Controlled_Hot_Gun construction manual

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Disassemble the RS Soldering station

https://at.rs-online.com/web/p/lotstationen/1244133

Prepare Arduino Mega Compatible Controller Board

MAX31855 for Thermocuple

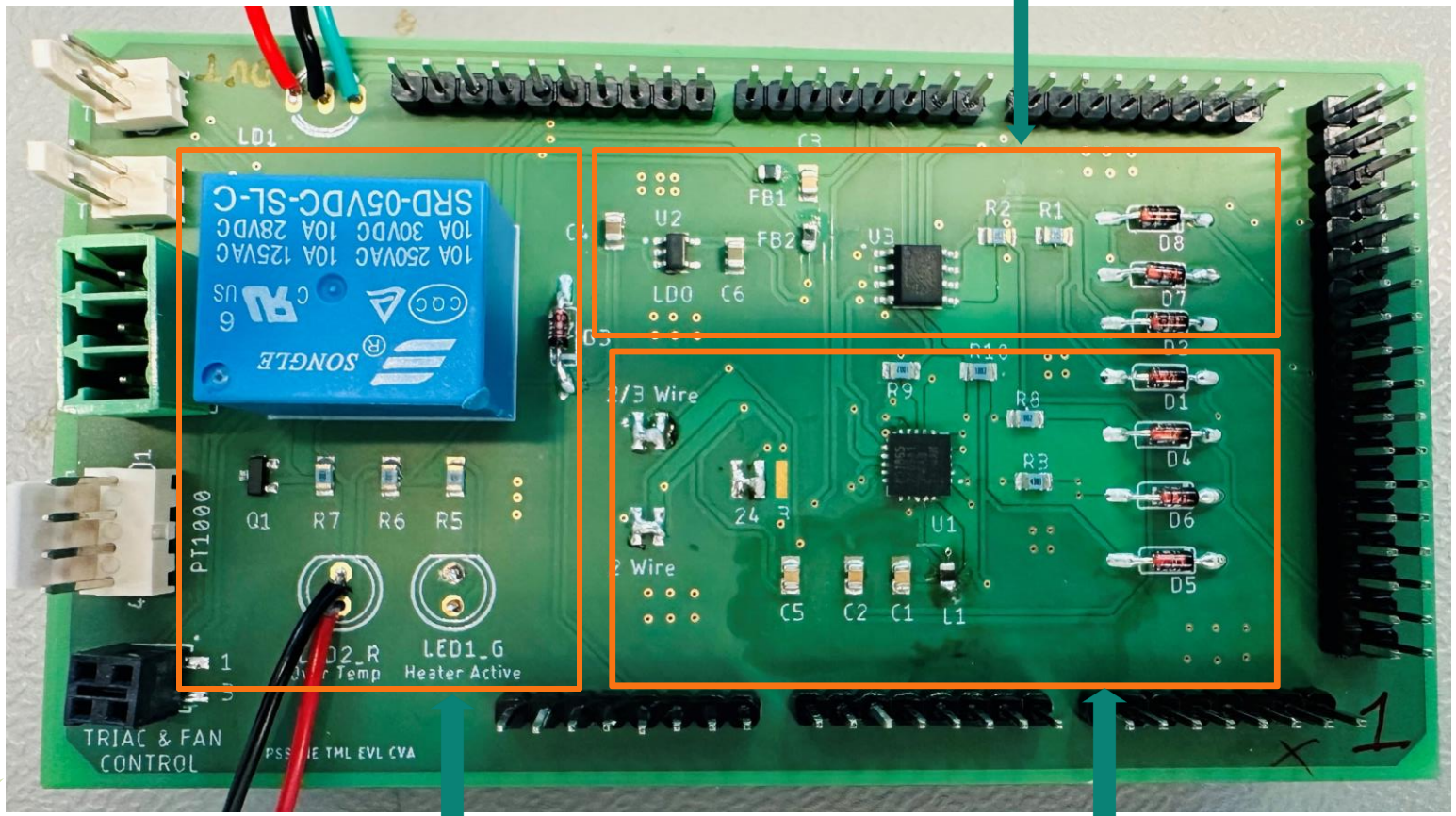
1 From DUT Thermocouple

2 From HotgunThermocouple

3 From mains supply

4 From PT1000,

5 To Main PCB (Adapter)



Protection Circuit

MAX31865 for PT1000

After soldering mount controller board on an Arduino Mega 2560

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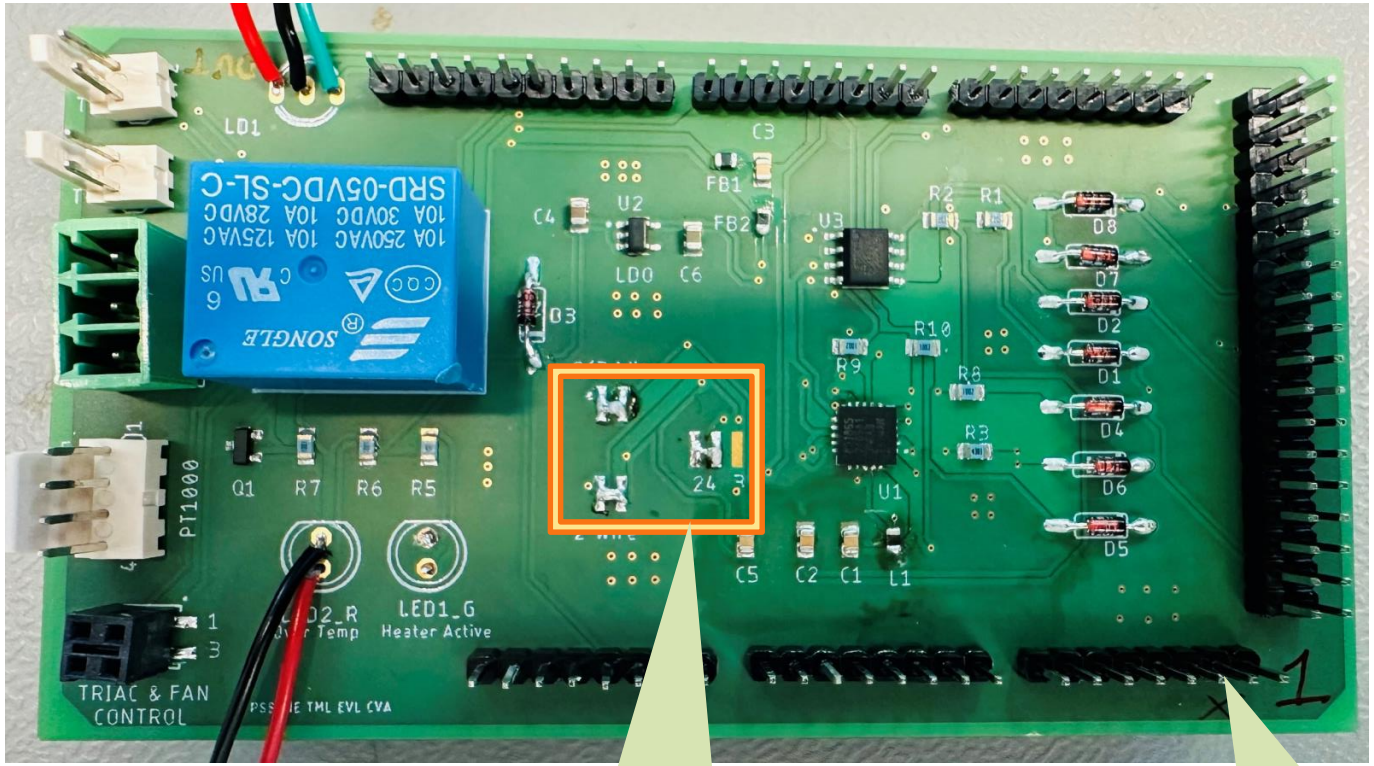
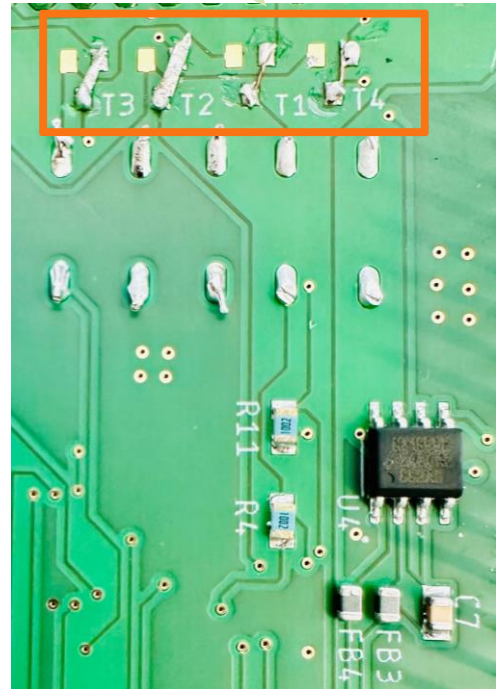
Solder Jumpers



Ensure to place solder jumpers as in the figure

- Pin header straight, 36-pin / 1-row
- RS: 251-8345

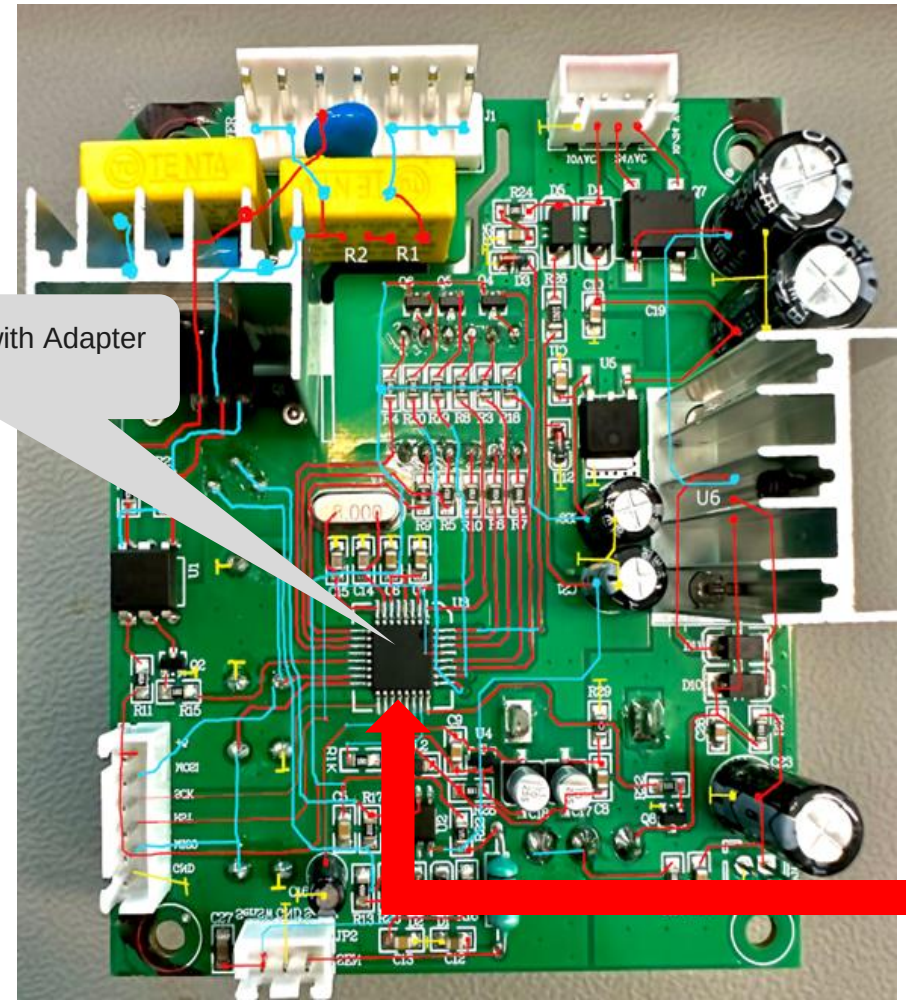
Place jumpers on T1, T2, T3, and T4 as shown. These configure the MAX31855 for software SPI. To use hardware SPI, use empty solder pads. Update the Arduino sketch as needed.



Bottom side of Controller board

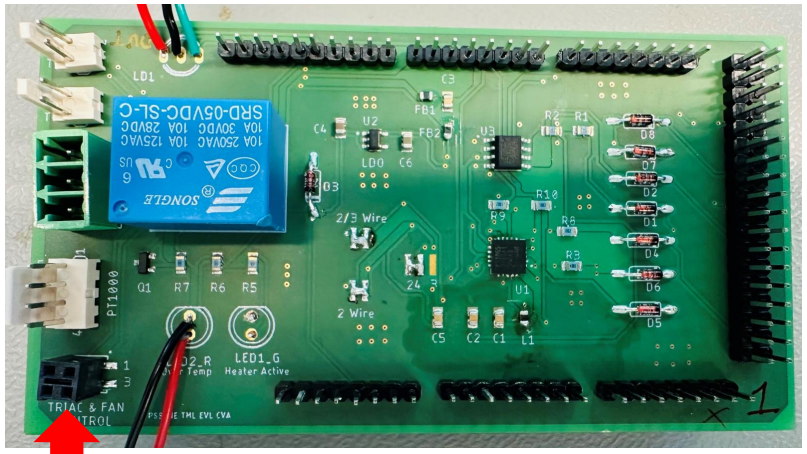
Adapter that connects Main PCB to controller

Replace the IC with Adapter PCB

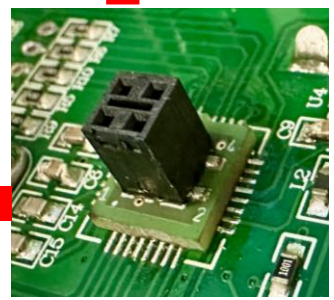


Main PCB

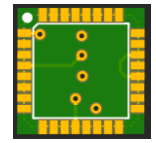
Controller PCB



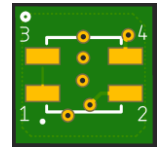
Connect adapter PCB with controller PCB using a 4 core cable.



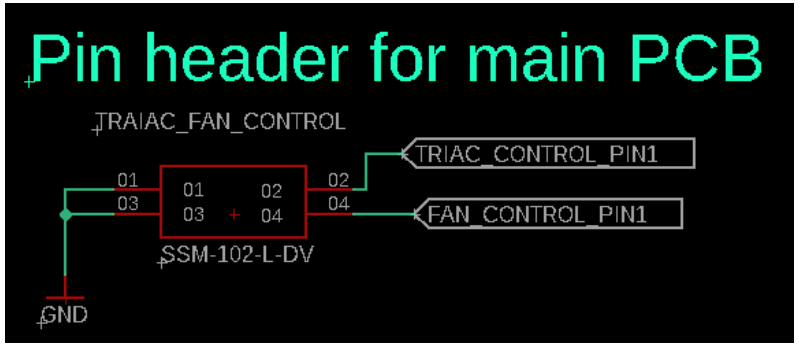
Adapter PCB



Bottom view
Atmega8A Footprint



Top view



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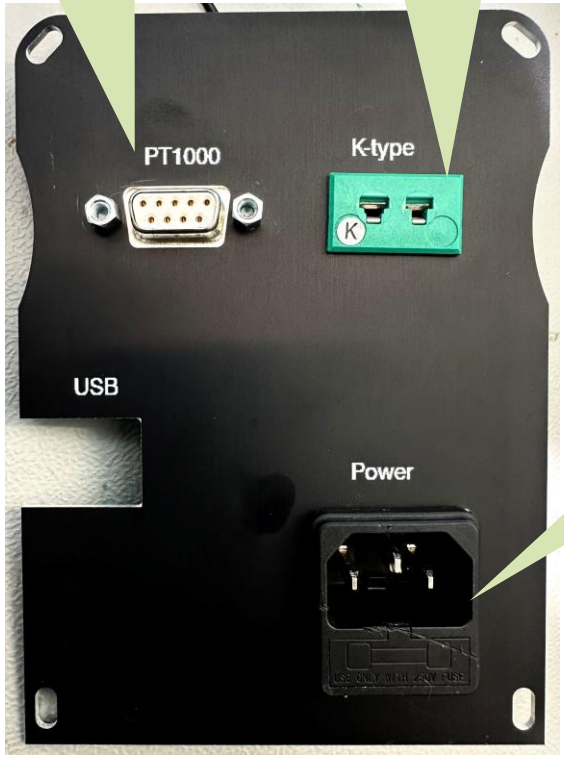
Mount PCB and connectors for sensors

Mount the PCB 2CM from ground

9 Way Panel Mount D-sub Connector Plug
RS : 544-3727

Thermocuple socket
RS: 455-9742



Use same socket from the Original unit

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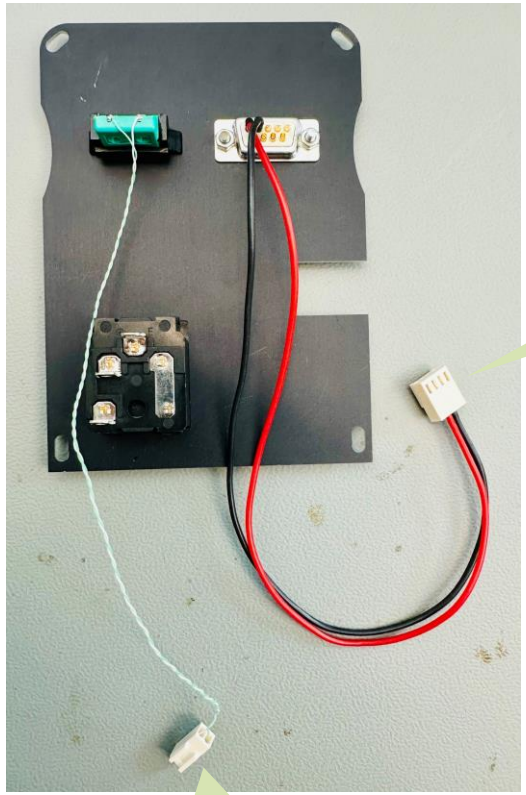
Prapare Cables for PT1000 and Thermocuple.



- Female Terminal Housing Würth: 61900411621
- Female Crimp Contact Würth: 61900113722DEC
- Connected to PT1000 on Controller board

- Pin Header, 2 Contact
- RS : 483-8461
- Connect thermocouple from DUT

Connect thermocouple from Hot Gun

- Terminal Block, 3 way
- RS : 237-8554
- Connection from mains

- Pin Header, 4 Contact
- RS : 483-8483
- Connect PT1000 from DUT

- 4 Position Female, Feed-Through Connector
- DigiKey Nr : SAM1146-02-ND
- Connect to adapter PCB on main PCB

- Terminal housing 2 pin Würth: 61900211621
- Crimp contact Würth: 61900113722D
- Connect to JP1 on controller board (DUT thermocouple)

LED indicators & Custom Front Panel

Drill 3 holes for the LED indicators

front panel

Proposed custom front panel

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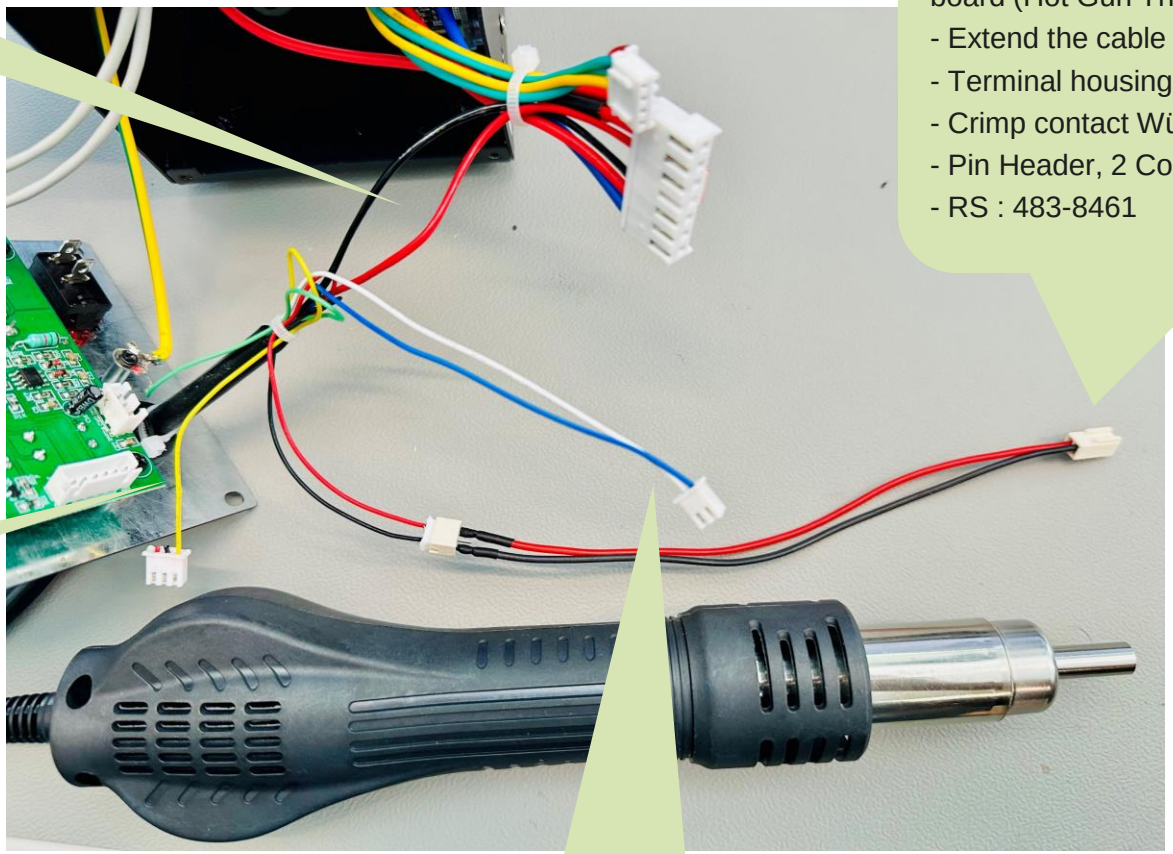
Connect Hot Gun

Thick Red & Black Wires connected to Heating Coil

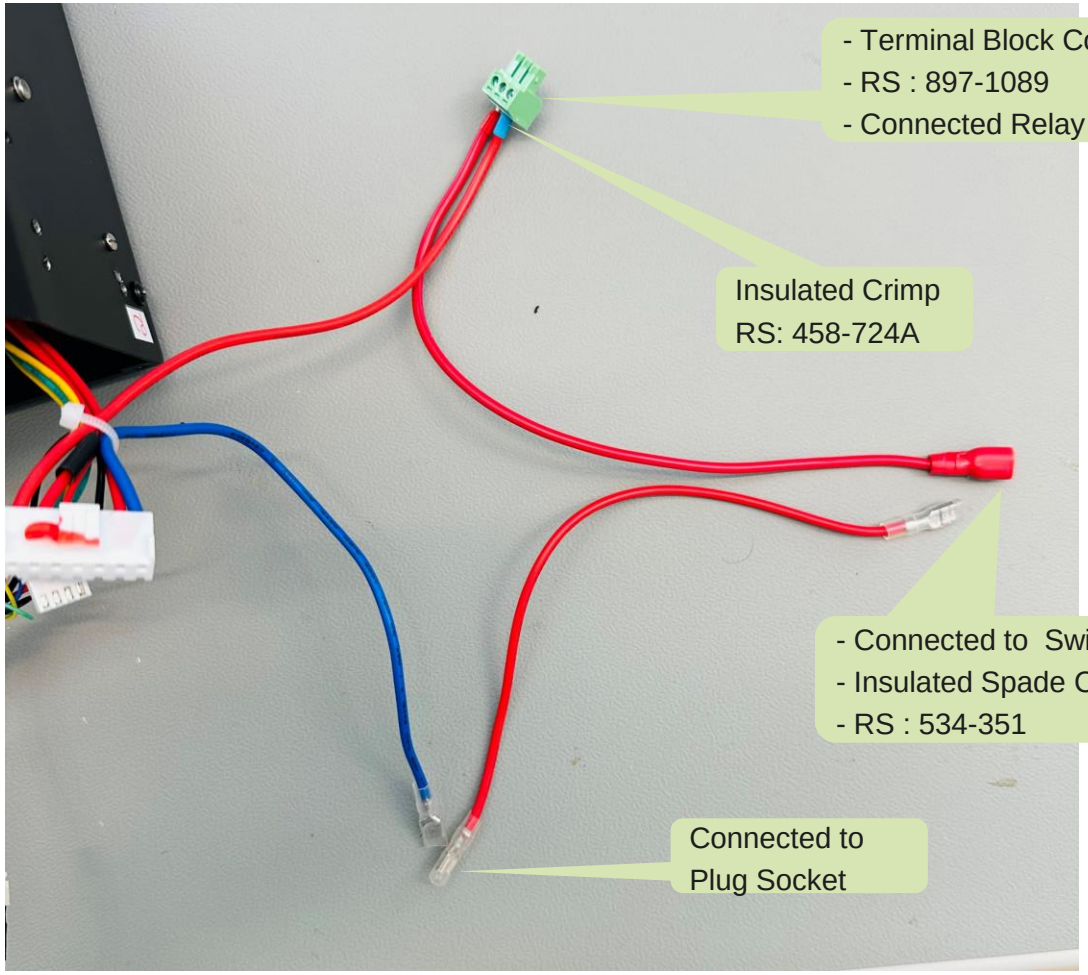


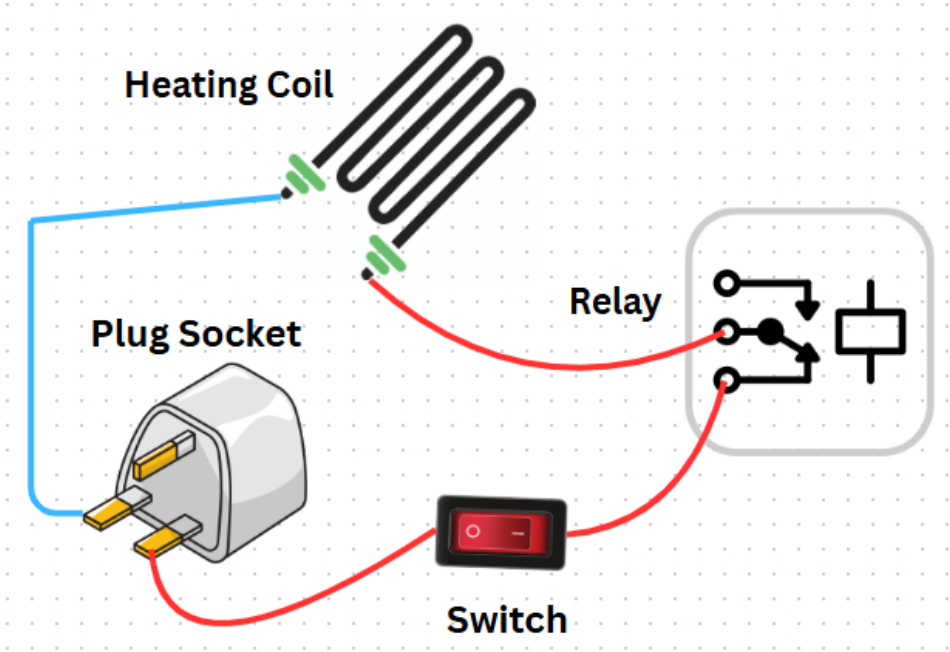
- Thin Red and Black wires connected to Controller board (Hot Gun Thermocouple)
- Extend the cable using :
- Terminal housing 2 pin Würth: 61900211621
- Crimp contact Würth: 61900113722D
- Pin Header, 2 Contact
- RS : 483-8461

Yellow wire Not connected

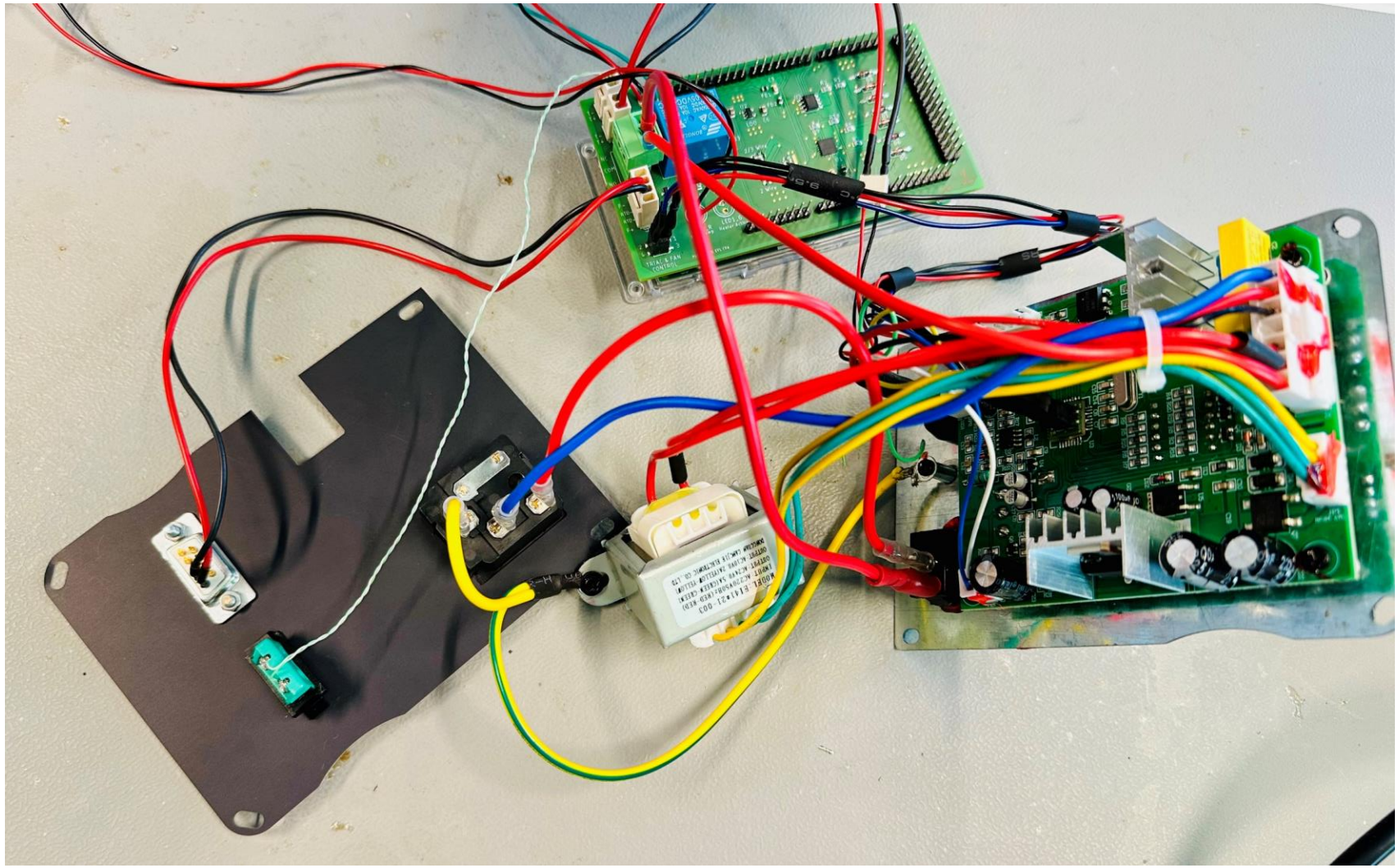
White & Blue wires Connected to Fan

Internal wiring Diagram

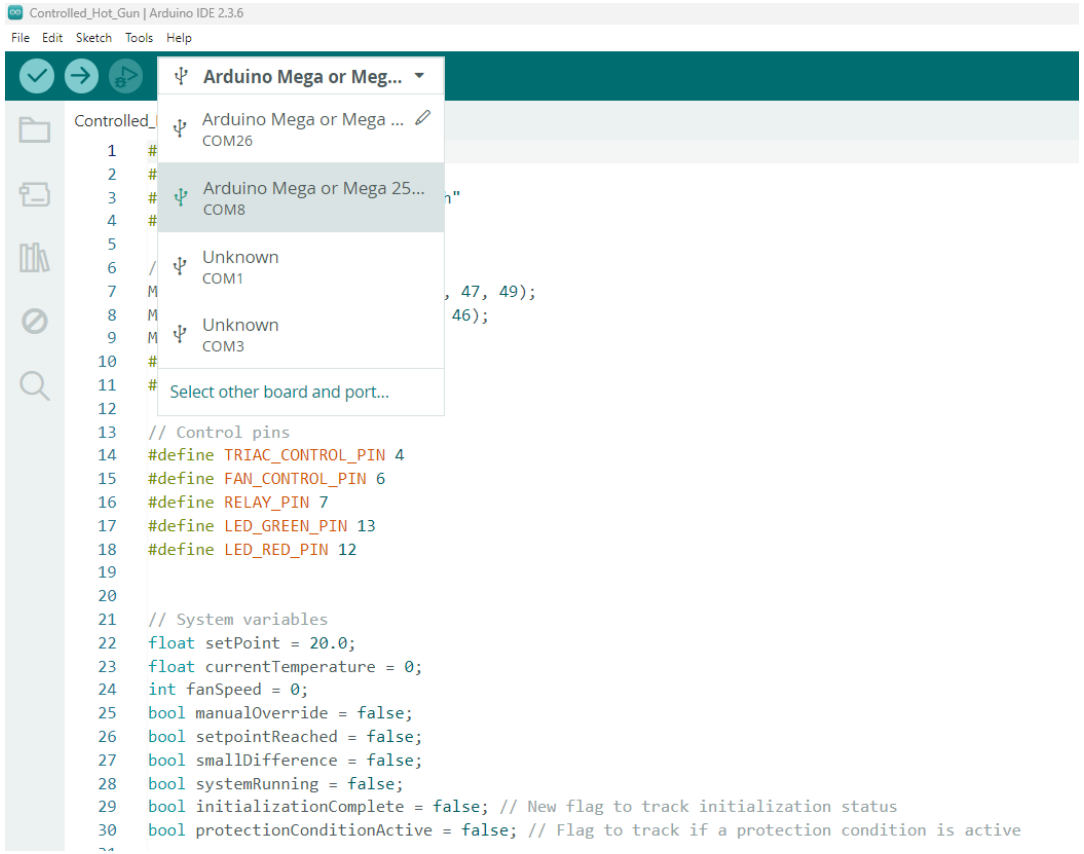




Internal Wiring, a reference



Flash MCU Firmware using Ardunio IDE



- Open the firmware for the Aruino using below given Directory (Controlled_Hot_Gun.ino) on Arudino IDE.
- Connect Desired Arduino Mega Board on IDE
- Click on Upload button

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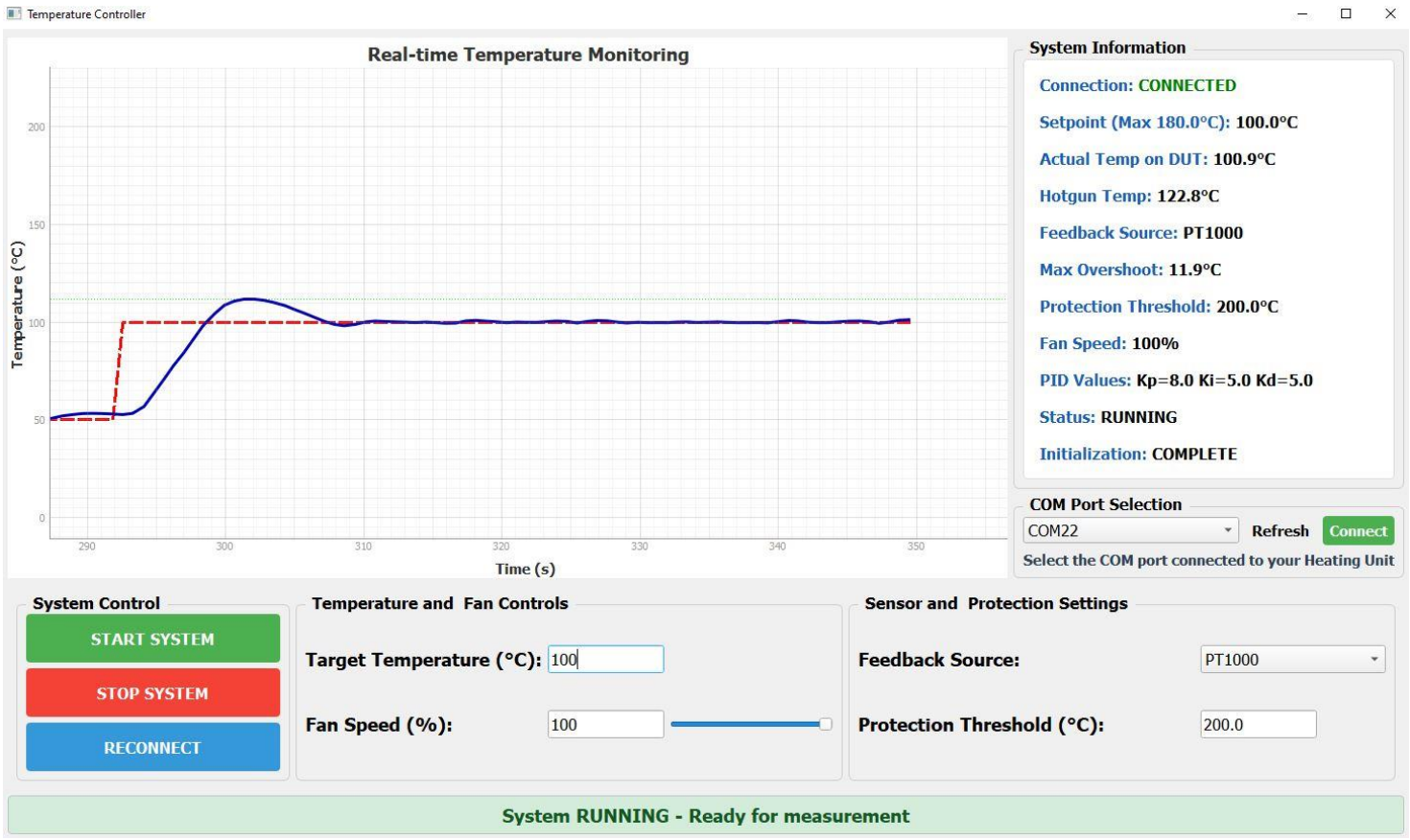
Python GUI



- Open The GUI Source code using below given Directory (Controlled_Hot_Gun_GUI.py) in a Code editor (eg: VS Code)
- Create an enviorment in a code editor by installing all dependencies as the code is not in a software or executable format.
- Run Python GUI Program
- Establish a connection to the Heating unit via COM Port Selection.

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Find useful files

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- Eagle files
- Autocad files
- BOM
- Arduino Firmware
- Python code for GUI

BOM

Description	Part Number	Pcs	Vendor
Pluggable terminal block connector	897-1089	1	RS-Components
Sub-D connector E socket	544-3749	1	RS-Components
Thermocouple panel socket	455-9742	1	RS-Components
Pluggable Terminal Blocks Header	651-1803280	1	Mouser Elecetronics
Arduino Atmega 2560 development board	715-4084	1	RS-Components
RS PRO soldering station	124-4133	1	RS-Components
Sensor interface MAX31855	700-MAX31855KASA+	2	Mouser Elecetronics
MAX31865ATP+, IC RTD TO DIGITAL CONVERT 20QFN	MAX31865ATP+-ND	1	Digi-Key
SMD ferrite beads	223-4974	5	RS-Components
General purpose relay 5V	392-101287	1	Mouser Elecetronics
Female Crimp Contact	710-61900113722DEC	8	Mouser Elecetronics
Straight pin header	251-8345	2	RS-Components
LDO Voltage Regulator	998-MIC5225-3.3YM5TR	1	Mouser Elecetronics
NPN Transistor	753-2721	1	RS-Components
Insulated Spade Connector	534-351	1	RS-Components
Insulated Crimp	458-724A	2	RS-Components
Terminal housing 2 pin	6190-0211621	3	Würth Electronics
Pin Header, 2 Contact	483-8461	3	RS-Components
Pin Header, 4 Contact	483-8483	1	RS-Components
4 Position Female, Feed-Through Connector	SAM1146-02-ND	2	Digi-Key
Dual Colour LED Green, Red (Front Panel - Over/UnderTemp Protection)	215-1697	1	RS-Components
LED Yellow (Front Panel - Power)	871-4631	1	RS-Components
LED Red (Front Panel - Heater ON/OFF)	871-4637	1	RS-Components

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Infineon