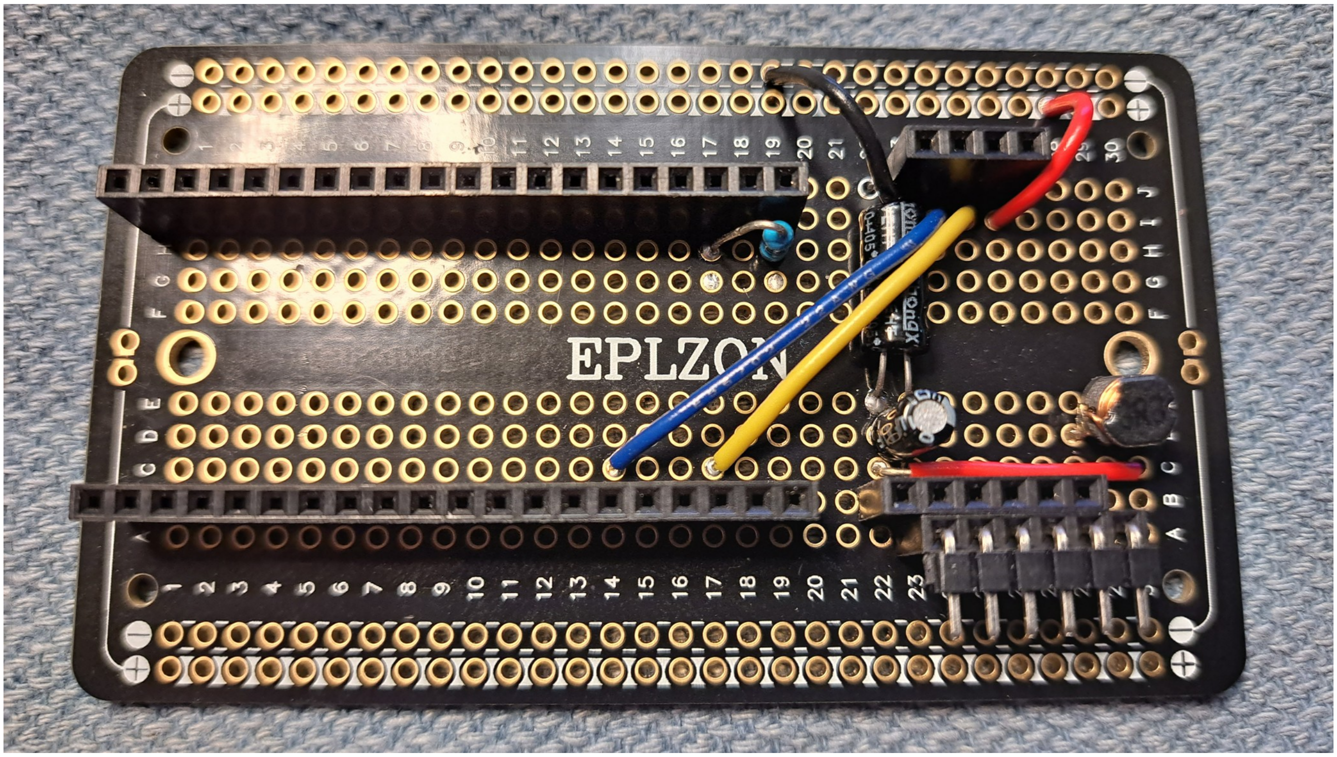
I almost always base my projects on PCB clones of breadboards to make planning easier. In rare cases, I will use plain old point-to-point boards if it doesn't involve a lot of jumper connections. Here's a link to the boards I used in the photos.

https://www.amazon.com/gp/product/B0BP28GYTV/



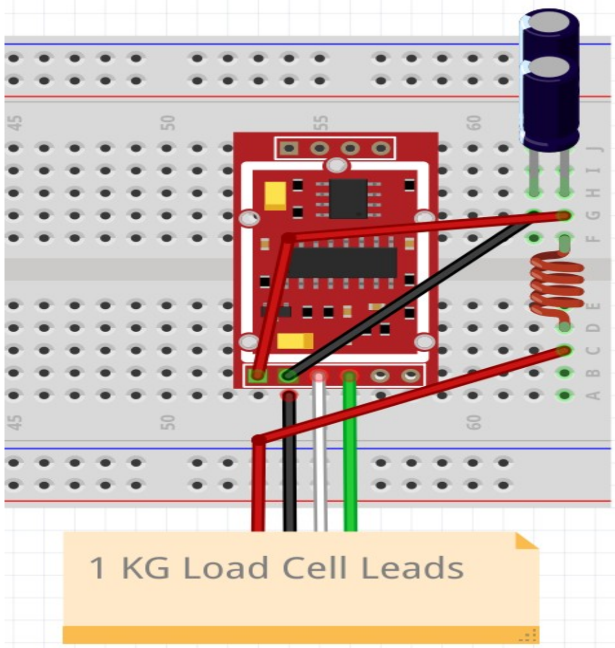
As you can see, there are a few external components used. From PCB pins 17H to 19H there is a 4.7K pull up resistor which is from the 3.3V pin of the ESP32 to GPIO 36 for the DS18B20 OneWire temperature sensor.

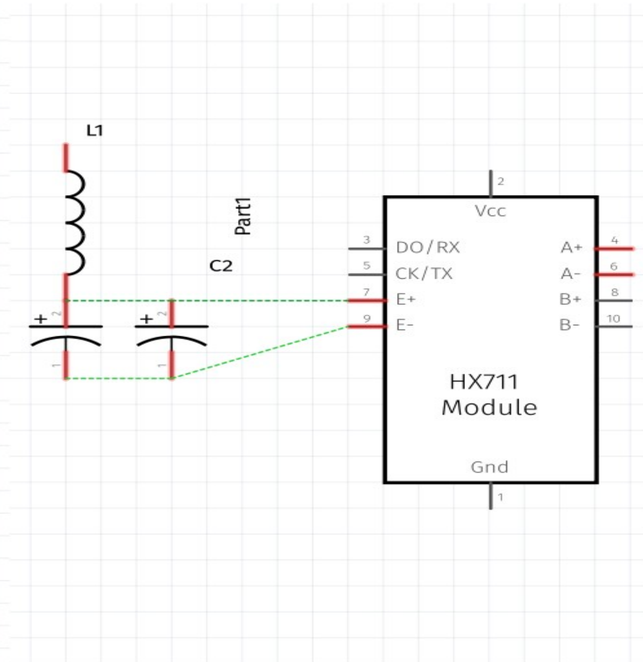
To the right of the ESP32 socket, there Is a socket for an HX711 load cell amplifier board. Below its 6-pin row, there is another 6-pin socket offset by one pin to the right. This is where the load cell connects, but it is offset so that a noise filter can be inserted into the path of the red wire (E+) of the load cell.

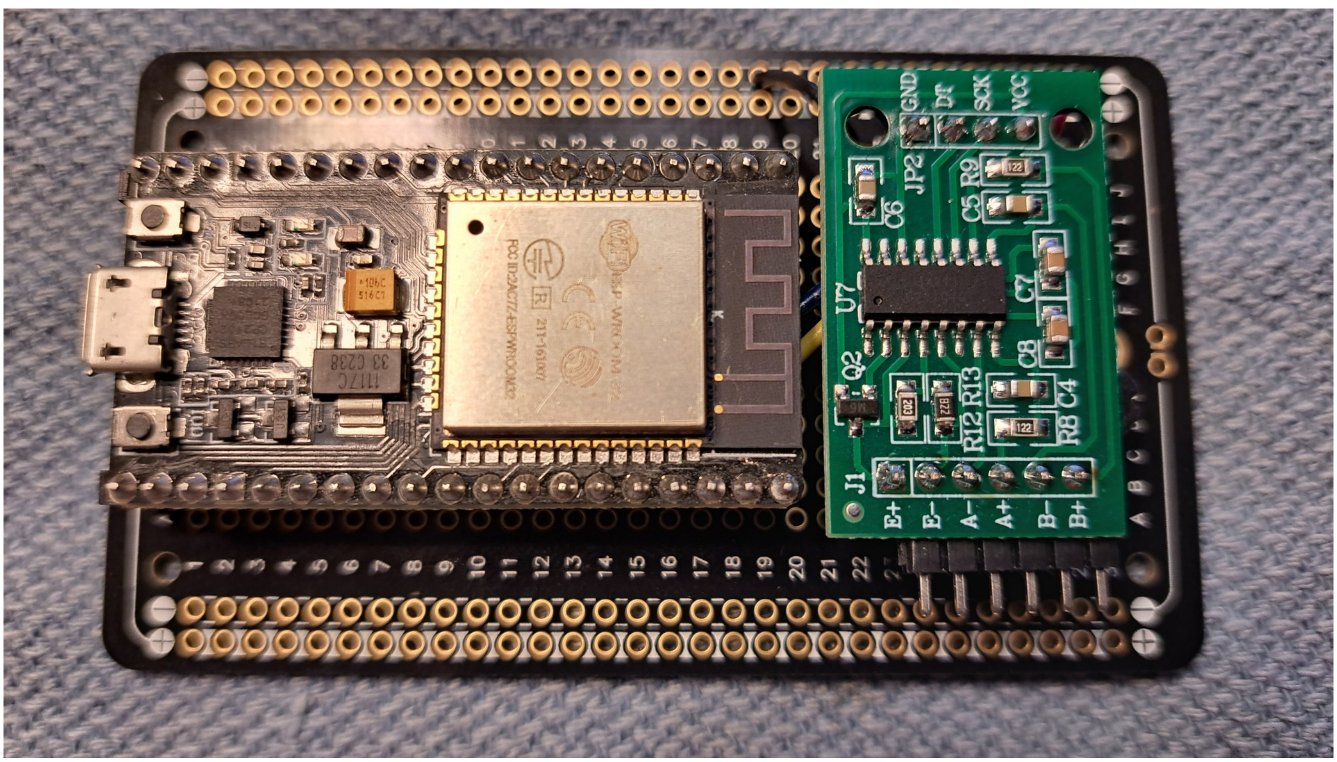
The pins on the load cell socket are black (E-), white (A-), green (A+), skip two pins, and red (E+) at the far right end.

The noise filter is Sparkfun's design, not mine. The red (E+) wire first runs through a 3.3 uH inductor before connecting to the E+ pin on the HX711. Two capacitors in parallel are placed across the E+ and E- pins of the HX711. This is because there is no such thing as an 10.1 uF capacitor, so you need to use a 10 and a 0.1 in parallel. I have no idea how they arrived at that value, but I'll just go along with it and do what they did.

The top row of pins are connected to the 5 volt supply and the I2C GPIO pins of the ESP32. Yellow to clock (GPIO 22) and blue to data (GPIO 21).

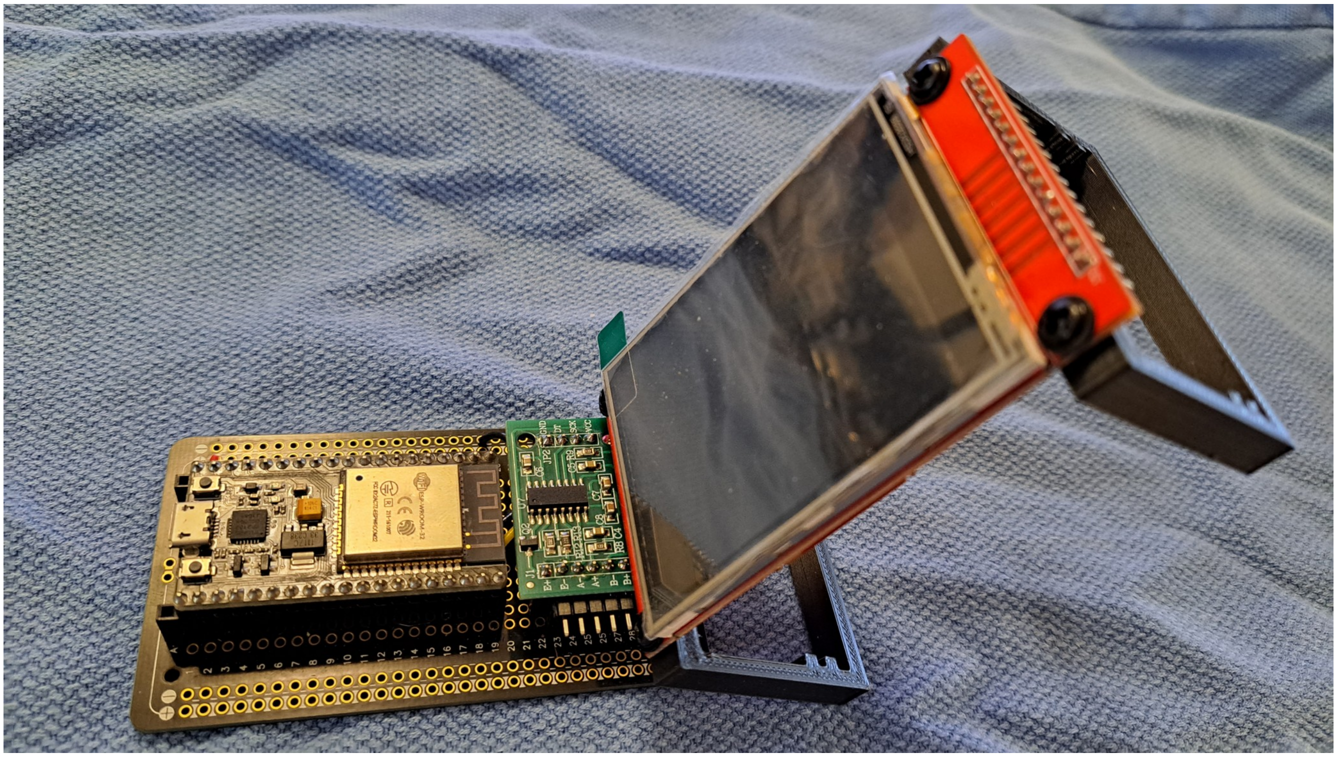






As you can see, the ESP32 and HX711 fit nicely on the board and the pins for the load cell are easily accessible to solder the load cell wires onto. Not pictured is the 5 volt supply wire to the top left pin of the ESP32 (whoops, I forgot).

Next you will want to 3D print a pair of the “Hydrometer LCD and PCB Carrier.stl” models and mount them to the LCD display as shown in the photo below. No need for high resolution printing here, plain old standard resolution is just fine.

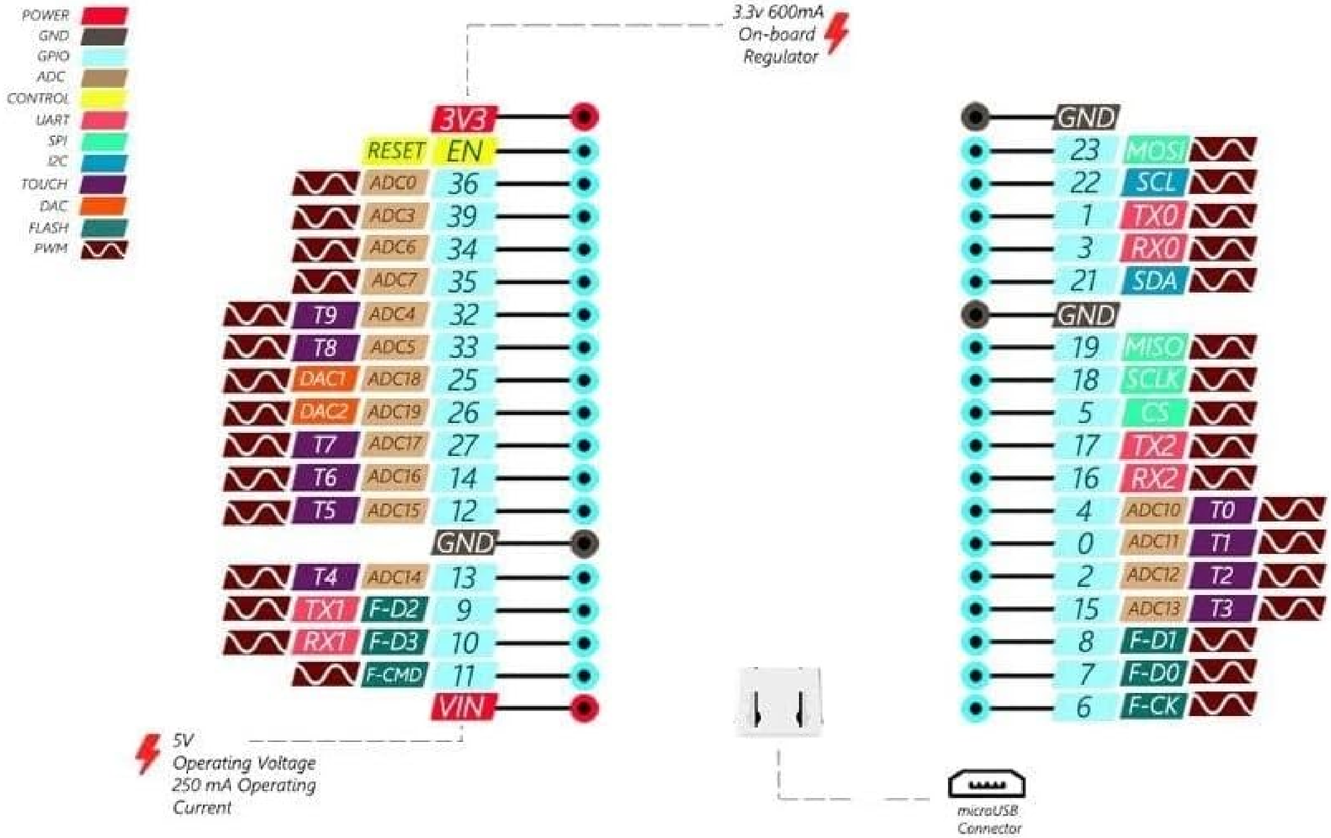


The display that I’m using here is the ever so common ILI9341 320x240 color LCD/TFT display that uses SPI communications. Here’s an Amazon link for it.

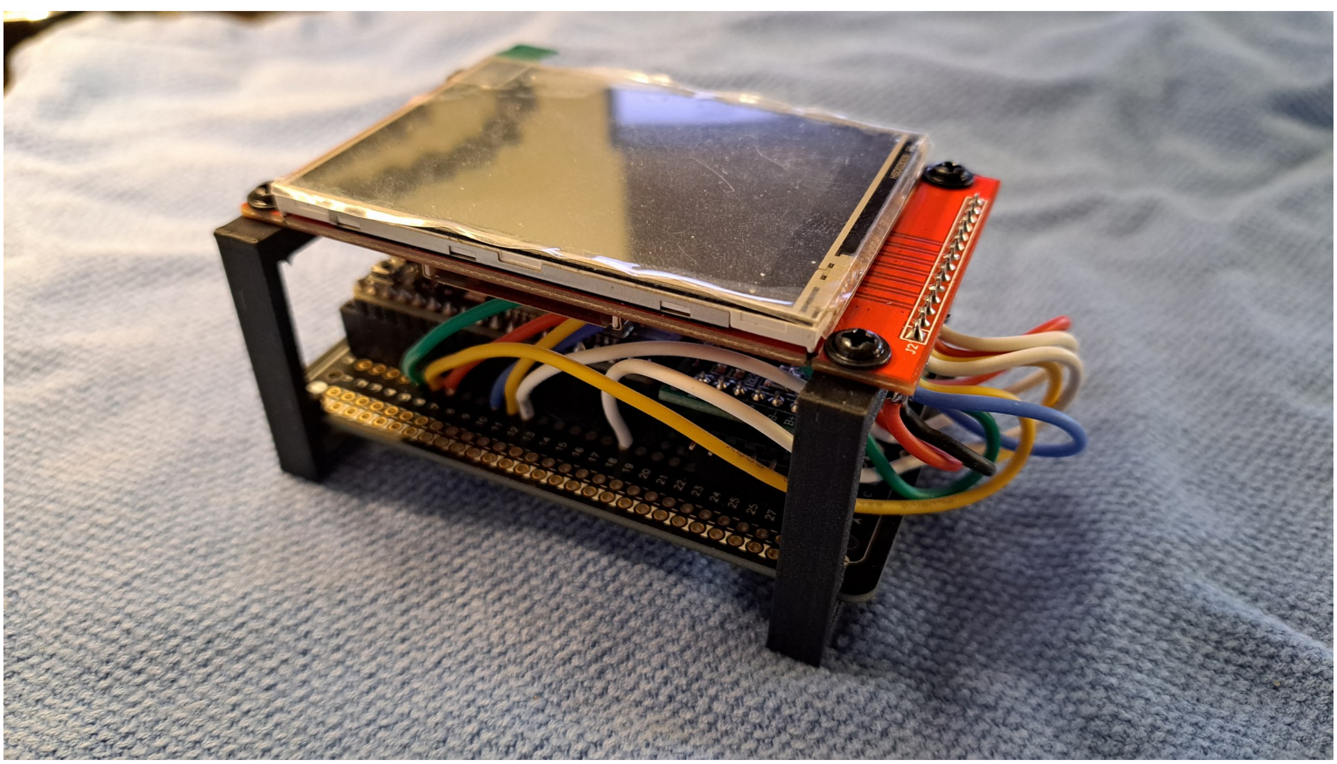
https://www.amazon.com/gp/product/B09XHJ9KRX/

The touch screen and SD card slot aren’t used here, so we only need to connect the first 9 pins on the unit. I simply solder wires onto the pins rather than using push-on connectors. If you want to install push-on connectors, have at it. I’m 50% blind and can’t get it right, so I gave up.

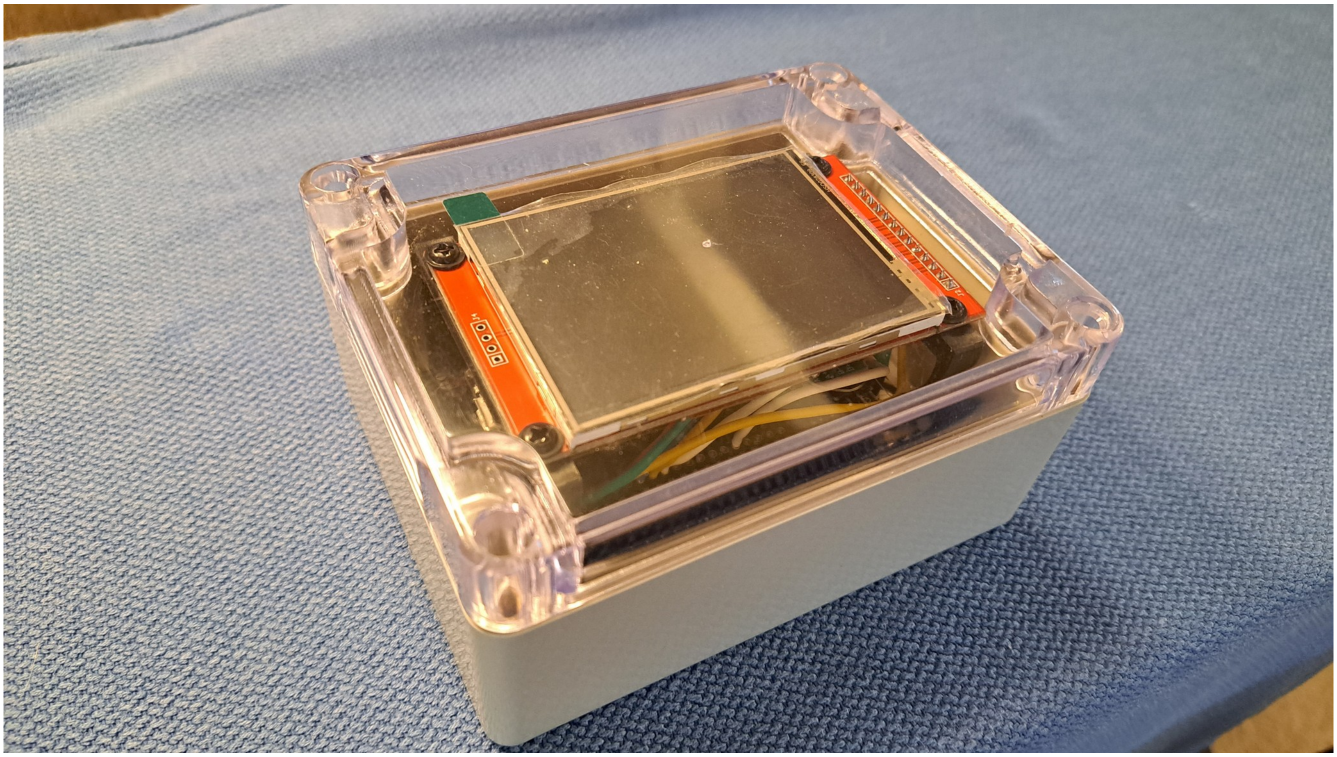
This is another reason why I use those PCB clones of a breadboard, the numbers on the rows and columns of pin holes really helps when connecting things to the GPIO pins of an ESP32. For example, I know the display’s CS line connects to GPIO pin 5 of the ESP32. I know that pin is 10th from the left in the above picture and that pin has a 10 right next to it on the PCB.



Above is the pin out of a 38 pin ESP32. Simply match up the constant definitions in the source code between the GPIO numbers on the light blue background with the pin labels on the back of the display.



The extra slack in the wires to the display will leave everything still serviceable after it is installed in the enclosure. If you ever need to reprogram the ESP32 or replace the HX711 load cell amplifier, just remove the screws from the display and pull them out of their sockets.



The enclosure is slightly over-sized, but this is necessary. Unfortunately, there is a mark in the middle of the top cover from the injection molding fill point. I have no idea if it's possible to polish it out, but I'm not going to bother trying. It's not that big of a deal. Below is an Amazon link to the enclosure.

https://www.amazon.com/dp/B07BPPKF2C/

We need to drill five holes in the back for the power and serial connector jacks and three smaller holes for the load cell, temperature sensor, and flow sensor leads. We will wait to do the soldering of these leads to the PCB after they are installed on the frame that holds everything together.

Before we go any further, you should 3D print the models "Flow Sensor Housing.stl" and "Condenser Feed Retainer.stl" at the highest resolution that your printer can do. These parts need to be precise, strong, and as waterproof as you can get them. I've broken off screw heads mounting high resolution 3D printed parts with 30% infill, breaking them off with pliers is by no means a simple task.

I don't expect everybody to use my design, mine is dual purpose so that it can be hung on the wall with picture hangers or around a 2" pipe such as a still column. So mine is made with two 14" pieces of a red oak 1x4 plank with the two models "Hydrometer Frame – Left.stl" and "Hydrometer Frame – Right.stl" on each end.

In the above photo, you can see a general idea of how the load cell and flow sensor are situated. The dot on the board between the two is where the hole for the DS18B20 temperature sensor cable is drilled to feed through.

As for the hydrometer frame end pieces, it’s up to you what resolution that you want to print them at, if you use this design plan. I just used plain old standard resolution because they’re only structural pieces and don’t need to be waterproof. The right side of the frame still took 14 hours to print at that resolution.