



Siemens S7-1200 Training Kit

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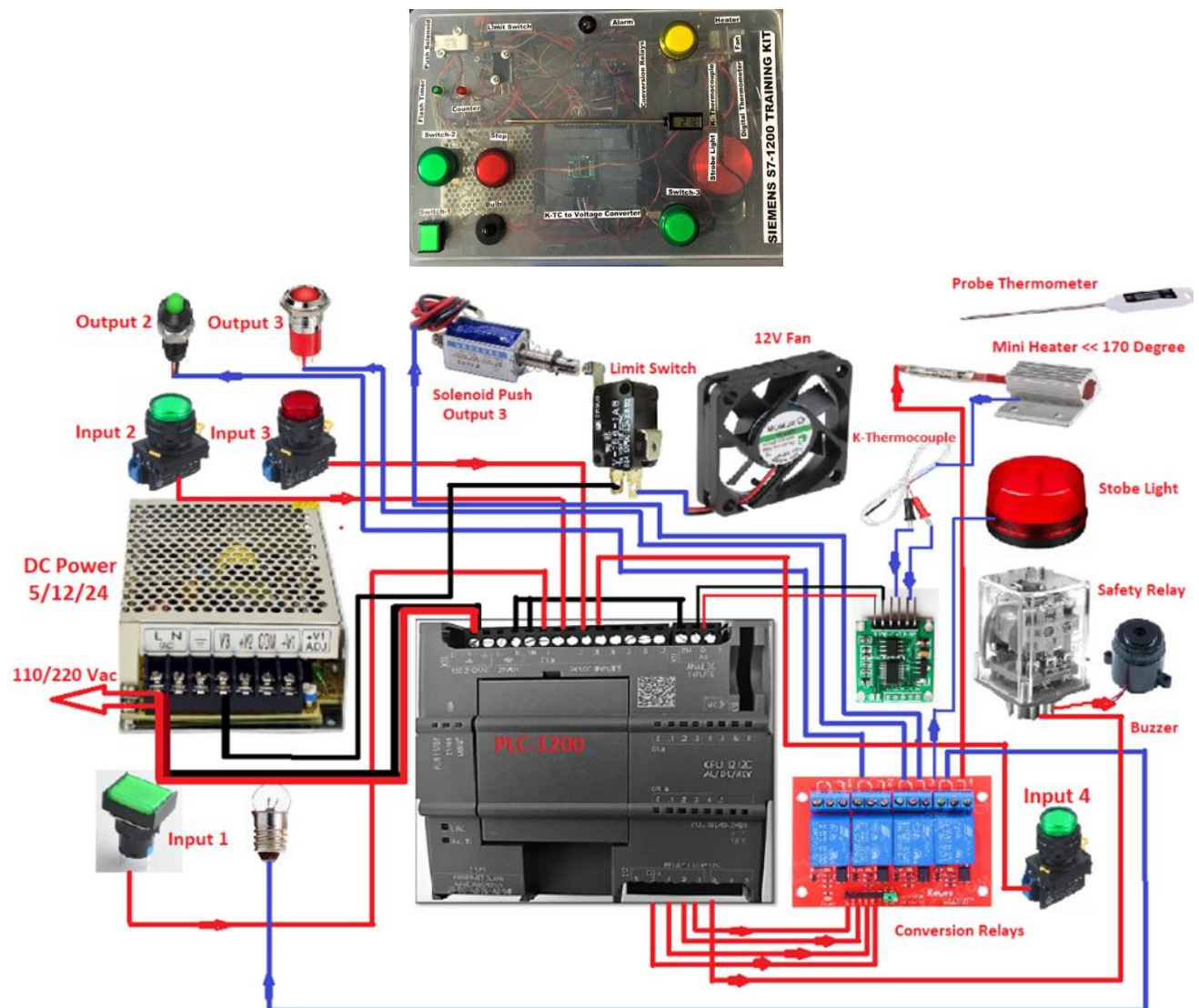
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Siemens S7-1200 Training Kit

The main goals of EIT Siemens Training Kit:

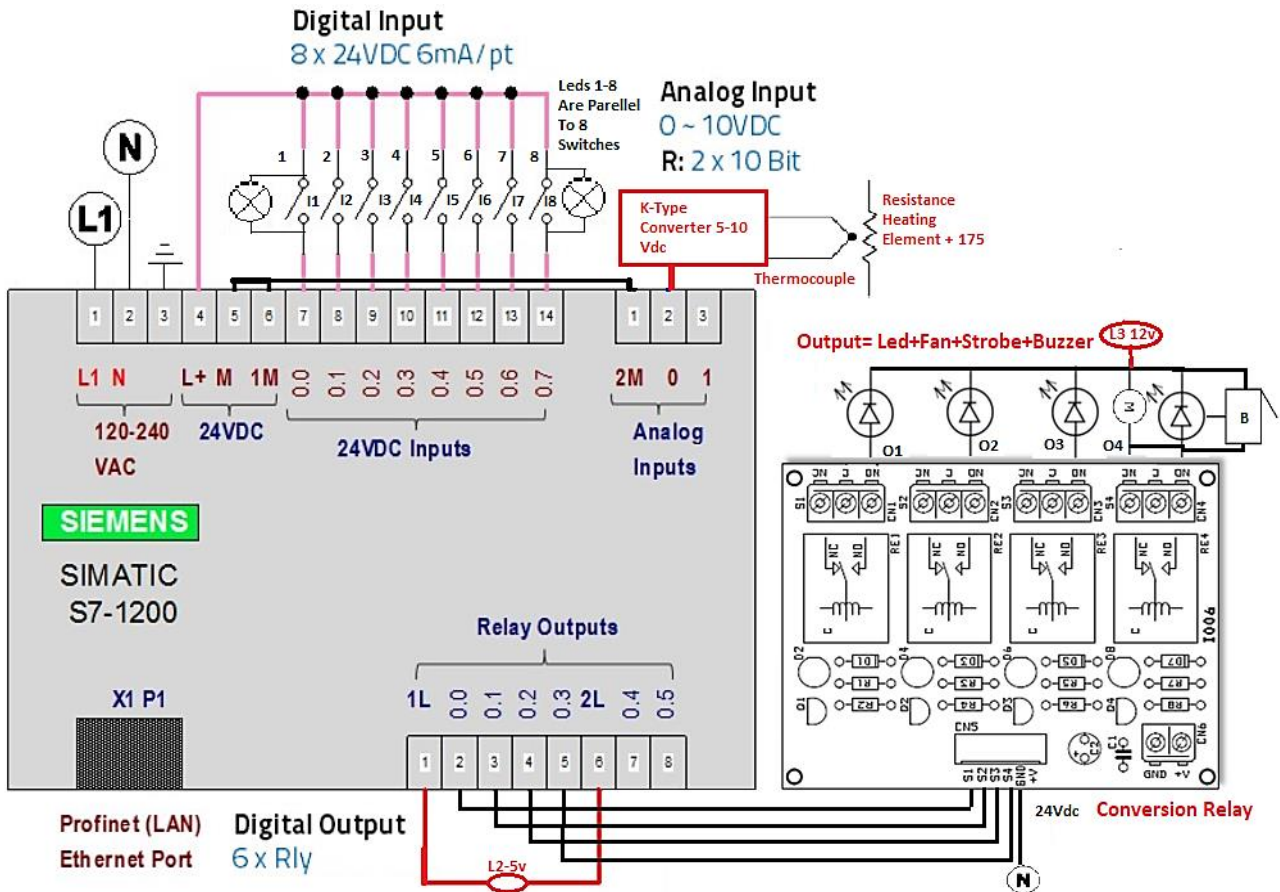
1. Student will Learn the Components Used in Project and how it is used to operate.
2. Student will learn to program in Siemens Training Kit and to understand working of PLC.
3. Student will learn to Simple Interlock PLC program through switch and bulb.
4. Student will learn timer & counter code to operate solenoid push switch & limit switch.
5. Student will learn to detect analog signal from temperature probe and feed to PLC.
6. Student will learn to put on alarm when maximum temperature reach and cutoff through safety relay through buzzer sound.



Pictorial Representation of PLC Kit

Components:

1. **Siemens Simatic S7-1200 PLC:** CPU 1212C AC DC Relay 6ES7212-1BE40-0XB0, Model No.: S7-1200 PLC CPU 1212C S7-1212C Relay output, **Power Supply: AC 85-264 V AC at 47-63 Hz**, Output Type: 6 Bits Relay Output., Digital Input: 8 Bits 24V DC Inputs, Analog Input: 2 Channels Analog 0-10 V DC input. [sourced [here](#)].
2. **Power Supply:** It is a normal power supply NET-50D with 3 output voltages +5,12,24 Vdc. [sourced [here](#)].
3. **Momentary Switch:** It is a momentary switch connected with LED, when it is pressed the LED is On and Off when release. [sourced [here](#)].
4. **LED:** It consume 12 Vdc. [sourced [here](#)].
5. **Conversion Relay:** This Funduino-0932640012 conversion relays with 4 SPDT relay consumes 24 Vdc and Its function is to trigger and switch on and off LED output, buzzer, fan and strobe light from the help of dc output of PLC [sourced [here](#)].
6. **Safety Relay:** This safety relays HF10FF is DPDT-relay which operates in +24v and one pole is used control buzzer and next pole to switch everything off.
7. **Push-Pull Solenoid:** It is normal 12 VOLT magnetic push switch where it changes the mechanical shaft as power is supplied to make work another limit switch. [sourced [here](#)].
8. **Limit Switch** It is a mechanical switch which is in industrial area to count the products, here it is used as a simple ON/OFF switch which controls Fan. [sourced [here](#)].
9. **Cooling Fan:** It operates in 12Vdc power and use to cool the circuit inside the system. [sourced [here](#)].
10. **Strobe Light:** This strobe light is the flashing light which is generally used in industry to alert. [sourced [here](#)].
11. **Heating Element:** It is external heating element varies from 50 degree to 175 degree Celsius. [sourced [here](#)].
12. **K-TYPE Thermocouple Probe** [here](#).
13. **K-TYPE Converter 5/10 Vdc** [here](#).
14. **Digital Temperature Display:** This is display of temperature in digital number from 0 to 300 degree Celsius. [sourced [here](#)].



Schematic Diagram of PLC and its peripheral Circuits

Operational Steps:

- Switch 1** green will switch 'ON' PLC 'DC Input 0' through its ladder code and it interlocks the conversion relay through PLC 'DC Output 0' and finally making the 'Bulb' in 'ON' state.
- To stop the interlock, press Red 'Stop' and it will switch PLC 'DC Input 1' 'ON' and the internal interlock code switches off the PLC 'DC Output 0' that means 'Bulb' will be in 'OFF' state.
- For the Timer press 'Switch 2' it will switch ON 'DC Input 2' and because of PLC code the PLC 'DC Output 1' will flash 'Green LED' within '500ms'. (Timer can be changed)
- For Counter program, if 'Green LED' flashes '10' times than from PLC Code 'DC Output 3' will be 'ON' and which makes 'RED LED ON' and in same time 'Solenoid Push Activates' which further push the 'limit switch' making 'FAN ON'. (Counter can be changed)
- For heating purpose press 'Switch 3' then it will make PLC 'Input 3 ON', further switching from PLC code 'DC Output 3 ON' and this will turn 'ON' conversion relay and 'Red LED' and finally start to heat the element.
- While heating process 'K- Thermocouple' will sense the heat and due variation in resistance and

voltage output it is connected to amplify with **“Thermocouple Converter Circuit”** into **0-10Vdc** varying dc signal.

7. This varying **‘0-10 Vdc’** is feed to PLC **‘Analog input 0’** and from PLC code the upper limit temperature is set (**>88°C**), if this temperature will exceeds, **‘ DC Output 4’** will be triggered making the **‘Strobe light and Buzzer ON’** and if the temperature further increase (**>93°C**) it will trigger PLC **‘DC Output 5’** turning **‘OFF Heater & Red LED’** in reverse turning **‘ON’** Fan for **‘30 Seconds’** until the temperature decreases beyond the limit and the process can start again. (Up & Low temperature can be changed)
8. This is how the interlock, timer, counter and heating element are controlled in the industry for different purposes.