RapidLED Coralife BioCube 29 Retrofit

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Overview

As with any type of lighting retrofit, there are many dangers, difficulties, and pitfalls that may occur. The Rapid LED Coralife BioCube 29 retrofit should only be attempted by people familiar with AC power and wiring, electronics, LEDs, LED Drivers, series circuits, and be comfortable with the fact that this retrofit will require complete disassembly and removal of major components of the original hood. If you are uncomfortable with or inexperienced at any of the prerequisites required for this retrofit, you should not attempt this retrofit. NOTE: These instructions are for installing individual LEDs in your hood. If you are using the kit with the Aurora Array, refer to the instructions located here: Coralife Biocube 29 Aurora Array Instructions
Hood Preparation

Ensure everything is unplugged. In this portion of the retrofit we will remove the hood from the tank, a transformer, the fluorescent bulbs and ballasts, the reflector, the LED strip sockets and some wiring among other things.

Fastener Removal

To begin, you must remove three fasteners from the rear of the hood to get it off of the tank. We found it easiest to insert a hex wrench into one side of the fastener and gently tap laterally with a hammer until it releases. The fasteners release easily, little power is required. Repeat this for all three and remove the hood from the tank.

After the hood is removed, unscrew and remove the plastic cover that protects the fluorescent bulbs and then remove the fluorescent bulbs.
**Reflector and LED Strip Removal**

Next, we will unscrew the reflector and LED sockets from the hood. Reflector removal requires unscrewing the two metal fluorescent bulb holders and the LED strip socket in the middle of the hood. The reflector should lift out easily. Cut the green grounding wire from the hood to completely remove it.
After removing the reflector, unscrew the four LED strip sockets included with the tank. Eight screws hold them down.

After unscrewing the LED strip sockets, unplug all five of them from the circuit board, and remove:

Next, we will remove the two fluorescent bulb sockets. Unscrew the four mounting screws as indicated by the arrows in the photo below, unclip, and remove the sockets.

**Ballast Removal**

The end goal of this section is to remove the ballasts and the right side AC line in (two power cords) from the hood. We will be left with one original power plug that will power the original fans.

Removing the ballasts requires cutting an AC line in. To avoid any problems, double check and confirm all power to the hood is disconnected. This portion of the retrofit has its own section because problems
can arise resulting in electrocution and possibly death. Please have a licensed electrician double check all modifications performed on your entire retrofit, and especially the ones in this section.

Please note that modifications on this step be and look different depending on manufacturer modifications out of our control. Keep in mind the actual goal of the step as opposed to the photos.

To begin, with the hood facing up with the back of it nearest your body, cut the AC line and neutral wires coming from the rightmost ballast. If you cannot locate them, the ballast has a wiring diagram on its label indicating ACL and ACN for the driver.
Next, strip and tightly cap the AC wires cut from the ballast with wire nuts.
Next, unclip the power connector for the left ballast:
After unclipping the left ballast, unscrew and remove both ballasts from the hood. There are two screws per ballast.

**Transformer Removal**

To remove the transformer on the right, we first unplug it from the circuit board. Simply unplug the two wires from their sockets in the lower right hand corner of the picture below.
Next, we will remove the unnecessary power connections from the hood switches. Be careful to not damage the components or hurt yourself in this step – the connections can be very tight and difficult to remove. Please note that we will leave 4 connections as is, which will switch the fans on and off.

Next, we remove the transformer on the right. Simply remove the two screws and remove it from the hood.
Right Side AC In Removal
The last step in preparing our hood is to remove BOTH power cords from the right side of the hood.

First, unscrew the strain relief holding down the right side power cords.

Next, cut the ends off of the cords and pull them out of the hood. Replace the strain relief unscrewed in the above picture and replace the rubber grommet the AC inlet wires were removed from.
Prepared Hood

Your prepped hood should look like the one below. You should be able to plug it in and switch the fans off and on.
Installing the Heatsink

The heatsink attaches to the plastic posts already in the hood via 6 screws. The screws are the large screws included with the kit. Tighten gently until heatsink is snug. Tightening them more than this may strip out the plastic screw bosses in the hood at which point you will have fill the stripped bosses with a hard glue or epoxy and drill them back out so the screw will grip again, or find some other solution. Over tightening may also snap the screw bosses from the hood, in which case, you will have to attempt repair with super glue.

For this retrofit, it is easiest to line up one of the rearmost screws and screw it in first. Next, rotate the heatsink around this screw until you can drop the other three rear screws into their mounting holes. Be patient, they will line up. Once they line up, screw them all in. Note the two screws furthest from the rear of the hood are not screwed in yet – they go last.
After the four bottom screws are snugly affixed, screw in the top two screws. Ensure you do not make them too tight. **Over tightening the top two screws may warp your hood** (and then the cover won’t fit!).
Attaching LEDs to the Heatsink

The heatsink has many little holes in it. Two little holes are used to secure 1 LED to the heatsink – one at each end of each LED.

We need to apply thermal grease to the back of each LED and then attach it to the heatsink. Thermal grease ensures proper thermal conductivity of heat away from the LED into the heatsink. A very small dab of grease on the back of each LED is all that is necessary. More is NOT necessarily better. Too little will lower conductivity and too much will create a mess. A thin layer works best. The photo below is about how much you should use.

After the thermal grease has been applied to the star, screw it into the heatsink with two little screws, adjusting the height of the two fastening screws to center the LED between them. Once again, do not over tighten. The screws should be snug but not tight. When screwing down the LEDs, ensure the screw is not touching any solder or solder pads. This will ground the string at that point and cause strange behavior and possibly, damage.
Wiring the LED Strings

*****NEVER APPLY POWER TO THE LED DRIVER BEFORE ALL WIRING IS COMPLETE *****

Please watch our see our Solderless LED Tutorial at the link below before proceeding:
http://www.youtube.com/watch?feature=player_embedded&v=j7fwVP61kiM

Wiring your LEDs is done as follows: Plug the driver jumper into the first LED in your string. Plug the LEDs together with the LED to LED jumpers and insert a terminal plug/jumper into the last connector of the last LED in your string.
Remember to:

- Apply no power until all wiring is complete
- Ensure the minimum number of LEDs are attached to your driver
- Adjust SVR2 if necessary
- Do not install LEDs upside down as indicated by the red X in the second example above.

Below are two photos of what your heatsink might look like if you are using Rapid LED Solderless LEDs:
Inside Hood Wiring for LED Strings to V+ and V-

Each driver has a V+ and V- output that powers the LED strings. Since we cannot put the drivers in the hood next to the LEDs, we will attach some wire to the driver jumpers and run that through the empty space left from removing some of the power cords.

We start by running our wire through the void left by one of the cut power cords.

Next, we run it through the rubber grommet separating the interior of the protected hood from the exterior. Tie a loose knot around the strain relief post to prevent damage to internal components if the outer wires get pulled too hard.
Next, we wire the LED strings (jumpers) to the bulk wire we just ran. Here are wiring tables for this particular example:

<table>
<thead>
<tr>
<th>String 1</th>
<th>Goes to:</th>
<th>Attaches to:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Red Driver Jumper (V+)</strong></td>
<td>Red</td>
<td>V+ on Driver 1</td>
</tr>
<tr>
<td><strong>Black Driver Jumper (V-)</strong></td>
<td>Black</td>
<td>V- on Driver 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>String 2</th>
<th>Goes to:</th>
<th>Attaches to:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Red Driver Jumper (V+)</strong></td>
<td>Blue</td>
<td>V+ on Driver 2</td>
</tr>
<tr>
<td><strong>Black Driver Jumper (V-)</strong></td>
<td>White</td>
<td>V- on Driver 2</td>
</tr>
</tbody>
</table>

Last, tuck the wires neatly underneath the heatsink.
Outside Hood Wiring for LED Strings to V+ and V-

Now that the LEDs are connected to the LED strings, we have to attach the drivers to those wires to get power to the LEDs. The wires were attached according to the table above. If you have a constant current kit, ensure you connect the LPC-60-1050 to the white LEDs and the LPC-35-700 to the blue LEDs.

If you haven’t already, strip the outside jacket off of both wires and then use a wire nut to connect them together. An example is below, but the colors differ.

Using a wire nut, connect V+ from the driver to a blue (or red) wire coming from your hood and connect V- from the same driver to the corresponding wire according to our table, in this case it should be connected to the white wire from our hood.
Wiring the Driver to AC Power

The AC Line and Neutral, or ACL and ACN wires, which are brown and blue, connect to the power cord included in our kits. Strip the white and black wires of the power cord (green is ground and unused) and attach them to the blue and brown wires on the driver with the included moisture resistant wire nuts. Order is not important because AC current alternates. Obviously, this step is dangerous because you are working with 120VAC. Make sure nothing is plugged in and have a licensed electrician assist you with this step.
There are 4 output wires on a dimmable driver as in the above photo. The dimming wires, DIM + (blue), and DIM – (white), simply hook up to the respective ports on your controller or dimmer. Dimmable drivers must have the dimmer wires hooked up to a controller or dimmer or the LEDs will not light up. No dimming signal = 0% brightness.

If you do not have a dimming circuit or controller, you can test by applying a voltage to the Dimmer + and Dimmer – wires on the driver. This voltage can range from 1-10V. Do NOT exceed 10V or you risk damaging the dimming circuitry. A 1V reference voltage will light the LEDs to 10% brightness, whereas a 10V reference voltage will light the LEDs to 100% brightness. You likely have something around your house that can supply a reference voltage. A “wall wart,” 9V battery, or even a AA battery can be used for testing. Be sure to test the actual output voltage of your wall wart with a multimeter before use – unregulated wall warts will output much greater than the output voltage on the label when used with small loads.

Adjusting Driver Current – Do this before applying power to non XP-G LEDs.
To adjust the driver output current, open the driver by removing the 4 screws and very gently rotate SVR2 counter-clockwise until it stops. Counter-clockwise rotation lowers output current and clockwise rotation raises output current. We have just set current to the minimum. The maximum output current of the ELN-60-48 D and P model drivers is 1.3A. **1.3A is the factory default setting and can burn out LEDs that cannot accept this much current (XR-E, XP-E, Osram, moonlight).**

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**Adjusting Driver Current with a Multimeter**

To adjust the driver output to a specific value, you must first wire a multimeter into your LED string and second, you must ensure the DIM+ and DIM- wires are connected to a dimmer. The dimmer should be set to full brightness.

The multimeter should be wired into your LED string exactly the same as an LED, + to -, in fact, if you just pretend it is an LED, you will have no problem measuring current. If you wire the multimeter in backwards, it will still work, but your measurements will be negative instead of positive.

To set your multimeter up for measuring current, move the RED probe plug to the 10A socket and rotate the knob to the 10A position. Multimeters can differ in operation. Please consult your multimeter manual for model specific operating instructions.

As in the photo below on the right, have a friend firmly hold the probes in a gap in the LED string. We had to remove a wire in an existing setup for this example. If either probe loses contact with a solder pad on either LED, do NOT re-touch it to the LED until power has been removed from the driver for a few minutes, and then start over from the beginning.
The following should be complete before applying power to the driver:

1. SVR2 has been gently rotated counter-clockwise until it stops (set to minimum current)
2. DIM+ and DIM- wires on driver are connected to a dimmer
3. Dimmer is set to 100% brightness (10VDC MAX)
4. Multimeter is turned on and set up to measure current
5. Multimeter is wired into LED string as if it were an LED

Once all of the above have been completed, power the driver and rotate SVR2 clockwise until the readout on the multimeter displays the desired output current for 100% brightness. In the below photos, the current begins at .25A, or 250mA. SVR2 was rotated clockwise until the desired maximum current, .75A, or 750mA. In our example, we wired our probes backwards, thus the – sign. When measuring current, you can ignore the – sign because we are only interested in the absolute amount of current flowing through the LED string. Switching the multimeter leads around would have flipped the sign around to +(no sign) in this example.

Now that you have set the current on your driver by rotating SVR2, un-plug the driver, replace the cover, and re-wire your LED string.

**Finishing Up**

After all of your wiring is complete, re-attach the plastic cover, power it up and enjoy!