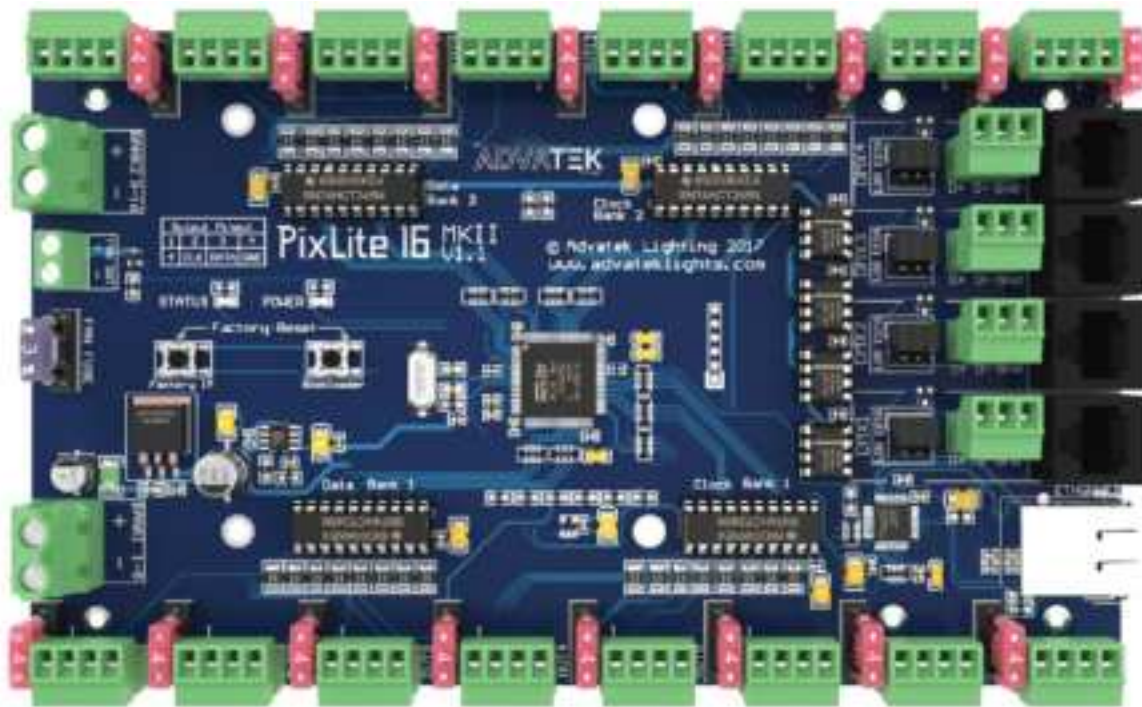




CREATE | CONNECT | CONTROL

## PixLite 16 Mk2 User Manual

Hardware Rev 1.1



# 1 - Table of Contents

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<b>1 - Table of Contents</b>	<b>2</b>
<b>2 - Introduction</b>	<b>4</b>
<b>3 - Safety Notes</b>	<b>5</b>
<b>4 - Installation</b>	<b>6</b>
4.1 - Supplying Power	6
4.2 - Output Fuses	7
4.3 - Logic Power	7
4.4 - Control Data	7
4.5 - Connecting Pixel LEDs	7
4.6 - Expanded Mode	9
<b>5 - Network Configuration</b>	<b>10</b>
5.1 - Network Layout	10
5.2 - IP Addressing	11
5.2.1 - Using a Router	11
5.2.2 - Using a Switch/Direct	11
5.2.3 - Forcing the Default IP Address	12
<b>6 - Operation</b>	<b>13</b>
6.1 - Start-up	13
6.2 - Sending Data	13
6.3 - Outputs	13
6.3.1 - Pixel Outputs	13
6.3.2 - DMX512 Outputs	13
6.3.3 - Fan Output	15
6.4 - Hardware Test Pattern	16
<b>7 - Firmware Updates</b>	<b>17</b>
7.1 - Performing a Standard Update	17
7.2 - Performing a Recovery Firmware Update	17
<b>8 - Specifications</b>	<b>19</b>
8.1 - Operating Specifications	19
8.2 - Mechanical Specifications	19
<b>9 - Troubleshooting</b>	<b>21</b>
9.1 - LED Codes	21
9.2 - No Power/Status LEDs	21
9.3 - No Pixel Control	21
9.4 - Other Issues	21
9.5 - Reset to Factory Defaults	22

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<b>10 - Disclaimer .....</b>	<b>23</b>
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## 2 - Introduction

This is the user manual for the PixLite 16 Mk2 pixel controller , hardware version 1.1. The PixLite 16 Mk2 controllers convert E1.31 (sACN) or Art-Net protocols from a lighting console, media server or computer lighting software into various pixel LED protocols.

The PixLite 16 Mk2 features an output capacity of up to 96 universes of multicast/unicast E1.31 or Art-Net data. It also outputs an additional 4 universes of data on 4 DMX512 outputs, operating from the same Ethernet protocol, bringing the total number of universes up to 100. This, combined with an advanced feature-set and easy-to-use configuration software, makes the PixLite 16 Mk2 an excellent choice for your pixel lighting application.

This manual covers physical aspects of the PixLite 16 Mk2 controller and its essential setup steps only. Detailed information about its configuration options can be found in the 'PixLite Configuration Guide'. Other manuals and the PixLite Configuration Guide may be downloaded from here:

[www.advateklighting.com/downloads](http://www.advateklighting.com/downloads)

## 3 - Safety Notes

The board comes shipped in an anti-static bag and has several electrostatic sensitive components on it. Appropriate anti-static measures should be observed when handling the board. For example, you should never sit the controller on carpet, and you should avoid touching components on the controller unnecessarily.

# 4 - Installation

## 4.1 - Supplying Power

The PixLite 16 Mk2 has two split power banks, each with 8 individual outputs. The split banks allow two different voltages to be used on the controller simultaneously. (You could run 5V lights off Bank 1 and 12V lights off Bank 2 for example.

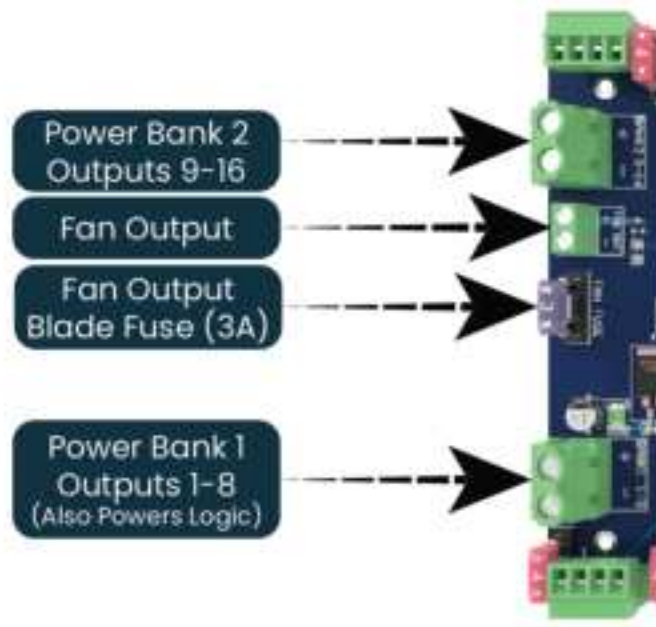
Power to the controller and outputs is applied via the power bank screw terminal connectors, located on the left-hand edge of the board, as shown in [Figure 1](#) below. They are both clearly marked on the PCB with the polarity and the power bank number.

Outputs on channels 1-8 are powered via power bank 1 and outputs on channels 9-16 are powered via power bank 2. The voltage on each bank can be anywhere between 5V and 24Vdc independently.

**Note:** It is the user's responsibility to ensure that the power supply used matches the voltage of the pixel fixture they are using and that it can supply the correct amount of power/current.

The total maximum current per power bank is 32A, giving the board a total maximum current capacity of 64A.

Figure 1: Location of Power Input



## 4.2 - Output Fuses

Each individual output is protected by a mini blade fuse. The PixLite 16 Mk2 comes with 4A fuses by default. You may use any value of fuse, up to and including 7.5A, depending on your specific application. Individual outputs should not exceed 7.5A and the total bank current should not exceed 32A.

## 4.3 - Logic Power

Logic power is automatically regulated from the bank 1 power input. Simply connect your DC power supply in accordance with specifications listed in [Section 8.1](#) to the power bank 1 input.

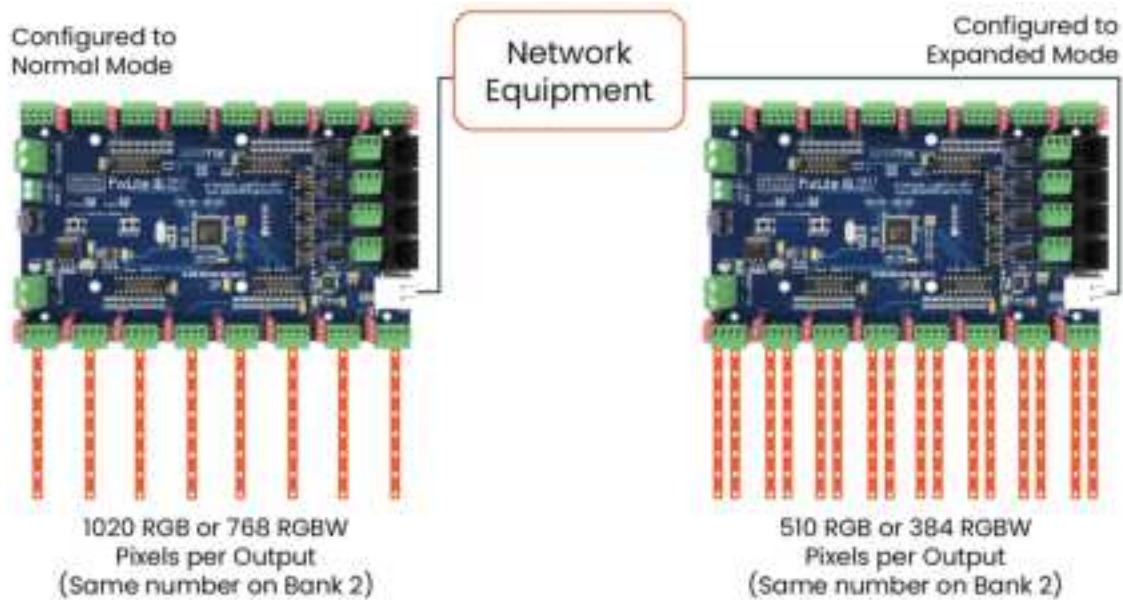
## 4.4 - Control Data

Ethernet data is connected via a standard network cable into the RJ45 Ethernet jack located on the right-hand side of the unit. The controller supports Streaming ACN (sACN / E1.31) or Art-Net data.

## 4.5 - Connecting Pixel LEDs

The number of pixels a PixLite 16 Mk2 can drive is shown in [Figure 2](#) below.

Figure 2: Pixel Set up



The pixel lights are connected directly via the 16 pluggable screw terminal connectors on the board. Each connector is labelled with its output channel number (1-16) and pin 1 is also clearly marked (There is also a pin-out for the connectors clearly marked on the PCB silk-screen for quick reference). Simply wire your lights into each screw terminal and then plug them into the mating sockets.

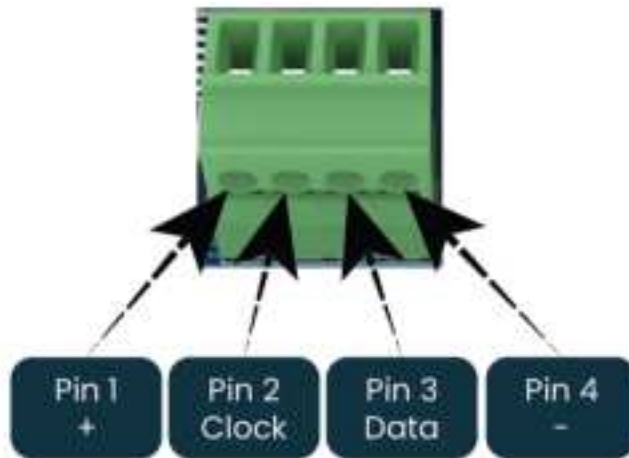
**Warning:** It is very important not to short +ve onto the clock or data lines when using pixels greater than 5V. Given this mistake can happen, additional protection circuitry has been added to prevent any damage to the main CPU. However, if the output buffer part is damaged due to shorting, it has been designed for easy replacement by the user. The part is cheap to replace and Advatek support will guide you through the process if you believe this has happened. Note that this can also happen from poor waterproofing when rain shorts the higher voltage onto either of those wires in your pixels/wiring.

The cable length between the output and the first pixel should not exceed 15m.

Figure 3 shows the pin-out of the pixel output connectors.



Figure 3: Pixel Output Pinout - Expanded Mode Disabled



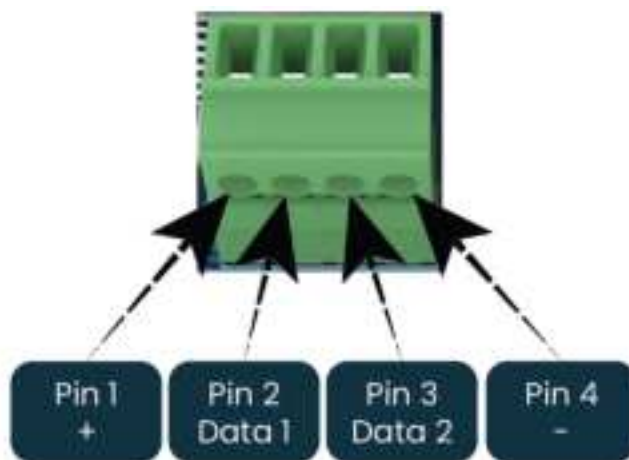
## 4.6 - Expanded Mode

If your pixels only use a single data line, you may optionally activate expanded mode on the controller. If using the PixLite 16 Mk2 with a PixLite T16X-S Mk3, expanded mode must be used, meaning that pixels can only use a single data line. The clock pins are not connected, as per the pinout below. In expanded mode, the clock signals are re-purposed for data signals instead. This means the controller effectively has twice as many pixel outputs (32), but half as many pixels per output can be run.

Expanded mode can help increase flexibility in a system as there are more outputs available. It can also assist by spreading out the number of controlled pixels across more outputs, which can help achieve higher refresh rates if clocked pixels aren't being used.

The pinout for expanded mode is shown in [Figure 4](#) below.

Figure 4: Expanded Mode Pixel Output Pinout



# 5 - Network Configuration

## 5.1 - Network Layout

Figure 5: Network Layout using a Server and Switch

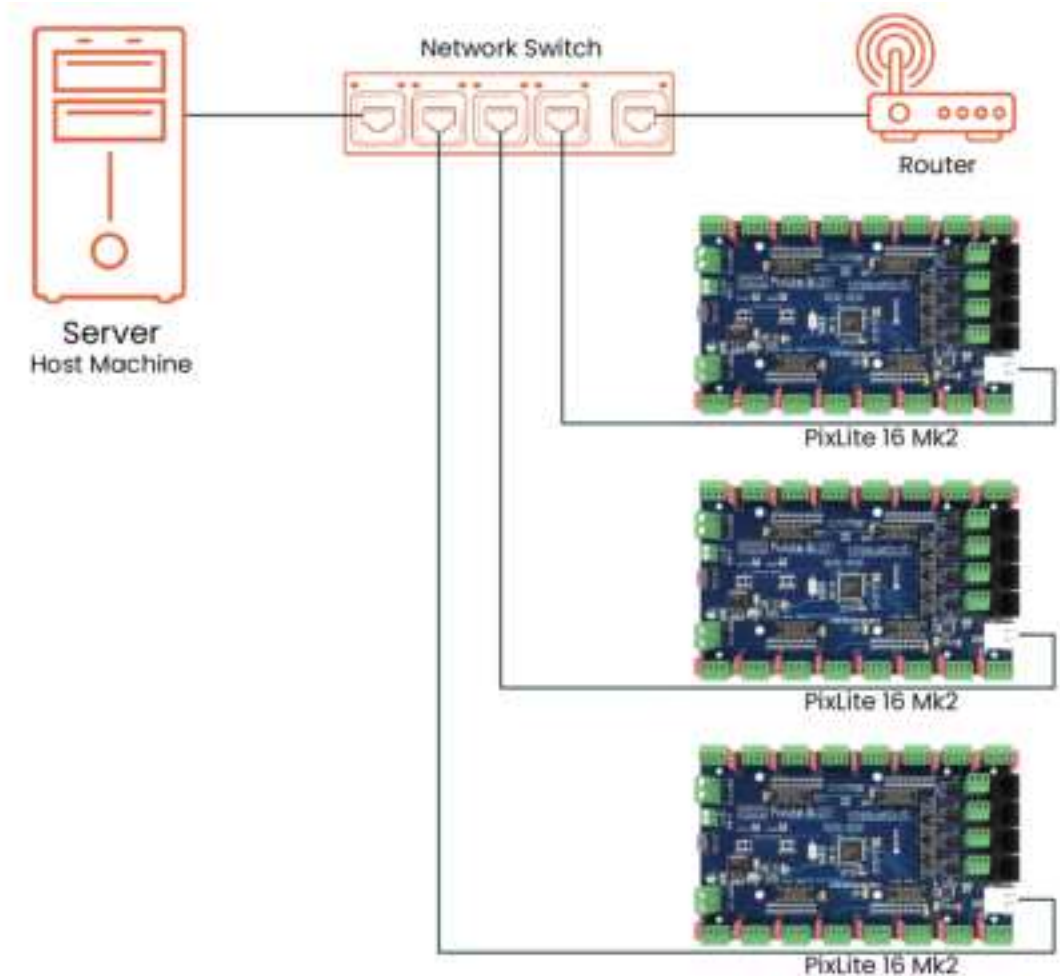
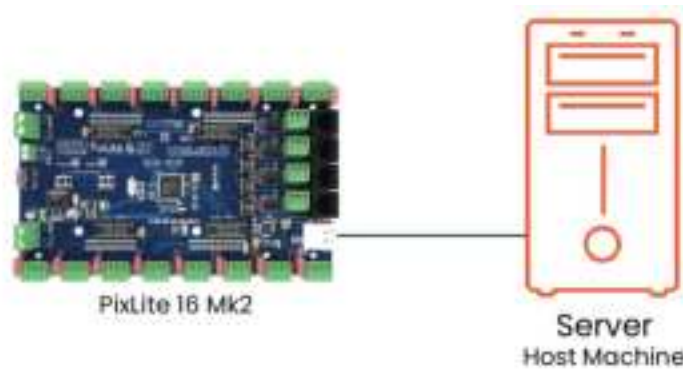


Figure 5 shows a typical network topology for the PixLite 16 Mk2 controller(s) LAN. Installations using multicast sACN will benefit from the use of IGMP Snooping enabled network equipment when there are more multicast universes on the network than any one PixLite is using. If there are more than 96 universes of multicast sACN on the network then IGMP Snooping is mandatory.

Having a router on the network is not mandatory but is useful for IP address management with DHCP (see [Section 5.2.1](#)). When IGMP snooping, a router may also be required (depending on your network switch functionality).

Figure 6: Network Layout using Only a Server



In a single controller installation, it may be preferable to connect the controller directly to the host machine, as shown in [Figure 6](#). A crossover cable is not required in this case, but it may be used if desired.

The controller(s) can be integrated straight into any pre-existing LAN such as your media, home or office network, the above diagrams are only provided as examples.

## 5.2 - IP Addressing

### 5.2.1 - Using a Router

Routers have a DHCP server in them - this means they will tell a device plugged into them what IP address to use, if asked.

DHCP is always enabled by default on a PixLite controller so it can immediately connect to any existing network with a router. However, you may instead prefer to assign a static IP address once communications have been established via the Advatek Assistant. If the controller is in DHCP mode and is not assigned an IP address by a DHCP server, it will timeout after a short time (approximately 30 seconds) and default to a static IP of '192.168.0.50'.

If DHCP mode is enabled, both the status and power LEDs will flash together until the controller receives an IP address or times out to its default IP. After this, the power LED will remain on solid and the status LED will flash, indicating it is in run mode and ready for use.

If a static IP address is assigned to the controller, then the power LED will be solid from power up.

### 5.2.2 - Using a Switch/Direct

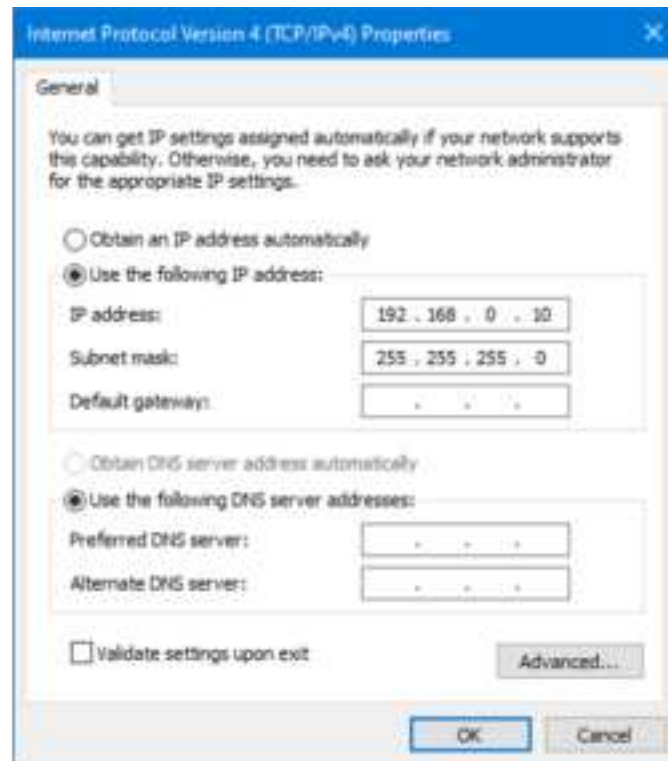
It may be necessary to connect the controller to a network without a DHCP server or even directly to the host machine instead of using a router. In this case (for first time configuration) you will need to ensure that the network adapter of your computer is set in the IP range that the controller will default to (controller defaults to 192.168.0.50). This means your PC's IP should be 192.168.0.xxx where xxx is anything between 1 and 254, other than 50. The subnet mask on your PC should be set to 255.255.255.0.

**Note:** The Advatek Assistant software will automatically detect if a controller is connected to the network, even if it is outside the adapter's IP address range. It will prompt you to change the IP settings if this situation is discovered.

Once you can successfully discover the controller in the Advatek Assistant, we recommended setting the controller to a static IP address other than the default.

Figure 7 shows a screenshot of typical computer network settings to communicate with a PixLite 16 Mk2 controller for the first time without a router.

Figure 7: PC Network Configuration



### 5.2.3 - Forcing the Default IP Address

In the event that you forget the IP of a controller and you can't see it in the Advatek Assistant, it can be forced to its default IP. A simple procedure can be employed on power up:

1. Hold down the "Factory IP" button on the PCB and power up the controller
2. After a few seconds release the button. The controller's IP address will now be 192.168.0.50.

You should now be able to set up your PC's network settings to find the controller at this IP and change the IP settings to a preferred static IP address.

# 6 - Operation

## 6.1 - Start-up

Upon applying power, the controller will quickly begin outputting data to the pixels, commanding the pixels to turn off. If no data is being sent to the controller then the pixels will remain turned off until valid data is received. During normal operation, the green power LED will remain on solid and the red status LED will flash to indicate the controller is running and outputting any received Ethernet data to the pixels.

## 6.2 - Sending Data

Input data is sent from the control PC/server/lighting console to the controller via Ethernet using a "DMX over IP" protocol such as sACN (E1.31) or Art-Net.

If no incoming data is received for a few seconds, the pixels will be turned off automatically unless that option has been disabled in your configuration. If the pixels are not controllable then make sure you have selected the correct pixel IC type in the Advatek Assistant under the 'LEDs' tab.

## 6.3 - Outputs

### 6.3.1 - Pixel Outputs

Each of the 16 outputs on the PixLite 16 Mk2 can drive up to 6 universes of data. This allows for a total of up to 96 universes to be driven out of the one controller.

The refresh rate of the pixels will depend on the operating frequency of the specific pixel chip type. Higher speed pixels will result in higher refresh rates. Pixels with no clock line will have a relatively low refresh rate when a significant number of pixels are used on a single output. Advatek recommends the use of clocked pixels whenever using a large number of sequential pixels on any output. Typically, the refresh rate can vary from 20 fps at the low end on data only pixels and up to 100+ fps at the higher end.

### 6.3.2 - DMX512 Outputs

The PixLite 16 Mk2 provides 4 DMX512 outputs which can be accessed either by pluggable screw terminal connectors or by RJ45 jacks. The hardware layer on which the DMX512 protocol operates is the RS485 electrical communications standard. This is a differential transmission system consisting of a two-wire differential signal pair and a ground connection. Ideally the differential signals should be wired into a twisted pair cable. The D+, D- and ground connections are clearly labelled on the PCB for the screw terminal connectors.

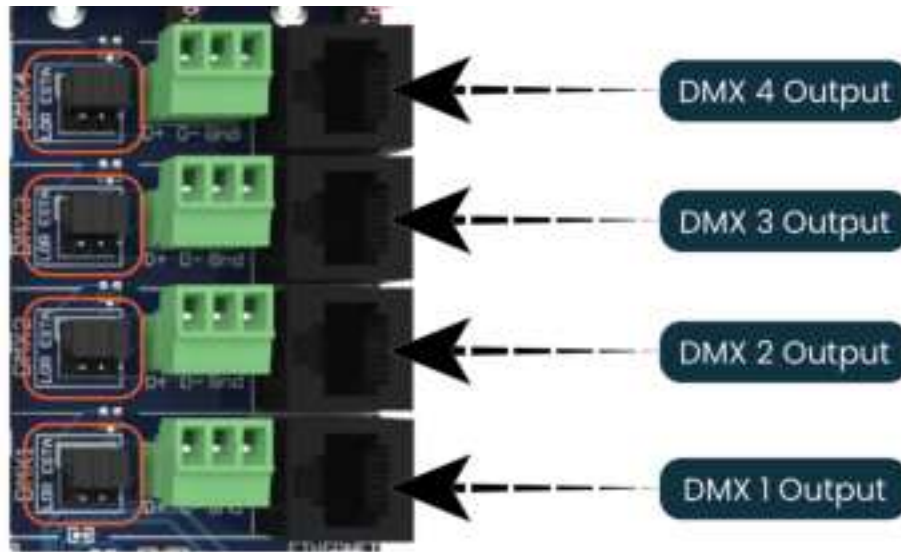
These outputs act as individual DMX512 universe outputs, effectively providing the user with an E1.31 or Art-Net to 4 x DMX512 bridge (in addition to the normal pixel outputs).

DMX512 signal data is also connected via the four vertical RJ45 sockets. On-board jumper links (circled in [Figure 8](#) below) allow each RJ45 DMX output to use either the 'ESTA' wiring or the 'LOR' wiring configuration. (All controllers are shipped with the links in the 'ESTA' configuration.)

**Note:** DMX outputs are not electrically isolated.

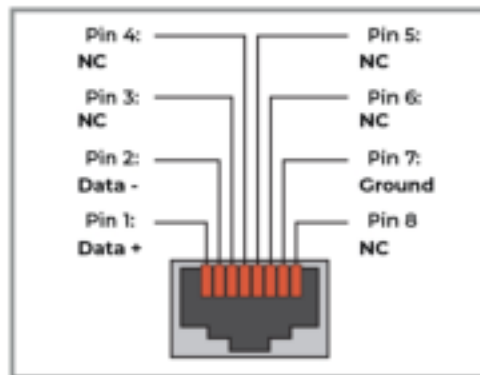
All these connectors and jumper links are located on the far right-hand edge of the controller as shown in [Figure 8](#) below.

*Figure 8: Location of DMX Outputs*



Below is the RJ45 socket pin-out for the DMX connectors when the "ESTA" wiring is selected:

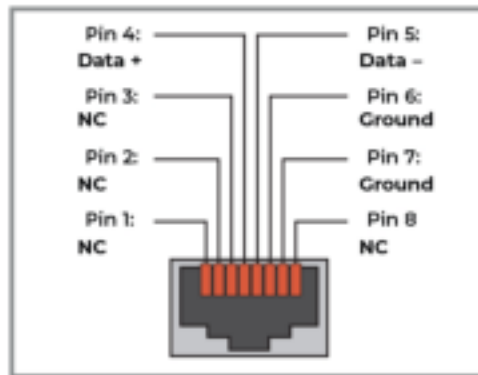
*Figure 9: ESTA Pinout*



Below is the RJ45 socket pin-out for the DMX connectors when the "LOR" wiring is selected:



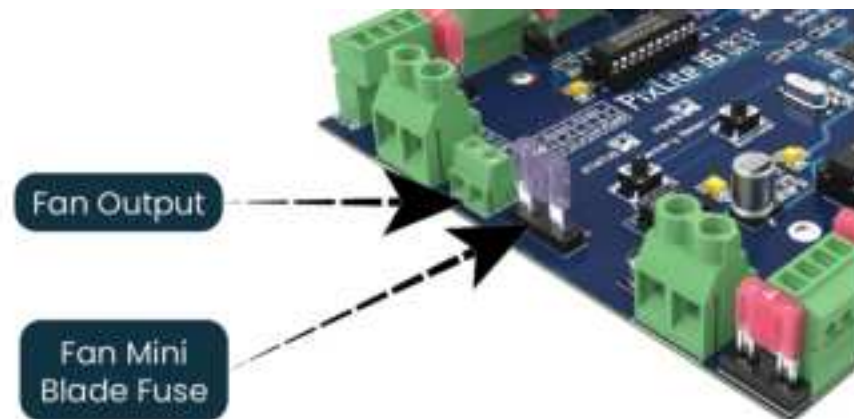
Figure 10: LOR Pinout



### 6.3.3 - Fan Output

The controller features an auxiliary fan output that can power an external fan(s) for cooling the enclosure that the controller is mounted in, as shown in Figure 11 below. This feature is useful in order to keep the temperature regulated when you mount the controller and a high wattage power supply together in a small, confined space.

Figure 11: Location of Fan Output



The output voltage of the fan output is the same as the power bank 1 voltage. So, to run a 12V fan for example, you would need to use a 12V input voltage on bank 1. The fan output can supply up to 15W of continuous output power and is PWM controlled. The output is protected by a 3A mini-blade fuse.

Basic operation is as follows: In the Advatek Assistant, the user can set a target temperature that the enclosure will ideally not exceed. The controller will then automatically adjust the fan speed based on the current temperature as measured by the controller's on-board temperature sensor.







For example, if the target temperature is set at 30°C then sometime before that temperature, the controller will turn the fan on and slowly ramp up the speed until it reaches 100% if required, in an attempt to maintain the temperature either at or below 30°C. If the temperature decreases the fan

will slow down. The controller will attempt to keep the temperature below the set point. If the detected temperature reaches the set temperature, the fan output will be on 100% at this point.

## 6.4 - Hardware Test Pattern

The controller features a built-in test pattern to assist in troubleshooting during an installation. To put the controller into this mode, press and hold the 'Factory IP' button for 3 seconds (after the controller is already running) or turn it on remotely from the "Test" tab in the Advatek Assistant.

The controller will then enter the test pattern mode, where different test patterns are available as described in the table below. The pattern will display the test pattern on all pixels on each of the pixel outputs and any enabled DMX512 outputs simultaneously. Pressing the 'Factory IP' button while in test mode will move through each of the patterns successively in one continuous loop.

Test		Operation
	Colour Cycle	Outputs will cycle automatically through the red, green, blue and white colours at fixed intervals. Pressing the button moves to the next mode.
	Red	Solid Red
	Green	Solid Green
	Blue	Solid Blue
	White	Solid White
	Colour Fade	Outputs will slowly move through a full continuous colour fade. Pressing the button will loop back to the original colour cycle test mode.

To exit the test mode press and hold the 'Factory IP' button down again for 3 seconds and then release.

The hardware test requires that the pixel driver chip type and number of pixels per output are set correctly in the Advatek Assistant. In this way you can test if that part of your configuration is correct and isolate other possible problems with the incoming Ethernet data side.



# 7 - Firmware Updates

The controller is capable of having its firmware updated (new software). An update is typically performed to fix problems or to add new features.

To perform a firmware update, ensure that you have your PixLite 16 Mk2 controller connected to the LAN network as per [Section 5.1](#).

The latest firmware is available from the Advatek website at the following link:

[www.advateklighting.com/downloads](http://www.advateklighting.com/downloads)

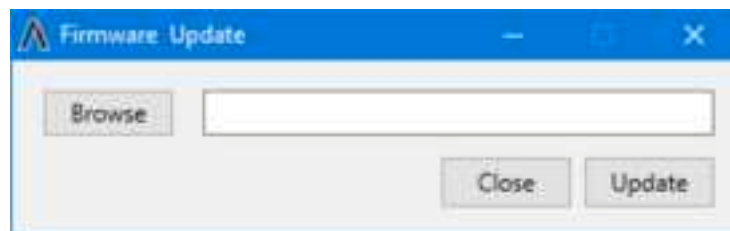
The downloaded file will be archived in a ".zip" format, which should be extracted. The ".hex" file is the file that the controller needs.

## 7.1 - Performing a Standard Update

1. Open the Advatek Assistant. Click "Search" and once the desired controller appears in the main window, double click on it.
2. A configuration window will appear. Click on the "Misc" tab and then locate the "Update Firmware" button and click on it. A "firmware update" window will appear, as shown in [Figure 12](#) below. Click "browse" to locate the firmware file you wish to use.
3. Click on the "update" button.
4. Once the update is complete, a message box will pop up saying it has completed successfully.
5. The controller will automatically reboot itself and then start running the new firmware application immediately.

If there is something wrong with the updated firmware, repeat the process again if it is still visible in the configuration utility. Otherwise, refer to troubleshooting in [Section 9](#) for further information.

*Figure 12: Firmware Update in the Advatek Assistant*



## 7.2 - Performing a Recovery Firmware Update

On the rare occasion that the controller encounters an error with its firmware, a recovery firmware update can be performed. This may be necessary if the firmware update process in [Section 7.1](#) fails.

1. Power down the controller and hold down the "Bootloader" button.

2. Apply power. The status and power LEDs should be flashing alternately to indicate the controller is in bootloader mode. It is now ready for a firmware update.

The controller will default to an IP address of 192.168.0.50 in this mode, so you must ensure your PC performing the recovery is on a network in the same address range as this IP address (e.g. 192.168.0.10).

3. Using the Advatek Assistant, click search in the main window and you should see the controller appear with “Bootloader” in the firmware column. Double clicking on it will bring up the file browse window as shown in [Figure 12](#) above.

4. Click browse to locate the firmware file.

5. Click on the update button. The update will only take about 5 seconds, and a message box will pop up once the update is completed.

6. The controller should now be operating with the new firmware.

# 8 - Specifications

## 8.1 - Operating Specifications

The table below specifies the recommended operating conditions for a PixLite 16 Mk2 controller.

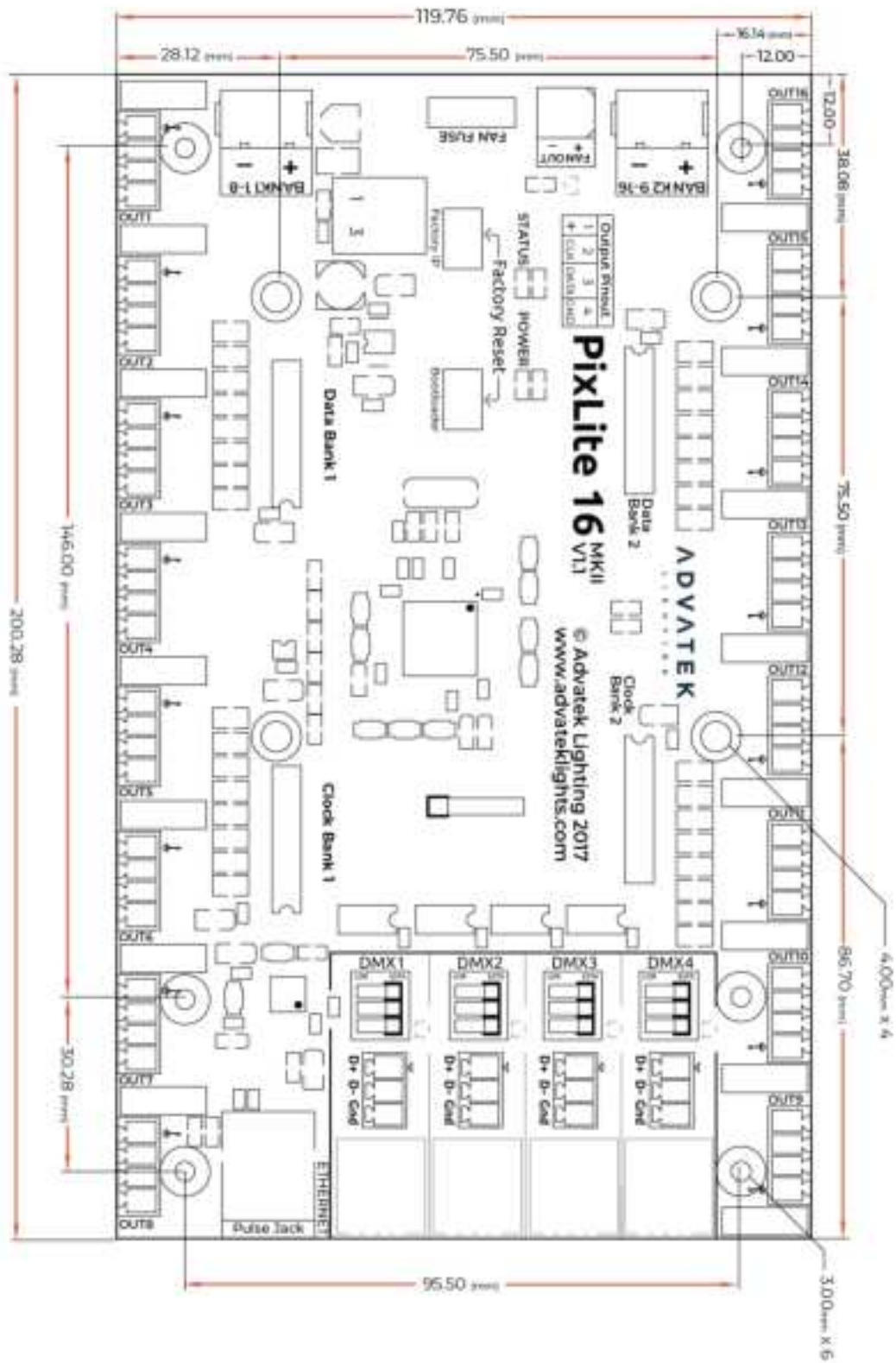
Parameter	Value/Range	Units
Input Voltage Range	5-24	V DC
Max Current Per Power Bank	32	A
Max Logic Current Consumption @ 5V	150	mA
Fan Output Max Power	15	W
Recommended Ambient Temperature <sup>1</sup>	-20 to +50	°C
Absolute Maximum Temperature of PCB Components	-40 to +80	°C
Maximum Current Per Pixel Output	7.5	A

*<sup>1</sup> Suggested limit only, the component temperatures must be kept within their absolute maximum ratings. Monitoring the component temperatures with the Advatek Assistant software is recommended.*

## 8.2 - Mechanical Specifications

The control board dimensions and locations of all mounting holes are shown in [Figure 13](#) below. There are 6 x 3mm mounting holes, and 4 x 4mm mounting holes. The 4 x 4mm holes will allow the board to be mounted directly into a CG-1500 enclosure.

Figure 13: Mechanical Specifications



# 9 - Troubleshooting

Generally, troubleshooting requires looking at the LEDs on the control board.

## 9.1 - LED Codes

Please refer to the table below for condition codes for the onboard status and power LEDs.

Status LED (Red)	Power LED (Green)	Condition
Flashing	Solid	Normal operation, Main application running okay
Slow flashing	Solid	Test mode running
Flashing together	Flashing together	Looking for IP address (DHCP Mode)
Solid	Solid	Main application not running
Off	Solid	Main application not running
Solid	Off	Main application not running
Alternate flashing	Alternate flashing	Bootloader mode
Off	Off	No power

Please refer to the table below for condition codes for the Ethernet jack status LEDs.

Link LED (Green)	Data LED (Yellow)	Condition
Solid	Flashing	Connected okay, receiving data
Solid	Off	Connected okay, no data
Off	Off	No link established

## 9.2 - No Power/Status LEDs

Ensure that your power supply is supplying correct voltage as per [Section 4.1](#). Additionally, ensure that it can supply enough current to drive the lights that are connected. You should also try disconnecting the pixel outputs and see if the controller then turns on. If the supplied power is correct, try performing a recovery firmware update as per [Section 7.2](#).

## 9.3 - No Pixel Control

Check that the correct pixel IC type has been configured. Also check the physical wiring and pinout of the pixels, as well as the output fuses.

## 9.4 - Other Issues

Check the LED codes as per [Section 9.1](#). If the device still fails to perform as expected, perform a factory default reset on the device as per [Section 9.5](#) below. For the latest information, and industry advice, you can refer to our online guides here:

[www.advateklighting.com/blog/guides](http://www.advateklighting.com/blog/guides)

You'll find information on management and configuration of the device in the PixLite Configuration Guide:

[www.advateklighting.com/downloads/user-manuals/pixlite-configuration-guide](http://www.advateklighting.com/downloads/user-manuals/pixlite-configuration-guide)

For any other questions, you can reach out to our support team at the link below:

[www.advateklighting.com/contact](http://www.advateklighting.com/contact)

[support@advateklighting.com](mailto:support@advateklighting.com)

## 9.5 - Reset to Factory Defaults

To reset the controller to its factory default settings, do the following:

1. Power down the controller.
2. Hold down the "Factory IP" button AND the "Bootloader" button together.
3. Power up the controller.
4. Wait for both LEDs to flash together.
5. Release both buttons and power down.
6. Power up the controller. It will now have factory default configuration.

# 10 - Disclaimer

If you require support or warranty, please refer to [Section 9.4](#) for information on creating a support ticket. You must be issued with a return authorization by Advatek support staff before returning any product.

The PixLite 16 Mk2 controller is supplied with a 3-year limited warranty and a repair/replacement guarantee. Please see the terms and conditions on our website for more information.

Art-Net™ Designed by and Copyright Artistic Licence Holdings Ltd.

This product has been manufactured by:

Advatek Lighting Pty Ltd  
U1, 3-5 Gilda Court  
Mulgrave, 3170  
VIC, AUSTRALIA