Firmware test

Before releasing a new firmware version, several tests must be performed.

Soft fuses

Current soft fuse

The current soft fuse should turn off the switch in case of over current. The default thresholds can be found in `Config.h`.

Test plan current soft fuse when using IGBTs

First see if the dimmer stays on (checking for false negatives):

- Factory reset crownstone.
- Setup crownstone.
- Turn relay off.
- Turn dimmer on (at 100%).
- Plug in a load of 120W - 150W.
- Place a phone right next to it, call it every 5 minutes for the first hours.
- Check if this continues to stay on for hours.

Repeat, but now with actual dimming:

- Turn relay off.
- Turn dimmer on at 50%.
- Plug in a load of 120W - 150W.
- Place a phone right next to it, call it every 5 minutes for the first hours.
- Check if this continues to stay on for hours.

Next, overload the IGBTs:

- Turn dimmer on (at 100%).
- Plug in a light (so you can see when the dimmer turns off).
- Additionally, plug in a load of 300W.
- Check if this turns off immediately.
- Check if it reports the correct error state (`10` according to the [protocol](#)).
- Check if you can't turn on the dimmer anymore.
- Check if you can still turn on the relay.

Now repeat the process below a couple of times with 300W and a couple of times with 2000W:

- Plug out the load.
- Reset the error state (or reset the crownstone).
- Turn dimmer on (at 100%).
- Plug in the load.
- Check if this turns off immediately.
- Check if it reports the correct error state (`10` according to the [protocol](#)).

Temperature soft fuse

The temperature soft fuse makes sure the Crownstone doesn't overheat. It monitors the temperature of the chip and the dimmer (IGBTs). The default chip temperature threshold is set in the `CMakeBuild.config.default`, while the dimmer temperature threshold is defined in the `board.c` file.

Test plan chip temperature soft fuse

- Factory reset crownstone.
- Setup crownstone.
- Turn relay on.
- Plug in a load of 3000W, or blow hot air on the chip.

Now it should heat up (you should see the chip temperature rise) and turn off within an hour.

- Check if it turns off.
- Check if it reports the correct error state (100 according to the [protocol](#)).
- Check if you can't turn on the relay anymore.
- Check if you can't turn on the dimmer anymore.

Repeat the process a few times:

- Wait for it to cool off.
- Reset the error state (or reset the crownstone).
- Turn relay on.
- Check if it turns off.
- Check if it reports the correct error state (100 according to the [protocol](#)).
- Check if you can't turn on the relay anymore.
- Check if you can't turn on the dimmer anymore.

Test plan dimmer temperature soft fuse

- Factory reset crownstone.
- Setup crownstone.
- Turn relay off.
- Set current threshold dimmer at 16000mA.
- Reset crownstone.
- Verify current threshold dimmer is set at 16000mA.
- Turn dimmer on (at 100%).
- Plug in a load of 200W.
- Check if this continues to stay on for hours.

Now overload the dimmer:

- Plug in load of 300W.

Now it should heat up (you should see the chip temperature rise) and turn off within 15 minutes. If this doesn't happen, try with a load of 400W, or else 500W.

- Check if it turns off.
- Check if it reports the correct error state (1000 according to the [protocol](#)).
- Check if you can't turn on the relay anymore.
- Check if you can't turn on the dimmer anymore.
- Factory reset the crownstone.

Dimmer

Check dimmer stability with:

- An incandescent lamp.
- A halogen lamp.
- A dimmable LED lamp.

Check if dimmer restores after reset:

- Set dimmer at 30%.
- Plug out crownstone.
- Plug in crownstone.
- Check if it dims at 30% again (write down how long it takes).

Power measurements

Check if the power measurements are ok. For each check, measure about 30 seconds. For each check, write down how much difference there is between the measured power by the Crownstone and the external reference. For each check, write down how stable the output is (are there peaks?, how much noise in W?).

Off:

- Turn relay off, dimmer off.
- Check if measured power is about 0W.

Relay:

- Turn relay on, dimmer off.
- Check if measured power is about 0W.
- Plug in about 30W load
- Check if measured power is about right, write down results.
- Plug in about 60W load
- Check if measured power is about right, write down results.
- Plug in about 100W load
- Check if measured power is about right, write down results.
- Plug in about 800W load
- Check if measured power is about right, write down results.

Dimmer:

- Turn relay off
- Dimmer 100%
- Check if measured power is about 0W.
- Plug in about 30W load
- Check if measured power is about right, write down results.
- Plug in about 60W load
- Check if measured power is about right, write down results.
- Plug in about 100W load
- Check if measured power is about right, write down results.

Dimming:

- Relay off, load of about 30W.
- Dimmer at 25%
- Check if measured power is about right, write down results.
- Dimmer at 50%
- Check if measured power is about right, write down results.
- Dimmer at 75%
- Check if measured power is about right, write down results.

Setup

- Turn relay off.
- Factory reset crownstone.
- Setup crownstone.

- Check if relay turns on when setup is complete.
- Factory reset crownstone.
- Check if relay turns off after factory reset.