Helena

User Manual

1 Preface

Helena is an alternative driver for the popular Yinding or KD2 Headlight Cycling Lamp with following features:

- Two independent 3A Step-Down constant current sources, each capable of driving two white LEDs in series. The intended setup is one Cree XHP50 LED equipped with a flood optic and one Cree XHP35 6V equipped with a spot optic.
- Integrated motion sensor to drive the LEDs in dependency of the head inclination, resulting a nearly constant brightness level, no matter if you're looking down or straight forward.
- Bluetooth interface for wireless remote control, lamp daisy-chaining and Smartphone based configuration.
- Integrated temperature regulation to prevent lamp from overheating.
- Smooth output power reduction when battery is low.
- Low standby current (less than 100µA).
- Works with input voltages between 3V and 4.25V (only 1 LED per current source), 6V and 8.5V and between 9V and 12.75V (max. output current is limited to 2.4A).

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2 Installation

2.1 Connections

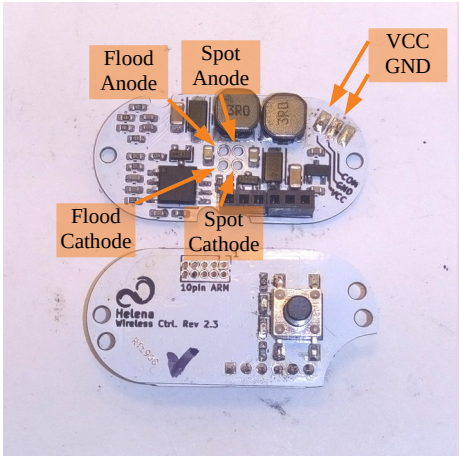

Image 1: board connections

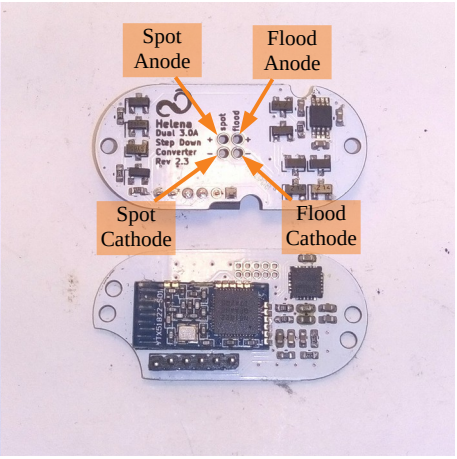

Image 2: board connections

2.2 Driver Swap for KD2

Step 1. Disassemble lamp and remove old driver. Mount LED board witch the notches facing to the top and route both cables through the left one. Then cut the cables to a length of 20-25mm and cover the screws with electric tape.

Image 3: LED board preparations

Step 2. Connect the LED cables to the spot driver output of the LED driver. Route the cables as shown in the image.

Image 4: LED connection

Step 3. Attach the power cable (and optionally the communication line). Route the cables along the board-to-board connector and use the notch next to it to lead it through the opening.

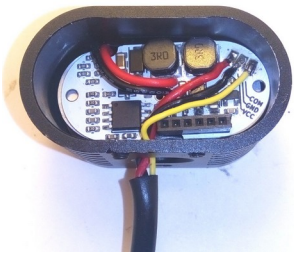

Image 5: power cable routing

Step 4. Mount the controller board to the lid.

Image 6: mounted Controller board

Step 5. Put a pair of tweezers, zip ties, toothpicks or a similar object between the LED- and driver board to lift it a couple of millimeters, then put the lid on and.

Image 7: Lift driver board for proper connection

Step 6. When the connector fits properly, remove the tweezers, close the lid and you are done.

Image 8: closed lid

2.3 Driver Swap for Yinding

Step 1. Disassemble lamp and remove old driver. Cut the cables to a length of 20-25mm.

Image 9: prepared LED cables

Step 2. Attach the power cable (and optionally the communication line) Don’t forget to run the cable through the opening in the lamp body.

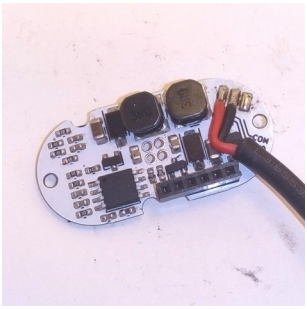

Image 10: attached power cable

Step 3. Now attach the cables from the LED board to the spot output. Connect them from the bottom side.

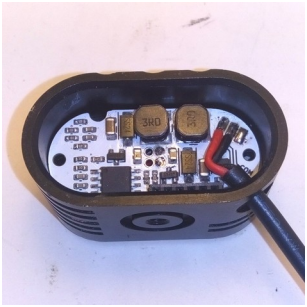

Image 11: attached LED cables

Step 4. Mount the controller board to the lid.

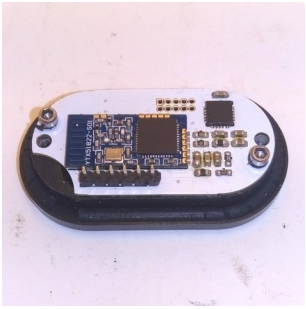

Image 12: mounted Controller board

Step 5. Close the lid and reassemble the lamp.

2.4 Full conversion for Yinding

Step 1. Prepare LED boards by attaching cables and cutting them to a length of 25-30mm.

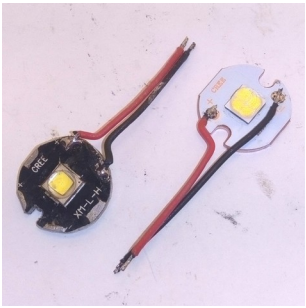

Image 13: prepared LED boards

Step 2. Attach the power cable (and optionally the communication line) Don’t forget to run the cable through the opening in the lamp body.

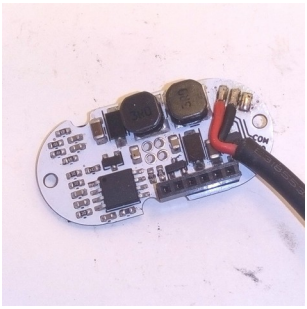

Image 14: attached power cable

Step 3. Route the LED boards cables through the inner hole.

Image 15: cable routing

Step 4. Now attach the cables from the bottom side. Solder the cables of the XHP50 to the flood output and the cables of the XM-L to the spot output.

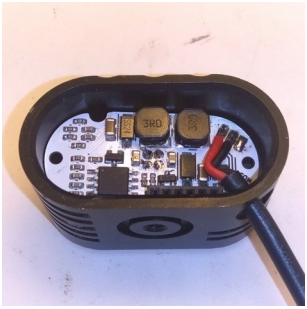

Image 16: attached LED boards cables

Step 5. Mount the controller board to the lid and close the lid.

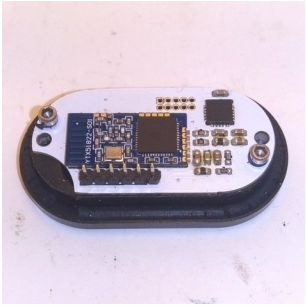

Image 17: mounted Controller board

Step 6. Flip the lamp around and tighten the screws to secure the lid and LED boards. Position the XHP50 board a bit to the top and the XM-L board a bit to the bottom.

Image 18: LED boards alignment

Step 7. Insert the lenses and use some spacers to tilt the spot lens upwards and the flood lens downwards. The spacers should have a height of 0.7-1.0mm, a quartered O-Ring works fine.

Image 19: tilted lenses

Step 8. Finally mount the lens cover.

Image 20: reassembled

3 Usage

3.1 Modes and Groups

Helena has 8 individual configurable modes, which can be organized in different groups.

3.1.1 Preferred Mode

One of the 8 available modes can be selected as the preferred mode. If no mode is selected to be the preferred mode, the lamp will shut off whenever the preferred mode is selected. If one mode is selected as the preferred mode the lamp will shut off, if it already is in the preferred mode. Otherwise it will jump to the preferred mode.

3.1.2 Temporary Mode

One of the 8 available modes can be selected as a temporary mode. If a mode is selected as temporary mode, it is possible to jump directly into this mode. When leaving the mode, Helen jumps back to the previously used mode.

3.1.3 Off Mode

One of the 8 available modes can be selected as the off mode. If a mode is selected as off mode, this mode will be used when the lamp is shut off. When the lamp enters stand-by mode (after three minutes without movement) it will completely shut off.

3.2 Remote Connection

Helena can manage up to 3 connections, 2 as a central (e.g. a remote control or another lamp) and 1 as peripheral (e.g. a smart phone or another lamp).

Although it is possible to pair with several remote controls, it is not possible to connect to more than one remote control simultaneously.

If two lamps are connected to each other, the lamp with the peripheral connection will break its connection with a remote control and won't reconnect as long as it is connected with the other lamp.

3.2.1 Central connection

To initiate a connection as central (e.g. if you want to connect to a remote control or initiate a central connection with another lamp), you have to

- shut of Helena,
- make sure, that all other unwanted compatible devices are shut of or out of range,
- press Helena's button for at least 2 sec.

Helena will indicate the search process with a fast blinking blue status LED. As soon as a connection is established the blue status LED will be constantly on. If no device is found within 30 sec. the lamp will stop searching and starts a 30 sec. window where it is open for peripheral connections (see next chapter).

This procedure is only necessary for the initial connection. The lamp will store all necessary information and automatically reconnect if the device is available.

3.2.2 Peripheral connection

To initiate a connection as peripheral (e.g. if you want to connect to a smartphone or initiate a peripheral connection with another lamp), you have to

- shut of Helena,
- make sure, that all other unwanted compatible devices are shut of or out of range,
- press Helena's button for at least 2 sec until the blue led blinks fast,
- wait 30 sec until the blue led stops fast blinking.

Now you can start the connection procedure on the central device.

This procedure is only necessary for the initial connection. The lamp will store all necessary information and you can establish future connection as soon as Helen is powered on.

3.3 Button Control

There are 4 button control commands:

- next mode:
  This command jumps to the next mode.
  If the ignore flag for this mode is selected, it will be skipped.

If the last mode within a group is reached, it will roll over to the first mode.
If the light is currently off it jumps to the first mode.

- next group:
  This command jumps to the next group.
  If the group only contains ignored modes, it will be skipped.
  If the current group is the last group, this command will jump to the first group.
  If the light is currently off, it jumps to the first mode in the second group.

- preferred mode:
  If the preferred mode is not set, the light will shut off.
  If the preferred mode is set, the light will jump directly to the preferred mode.
  If the light is already in the preferred mode, it will shut off.

- temporary mode:
  If the temporary mode is set, the light will jump into the temporary mode and jumps back to the previous mode.

3.3.1 Integrated button

- short click:
  next mode command

- long click:
  next group command

- press and hold > 2 sec., light is on:
  preferred mode command
- press and hold > 2 sec., light is off:
  initiate connection procedure
  hold button again for 2 sec. to delete all bluetooth bonding data
- press and hold > 10 sec., light is off:
  initiate a factory reset

3.3.2 External button (if available)

- short click:
  next mode command
- long click:
  next group command
- press and hold > 2 sec.:
  preferred mode command

3.3.3 Xiaomi Yi remote control

- main button, short click:
  next mode command
- main button, press and hold > 0.5 sec.:
  enter temporary mode as long as button is pressed
- secondary button, short click:
  next group command

Image 21: Xiaomi Yi RC

- secondary button, press and hold > 0.5 sec.:
  preferred mode command

3.3.4 Pearl/Auvisio remote control

- next track button, short click:
  next mode command
- previous track button, short click:
  previous mode command
- volume up button, short click:
  next group command
- volume down button, short click:
  previous group command
- play/pause button, short click:
  preferred mode command

Image 22: Pearl/Auvisio remote

3.4 Remote Synchronization

If Helena is connected to another lamp, both lamps will synchronize their current mode. This means if one light receives a button command, it will change its mode according to the description in the previous chapter and then relay this new mode (the number, not the configuration!) to the other lamp.

This lamp will then also jump into this mode, nevertheless if this mode is used or not. With this behavior it is possible to generate configurations where one lamp is on and the other not.

3.5 Status LED

Helena is equipped with a red and blue status LED, which is visible through the transparent button cap.

The blue LED gives information about the wireless connection. If is on, Helena is connected to a remote or another lamp. A fast blinking indicates, that Helena is searching for any compatible device. A slow blinking blue LED indicates, that Helena is searching for a already known device.

The red on turns on whenever the output is limited due to high temperature or dropping input voltage.

When Helena enters standby mode, the Status LED is shut off for minimum current consumption (but an established connection or the scanning for a known device will not be stopped).

4 Configuration

4.1 Connecting with the App

To connect to your lamp plug in the battery, open the App on your phone and press the SEARCH button. The App will then search and connect to all compatible lamps in range. Tap on the the light you want to configure.

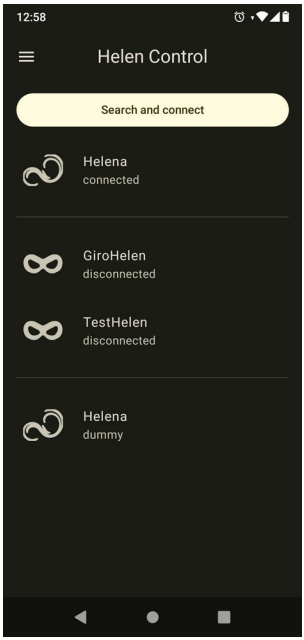

Image 23: Connecting

4.2 Light status

The `STATUS` page gives you information about the current state of the lamp.
If you tap at the control icon in the top bar you can also select any of the light modes or shut it off.
You can also switch between the `Expert Mode` and two profiles for easier configuration and setup (`Helena` for a full conversion, or `SimpleHelena` if you just swapped the driver)

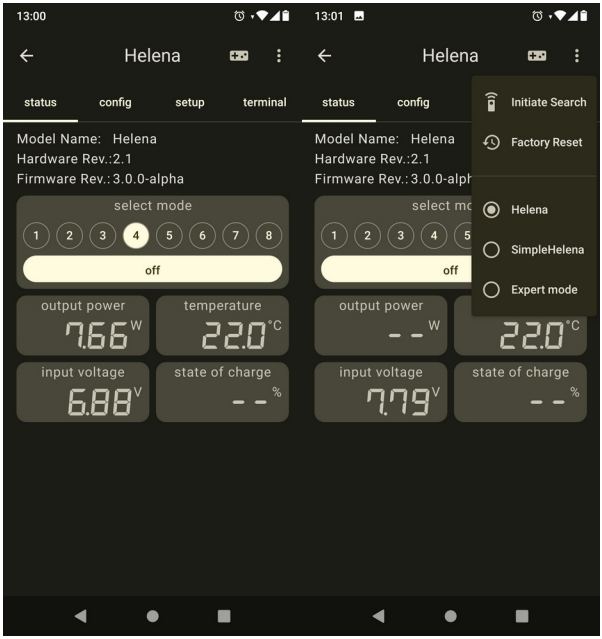

Image 24: Helena status

Image 25: Expert Mode or profile selection

4.3 Configuration

On the CONFIG page you see an overview of your modes and the group arrangements. To change the group arrangement simply drag and drop the group dividers. To add a group you can drag and drop from the top or bottom. To change a mode configuration tap on the mode. There you can select if the mode should be ignored, used as preferred, temporary or off mode, you can select the intensity of the light and if the motion sensor should be used for to adjust the light depending on your head inclination.

Image 26: Helena configuration

Image 27: Mode configuration

4.4 Setup

On the SETUP page you can select how to use the the communication pin. If you selected the Expert Mode you can also specify the setup of both LED channels.

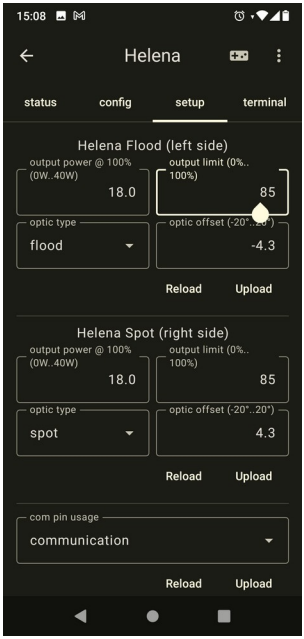

Image 28: Setup