

ScaleRCHelis.com Light Controller Users Manual V1.1c



This manual is for both the 450, 600 and High Power light controllers. The difference between the controllers: The 450 controller is only single input allowing the user to directly control the landing and warning lights and is powered directly from the receiver. There is no need for an external BEC and can operate between 5V and 8V reliably. The LED output voltage is regulated to around 5v output. This should make the controller a perfect replacement for Curtek light installs and also for the Roban Super Scale aircraft that are supplied with a light kit (Will require resistors inline with LED's).

The 600 controller has the same functionality as the 450 however it has been upgraded to power 1 watt LED's and a separate power lead to connect to a BEC.

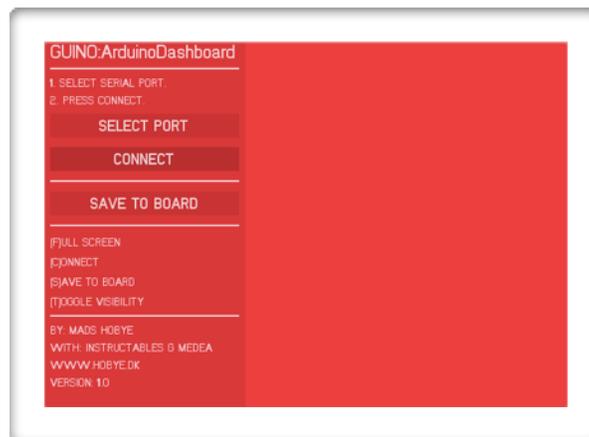
The High Power controller has 2 input channels, dual power leads (recommend 5.0V - 7.0V input) and a jumper lead to dim the position lights. This controller requires an adjustable BEC of 5 - 20 amps. We recommend the BEC we carry online or the Castle 10 amp and 20 amp BECs set to 5v.

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Connecting to the Dashboard for the first time

The Dashboard is the same for both Windows and Mac. The only difference will be selecting the connection port. Windows you will need to select the COM port identified during install, Mac will be a port called tty.wchusbserial####.

Plug in your controller and open the GUINO Dashboard and you will be presented with this following screen:



You will notice there are options to view in Full Screen (**F**), Connect and Disconnect (**C**), Save to Board (**S**) and Toggle Visibility (**T**) which hides the menu system. The Toggle Visibility or Full Screen may be helpful if running on a low resolution monitor so you can view all the parameters.

“Select Port” and select the Port the light controller is connected to. Once selected the Dashboard will automatically connect to the light controller and populate the page if on a Mac, Windows users must hit the Connect button. If the controller does not connect the first time, select the port again and it should connect.

Now we are connected to the light controller. To disconnect just click the disconnect button or hit “**C**” on your keyboard. To reconnect hit the connect button or “**C**” as long as you did not close the dashboard. If you closed the dashboard, you will have to select the port again to connect.

To Store a change in the controller, you **MUST** click the **SAVE TO BOARD** or “**S**” before disconnecting or the changes will not save. Changes will occur real time so you can adjust settings while connected but just **make sure to SAVE TO BOARD** before

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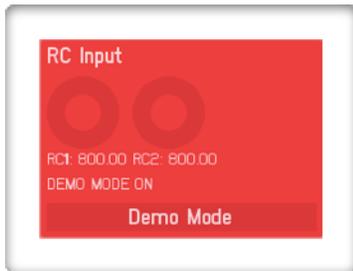
exiting. Some functions may not work properly until they are saved and you disconnect and the reconnect allowing the controller to reboot with the new settings. The main cause of this is the way the controller initializes during boot to behave a certain way based on the active functions. When you change Fading Warning Lights to Flashing Warning Lights, the RC input will not work properly to control that function until the board reboots. So if you see something that doesn't look right, **SAVE TO BOARD** or **"S"**, disconnect and then reconnect and the function should now work correctly. If you do not want to store a change, just disconnect and the changes will be discarded.

We will use the Dashboard for the High Power controller since the functions are identical to the 450 controller.



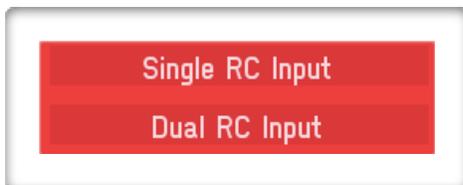
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RC Input: First we see the RC Input gauges, this tells us what input the controller is receiving from the radio. This will be stationary when Demo Mode is enabled. When our 3 position switch, rotary knob or slider is in the high position we should see a number above 1800uS. If it is near 1000uS then you need to reverse that channel in your radio. You will see a single RC Input on the 450 and 600 controllers.

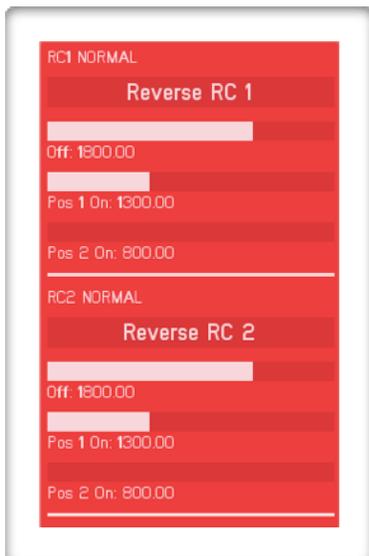


Demo Mode: This is on by default and turns all the outputs on making it easy to attach your LED's for testing without having to use your radio to enable the outputs. This may also be useful when your aircraft is on display for competition.

RC Input Mode: Single RC Input allows the High Power Controller to operate using only one RC Input in the same way the 450 controller works. Only the Landing and Warning Lights can be controlled, all other lights will be on at all times. Click Dual RC Input and the unit goes into Dual Input mode. This will not be present on the 450 and 600 Controllers.



RC 1 and RC 2 Switch Position and Input Reversing: The sliders give you the ability to adjust the trigger points to enable a function on the light controller. Default settings are shown in the image. What it shows is: when the switch is above 1800uS all functions are off for that channel. When it is between 1800uS and 1300uS, the first function is enabled. When below 1300uS the first and second function of the channel is enabled. These sliders allow you to adjust it to your requirements. For example, you want to slave a servo on RC 1 to operate a retractable landing light but your light fully extends with only half the travel of the channel. You can then adjust the RC 1 sliders to ensure the controller operates the function requested based on the signal your radio outputs to complete the task of operating the servo.



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RC input reversing was added to help with installs where a servo operating a light housing may be in use and the Light Controller Input needs to be reversed. When reversing the input you will need to change the trigger points to make the system work. Basic settings that should be used are:

Off = 1200uS Pos 1 = 1700uS Pos 2 = 2200uS

RC 1 Controls Landing and Warning Lights. RC 2 Controls Beacon, Strobe and Position Lights. Note: The 450 and 600 controllers only uses RC 1.



To Return the inputs to normal operation click the RC Inputs Normal button and both RC1 and RC2 no longer be reversed.

Strobe Light Pulse Times: This section controls the strobe light pulses. You can use 1 to 3 pulses per strobe. All three strobe lights share the same pulse timing. Each strobe has an On and Off time except strobe 3 only has an ON time. To strobe only one pulse, move all sliders to 0 and only put a time in for P1 On Time. To have 2 pulses, put a time in for 1 - 2 but not a time for P2 Off or P3 On. Never put a



Off Time for the last strobe. The off time is controlled by the Strobe Light Cycle Times. If you do enter a time into the last Strobe Off Time, you will notice a short pulse when there should not be one.

Strobe Light Cycle Time: This is where the delay between strobe cycles is set on Strobe Outputs 1 thru 3. Use a different Cycle time for each light to give a random strobe pattern (makes the strobes chase each other). Strobe Cycle 1 Time is the delay from when the above strobe pattern finishes and when the next cycle starts. Based on the

default timings Strobe 2 will flash at the same time as Strobe 1 once every 20 cycles. Strobe 3 will flash at the same time as Strobe 2 once every 10 cycles. If you are using the Dual Beacon

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feature, the Strobe 3 Cycle Time will be ignored since this port now controls the second Beacon light.

Link WARN /LAND: This function places the Landing Lights onto the Warning Light output. Both the Landing Lights and Warning Lights will be on the same Pins (Pin 1 and 2 on the High Power Controller, Pin 4 and 5 on the 600 Controller and Pin 7 and 8 on the 450 Controller). This will free-up the Landing Light ports to be used for other Lights such as a Night Sun. This is useful if your model uses it's landing and warning lights in combination. By default the Landing and Warning Lights are on separate outputs.



Warning Light Type: There are two patterns available, Fading and Flashing. Fading patterns are typically found on aircraft that still use incandescent lights. They are not Instantly on or off, they tend to look like they fade on and off. Newer aircraft that use LED lighting exhibit a flash pattern since these lights can instantly turn on and off. Fading is on by default.



Fading Warning Lights: There are two adjustable parameters on the fading warning lights. Fade Cycle Time is the time to complete a full fading cycle (Off to On to Off). The default of 250ms takes 125ms to ramp up and then 125ms to ramp down. In the middle of this we have the On / Off Interval. This is how long one Light stays on once it reaches full brightness and how long the opposite light stays off once it reaches full dim. The default provides a 1100ms (1.1 second) cycle of the warning lights.



Flashing Warning Lights: This is the time each light is on in in the cycle. The default time is 1000ms (1 second) so a complete cycle would take 2 seconds.



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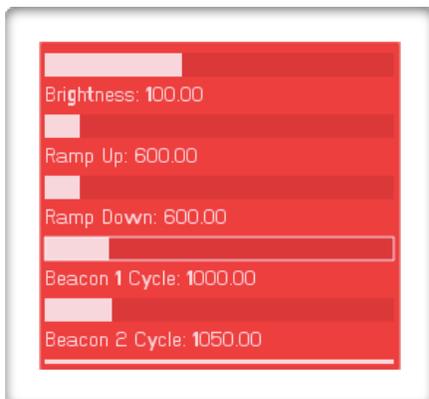
Nav Light Dimmer: This value is used to dim the position lights when the jumper is installed. It is a PWM value from 0 to 255. Note: the way we perceive light does not mean that 127 is half the brightness. Play with this value till you get the desired brightness when the jumper is installed for dusk and night flying. This feature is not available on the 450 and 600 controllers since the smaller LED's seldom pose the issue of being too bright in these conditions.



Beacon (Revolving) Light: The Beacon Light Type controls whether there is a Single Beacon or Dual Beacon setup. When in Single Beacon mode you will have One Beacon Light and 3 Strobe Lights. When in Dual Beacon Mode you will have 2 Beacons and 2 Strobes. The second Beacon will be on Pin 4 on the 450 Controller, Pin 6 on the 600 Controller and Pin 3 on the High Power Controller.



Beacon Light Parameters: The Beacon light has 5 adjustable parameters. First is the Brightness. This is the brightness the beacon ramps up to (0 - 255) and then pulses. Any value less than 255 will produce a fast pulse when the Light ramps to full brightness. If you do not want a Pulse then set the Brightness to 255. Ramp Up Time is how long it takes to ramp the Light up from 0 (off) to the requested peak brightness value (up to 255). Ramp Down Time is the time it takes to ramp the Light from full brightness back to 0 (off). Beacon 1 Cycle Interval is the time Beacon 1 is off between cycles. Beacon 2 Cycle Interval is the time Beacon 2 is off between cycles. To get a random appearance the Cycle Intervals should be different.



Reset to Default: This resets the controller back to default settings. To perform a reset you must click the Reset to Default button, then Save to Board and then Disconnect and

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Connect. You may also have to power cycle the controller. This will clear the stored parameters and return the controller back to the default parameters it was shipped with. You will also see your firmware version listed here also.

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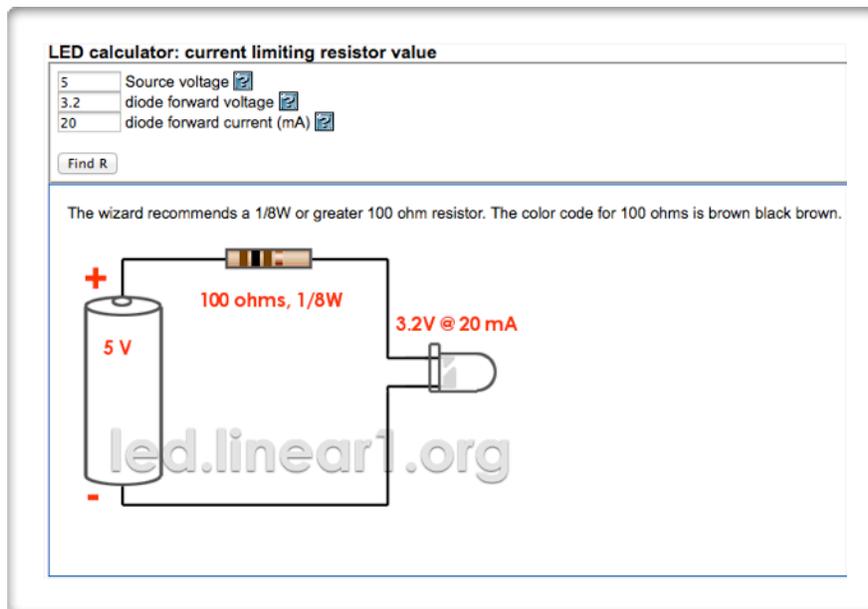
450 Light Controller LED's

We recommend using either 3mm or 5mm 20mA LED's for this controller. Each channel is capable of up to 40mA output and a total of 200mA combined. Because of this we want to limit our always on lights (Position, landing and warning lights) to 15mA. This will help keep the total output power to under 200mA worst case. The low duty cycle LED's (Strobes and Beacon lights) can be set to 20mA with no issues.

To determine your resistor values you first need to know the supply voltage (5V in this case), the LED's forward voltage and the current we want to use (15mA or 20mA). Once this is know, you can use an online calculator to determine the proper resistor for your LED. We will use this online calculator to determine this information:

<http://led.linear1.org/1led.wiz>

I will do a sample calculation. Our sample values will be for a White strobe light. We are going to use 20mA with a input voltage of 5V and a Forward Voltage (Fv) of 3.2v. Plug the numbers into the calculator and we get a resistor value of 100 ohm.



The image shows a screenshot of an online LED calculator tool. The title is "LED calculator: current limiting resistor value". It has three input fields: "Source voltage" set to 5, "diode forward voltage" set to 3.2, and "diode forward current (mA)" set to 20. Below these is a "Find R" button. The output text says: "The wizard recommends a 1/8W or greater 100 ohm resistor. The color code for 100 ohms is brown black brown." Below the text is a circuit diagram showing a 5V battery connected in series with a resistor labeled "100 ohms, 1/8W" and an LED labeled "3.2V @ 20 mA". The website "led.linear1.org" is watermarked across the diagram.

Now lets find the resistor value for one of the white landing lights. The only thing that changes is the current requirement from 20mA to 15mA because we want to limit the current. What we find is a 120 ohm resistor is required to reduce our current draw to

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15mA. Also pay attention to the suggested wattage rating the calculator gives you for your resistor. 1/8 watt resistors will do fine for all the LED's on the 450 controller but when discussing the High Power controller, this will be important to pay attention to.

High Power Controller LED's

The High Power controller is built with high output components. Each output is capable of 1 amp (1,000mA) of output. We recommend that 1 amp is only requested on low duty cycle outputs such as the strobes, beacon and warning lights. High duty cycle lights such as the landing and position lights should be kept to a lower current requirement of no more than 500mA in a well ventilated installation. We tested 3 watt luxeon LED's on the low duty cycle outputs and 1 watt LED's on the high duty cycle output with no issues encountered over a 24 hour period.

Note: The Voltage at the LED output will be 0.7V less than the BEC output Voltage. For example, you have a 5.0V input, you will have a LED output voltage of approximately 4.3V. We have tested with both the Castle 10 amp BEC and the Castle BEC Pro 20 amp BEC, both work well to power the system.

Luxeon LED's are typically found in 1 watt (350mA) or 3 watt (750mA - 1,000mA) variants. It is up to you to ensure proper cooling of your LED's as they will generate a lot of heat. Most luxeon LED's include a small PCB star on the base that acts as a heat sink. It is OK to remove the star as long as you are not pushing the LED to it's maximum current. I personally run my position lights on 1 watt LED's with a current draw of around 180mA without the PCB stars. They run cool enough to be on for an extended period of time. For the strobes, I run them full power without the PCB star since they are low duty cycle and can handle the short burst of current without damaging effects. Warning, beacon and landing lights may or may not need the PCB star. If you can fit them into your installation, by all means keep the LED on the star which will allow you to run higher current in these applications.

Lets do a sample calculation for a 1 watt position light and a 3 watt strobe.

We are going to use a Red 1 watt luxeon in our example with a Fv of 2.8v, current of 180mA (about 1/2 of the 350mA spec) with a supply voltage of 5.0V. Based on the calculator, we will need an 15 ohm 1 watt or larger resistor.

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The strobe is a White 3 watt luxeon with a Fv of 3.7v and a current of 1,050mA (we want it bright!). We need a 1.5 ohm 2 watt or larger resistor.

Play with your resistor values. Green LED's typically have higher visibility vs Red LED's so you may have to experiment to match intensities and this may require using different value resistors.

Roban LED Info: In order to use the existing Roban LED's with our light controllers, you will need to add inline resistors. We use 100ohm 1/8 or 1/4 watt resistors for the Green and White LED's and 160ohm for Red LED's.

High Power and 600 Controller Warning:

The Positive rail on the High Power Controller is always active. Once all LED's are plugged into the controller, wrap the output pins with electrical tape, shrink tube or install the remaining LED connectors supplied to prevent shorts.

As always with any new equipment added to your aircraft, do a range check per your radio manufactures recommendation and ensure there are no issues with your installation.

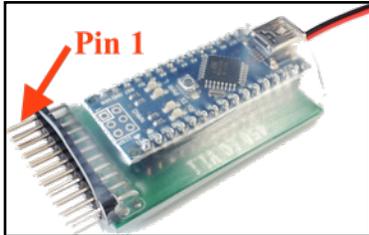
Again, thank you for purchasing a ScaleRCHelis.com Light Controller.

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Pin map for LED's

450 Controller:

From Left to Right where the Nano is facing up. The Top Pins are Positive, the bottom Pins are Negative on this controller.



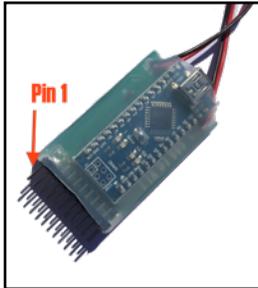
- Pins 1 thru 3: Position Lights
- Pins 4 thru 6: Strobe Lights
(Pin 4 is second Beacon port when enabled)
- Pins 7 thru 8: Warning Lights (Landing Lights when Linked)
- Pins 9 thru 10: Landing Lights
- Pin 11: Beacon Light

Wires:

The 450 controller uses a single servo wire, plug this into an open port on the receiver.

600 Controller:

From Left to Right where the Nano is facing up. The Top Pins are Negative, the bottom Pins are Positive on this controller.



- Pins 1 thru 3: Position Lights
- Pins 4 thru 5: Warning Lights (Landing Lights when Linked)
- Pins 6 thru 8: Strobe Lights
(Pin 6 is second Beacon port when enabled)
- Pins 9 thru 10: Landing Lights
- Pin 11: Beacon Light

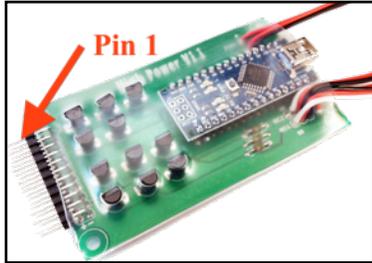
Wires:

- Single servo wire for Signal input.
- Power wire to connect to a BEC.

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High Power Controller:

From Left to Right where the Nano's USB plug is on top. The Top Pins are Negative and the bottom Pins are Positive on this controller (See warning below).



Pins 1 thru 2: Warning Lights (Landing Lights when Linked)

Pins 3 thru 5: Strobe Lights

(Pin 3 is second Beacon port when enabled)

Pins 6 thru 8: Position Lights

Pin 9: Beacon Light

Pins 10 thru 11: Landing Lights

Wires:

The Female Servo Lead with DIM label is the Dimmer Jumper lead.

The 2 Female Servo Leads with Red and Black wires are the power input leads.

The 2 Male Servo Leads labeled RC1 and RC2 are signal wires that go to the receiver.