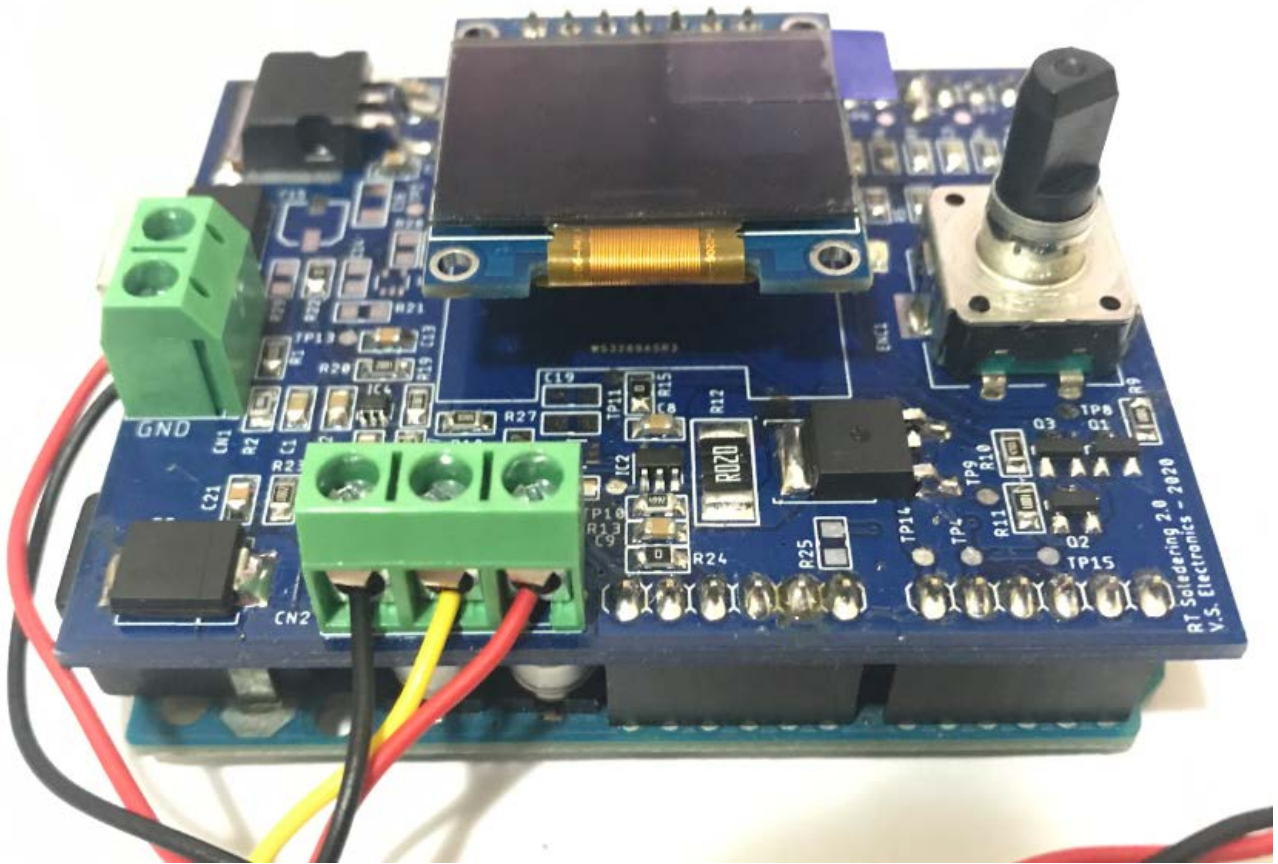# SolderDuino

Manual Version: 1.0

HW Version: 1.0

FW Version: 1.0

Data: 08/06/2020

As an electronics enthusiast I am fortunate to work in the electronics field and I have started welding the first components with a soldering station from Weller.

By developing electronics projects even at home, the expense of a soldering station like that of Weller is not justified so following various projects of other soldering stations I have built myself.

I opted to make a shield that adapts to Arduino for simplicity and cost.

Features:

- Measurement of the input voltage;
- Rotary encoder for menu and temperature management;
- Oled display 0.96" SPI;
- Screw terminal blocks for easy insertion of cables;
- Cold junction compensation by NTC;
- OPAMP with low offset voltage for better thermocouple acquisition;
- Current measurement by shunt resistance;
- Automatic shutdown with the possibility of setting the time;
- PID regulation;
- Personalized settings;
- Save in eeprom of temperatures, PID and shutdown time;
- rotection for low voltage, high temperature, polarity inversion and tip not connected.

Specifications:

- Supply voltage range: 12V ÷ 13V (if it drops below 11 volts the PWM is turned off);
- Current: 12V 6A peak;
- IDLE Current: <10mA;
- Temperature set: 0°C ÷ 450°C;
- Heating speed: 50°C to 350°C about 5sec.

Power Supply

The power supply is defined by the connector CN1 and + 12V and GND as in the image:
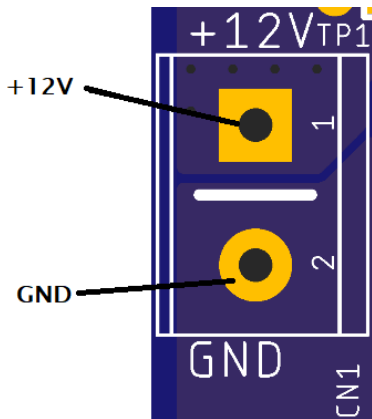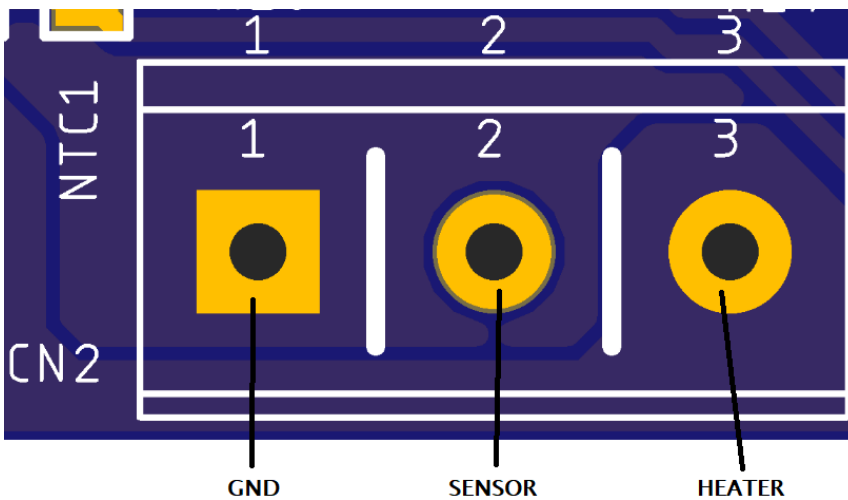

The power supply is protected against polarity reversal by means of diode D1.

Weller Tip:

The terminal block for connecting the tip cables is identified by the code CN2 with the following pinout:

1- GND;
2- Thermocouple;
3- Heater.

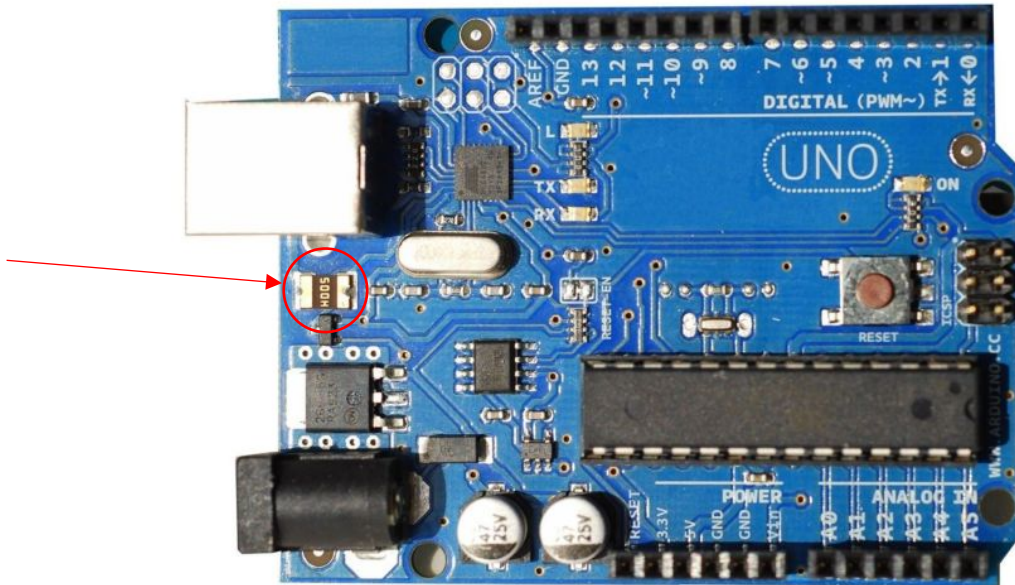
In the image below, for convenience, the 3.5mm jack plug of the Weller RTM tip

Board programming:

We recommend programming individually. For programming it is necessary to download the 4 libraries listed below:

- Adafruit SSD1306 by Adafruit;
- Adafruit GFX Library by Adafruit;
- Encoder by Paul Stoffregen;
- PID by Brett Beauregard.

Download the FW FirstRun_1.0 which has the task of deleting the entire eeprom and then writing the main settings. Once the whole process has been successful, the Arduino LED 13 remains on steady. If there are problems, LED 13 flashes.

It is possible to see the whole process via serial monitor set the baud rate to 115200.

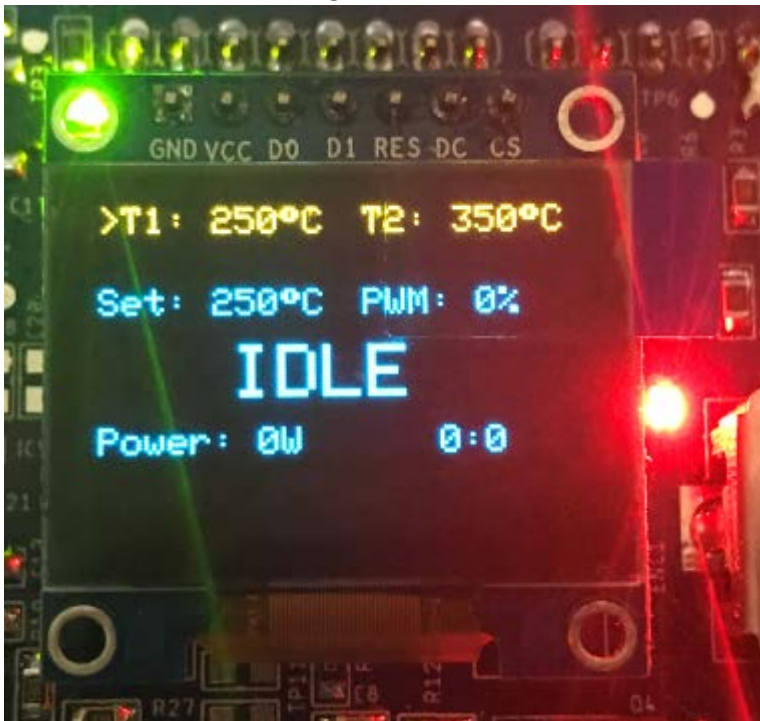Once the eeprom has been programmed, the FW Weller_1.0 can be loaded.

After programming Arduino put the shield and the display and connect the tip and the power supply.
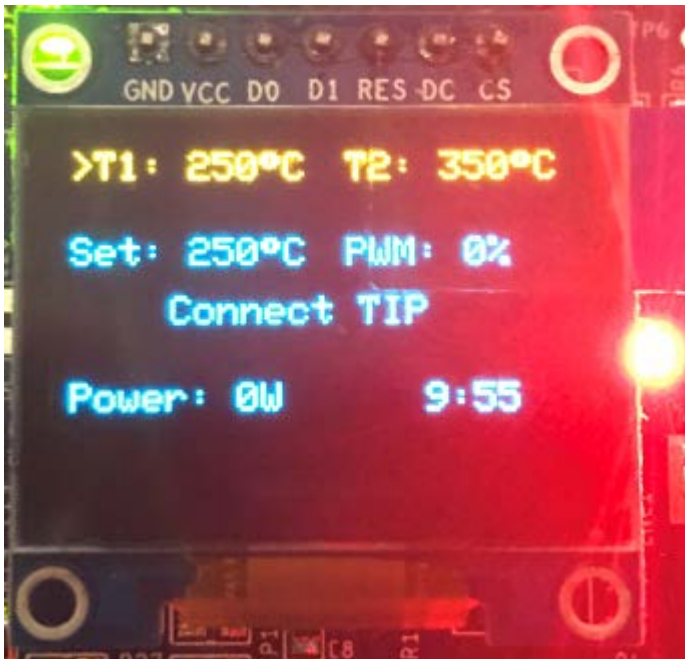
Screens:

Logo

After 1 second the following screen is shown:

This screen indicates that we are on stand by and the soldering iron is off.

If the tip is not connected, the red LED lights up steadily and the following screen will appear:
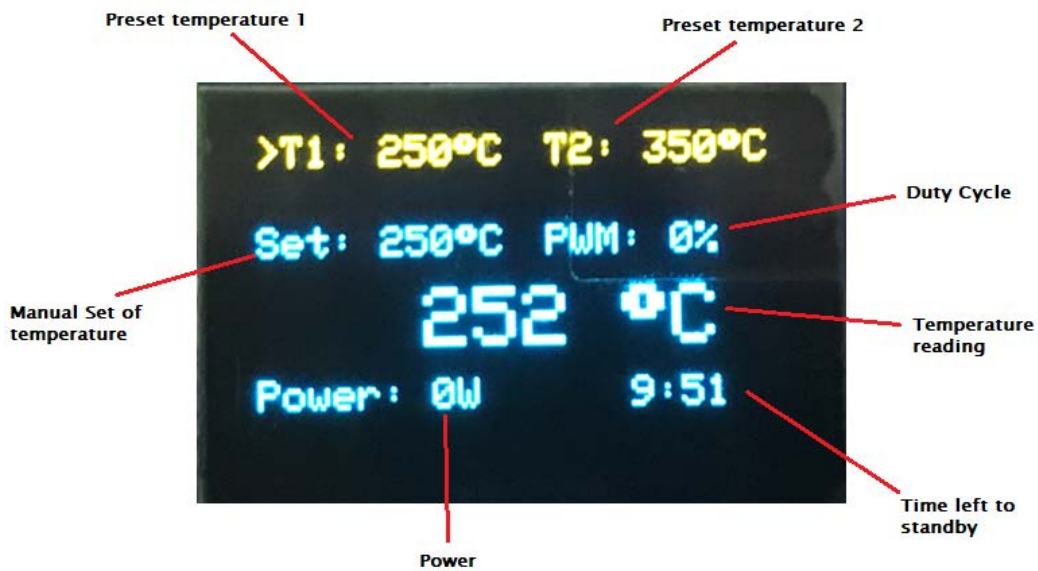

The green led indicates that the board is powered while the red led has 3 operating modes:

➢ LED Fixed → Error or tip not connected;
➢ LED Fade → Standby soldering iron;
➢ LED Off → Soldering iron on and working .

To turn on the soldering iron just connect the tip and quickly press the encoder once.

MainScreen:

This screen allows the encoder to:

- Pressing and releasing the encoder quickly to select the desired temperature indicated by the arrow >
- By turning the encoder to manually change the set temperature in increments and decreases of 5 ° C. The temperature can go from 0 ° C to 450 ° C.

Indications:

- Show the Duty cycle;
- Show the power;
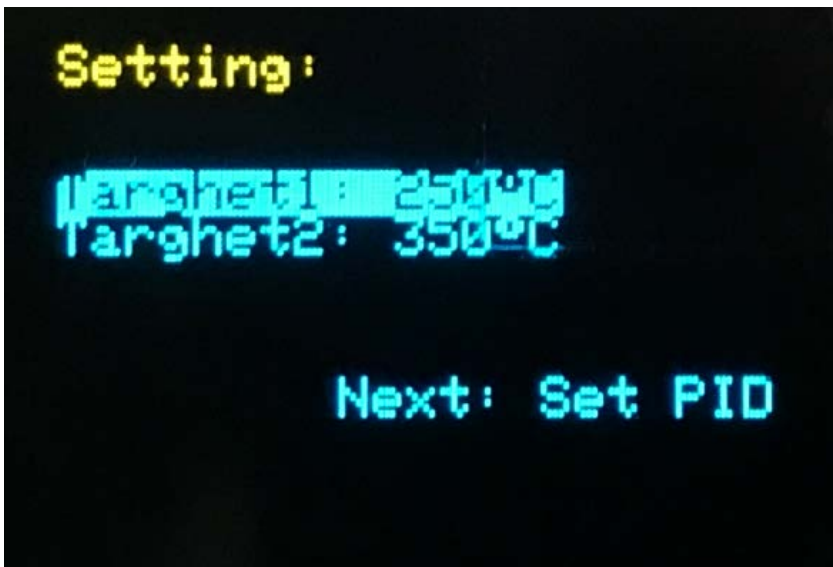- Shows the time left to switch off.

SettingMenu:

The setting menu can only be accessed from the main screen by pressing the encoder for more than 3 seconds and then releasing it.

The settings menu allows you to set:

- Preset Temperature T1 e T2;
- PID parameters;
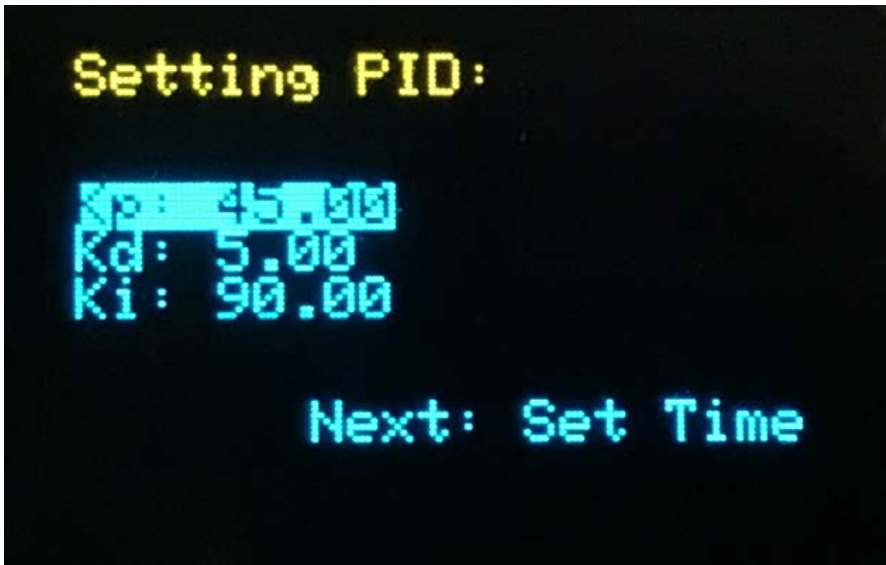- Timer for switching off.

Preset Temperature:

The two temperatures can be changed by rotating the encoder and confirming by pressing and quickly releasing. Each quick press of the encoder confirms the entered data and goes to the second setting.

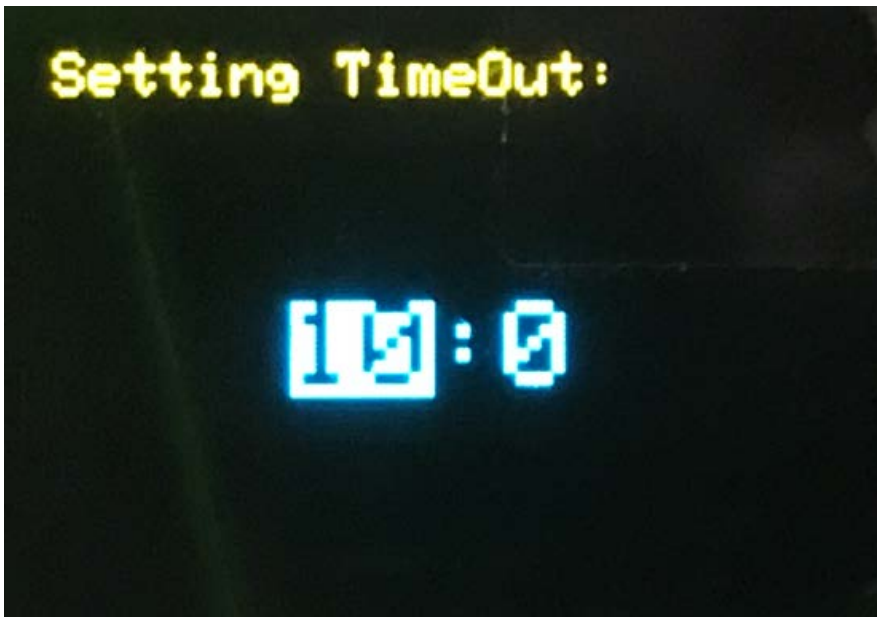Going to Next we go to adjust the PID.

PID menu:

We can adjust the Kp, Kd, Ki by acting on the encoder and always confirming with a fast pressure of the encoder.

By pressing on Next we can set the sleep timer.

Timer setting:

The first number indicates the minutes and the second number indicates the seconds (mm: ss).

In each menu setting we can always go back to the main screen by pressing for more than 3 seconds and then releasing the encoder.

Encoder states:

1. Long Press → Enter or exit the settings menu;
2. Short Press → Change the temperatures, confirm the data entered in the setting menu;
3. Rotating → Varies the temperature, changes the data in the setting menu.

System states: