ADVATEK LIGHTS
Creative Digital Lighting Solutions

PixLite 4

Hardware Rev 1.2

User Manual V1.0

Contents

1 – Introduction

This is the user manual for the V1.2 PixLite 4 control board.

The PixLite 4 controller converts the E1.31 (sACN) and Art-net protocols from a lighting console, media server or computer lighting software into various other data protocols and outputs that data in real time to control pixel lighting fixtures.

PixLite 4 features an output capacity of up to 16 universes of either multicast/unicast E1.31 or Art-net data, in addition to a single DMX512 universe output (17 universes of data total.) This combined with an advanced feature set and easy to use configuration utility makes PixLite 4 an excellent choice for your pixel lighting application.

This manual only contains information specific to this physical control board, not the software configuration of PixLite controllers in general which can be found in the 'PixLite Configuration Guide'.

Separate manuals for other PixLite controllers and the PixLite Configuration Guide may be downloaded from here: http://www.advateklights.com/resources

2 – Safety Notes

2.1 - Static Electricity

The controller comes shipped in an anti-static bag and has a number of static-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 un-necessarily. Extra care should also be taken when mounting the board into an enclosure.

2.2 - Providing Power

Power to the outputs is applied via a large screw terminal, located on the left-hand edge of the board as shown in Figure 1 below. The PCB is clearly marked with the polarity.

The input voltage can be anywhere between 5V and 24V DC and 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 maximum current that can be safely used is 30 Amps.
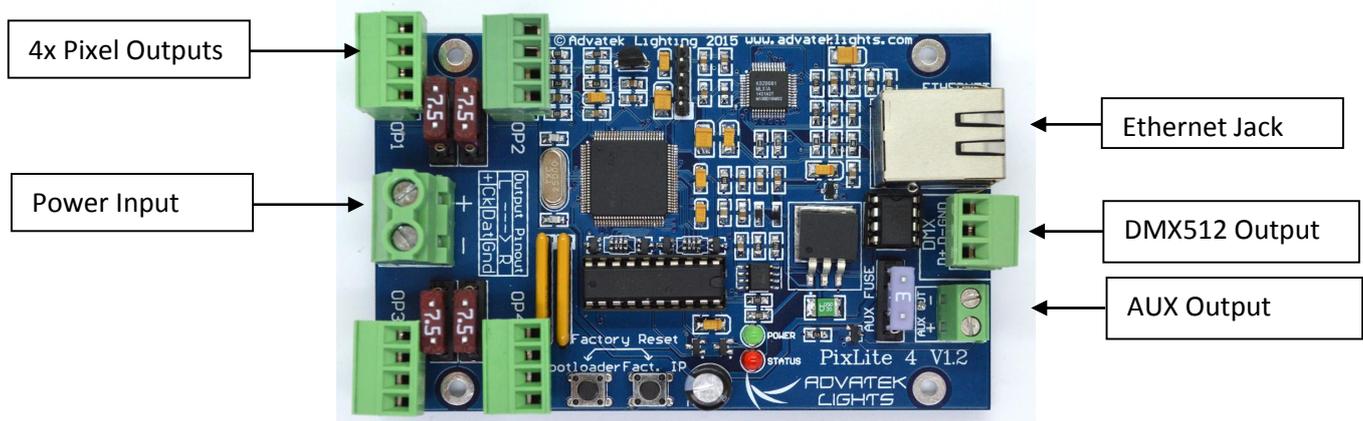
Figure 1

3 – Installation

3.1 - Power and Fuses

Each individual channel output is protected by a mini blade fuse (board shipped with 5A fuses.) These may be changed to a higher or lower value depending on your specific application, provided any individual output does not exceed 7.5A and the total board current capacity does not exceed 30A.

The logic circuitry is protected by an on-board 500mA self-resetting polyfuse. This fuse will go open-circuit in a fault condition and will automatically reset after normal operation resumes.

3.2 - Control Data

Control data to the PixLite 4 is achieved via the on-board Ethernet jack.

3.3 – Installing Lights

The lights can be screwed into the 4 way pluggable screw terminal connectors on each of the four outputs. The pin out of the connectors is labeled on the silkscreen as well as in Figure 2 on the following page.
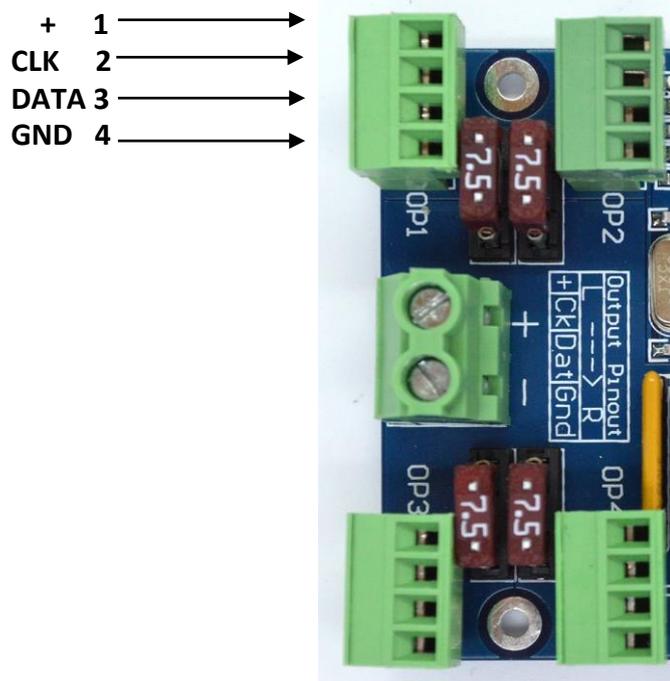
Figure 2

Some pixel protocols do not use the clock line and lights of this type will only have 3 wires. In this case you can leave the clock line disconnected.

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, the part it damages has been designed for easy replacement by the user. The part is very 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.

4 – Network Configuration

4.1 – Physical Network

4.1.1 – Network Layout
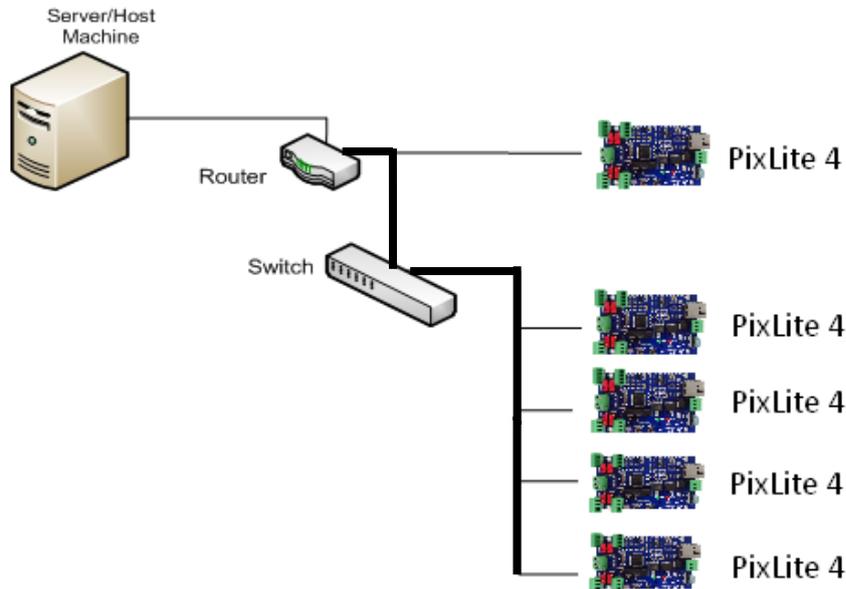
Figure 3

Figure 3 shows a typical network topology for the PixLite 4 controller(s) LAN. The host machine connects to a router and then to the PixLite 4 controller(s). If you are only using a few controllers, they can be connected straight to the router. Larger installations will benefit from using a network switch between the router and controllers. Using an IGMP enabled network switch is also recommended in large installations.

In smaller installations it may be preferable to connect the controller directly to the host machine's network adapter.

The PixLite 4 controller(s) can also be integrated straight into any pre-existing LAN.

4.2 – IP Addressing

4.2.1 - 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 it is recommended that you 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 15 seconds and default to a static IP of 192.168.0.50

If DHCP mode is enabled, both LEDs will flash together until the controller receives an IP address, at which point the power LED will remain on solid and the status LED will flash slowly indicating it is in run mode and ready for use.

If a static IP address is assigned to the board, then the power LED will be solid from power up. If a DHCP timeout occurs the power LED will stop flashing and go solid also.

4.2.2 - Using A Switch/Direct

It may be desirable to connect the controller directly to a switch 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 you 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.

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

Figure 4 shows a screenshot of typical computer network settings to communicate with a PixLite 4 for the first time without a router.
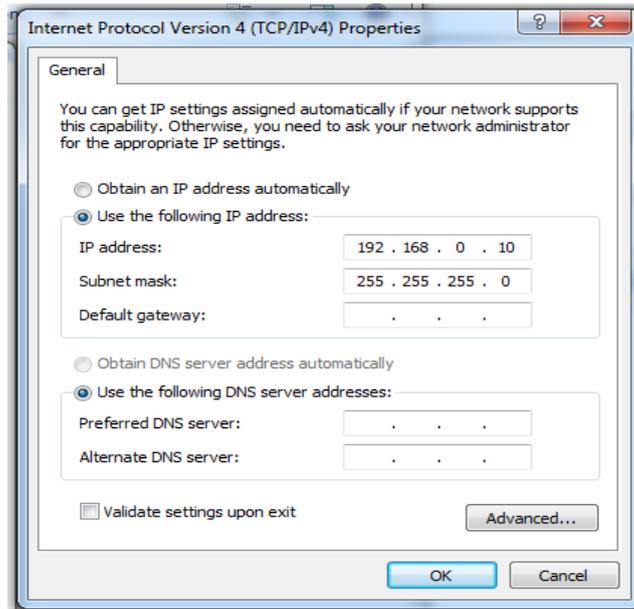
Figure 4

If you want to connect the PixLite directly to a PC then in addition to setting the computer's IP range as specified above, you may also need to use a crossover network cable as opposed to a straight-through cable as described in section 4.1.1.

4.2.3 - Forcing the Default IP Address

In the event that you forget the IP of a controller and you can't see it in the 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 and power up the board
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 setup your PC's network settings to find the controller at this IP and change the IP settings to what you prefer. After changing the settings or if you power the controller off and on again, the controller will revert to using the saved settings.

5 – Operation

5.1 – Startup

Upon applying power, if you already have strings connected they will flash very briefly (<50mS) and then immediately turn off as the controller takes control of the pixels. If no data is being piped through 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 status LED will flash slowly to indicate the controller is connected to a valid network and is ready to run.

5.2 - Sending Data

Data is sent from the host machine to the controller via the LAN using a "DMX over IP" protocol such as sACN (E1.31) or Art-net.

5.3 – Outputs

5.3.1 – Pixel Outputs

Each of the 4 outputs can drive up to 680 individual pixels. This allows for a total of 2,720 pixels to be driven out of the one controller (in addition to a DMX512 universe output.) However driving that many pixels out of just 4 outputs would also require some kind of power injection. How much power you need to inject and how often will typically vary depending on the number of pixels used and their individual current consumption.

The refresh rate of the pixels will depend on the operating frequency of the specific pixel chip type. Higher speed chips will result in higher refresh rates. Typically it can vary from a minimum of 25 fps at the low end and up to 100 fps at the higher end.

5.3.2 – Pluggable Resistor Networks

Each output features a pluggable resistor array to limit current and increase transmission distance by helping to prevent unwanted signal reflections in the clock and data lines. There are 2 resistor arrays per controller (one for the data lines, one for the clock lines). These arrays may be changed to a different optimum value depending on the characteristics of the wire used. The controller comes with 51 ohm resistors loaded by default as this is a suitable value for most typical installations.

If you require this value to be changed you may remove them by hand and insert new ones into the sockets. You should ensure you find a suitable isolated bus resistor array to replace it with. The pluggable resistor arrays can be identified below in figure 5.
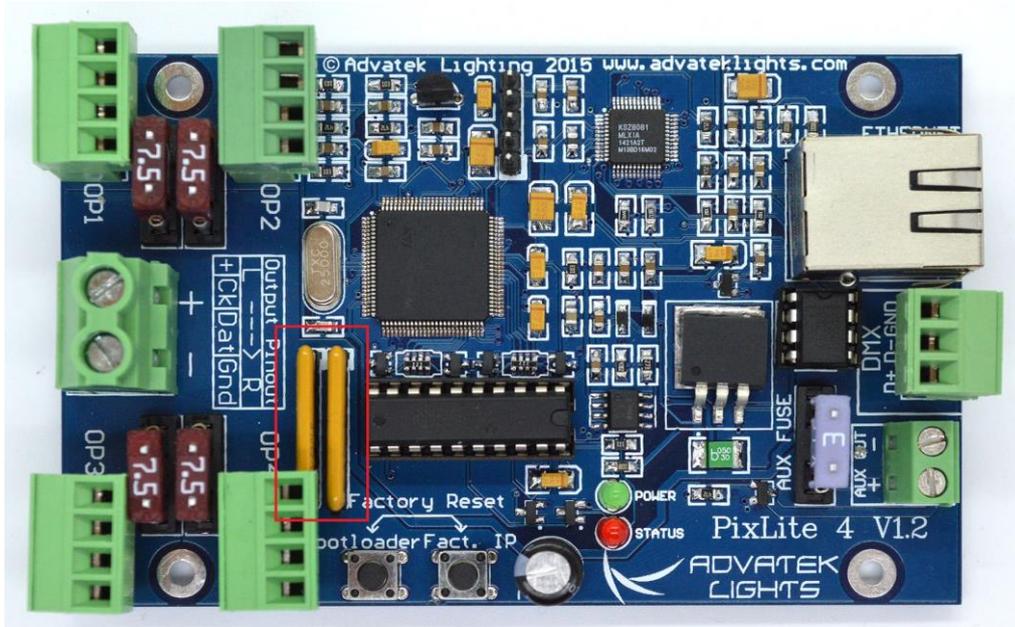
Figure 5

5.3.2 – DMX512 Output

The controller provides a single DMX512 output which can be accessed by the 3 way pluggable screw terminal connector located on the far right edge of the board (see Figure 1). The hardware layer on which the DMX 512 protocol operates is the RS485 electrical communications standard. This is a differential transmission system consisting of a two-wire differential twisted pair and single wire ground connection. The D+, D- and GND connections are clearly labelled on the PCB.

The output acts as an E1.31 to DMX512 bridge (**in addition** to the normal pixel outputs). These do **not** convert Art-net data to DMX, only sACN (E1.31).

The DMX output is **not** electrically isolated and is not recommended for commercial/industrial use.

5.3.3 – Auxiliary Output

The controller features an auxiliary output that can power an external fan(s) for cooling the enclosure that the controller is mounted in. This output is located on the far right edge of the board and is show in Figure 6. This feature is useful in order to keep the temperature regulated when you mount the control board and a high wattage power supply together in a small, confined space.

The output voltage of the auxiliary power is taken from the Bank 1 voltage input. In order to run a 12V fan for example, you would need to use a 12V input voltage for your Bank 1 supply. The auxiliary output can supply up to 15W of continuous output power, and is PWM controlled. The output is also protected by a 3A mini-blade fuse.

Basic operation is as follows: In the Assistant configuration software (see the PixLite Configuration Guide), 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 were to then slowly drop back down then the fan will also reduce speed until it switches off completely. The same process will be repeated if the temperature begins to rise again.

If the detected temperature reaches the set temperature, the fan output will be on 100% at this point.

Figure 6

5.4 – 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.) The controller will then enter the test pattern mode and will display red, green, blue and white sequentially in a repeating pattern on all pixels on each of the 4 outputs. Pressing the button while in this mode will then cycle through each of the four colors successively (on all outputs simultaneously) before returning to the current pattern again.

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

6 - Firmware Upgrades

The controller is capable of having its firmware upgraded (new software). An upgrade is typically performed to fix any bugs that may have been overlooked in previous revisions or to add new features.

6.1 - Physical Setup

To perform a firmware upgrade, ensure that you have your PixLite 4 controller connected to the LAN network as per section 3.1.1.

6.2 - Obtaining New Firmware

The latest firmware is available from the Advatek website at the following link:
http://www.advateklights.com/resources

It will come in a ".hex" format.

6.3 - Performing an Automatic Update

1. Open the 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 "Upgrade Firmware" button and click on it. A "firmware update" window will appear (as shown in Figure 7). Click "browse" to locate the firmware file you wish to download.

3. Click on the "update" button.

4. Once the download 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 upgraded firmware, repeat the process again if it is still visible in the configuration utility. Otherwise, refer to the troubleshooting section for further information.
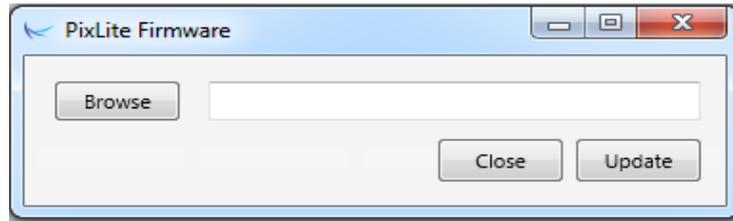
Figure 7

6.4 - Performing a "Forced Boot" Update

1. Power down the controller and then 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 upgrade.

   The current bootloader will default to an IP address of 192.168.0.50 in the force mode, so you must **ensure you are running it on a network in the same address range as this IP address**.

3. Using the 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 7).

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 download is completed.

6. Power the board down again

7. Apply power again and the board should now be operating with the new firmware.

7 – Specifications

7.1 - Operating Specifications

The table below specifies the recommended operating conditions for a PixLite 4 controller.

PARAMETER	VALUE/RANGE	UNITS	TOLERANCE
Power Input Voltage	5-24	V DC	+/-5%
Max Current Capacity	30	A	+/-5%
Logic Current Consumption (@ 5V DC)	130	mA	+/-10%
Operating Temperature	-40 to +80	°C	+/-5%
Max Current Per Output	7.5	A	+/-5%

Table 1

7.2 - Mechanical Specifications

The controller's dimensions are shown in Figure 8 below.
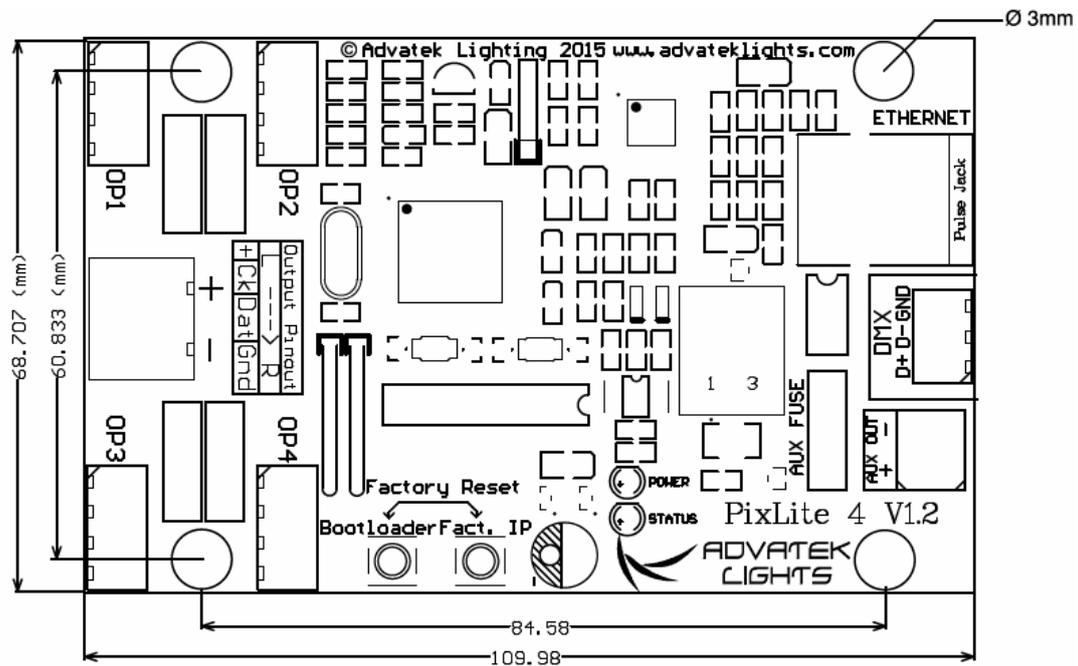

Figure 8

8 – Troubleshooting

8.1 – LED Codes

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

POWER LED (GREEN)	STATUS LED (RED)	CONDITION
SOLID	FLASHING	NORMAL OPERATION, MAIN APPLICATION RUNNING OK
SOLID	SLOW FLASHING	TEST MODE RUNNING
FLASHING TOGETHER	FLASHING TOGETHER	LOOKING FOR IP ADDRESS (DHCP MODE)
SOLID	SOLID	MAIN APPLICATION NOT RUNNING
SOLID	OFF	MAIN APPLICATION NOT RUNNING
OFF	SOLID	MAIN APPLICATION NOT RUNNING
ALTERNATE FLASHING	ALTERNATE FLASHING	BOOTLOADER MODE
OFF	OFF	NO POWER

Table 2

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

LINK LED (GREEN)	DATA LED (YELLOW)	CONDITION
SOLID	RAPID FLASHING	CONNECTED OK, RECEIVING DATA
SOLID	OFF	CONNECTED OK, NO DATA
OFF	OFF	NO LINK ESTABLISHED OR POWER IS OFF

Table 3

8.2 - No Status/Power LEDs On

Ensure that your power supply is supplying correct voltage as per section 3.1. Also ensure that it can supply enough power to drive the lights that are connected as well. You should also try disconnecting all outputs and see if the controller starts then. If the supplied power is correct try performing a forced firmware update as per section 6.4.

8.3 - Other Issues

If the device fails to perform as expected, please check the LED codes as per section 8.1. For the latest more specific troubleshooting information and other help, you should refer to our online knowledgebase here: http://www.advateklights.com/support/kb

If you can't resolve your problem with the help of our knowledgebase, you can open a support ticket here for assistance: http://www.advateklights.com/support

You can also send an e-mail to support@advateklights.com and a ticket will be automatically created for you.

If you create your ticket through the website you will have the ability to login and manage past and existing tickets.

8.4 – Reset To Factory Defaults

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

1. Hold down the "Factory IP" button AND the "Bootloader" buttons together before applying power.

2. Power up the board.

3. Wait for both LEDs to flash together.

4. Release both buttons.

5. Power cycle (turn power off, wait 5 seconds then turn it on again).

9 - Warranty and Service

If you require support or warranty, please refer to section 8.3 for information on creating a support ticket. For warranty cases the support staff will usually require you to perform some troubleshooting steps first. If we cannot solve your problem remotely we will issue you with an RMA number through the support ticket system. You may then either return the device to a local distributor or return it to us directly for warranty services.

The PixLite 4 V1.2 control board is supplied with a full 3 year factory warranty.