

# Assembly and Calibration Guide for the Scale

Whoooo

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## 1 Introduction

This document provides step-by-step instructions on how to 3D print the parts, assemble the electronics, and calibrate your scale.

## 2 Parts and Preparations

### 2.1 3D-Printed Parts

- Main enclosure
- Base plate
- Bracket
- Anti-slip mat

### 2.2 Electronics

- LilyGO T-touch bar OLED (microcontroller)
- HX711 (load cell amplifier)
- Load cell (sensor)
- Battery (with battery connector)
- GPIO wires (for connections between microcontroller and HX711)

### 2.3 Tools and Supplies

- Soldering iron and solder
- Wire cutters (to trim cables)
- Screwdriver
- Reference weight (for calibration)
- Computer with Arduino IDE and VisualStudio with PlatformIO
- Optional: Hot glue gun or suitable adhesive for attaching TPU anti-slip mat

## 3 3D-Printing the Parts

1. Print all main parts
2. (Optional) Print the anti-slip pad or mold

## 4 Preparing the Electronics

### 4.1 Trimming the GPIO Wires

- Cut the GPIO cables to a length shorter than 55 mm.



Figure 1: The length should be no longer than 55mm.

### 4.2 Soldering the Load Cell to the HX711

- Red to E+
- Black to E-
- White to A-
- Green to A+

### 4.3 Soldering ESP Pins to the HX711

- Included with the controller is a 16 wire (4) cable for gpio.
- Solder the following wires:

ESP Pin	HX711 Connection
4	DAT
3	CLK
6	VCC/2.7–5 V
GND	GND

Table 1: Connections from ESP to HX711

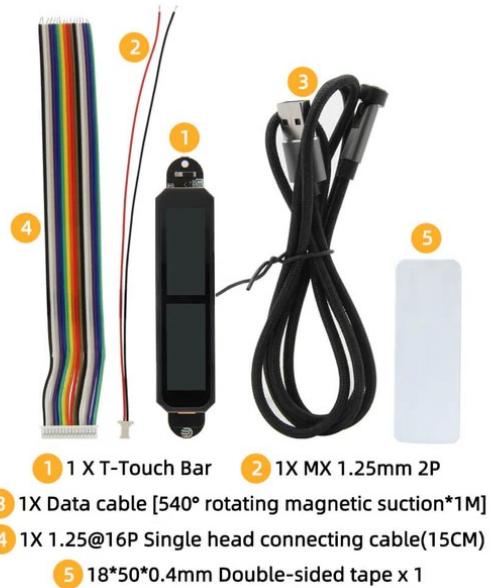


Figure 2: LilyGO Items included

#### 4.4 Soldering the Battery Connector

- Carefully solder the pigtail (2) included with the controller to the battery wires.

### 5 Connecting Everything

1. Connect the ESP to the HX711 using the wires you soldered in the previous step.
2. Plug the battery into the ESP.
3. Connect the device to a computer and check that it powers on correctly. (it should launch an example project)

### 6 Assembling the Unit

1. Insert all the threaded inserts as shown, red circles being necessary and green optional:

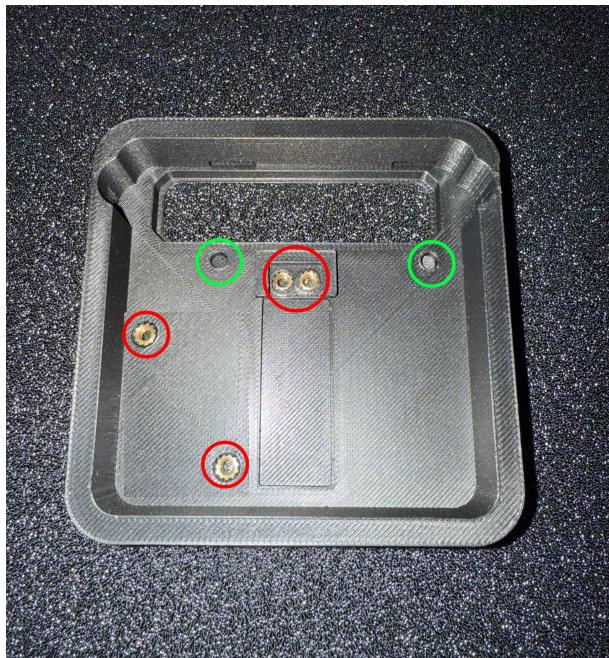


Figure 3: Heated inserts

2. Put the display and esp into the enclosure making sure the buttons are facing the "wall"
3. Insert the bracket between the display and esp, pushing it down. Should feel it get stuck
4. (Optional) Screw the bracket down using the M3x6 screws
5. Place the electronics into the main enclosure as shown routing the cables under the hx711.



Figure 4: Assembled

6. Make sure the load cell is mounted securely using the M3x10 screws. (NOTE: It should be attached with the non threaded side)

7. Mount the battery with double sided tape.
8. Attach the base plate using the M3x12 screws (Optional: use countersunk screws)

## 7 Calibrating the Scale

1. Obtain a reference weight (using another accurate scale or a dedicated calibration weight).
2. **Important:** Place the scale **upside down** for calibration.
3. Open the Arduino IDE and load the sketch named `Scale_calibration`. (Creds: SparkFun)
4. Upload the sketch to your ESP and open the Serial Monitor at 9600 baud.
5. When the weight readings appear, place the reference weight on the scale.
6. Use the + or - keys in the Serial Monitor to adjust the calibration factor until the displayed value matches the reference weight.
7. Note down the final calibration factor.

## 8 Final Firmware Installation

1. Follow the instructions on the project's GitHub repository to download the final firmware.
2. Open `scale.cpp` and insert the calibration factor you found.
3. Upload the final firmware to the ESP.
4. Verify that the scale now reads correctly when placing your reference weight.

### 8.1 OTA

To use OTA update note the IP address displayed in the serial after uploading program, then set the upload port to the IP address.

1. Press the plug icon at the bottom
2. Choose custom
3. Write in the ip address

Now as long as the scale is powered on you should be able to update it.

## 9 Attaching the TPU Anti-Slip Mat (Optional)

1. Apply glue (e.g., hot glue) to the bottom of the scale.
2. Place the TPU mat carefully and press it in place.
3. Let the glue dry before using the scale.

## 10 Usage

- The battery powers the device; tells you when battery is low, recharge using provided cable.

- Touch left display to start/stop timer
- Touch right display to tare weight and reset time
- The scale goes into deep sleep when idle for 5 min.
- Touch any part of the display to wake up.
- For best accuracy, place the scale on a stable, flat surface.
- Avoid impact.

## 11 Troubleshooting

- **No readings:** Check if the HX711 is soldered correctly, and if the DAT/CLK lines are connected to the correct ESP pins.
- **Unstable readings:** Ensure wires are soldered well and that there are no shorts.
- **Constantly increasing weight:** Ensure that the base plate and the main enclosure can move independently, and that the load cell is free to "bend"
- **Incorrect calibration:** Repeat the calibration process with a more accurate reference weight. More accurate reference and calibration factor equals more accurate scale

## 12 Conclusion

Following these steps should result in a fully functional scale. Keep a record of your calibration factor in case you need to update or re-calibrate in the future. Good luck!

### Contact / Support:

If you need additional help or guidance, please refer to the project's GitHub repository or contact me.