The CAN_IMU Thermostat assembly instruction

This document describes the assembly of the CAN_IMU thermostat kit. Thermal stabilization makes the CAN_IMU module immune to changes in the environment temperature, preventing variation of its calibration parameters and improving the overall sensing precision. Test results are provided in Appendix A.

Applicable for **CAN_IMU rev.C** (see product page https://www.basecamelectronics.com/can_imu_rev_c/)

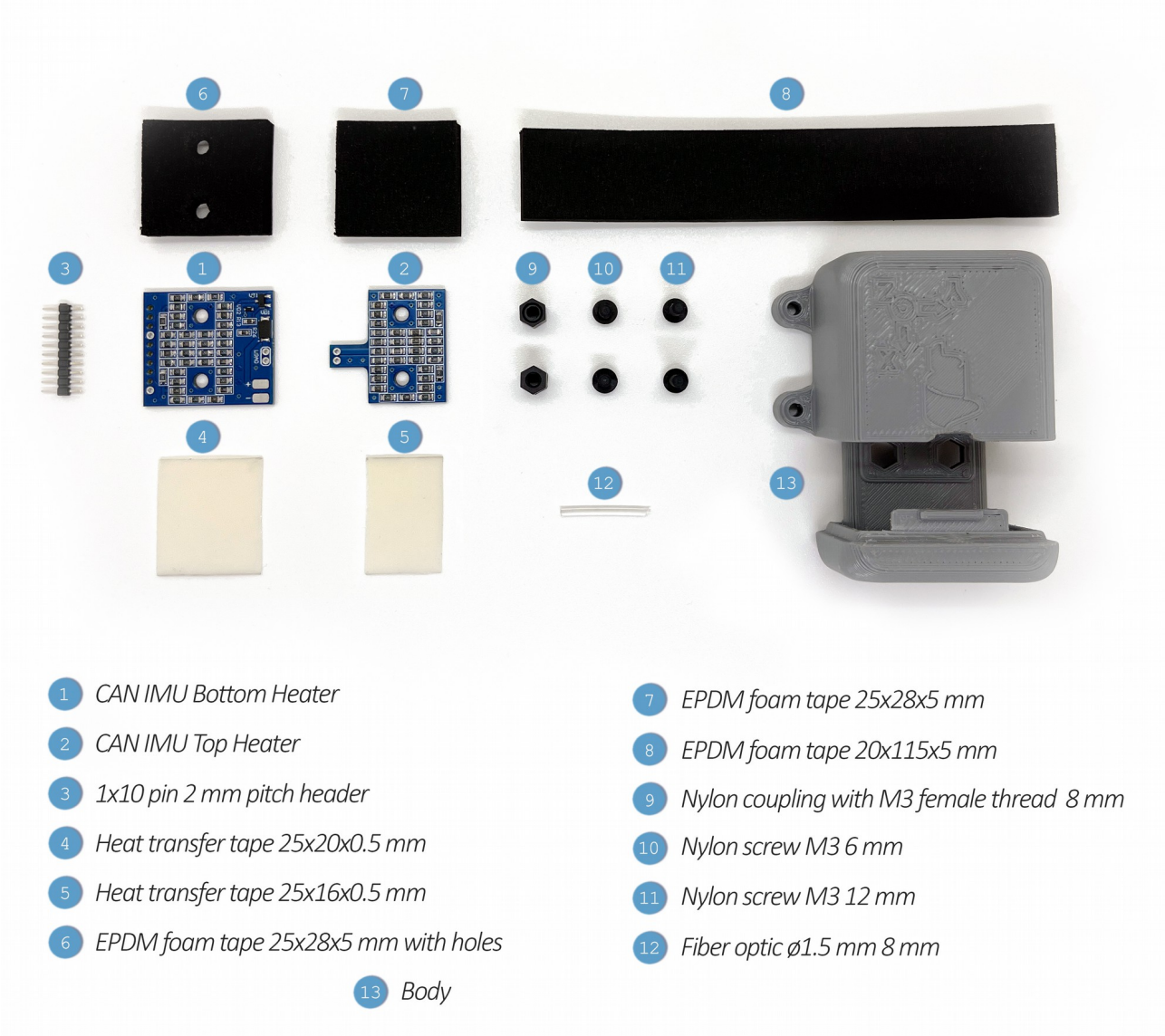

Figure 1. The thermostat kit contents

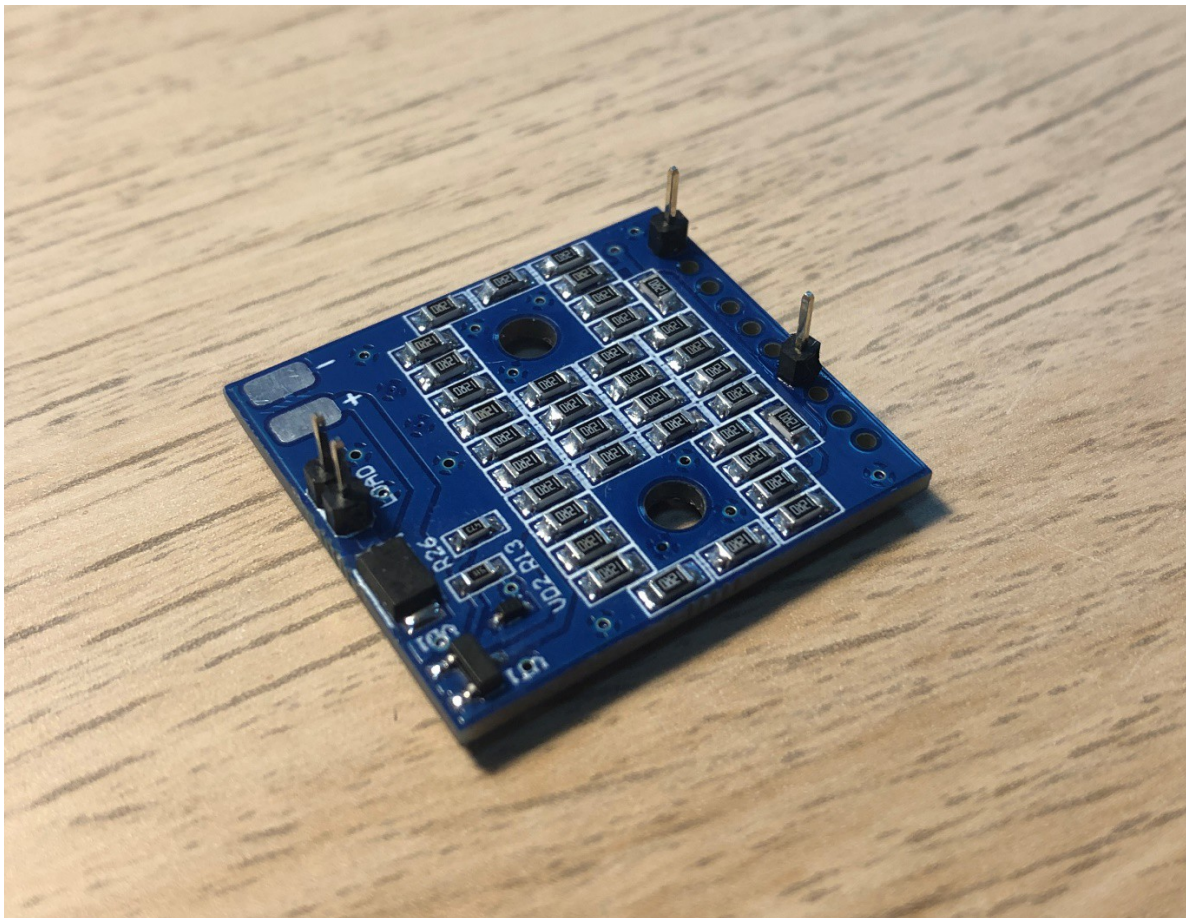

Figure 2. Bottom thermostat PCB preparing

1. Assembly starts from the bottom thermostat board. A two-pin 2 mm step header is soldered into the «LOAD» joint and one-pin headers into the «GND» and «PWM» pads.

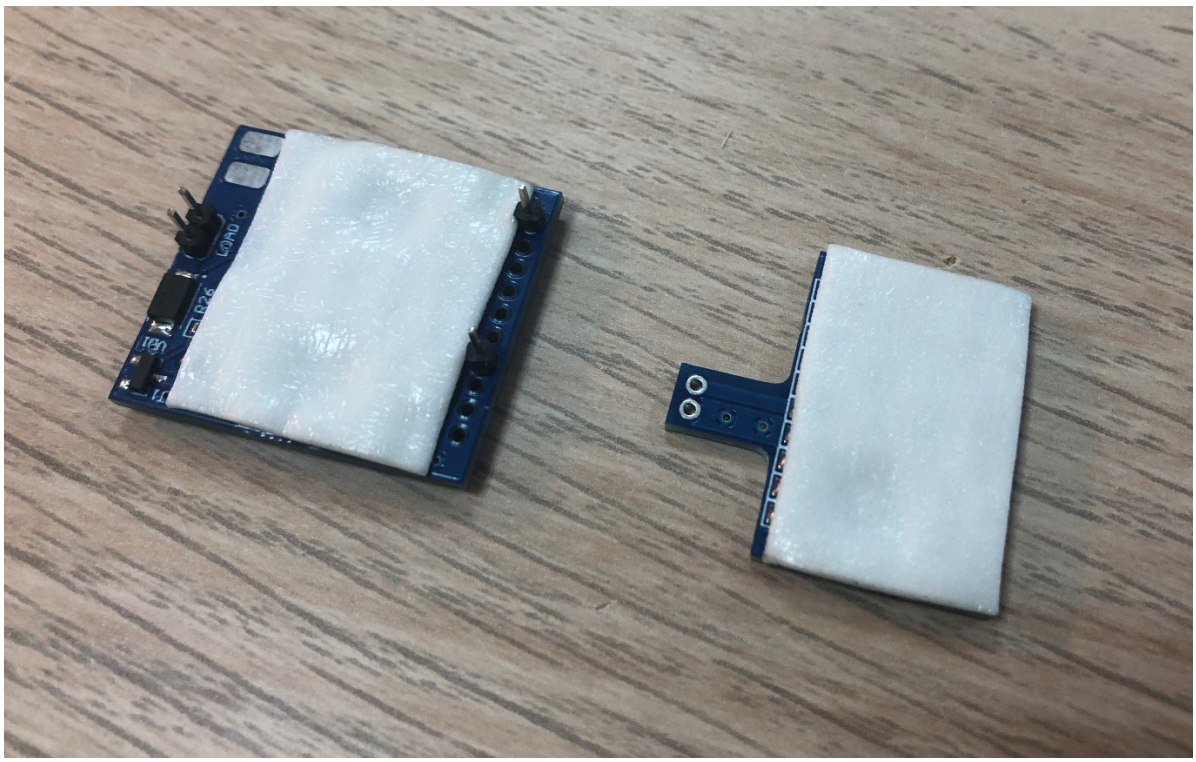

Figure 3. Thermal pads glued on

2. Next, a layer of thermal pads is glued on both thermostat boards from the side of the resistive matrices (fig. 3). The most convenient way to assemble: peel off a thick layer of the protective film and carefully stick the material to the corresponding boards – 20 mm piece to the bottom and 16 mm piece to the top PCB. Then it is necessary to peel off a thin protective film from the upper sides of the thermal pads. During this procedure, it should be avoided the deformation of the thermal pad itself.

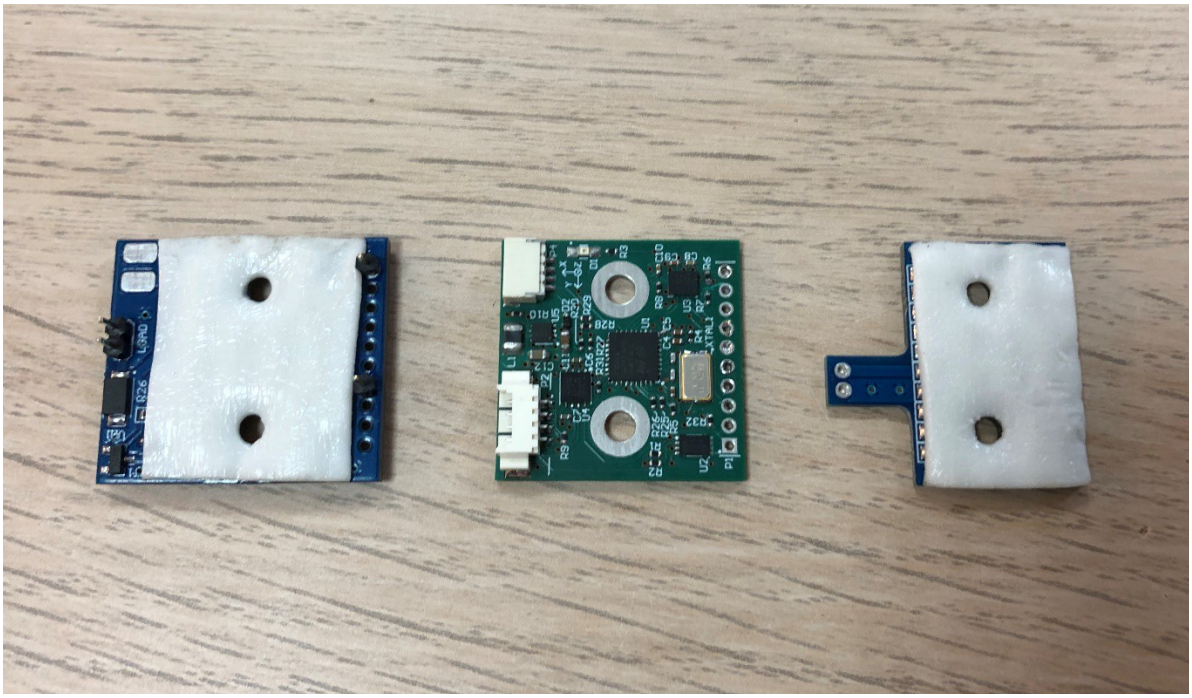

Figure 4. The thermostat is ready for assembly

3. After the protective layer is removed, make holes in compliance with the mounting holes on PCB (fig. 4). Now, the thermostat is ready for assembly.

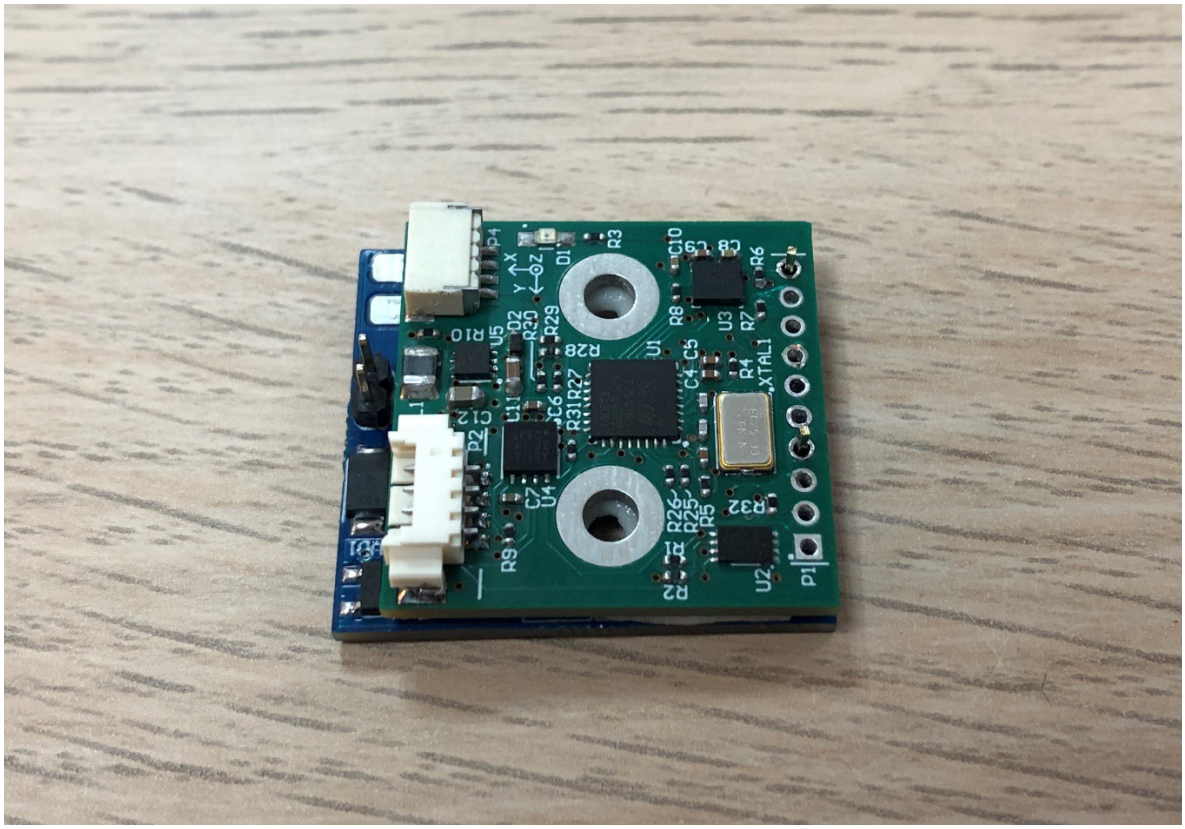

Figure 5. Connecting the bottom thermostat board to the CAN_IMU

4. Pulling off «PWM» and «GND» pin spacers is needed to have a good contact. After that, stick the CAN_IMU board onto the bottom thermostat board. In case of an unsuccessful attempt, carefully peel off the CAN_IMU, trying to avoid damaging the thermal pad and repeat again. Then lightly press the boards together. Leave the pins unsoldered at this moment.

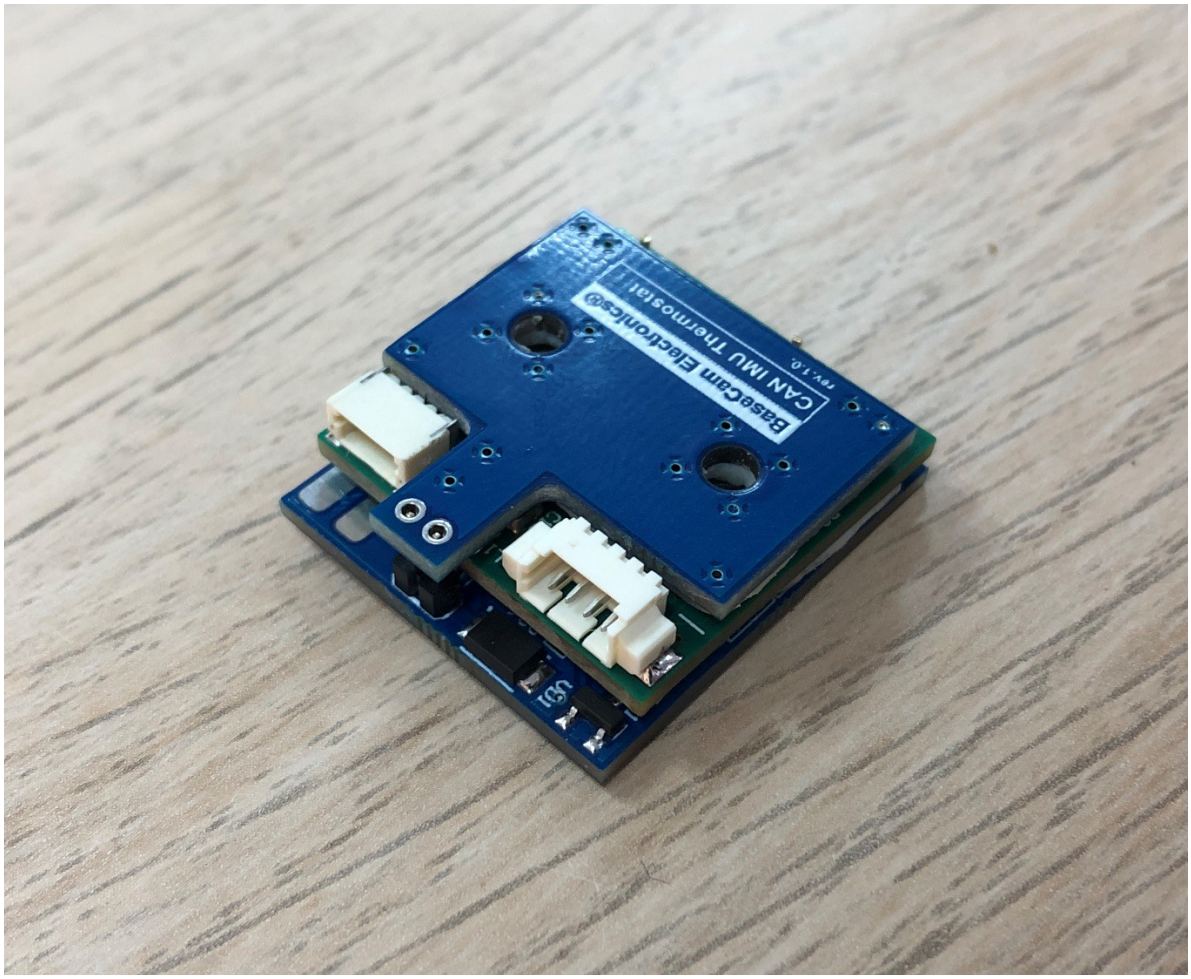

Figure 6. Installing the top thermostat board

5. Likewise, join the top thermostat PCB without soldering (fig. 6). Make sure that the "LOAD" pin connector fits into the connection pads of the top board.

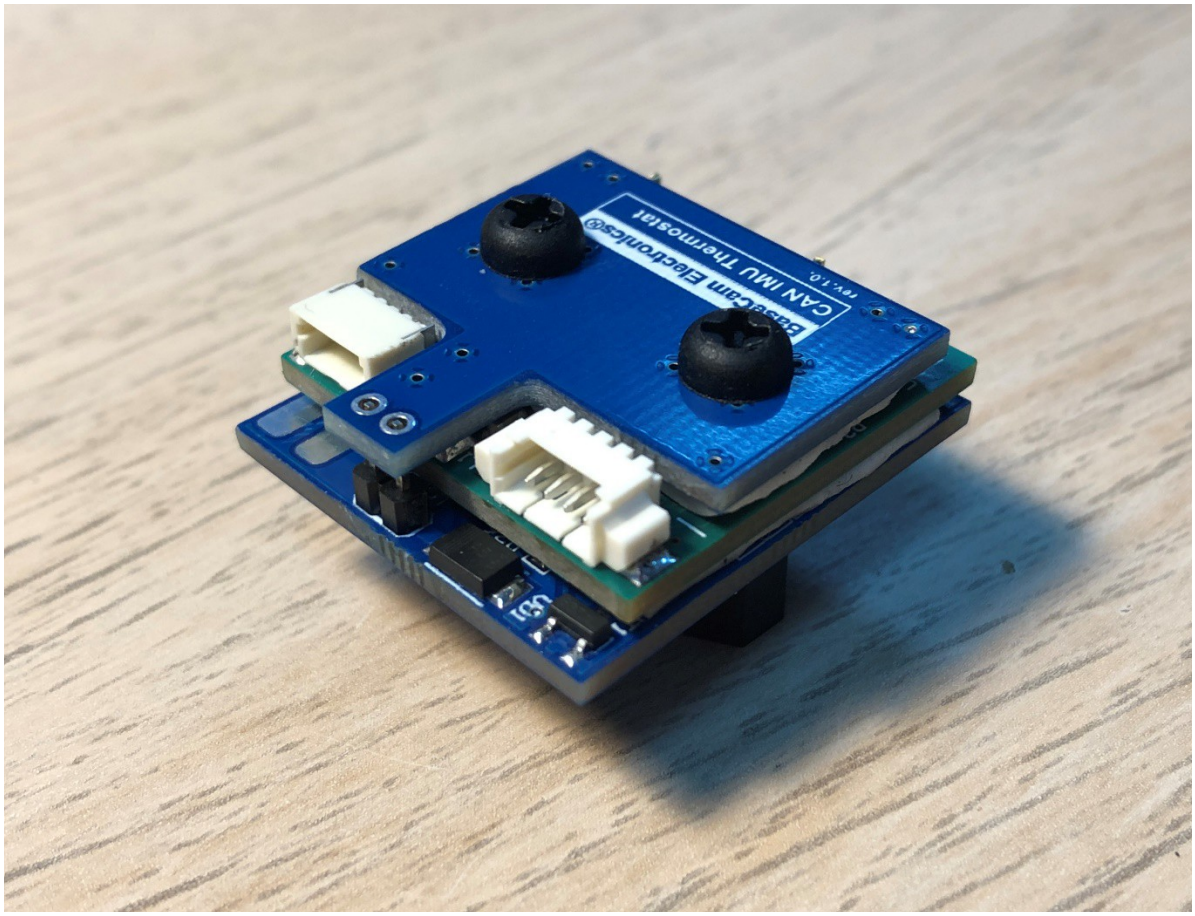

Figure 7. Nylon screws assembling

6. Fit two 12 mm nylon screws into the mounting holes of the top board (fig. 7). From the reverse side, screw nylon couplings with M3 internal thread 8 mm high onto them. Tighten this construction with a little effort. In the process, monitor the absence of skew in all axes.

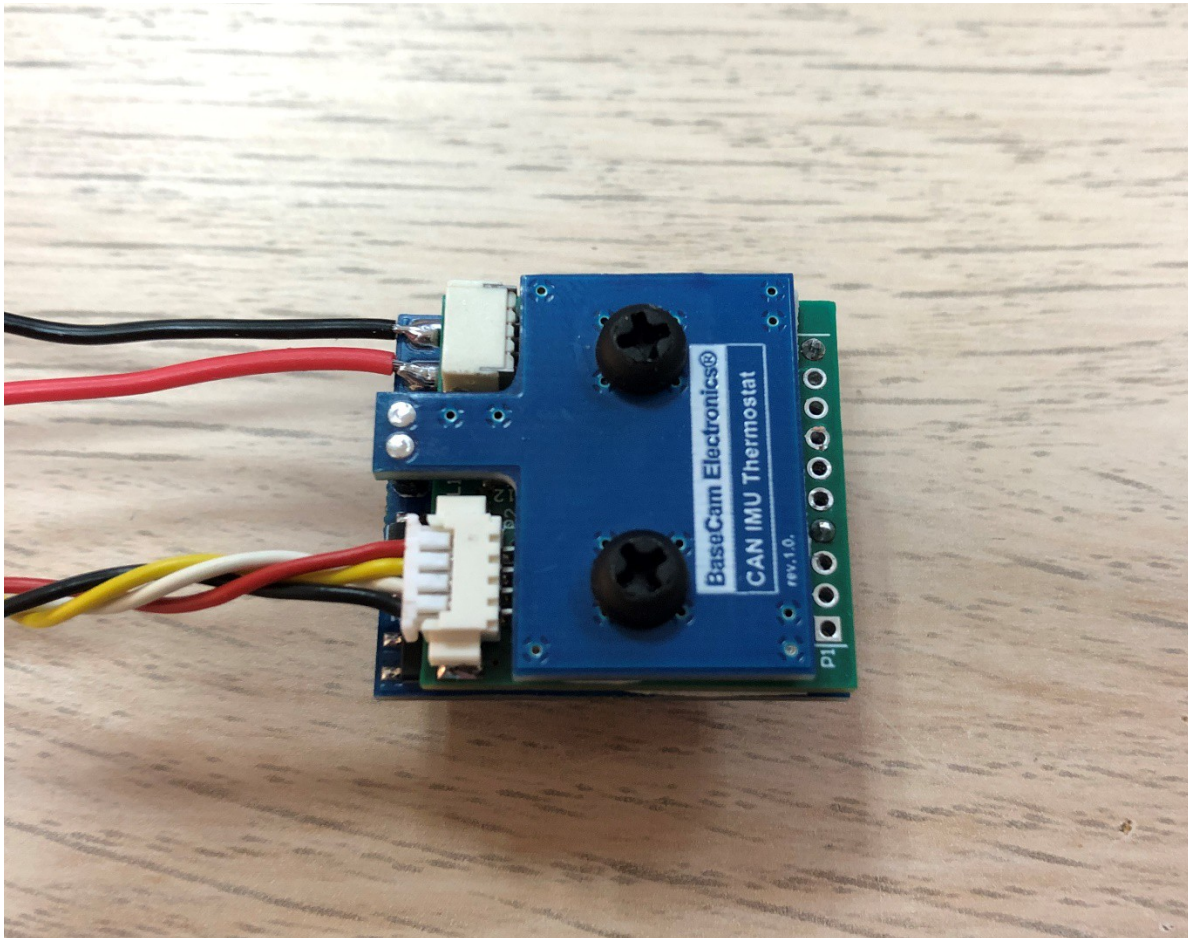

Figure 8. Final electrical installation

7. Check PCB parallelism one more time. The next step, it's needed to solder the PCB («LOAD» connection on the top thermostat as well as «PWM» and «GND» pads on the CAN_IMU board). Excess header length can be cut off. Then solder two power wires to the bottom thermostat board. The wire cross-section must be at least 0.5 mm. Install the CAN cable plug. The electrical assembly is finished (fig. 8).

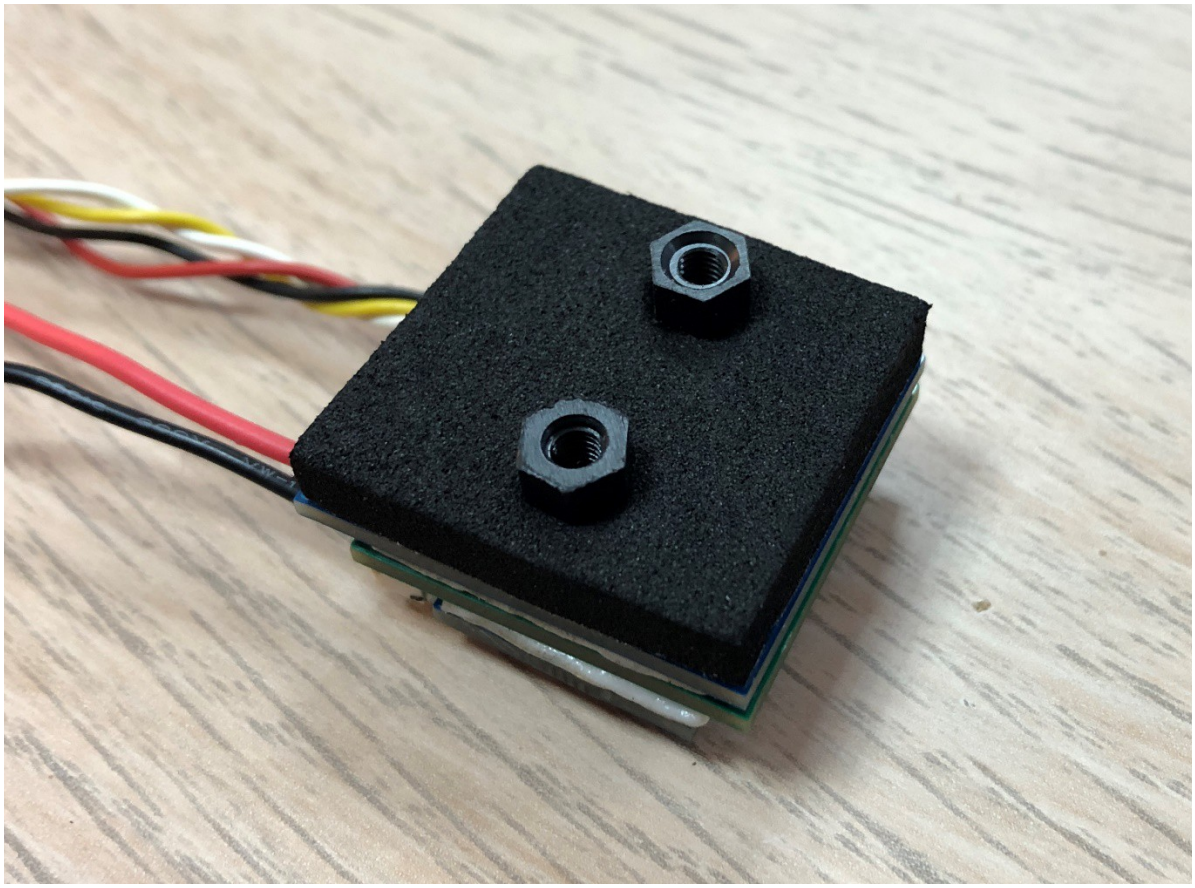

Figure 9. Heat insulation of the thermostat bottom side

8. Next, it is necessary to stick a 28 mm piece of thermal insulating tape of «EPDM Foam» with holes to the bottom thermostat PCB. The nylon couplings must be aligned, as in figure 9.

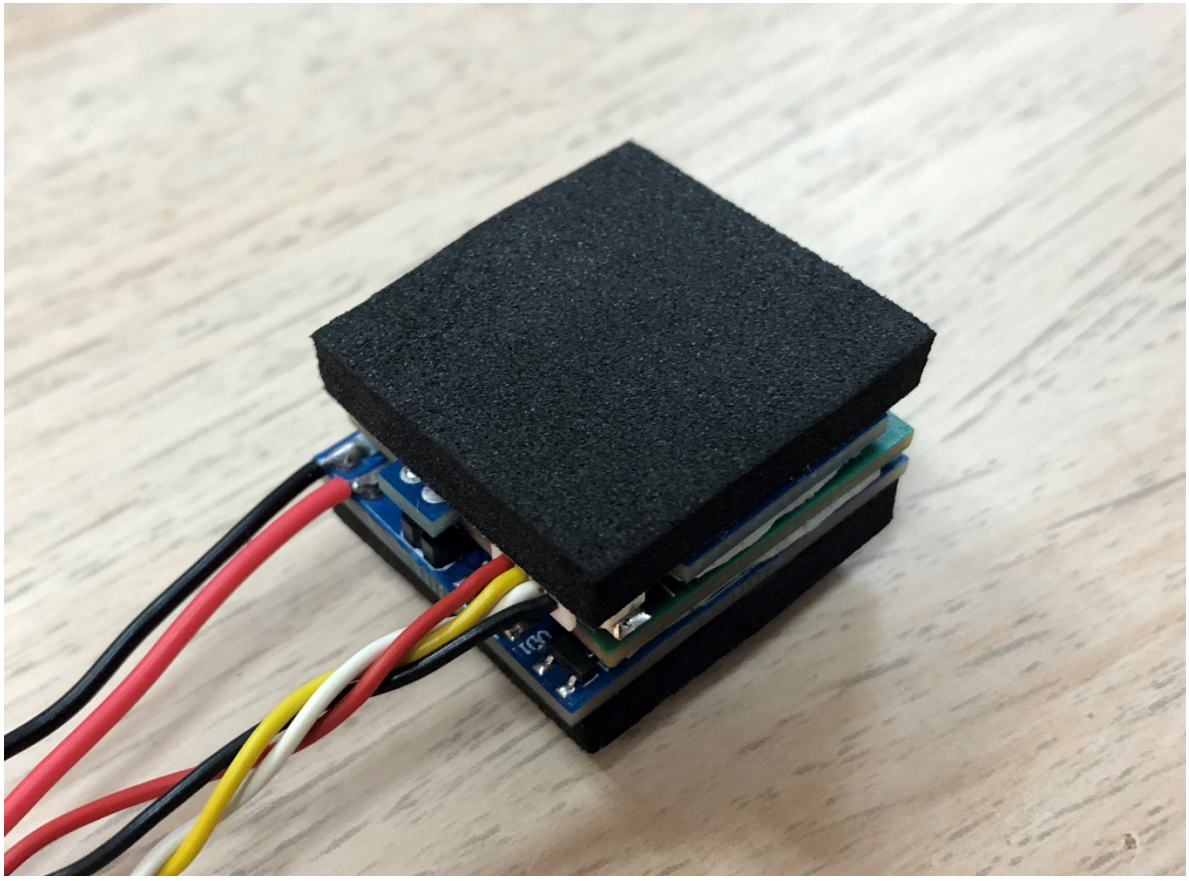

Figure 10. Heat insulation of the thermostat top side

9. Repeat step 8 for the top side (fig. 10). Ignore the screw heads. Press firmly around the edges.

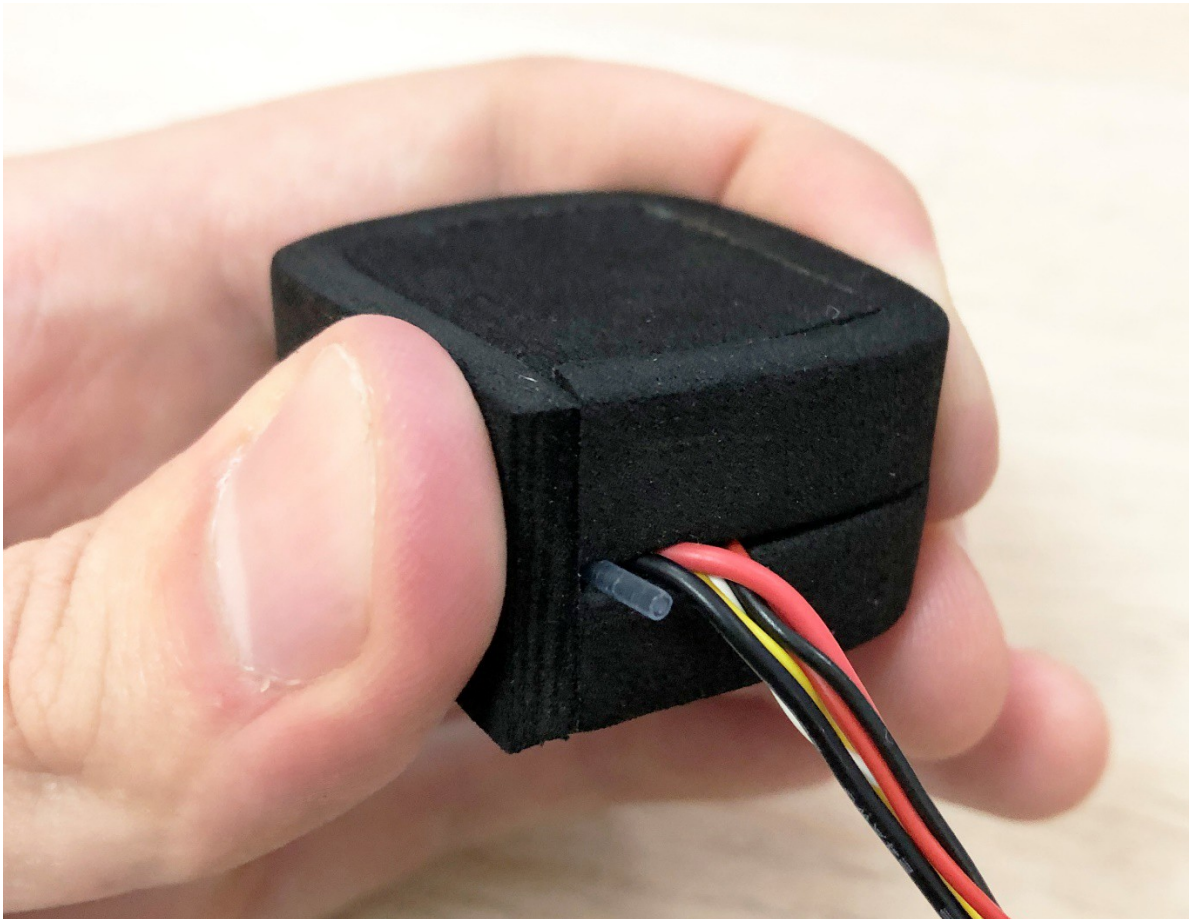

Figure 11. Thermal insulation of the thermostat sides

10. Create a 20 mm cut from the edge of the thermal insulating tape, through which the wires will come out. Then remove the protective layer and envelop the thermostat around the perimeter with a little tension (fig. 11). Pull out the power and CAN wires through the cut. At the place of convergence of the tape and the cut, install the fiber optic tube so that its oblique edge is directed to the LED of the CAN_IMU board located on its edge.

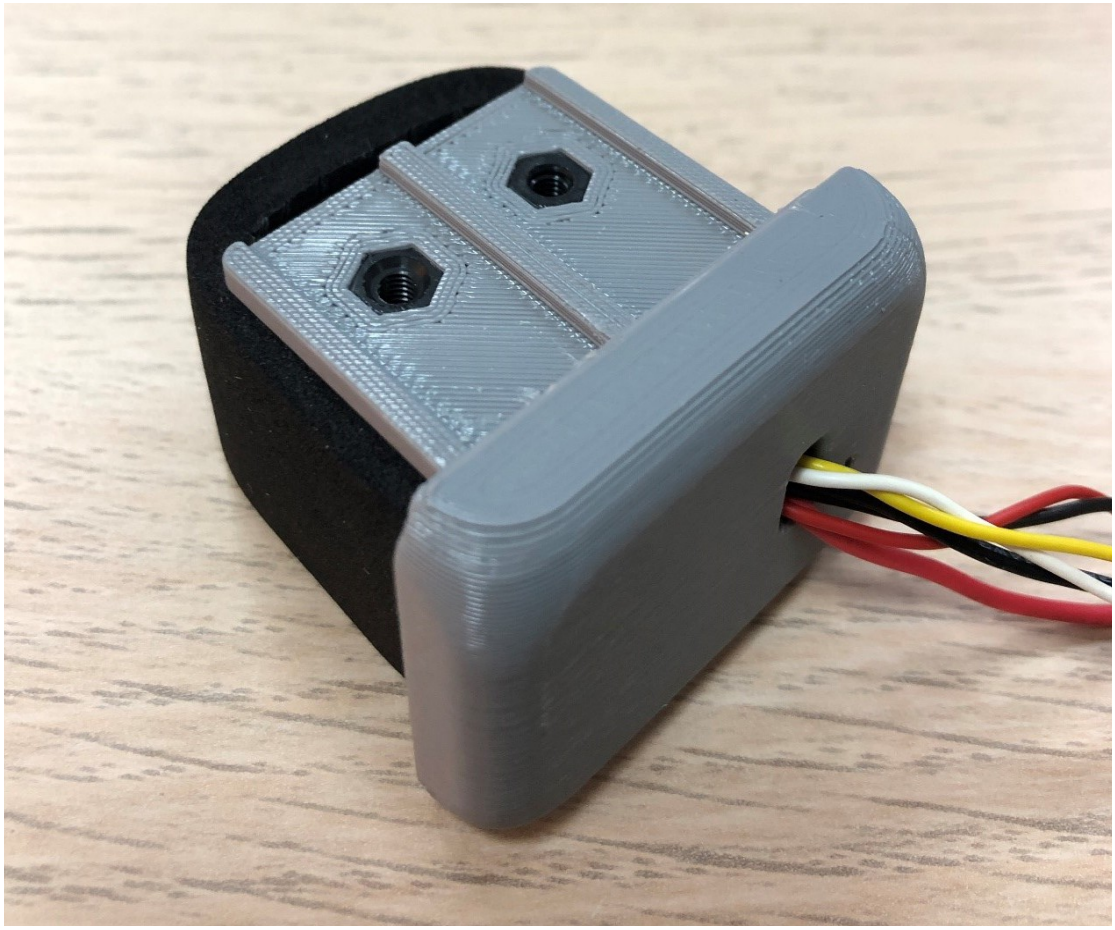

Figure 12. Installing the thermostat in the front of the body.

11. The next step it is needed to pull out the wires through the front-side hole of the box. Mount the thermostat into the bottom body holes (fig. 12). The fiber-optic tube should fit in its hole.

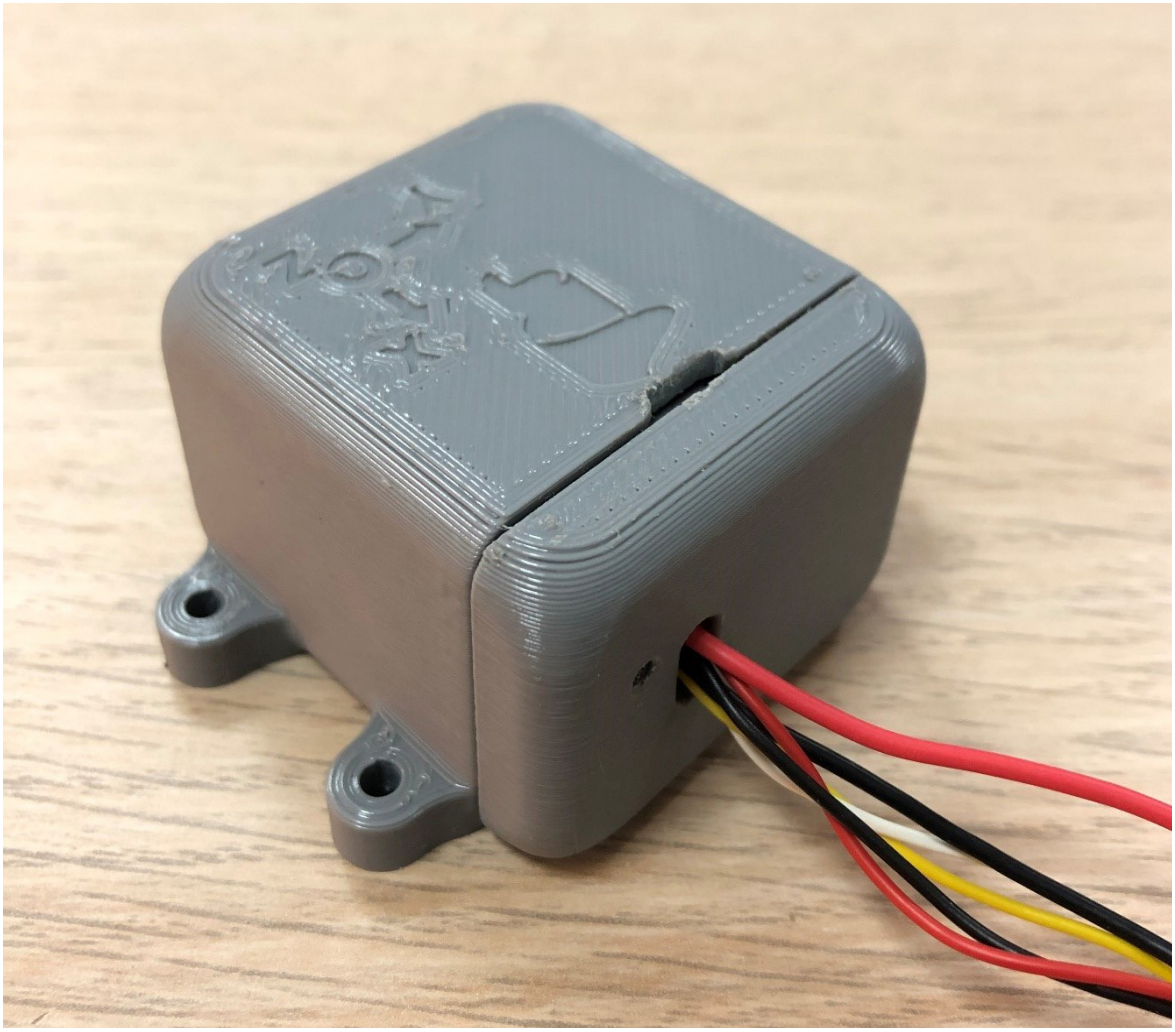

Figure 13. Packing thermostat into the body

12. Install the assembled unit into the remaining part of the box. It should go in with some effort. Fix it from the bottom side with two M3 screws, 6 mm long. Figure 13 shows the fully assembled device.

Appendix A: Test results in various environments

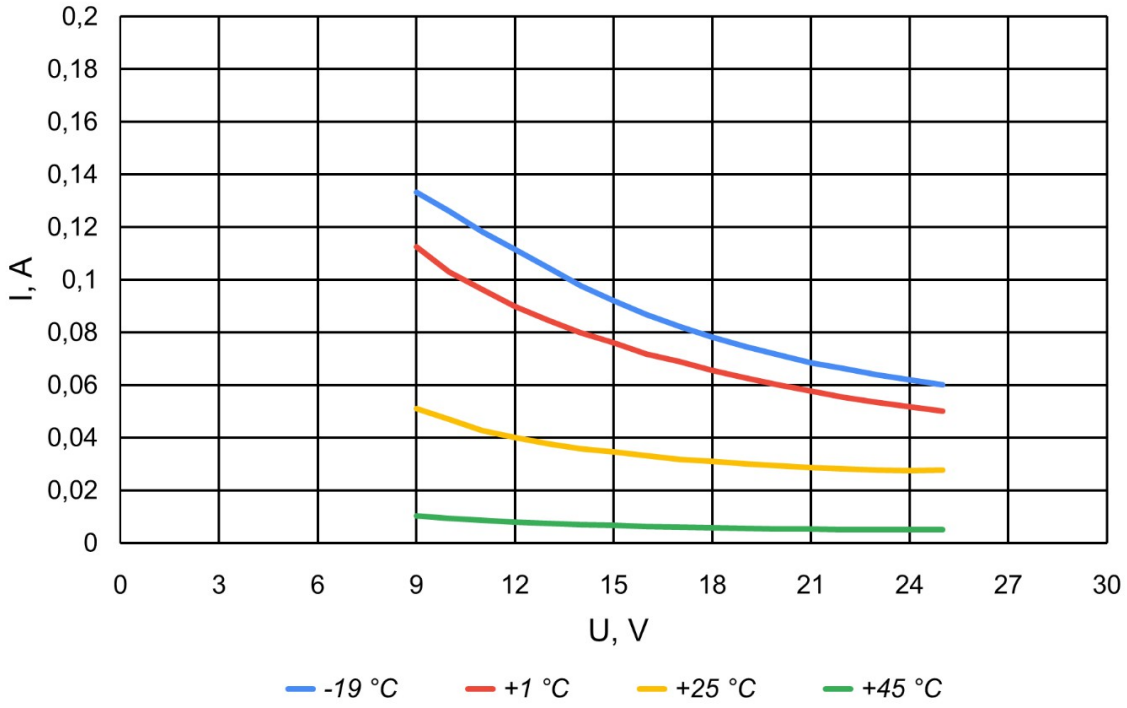

Figure 14. Power supply characteristics of the thermostat in a normal mode

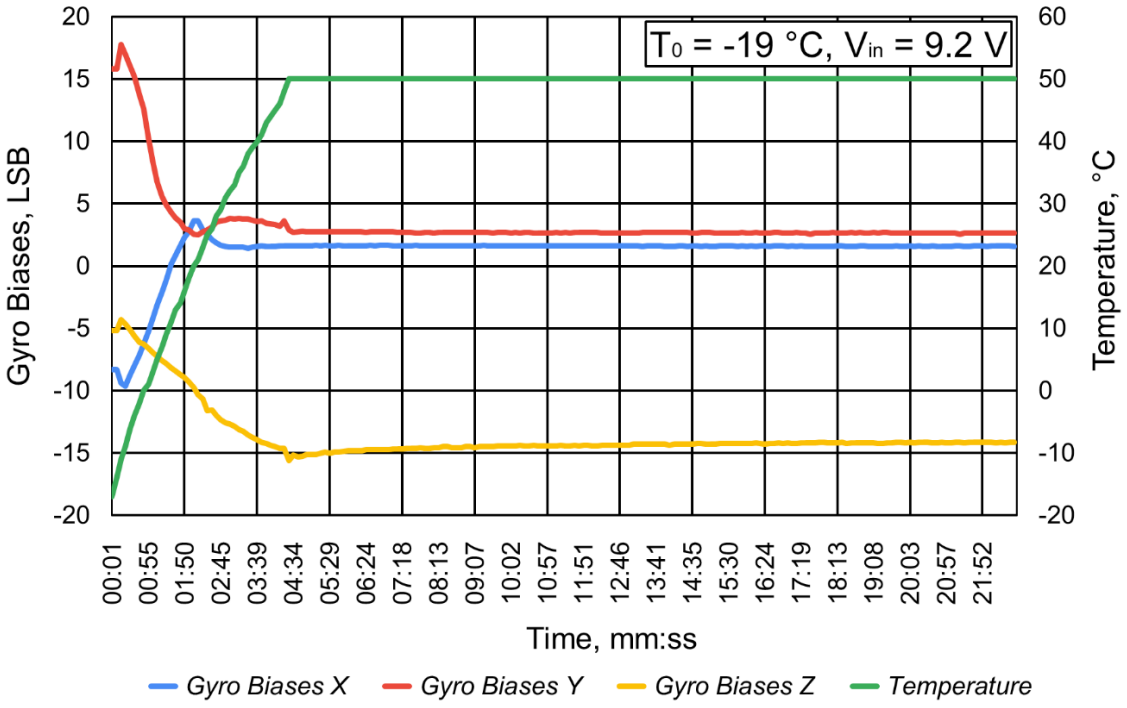

Figure 15.1. Settling at T_{ENV} = -19 °C

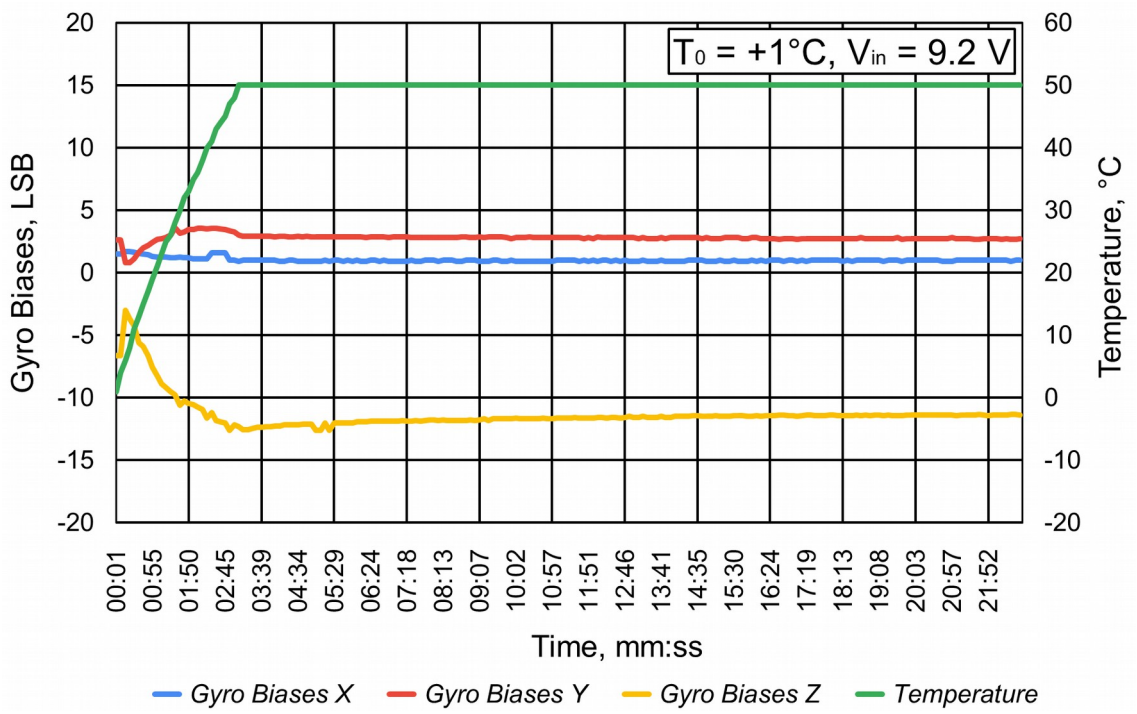

Figure 15.2. Settling at T_{ENV} = +1 °C

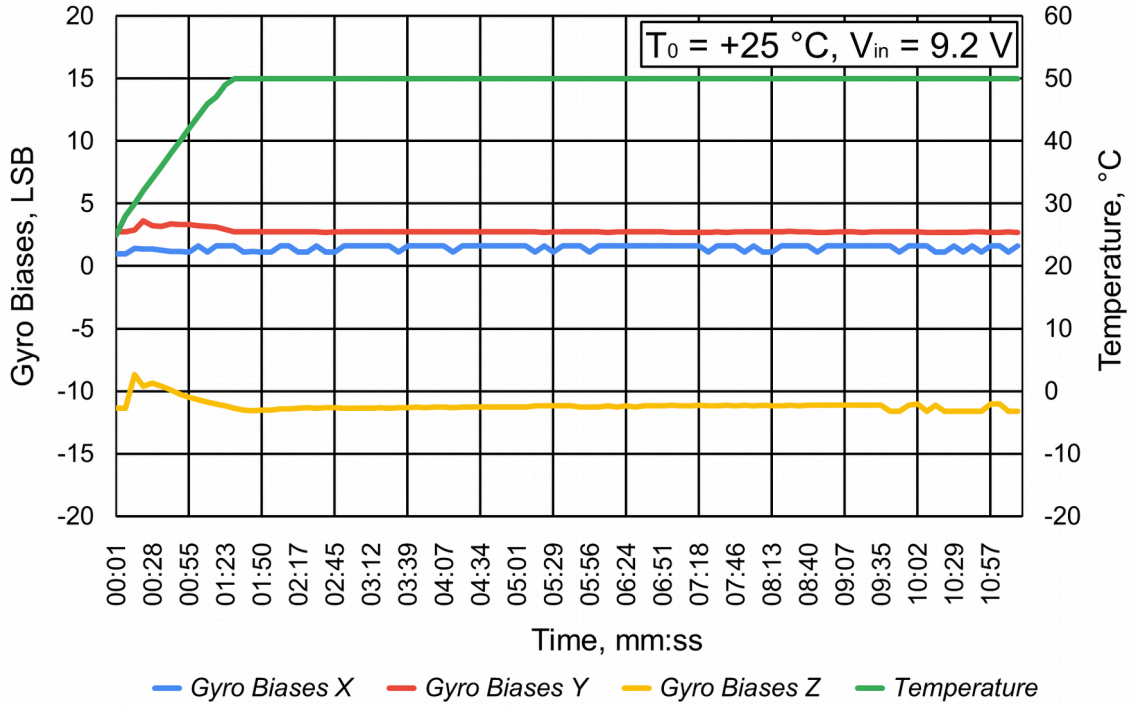

Figure 15.3. Settling at T_{ENV} = +25 °C

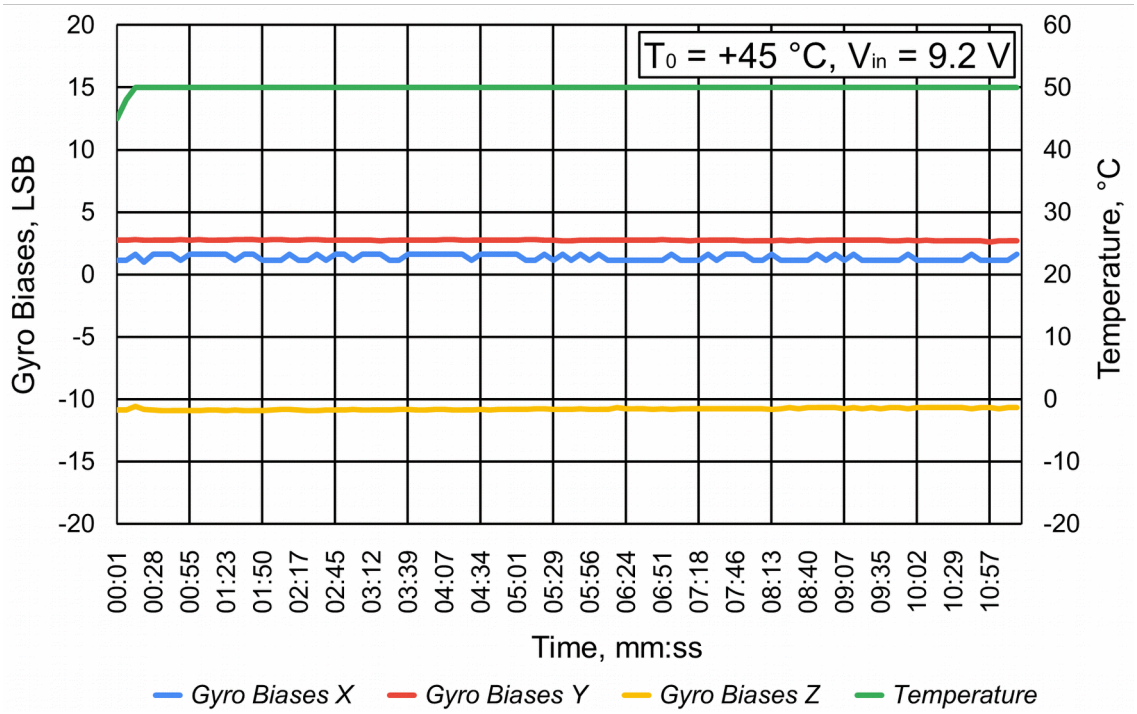

Figure 15.4. Settling at T_{ENV} = +45 °C

$$LSB = \frac{2000}{32768} \text{ (°/ sec.).}$$