturer	Product ID	HW version	SW version	Protocol version
1	RT775A00976	3AC0:271F:C4D6:DDB3:11E8:D7DA:E6D9:C0AA	Pixel	Lucenti	LU-BW-100	v1.0	v2.1	v2.7
2	RT775A00007	3AC0:271F:C4D4:ACA2:11E8:D7BA:954A:C934	Pixel	Lucenti	LU-BW-100	v1.0	v2.1	v2.7

7

9.5 Help

The internal webpage contains a brief overview of several quick startup items. This overview is accessible through the question mark at the right of the top menu.



Why do I have to perform an auto setup before anything else?
Performing an auto setup is necessary for the controller to understand which and what type of fixtures are connected to its output. Without performing the setup, the system can't run properly.

Some pixel fixtures stay black or flickering. What's happening?
Make sure all connections are well seated and that the first fixture is connected to the controller. Perform an auto setup again and try to run a test pattern.
Contact support when the pixel fixture still doesn't operate normally.

I can't connect to the internal configuration webpage!
Make sure your computer is in the same IP range as the controller. Furthermore, make sure the controller displays a valid IP address on its LCD display.

Where can I buy PixlBus compatible devices?
Check our website http://lucenti.lighting or contact our support team for more information on how to buy BlackWave products.

Why is my pixel fixture displaying one or multiple white LEDs at startup?
When performing an auto setup each fixture receives a unique and incremental PixlBus ID. This process is called enumeration. Each fixture flashes this ID using a white color on startup, or upon enumeration.

What's the minimum and maximum number of pixels that I can drive with a PixlDrive1 controller?
Minimum: 1 – Maximum: 400

Can I use the BlackWave Collection products outside?
The BlackWave pixel bars are IP66 rated and can be safely used outside. The controller is IP20 rated and not suited for outdoor use.

What does the standalone mode of the controller mean?
While in standalone mode, the controller uses its built-in effect engine to generate colors for all connected fixtures. Effects can be controlled live through the built-in configuration webpage.

What does the Ethernet DMX mode of the controller mean?
The controller can receive DMX512 packets through the Ethernet protocols, supporting Art-Net I (broadcast), Art-Net II, 3 & 4 unicast, sACN/E1.31 Multicast and sACN Unicast. It also houses a customizable internal effect engine.

How do I reduce the total brightness on the pixel fixtures?
Use the global intensity slider on the Dashboard tab of the configuration webpage.

When to perform a Factory reset?
Performing a factory reset will forget all previously connected fixtures, will reset all parameters to default values and will switch Wi-Fi to Ad-Hoc mode, creating an open network with no password. Perform such reset when you can't connect to the controller anymore.

11 TECHNICAL SPECIFICATIONS

Specifications - Lucenti PixlDrive1	
SMART PIXLBUS	
Auto Setup	Enumerate, address and map all connected fixtures in an automated way
PixlBus	Get detailed status reports from fixtures Global synchronization Detect failures Update fixture firmware
CONTROL	
Supported Ethernet DMX protocols	Art-Net I (broadcast) & II, 3, 4 (unicast). Supports ArtPoll. sACN/E1.31 multicast (IGMPv2) and sACN unicast.
Synchronization	ArtSync packet. sACN synchronization packet.
User Interface	16x2 LCD display + rotary pushbutton. Built-in responsive HTML5 web interface.
Built-in effect engine	Library of customizable dynamic patterns.
Set of test patterns	Identify pixel fixtures and run test patterns.
Drives up to	400 RGBW pixels per controller.
User Interface	16x2 LCD display + rotary pushbutton. Built-in responsive HTML5 web interface.
Wi-Fi	Built-in Wi-Fi for configuration access.
CONNECTORS	
AC power input	Neutrik powerCON TRUE1
AC power output	Neutrik powerCON TRUE1
Ethernet	Dual Neutrik etherCON ports, internal 100Mbit network switch
Pixel output	Proprietary Pixlbus connector. Drives up to 400 RGBW pixels.

MECHANICAL	
Housing	Metal, black powder coating
Dimensions (L x W x H)	330 x 180 x 45mm
Weight	2365g
Construction	Indoor, IP20
Operating temperature	-20 to +45 Degrees Celsius
Mounting	M6 hole for safety hook. Integrated M12 thread for truss mounting. 19inch rack mount available (LU-BW-RM2)
MAX CABLING CONSIDERATIONS	
	30M in between controller and first bar and NO cable in between bars
	NO cable in between controller and first bar and 10M in between 8 BW-100 bars
	NO cable in between controller and first bar and 5M in between 16 BW-50 bars
The cable lengths might be increased when using less bars or not using full output (RGBW@Full) on all bars!	
BUILT-IN POWER SUPPLY	
AC input voltage	100-240V ac / 50-60Hz
DC output voltage	24V dc
Max. total power consumption	200W
MODELS	
PN	BW-PixlDrive1
ACCESSORIES	
Rack mount bracket kit (LU-BW-RM2)	

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