



## MEP 480 B. Sc. Design Project- Year 2007/2008

### Using PLC in Automatic Temperature Control

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#### Abstract:

Cooling system will increase efficiency of many MEP applications, reduces cost and improve system life in general, that's why it is essential to merge automatic control using PLC in Temperature cooling processes for better efficiency and accurate, safe and stable operation. But because different application have various cooling system designs, that's why we decide to make our project as an educational Automatic Control Temperature Cooling System that can simulate many industrial applications.

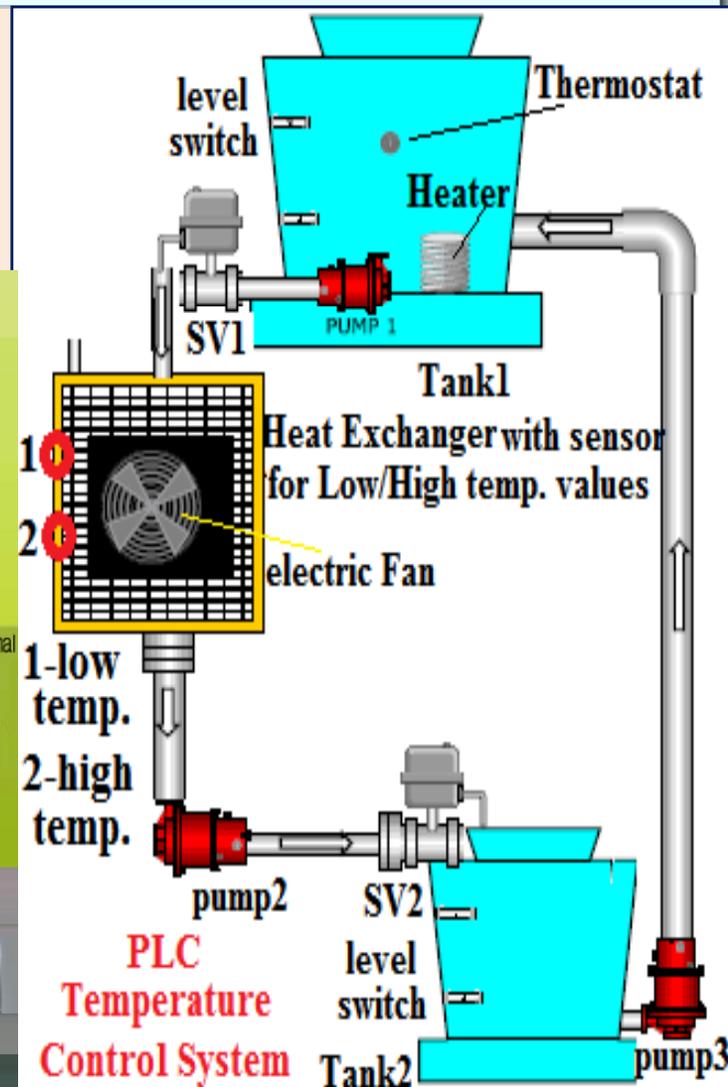
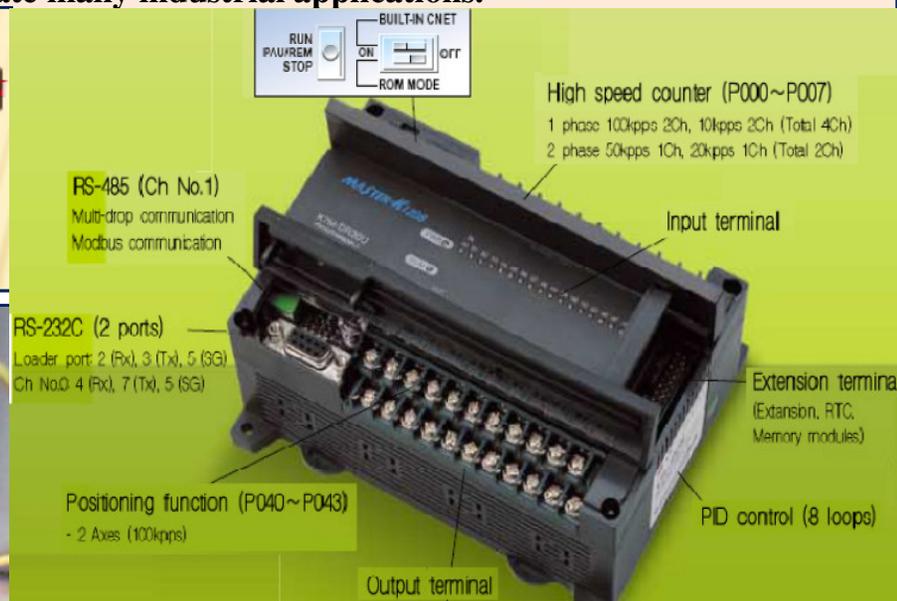
#### INTRODUCTION

#### THEORY OF OPERATION

#### CALCULATION

#### PLC System

#### COMPONENTS

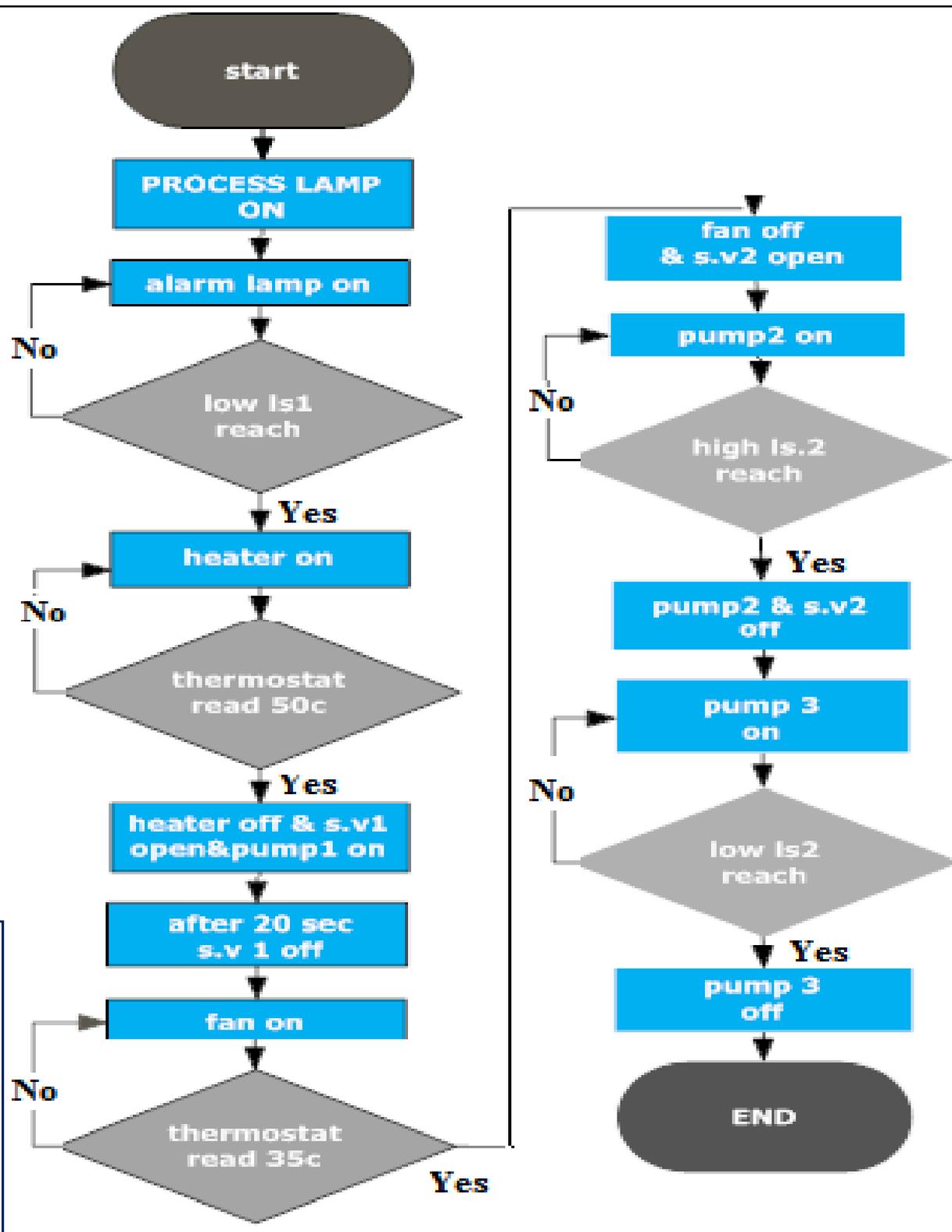
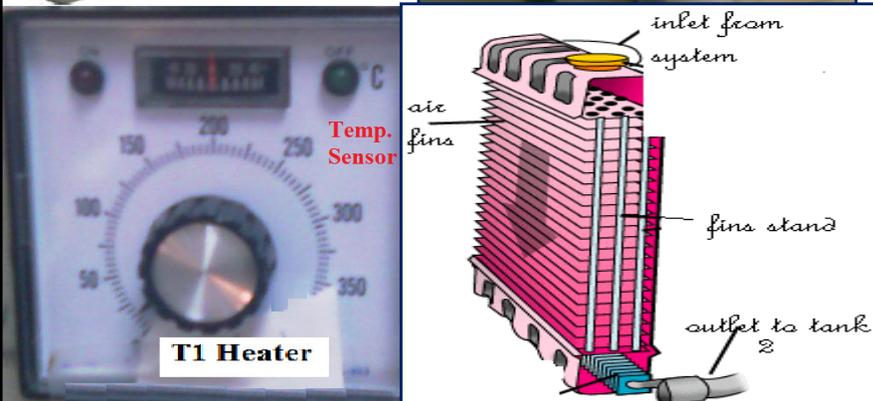
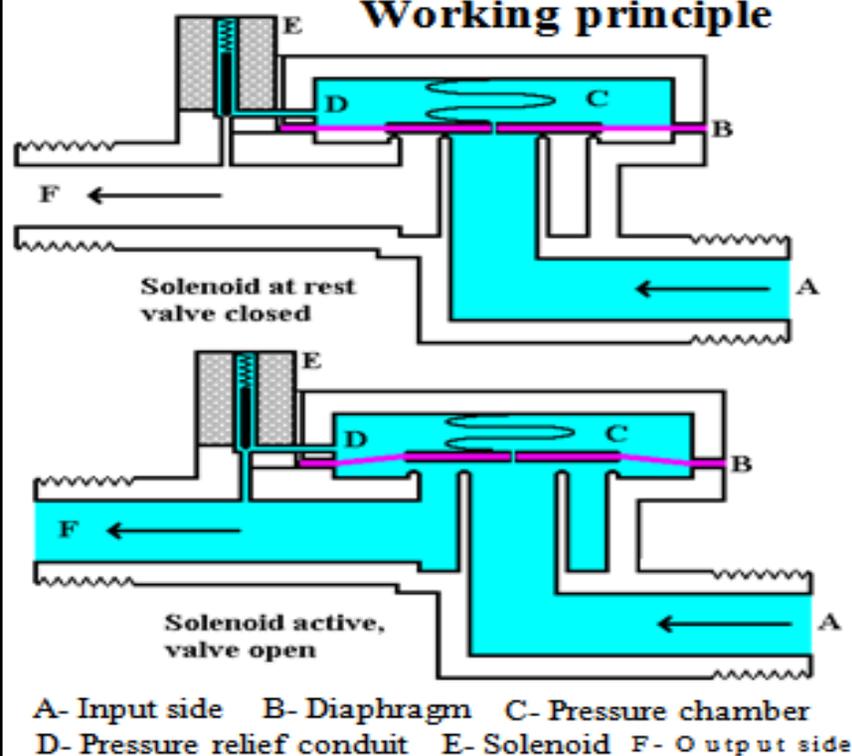


SOLENOID VALVE

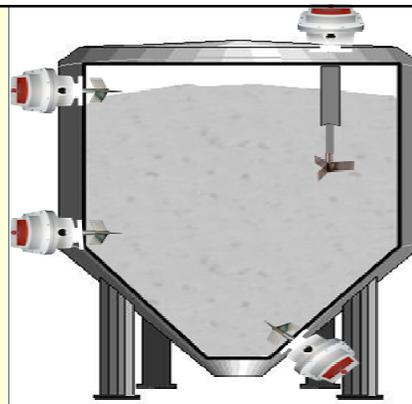
HEATER

LEVEL SENSOR

# Working principle



**System Operation Method:** After pressing start button, level-switch in tank 1 shows if water is at low level & alarm will be ON and system will stop. If else, heater will run ON to reach max. temperature then valve S.V1 opens for given time then S.V1 is close. Fan will run until temp. sensor reads low temp.-1 where S.V2 opens & water will go to tank 2. After switch level reads high level the pump will pump water to tank 1 & so on.



Push the start button (with the green color) the heater will start to run. And if the red lamp on the control board lightened it means that the tank is at low level and the system is not designed to work at the low levels, so you have to make sure that the water level is over the electrode. When the temperature at the first tank reaches the desired value (60 Celsius) ,(you can observe the change of the temperature in the first tank using the analog temperature thermometer fixed in the tank ). Then the plc will receive a signal from the temperature sensor indicating that the heating operation completed safely. After the previous step the plc sends three simultaneous signals ordering the heater to stop running, the solenoid valve to open and run the pump1. The solenoid valve will keep opening via a timer that is set 16 sec From the time of opening (after an accurate calculations we estimated that 16 seconds are equivalent to 1.5 liter of water which is the radiator volume) . After the timer ends, the plc will send two simultaneous signals to close the solenoid valve and runs the radiator fan. The radiator fan will keep running until the water temperature cools down to 40 Celsius (which is the adjustable). Then the plc will receive a signal from the temperature sensor indicating the cooling process is done successfully. The plc will send three simultaneous signals to stop the radiator fan, open the solenoid valve and run the second pump. After the water level reached the electrode high level in second tank, then the high electrode level sense the water level and sends a signal to the plc indicating that the water level reached the specified level and the plc will send a two simultaneous signals to stop the second pump and run the third pump which is connected to the second tank. The second tank will discharge the water through the third pump which will deliver the water via pipe to the first tank. The pump will keep running until the low level electrode senses the low water level When the low level electrode in the first tank reaches the specified level the heater will start running via plc. By these previous steps we can say that the system have finished one complete cycle and it will repeat the other similar cycles automatically.

**Conclusion** :This project was an incredible learning experience for us. We feel that we have become a better engineers because we were challenged by something that we have never worked with. Since we have a Mechanical emphasis, we learned a lot about what goes into the design of a circuit .To us electricity and circuits was always something that we wanted to stay away from, but after this project we intrigued by what can be done with some simple circuits. Not only have we learned a lot about PLC we also learned a lot about documentation and time management, two of the biggest things that cannot be taught, but are skills that are developed. We are very happy that we worked on this project and even though it was a lot of work it was worth the effort to see it work.

