Smart-Coffee Wiring guide

Revision: 1.3

(This wiring guide is compatible with Smart Coffee PCB's version: 1.6)

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Legal disclaimer:

The Smart Coffee PCB provided is intended for use by qualified individuals with experience in electrical and mechanical systems. It is the sole responsibility of the end user to ensure that the installation, operation, and maintenance of this product comply with all applicable local, state, and national electrical and safety regulations.

By using this product, you acknowledge that it is supplied "as is" and that you assume full responsibility for any risks associated with its use. The supplier of this PCB assumes no liability for any damage, injury, or loss of any kind, whether direct or indirect, resulting from the use, misuse, or inability to use the hardware, software, or associated components provided.

It is strongly recommended that users seek professional advice and services to ensure compliance with relevant safety standards and to avoid potential hazards.

Wiring information:

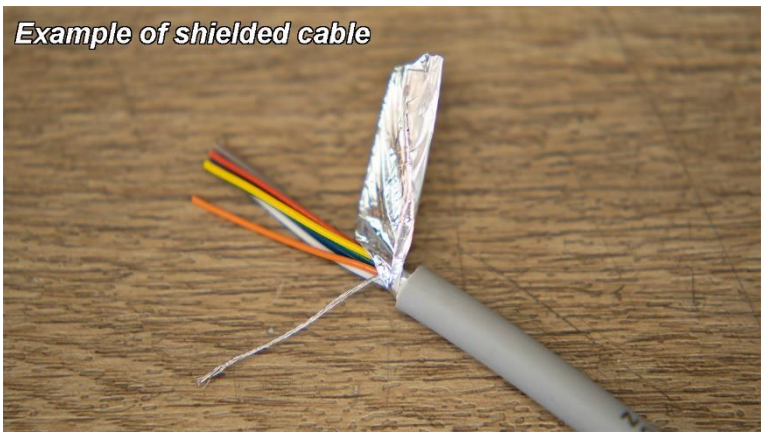
Keep wire length to a minimum:

Plan the mounting position of the PCB in a location that reduces the cable length to the various sensors you plan on using. Longer cables can reduce the signal quality from various sensors.

Use shielded cable:

It's good practice to use shielded cable between the sensors and PCB. This reduces electrical interference that can impact the quality of the signal. The outer shielding of the cable should be connected to any of the GND terminals on the PCB.

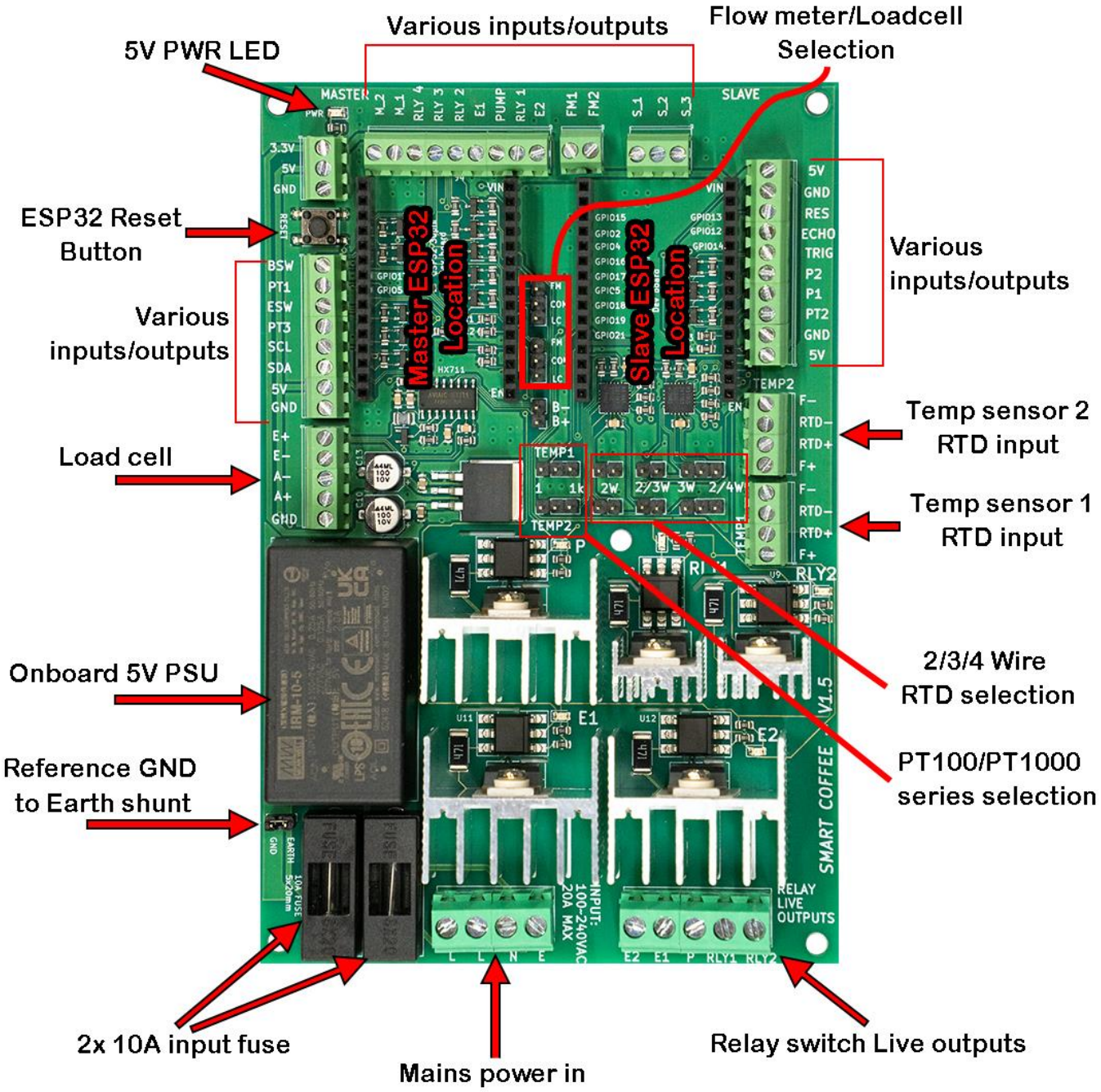
Note: Only connect one end of the shielding to GND



Display cable:

The OLED display connections (SDA and SCL) are particularly sensitive to electrical interference. It is vital to use shielded cable with one end of the shielding connected to any GND on the PCB. It is recommended to keep the cable length to a minimum (max recommended length is 400mm).

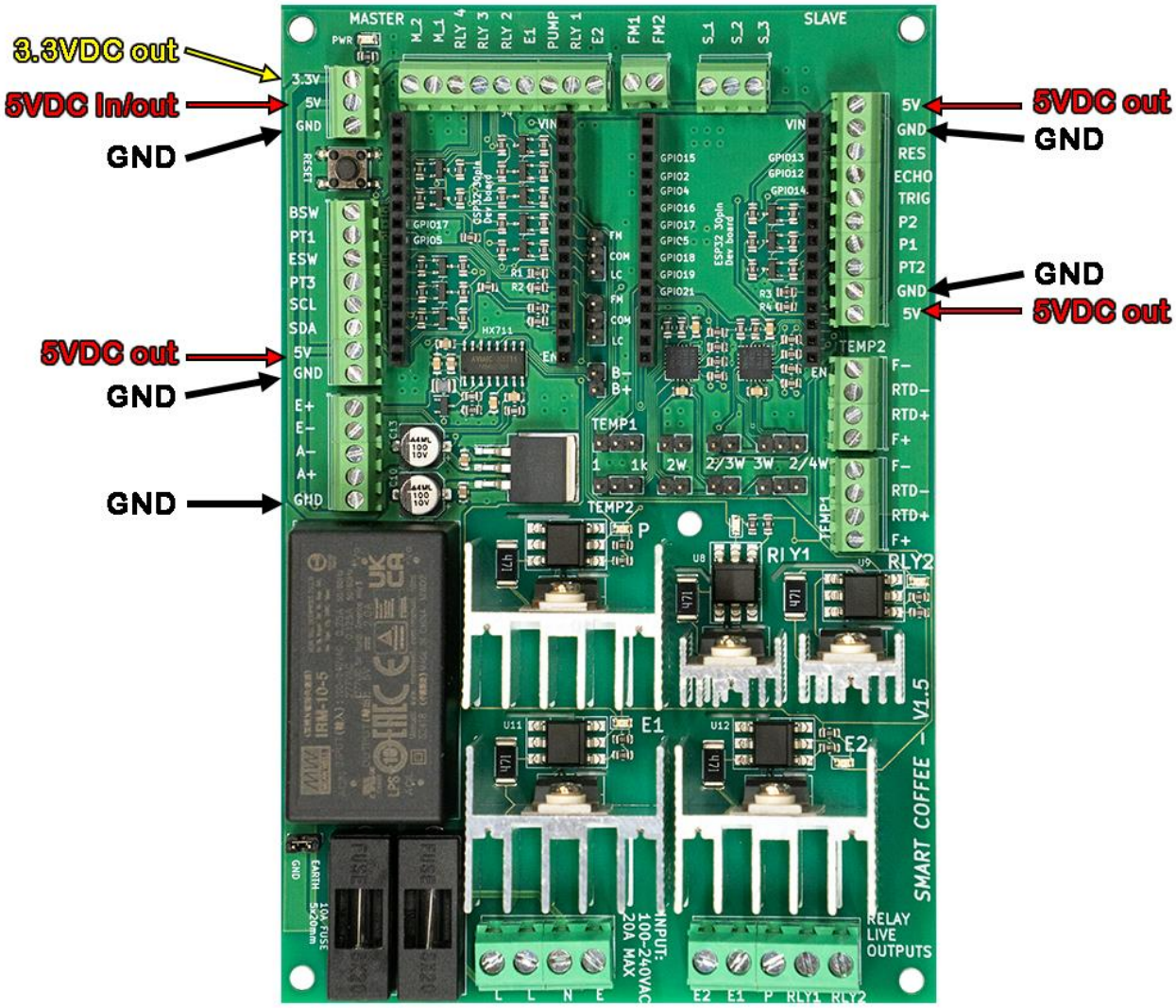
PCB Overview



DC Power

DC power in and out:

The PCB has an onboard power supply that converts the 100~240VAC input, down to 5VDC. There are several GND and 5VDC outputs to supply power to operate the various sensors, display, relays and switches on the machine.
Alternatively, the PCB can be powered by an external 5VDC power supply connected to the 5VDC in/out Or via USB when connected to an ESP32



NOTE:

The onboard 5V PSU has a maximum current output of 2A. This is more than sufficient to operate the PCB and all the sensors connected. However, if you connect additional accessories to the 5V supply, ensure that you are not exceeding the 2Amp current limit of the PSU.

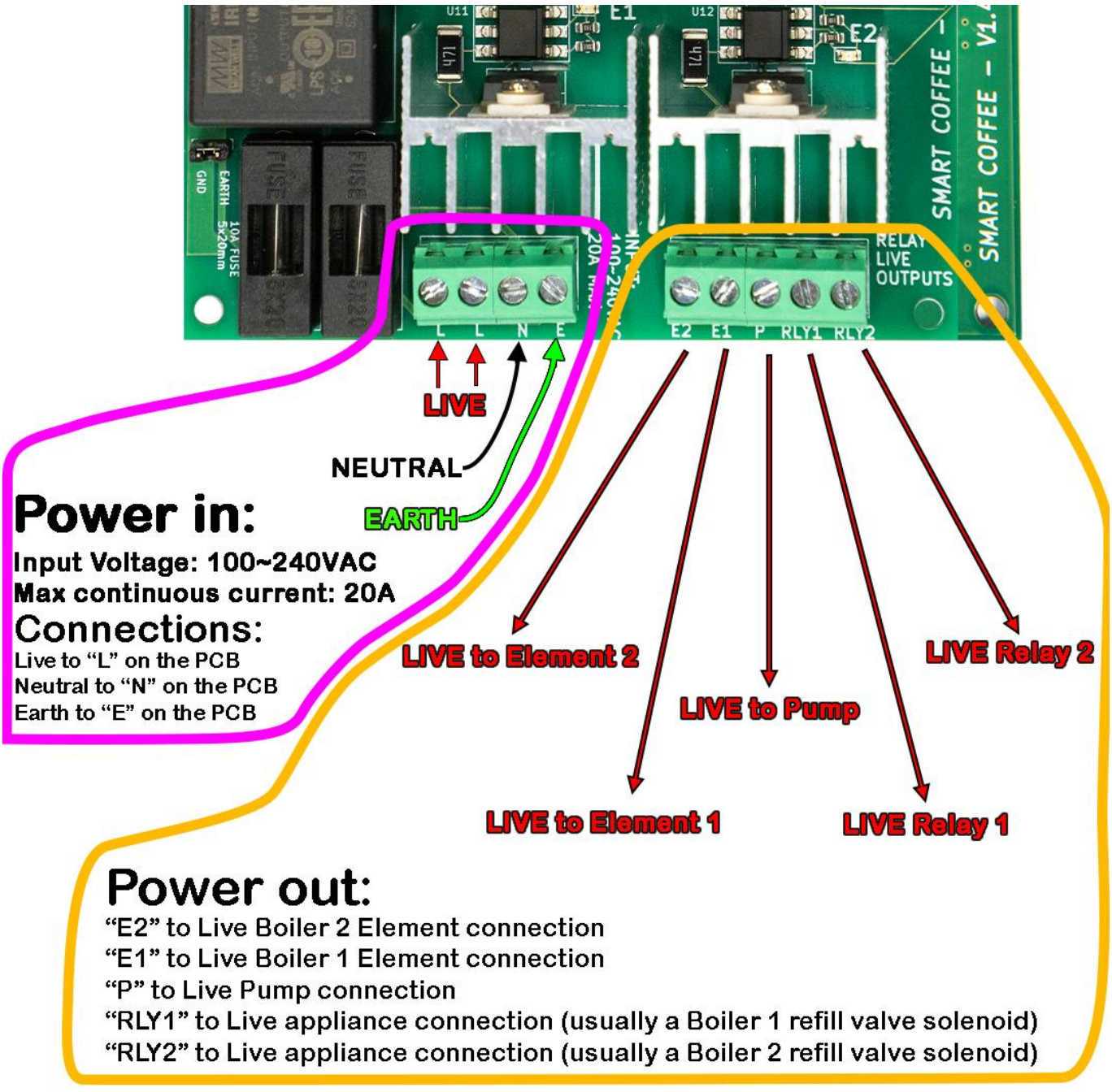
100 ~ 240VAC Input and Relay Outputs

NOTES:

1. You'll find dual "LIVE" power inputs on the board. Both must be connected to LIVE for all the relay outputs to function. The reason for dual inputs is each terminal is rated for 10A maximum. By having 2 Live terminals, the total maximum LIVE output current is rated at 20A.

2. For inductive loads such as mechanical relays, solenoid valves. Etc, it may be necessary to install a metal oxide varistor to reduce inductive kickback which can prevent the on board zero-crossing solid state relays from turning off. For more information **click here**

RELAY LIVE OUTPUT CURRENT LIMITS:
Element 1, and Pump combined max current: 10A
Element 2, RLY1, and RL2 combined max current: 10A

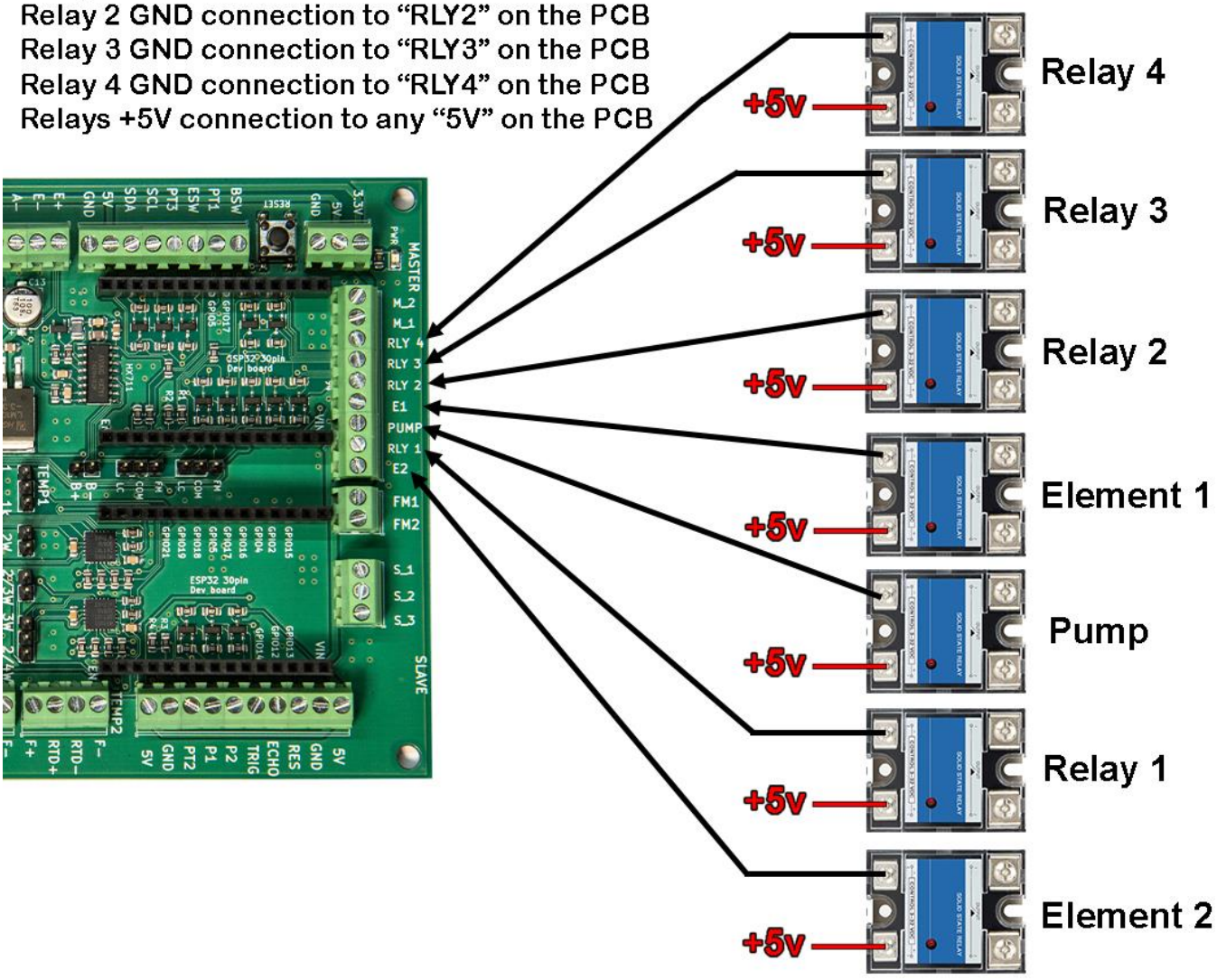


External Relay Control Outputs

5VDC Relay Control Outputs:

Connections:

Element 1 Relay GND connection to “E1” on the PCB
Element 2 Relay GND connection to “E2” on the PCB
Pump Relay GND connection to “PUMP” on the PCB
Relay 1 GND connection to “RLY1” on the PCB
Relay 2 GND connection to “RLY2” on the PCB
Relay 3 GND connection to “RLY3” on the PCB
Relay 4 GND connection to “RLY4” on the PCB
Relays +5V connection to any “5V” on the PCB

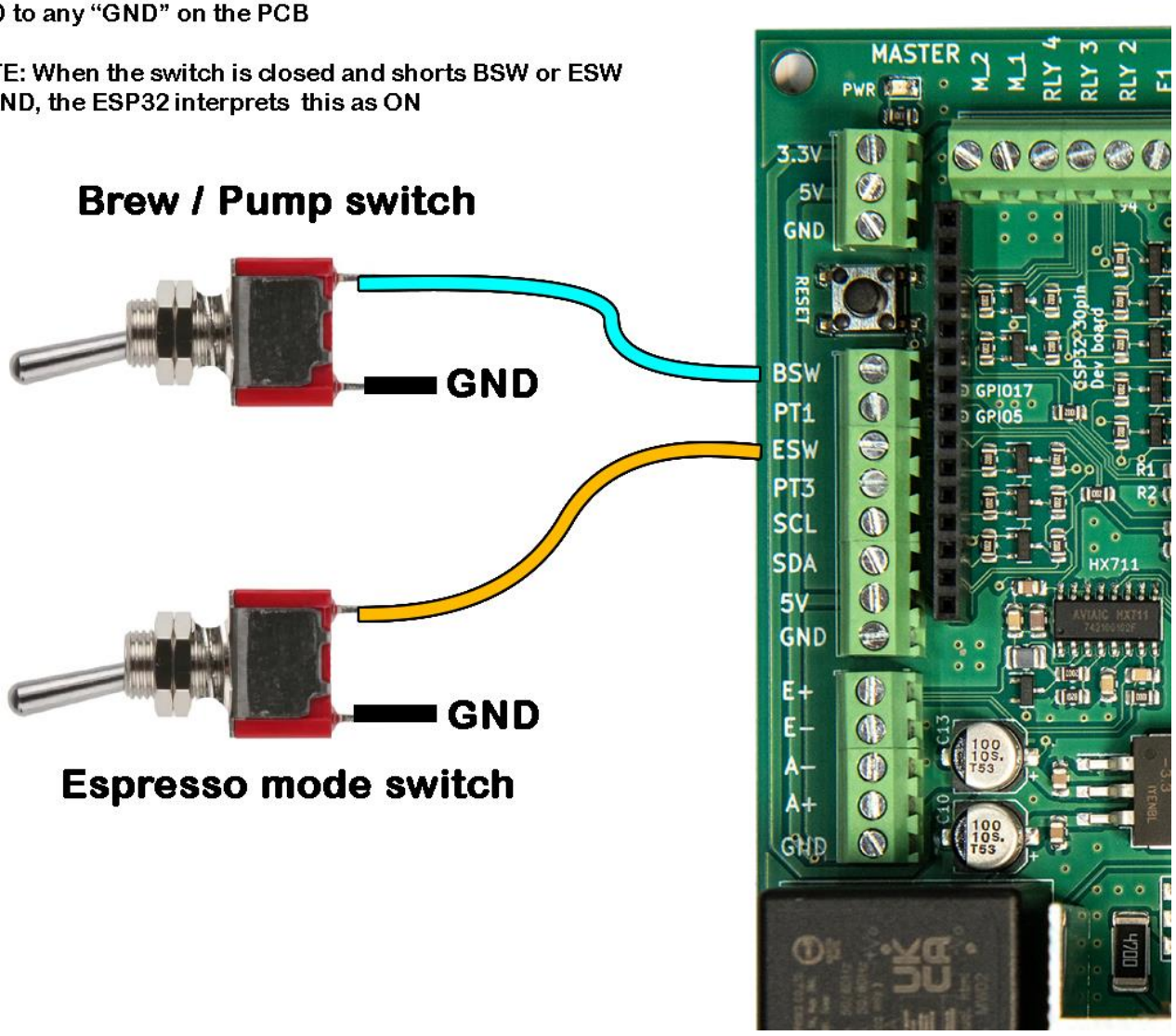


Brew and Espresso Mode Switches:

Connections:

Brew/Pump switch to “BSW” on the PCB
Espresso mode switch to “ESW” on the PCB
GND to any “GND” on the PCB

NOTE: When the switch is closed and shorts BSW or ESW to GND, the ESP32 interprets this as ON



Display Screen

NOTES:

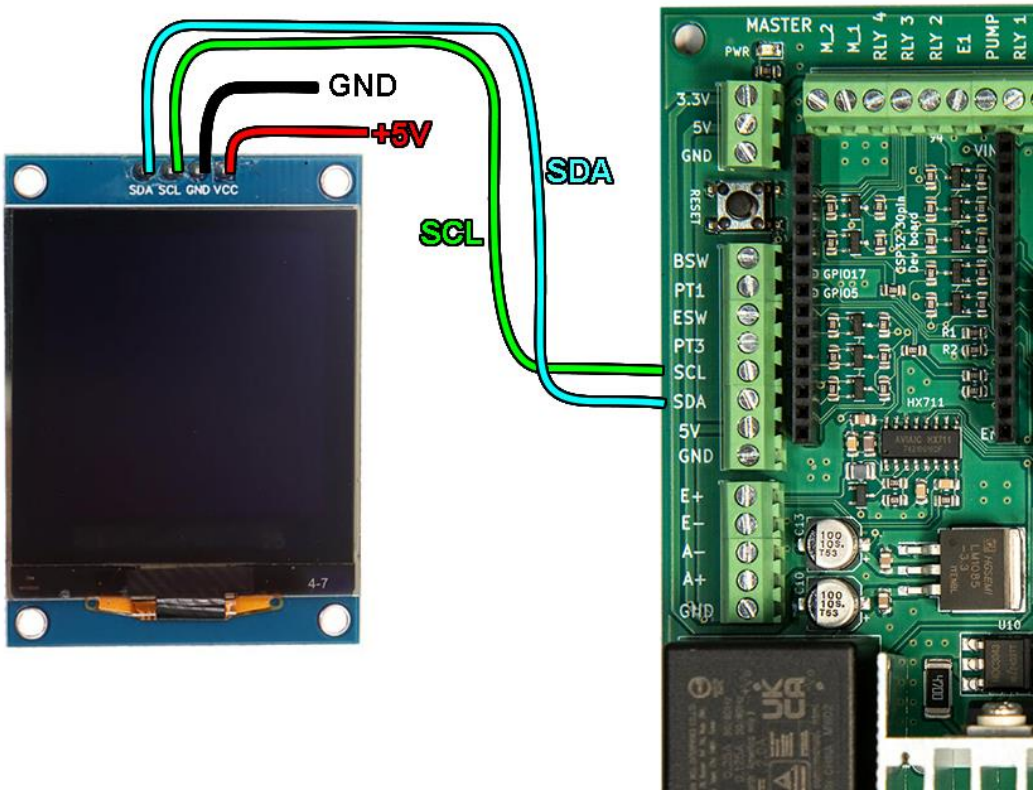
The OLED display connections (SDA and SCL) are particularly sensitive to electrical interference. It is vital to use shielded cable with one end of the shielding connected to any GND on the PCB. It is recommended to keep the cable length to a minimum (max recommended length is 400mm).

OLED Display:

128x128px OLED Display
Model: SH1107
Interface: I2C
VCC: 3.3~5V

Connections:

SDA to "SDA" on the PCB
SCL to "SCL" on the PCB
GND to any GND on the PCB
VCC to any 5V on the PCB

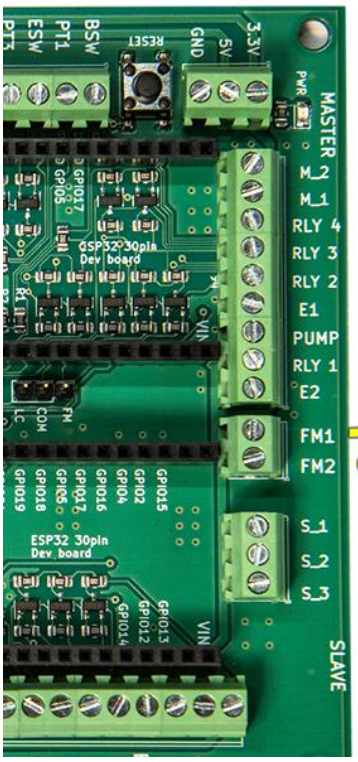


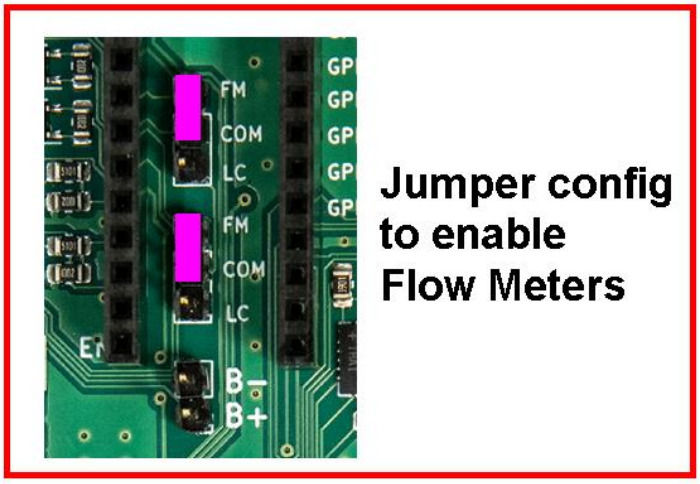
Flow Meter/s

Connections:

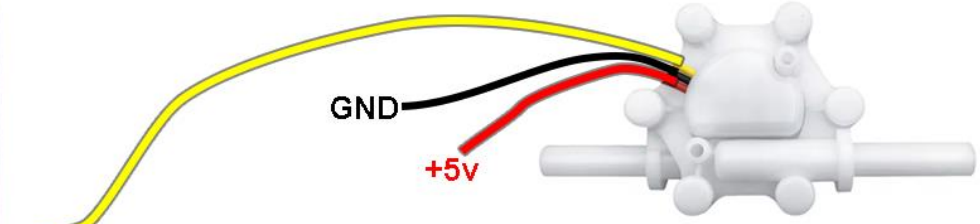
Flow meter 1 signal wire (normally Yellow) to "FM1" on the PCB
Flow meter 2 signal wire (normally Yellow) to "FM2" on the PCB
(Maximum voltage input on FM1 and FM2 is 5V)

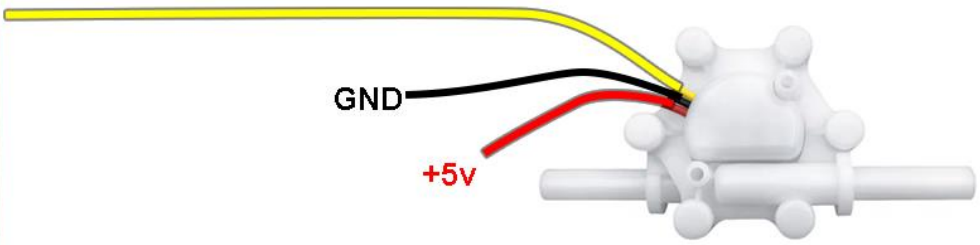
GND to any "GND" on the PCB
+5V to any "5V" on the PCB





Flow meter 1



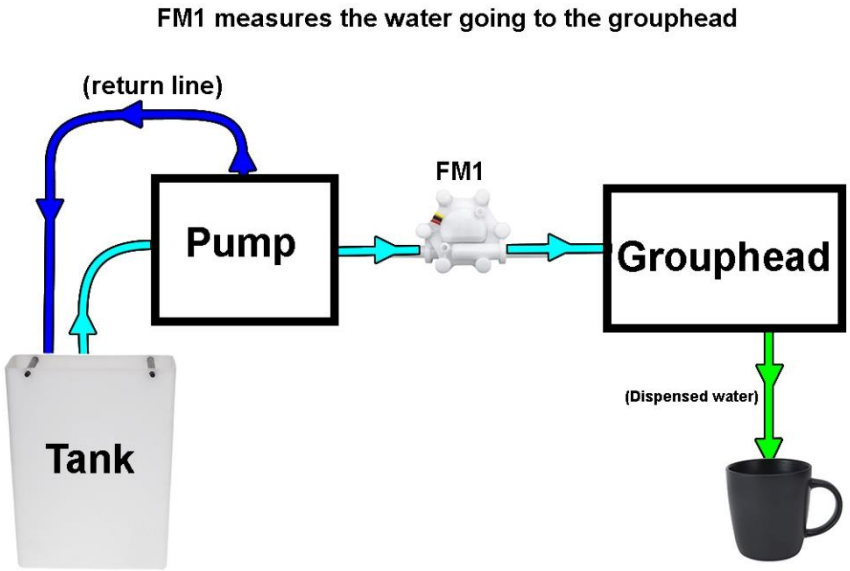


Flow meter 2

Single flow meter setup

A single high-pressure rated flow meter is the easiest configuration to calibrate. The flow meter should be installed in a location close to the group head, and after any pressure regulators.

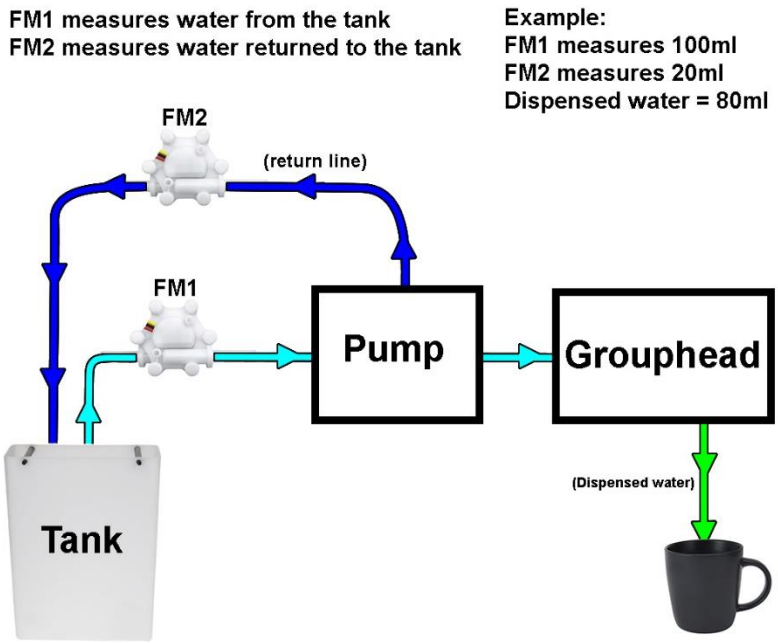
Pros: Easy to calibrate and accurate. **Cons:** high pressure flow meters are expensive.



Dual flow meter setup

In a dual flow meter configuration, FM1 measures the volume of water going to the pump. Any water that is bleed off by pressure regulators is measured by FM2 before being returned to the tank.

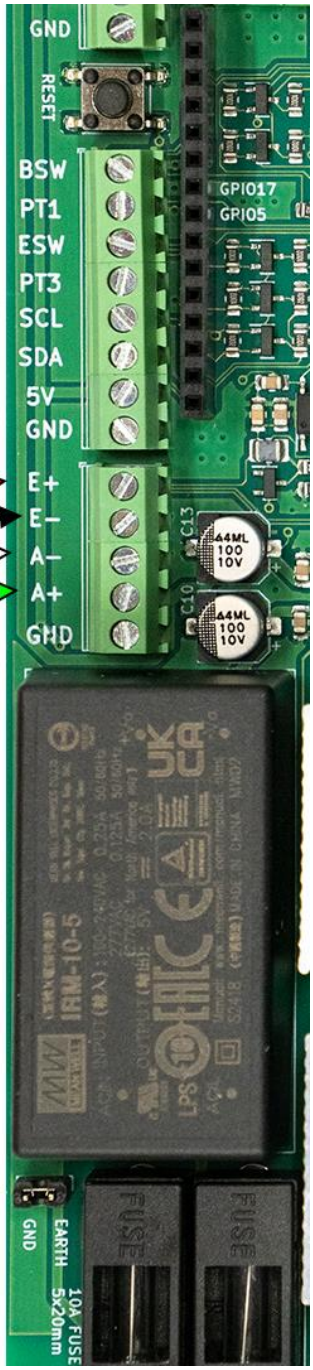
Pros: Low pressure flow meters are cheaper. **Cons:** Difficult to calibrate and achieve accurate results.



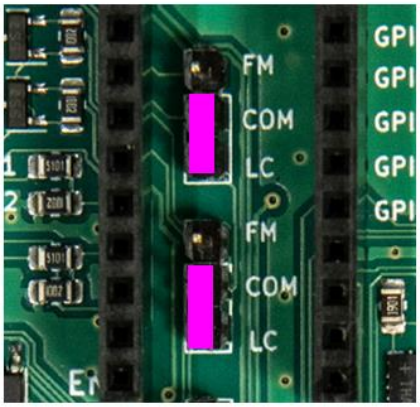
Load Cell:

Connections:

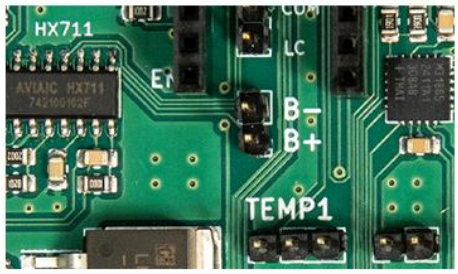
E+ wire (normally red) to “E+” on the PCB
E- wire (normally black) to “E-” on the PCB
A+ wire (normally white) to “A-” on the PCB
A- wire (normally green) to “A+” on the PCB



Jumper config to enable the load cell



NOTE:
For 6 Wire load cells, B+ and B- are located near the middle of the PCB as shown below



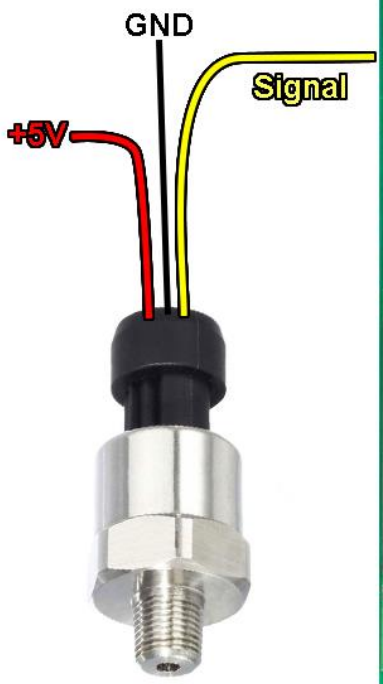
Pressure Transducer/s:

Maximum input voltage for PT1, PT2 and PT3: 5VDC
Recommended voltage signal range: 0.5 ~ 4.5V

Connections:

+5V to any "5V" on the PCB
GND to and "GND" on the PCB
Boiler 1 pressure transducer signal wire (normally yellow) to PT1
Boiler 2 pressure transducer signal wire (normally yellow) to PT2

Boiler 1 pressure transducer connected to PT1



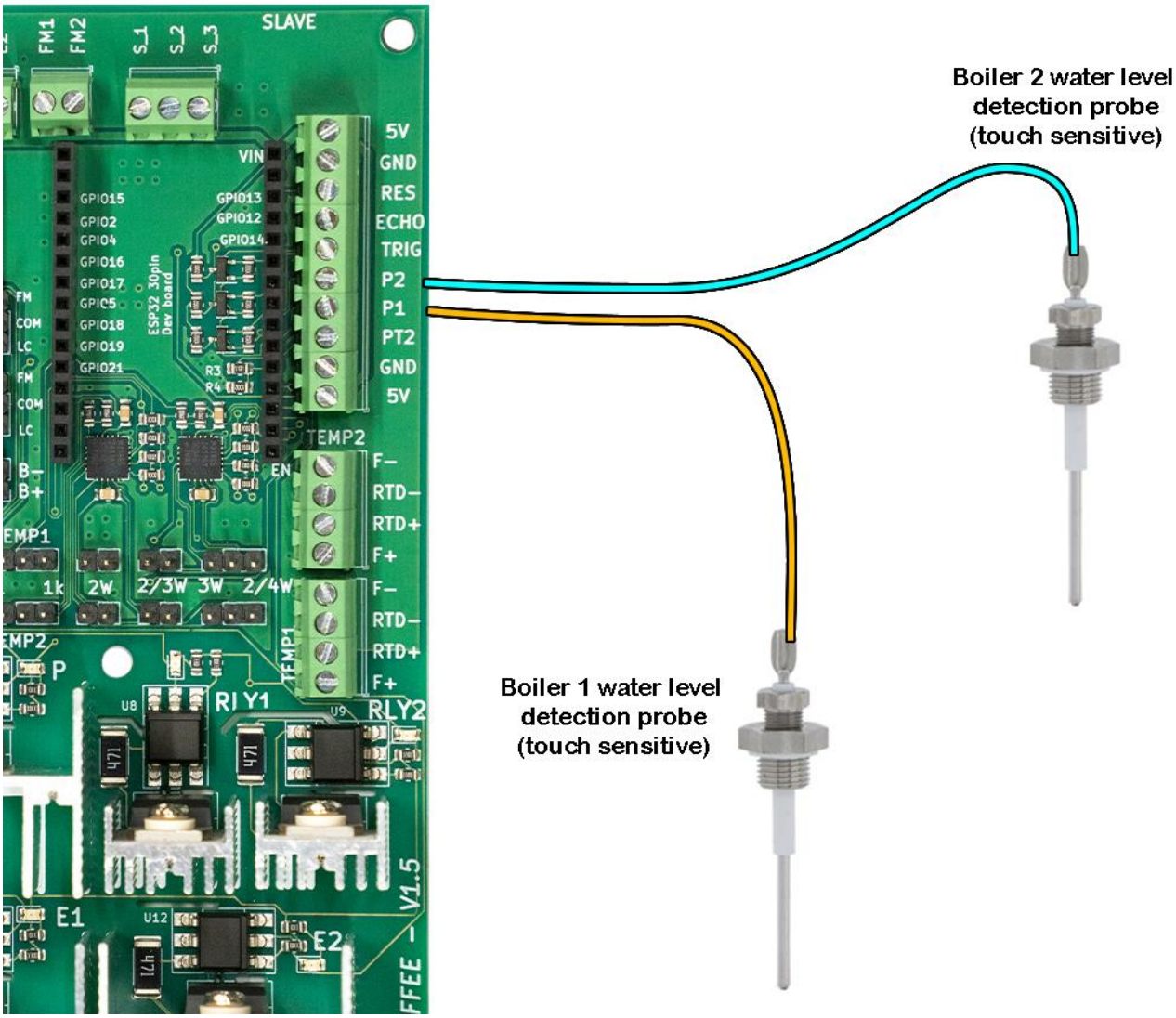
Boiler 2 pressure transducer connected to PT2

Boiler Probs

Boiler 1 and 2 water level probs:

Connections:

Connect the Boiler 1 probe to “P1” on the PCB
Connect the Boiler 2 probe to “P2” on the PCB



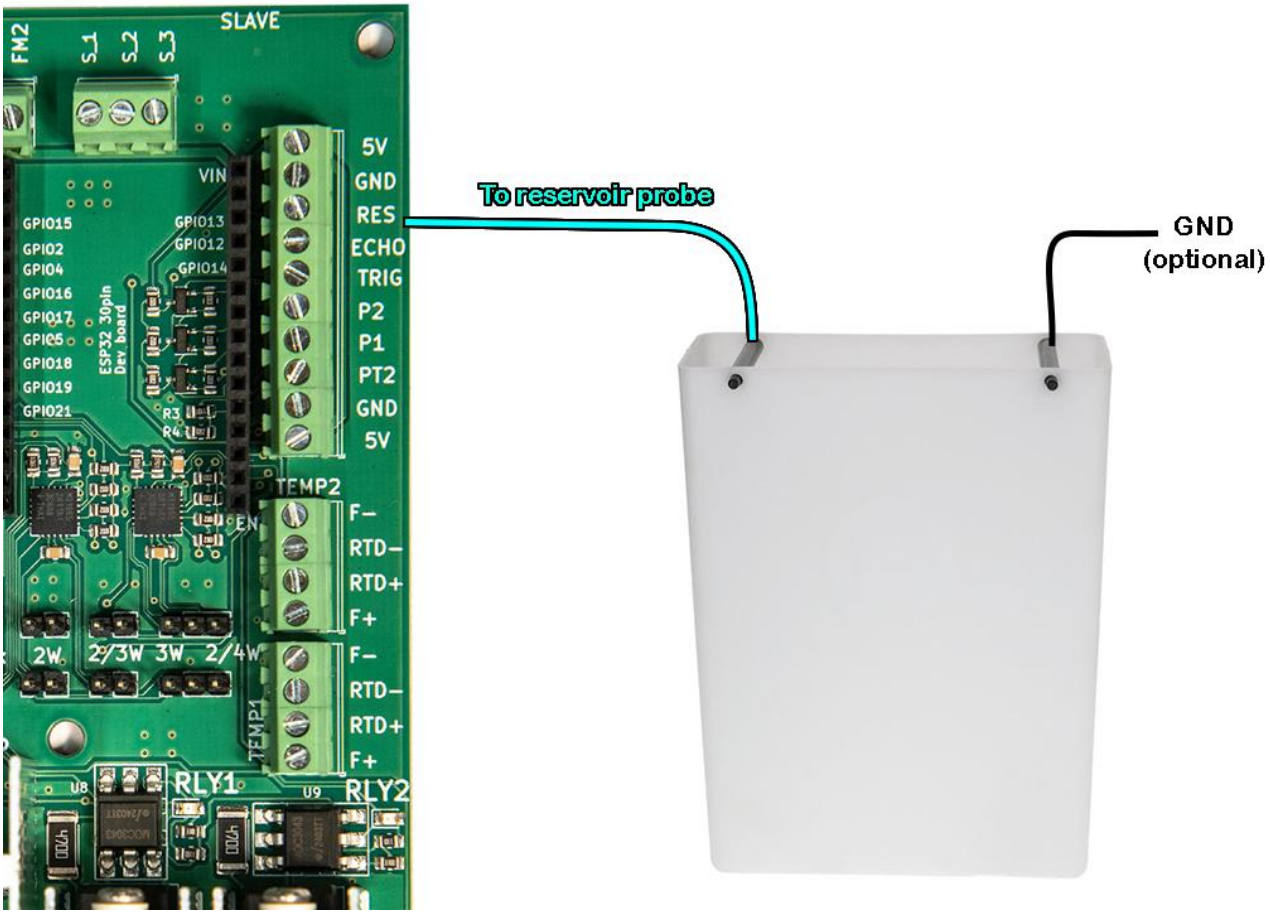
Reservoir Probe:

Connections:

Reservoir probe to “RES” on the PCB
Optional reservoir grounding prob to any “GND” on the PCB

NOTES:
GND connection is optional.

If the touch sensitivity doesn’t change when water is touching the probe, a second probe can be placed in the tank connected to GND to increase the touch sensitivity.

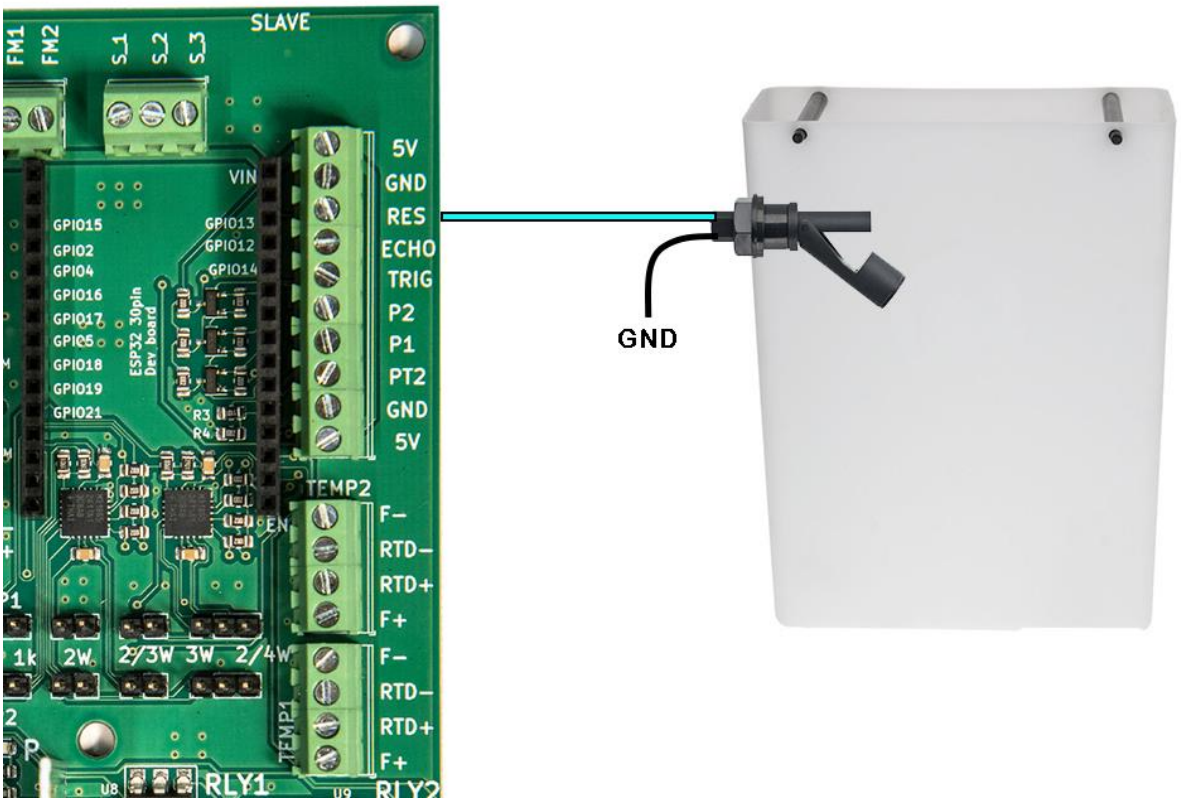


Reservoir Switch:

Connections:

Connect the switch to “RES” on the PCB
Connect the switch to any “GND” on the PCB

NOTE:
Switch logic can be inverted in the software to be compatible with normally open and normally closed switches.



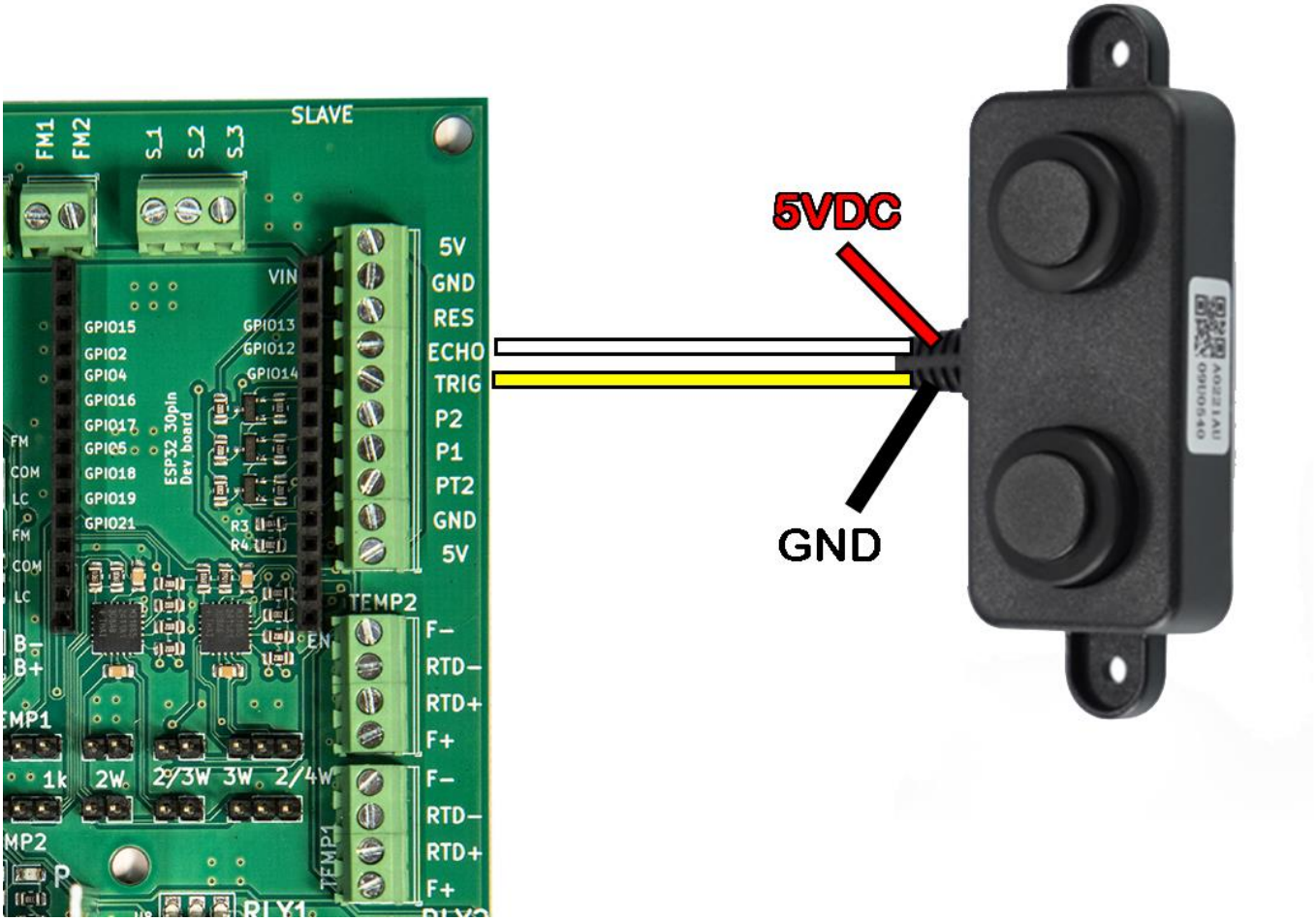
Ultrasonic sensor

Model: A02YY

Signal type: PWM

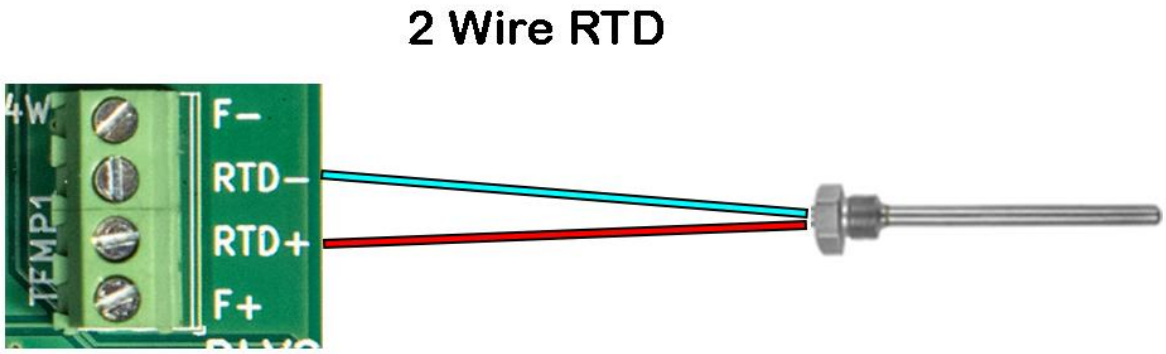
Connections:

Echo wire (normally white) to “ECHO” pin on the PCB
Trigger wire (normally yellow) to “TRIG” pin on the PCB

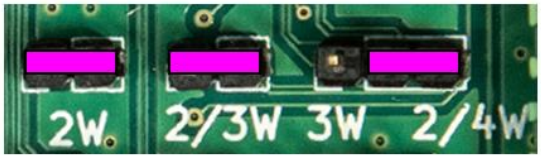


Temperature Sensors

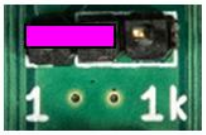
2 Wire RTD:



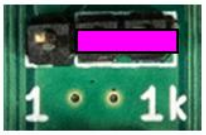
Temp sensor jumper config for 2 Wire RTD



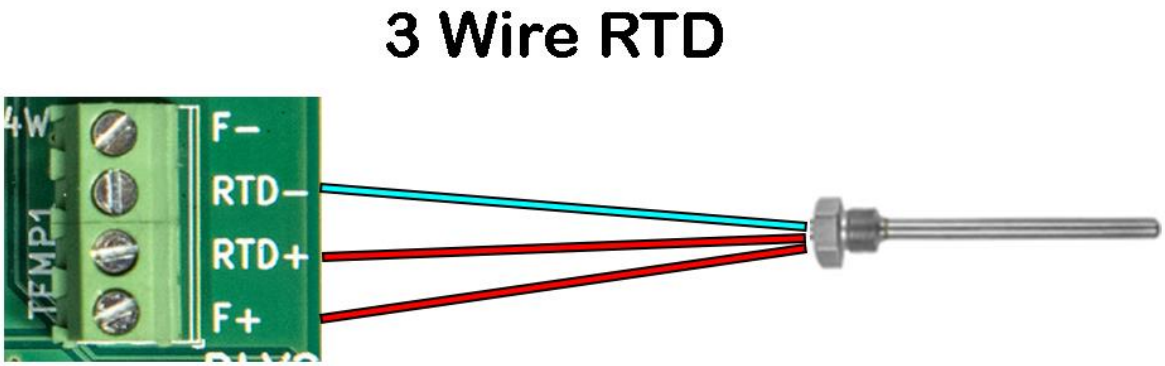
Jumper config for PT100 (aka 100ohm)



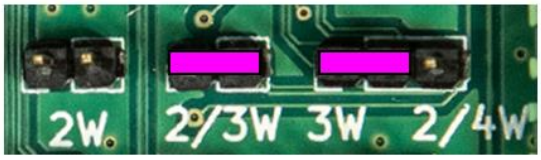
Jumper config for PT1000 (aka 1000ohm)



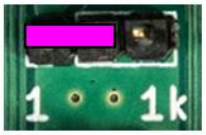
3 Wire RTD:



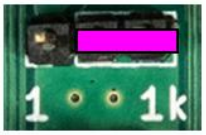
Temp sensor jumper config for 3 Wire RTD



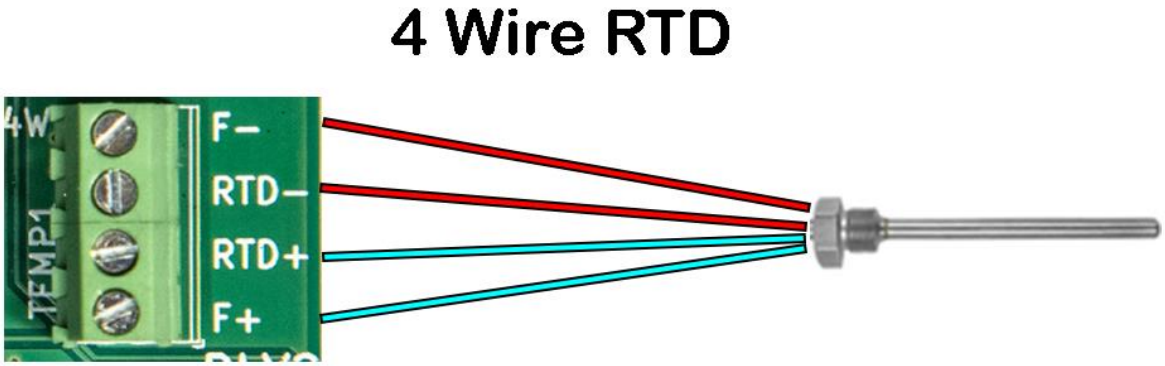
Jumper config for PT100 series RTD



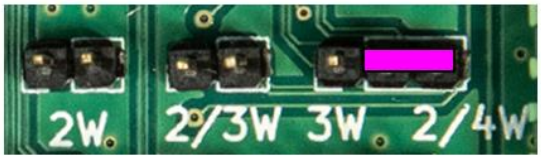
Jumper config for PT1000 series RTD



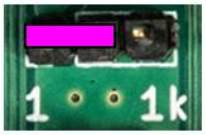
4 Wire RTD:



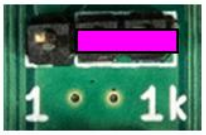
Temp sensor jumper config for 4 Wire RTD



Jumper config for PT100 series RTD

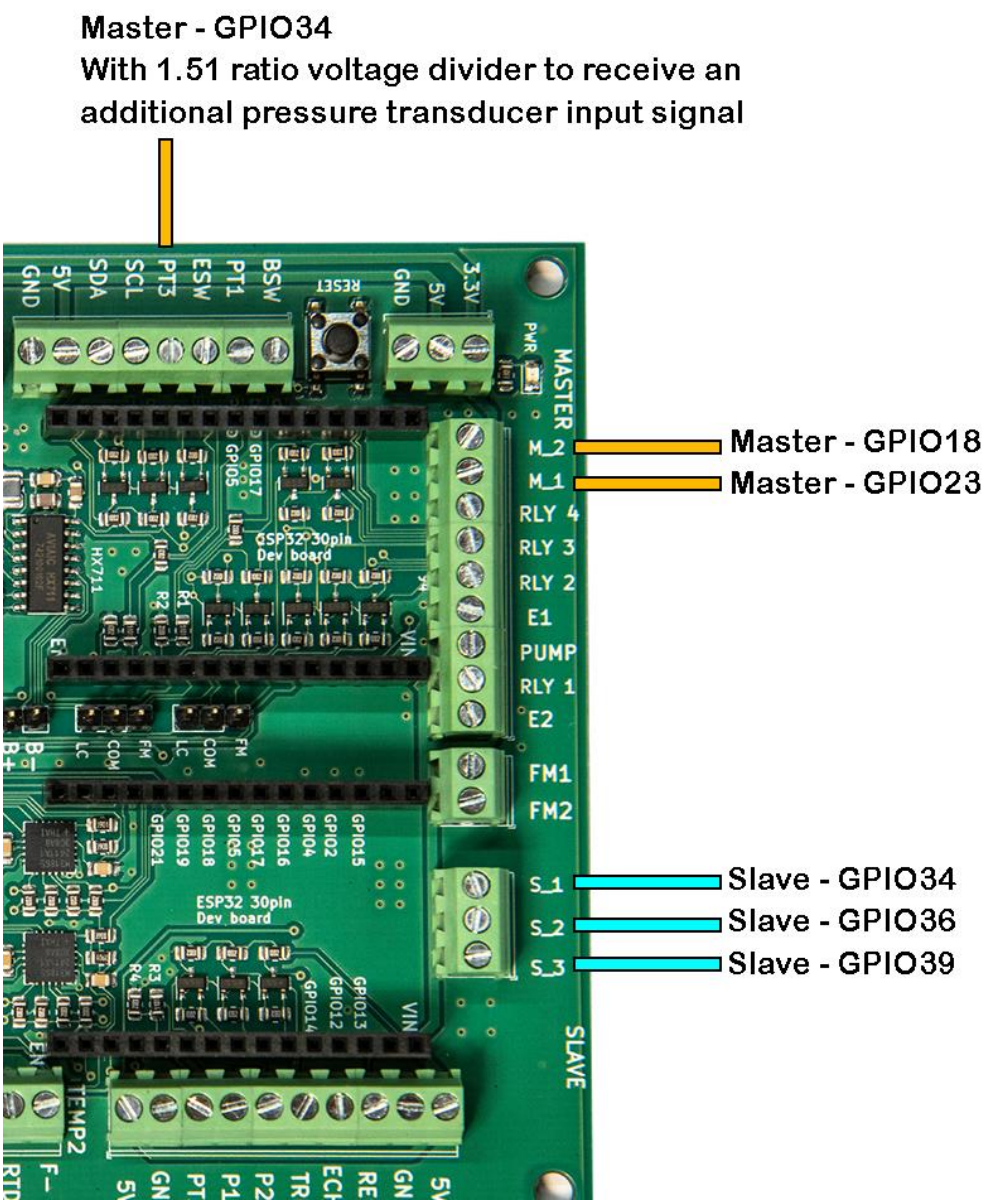


Jumper config for PT1000 series RTD



User Programmable GPIO pins

User programmable GPIO pins:



Currently, the S1, S2, S2, M1, M2, and PT3 have no functions in the software. These pins have been reserved for future development and features. You can also write your own custom code to make use of these pins.

PCB Dimensions