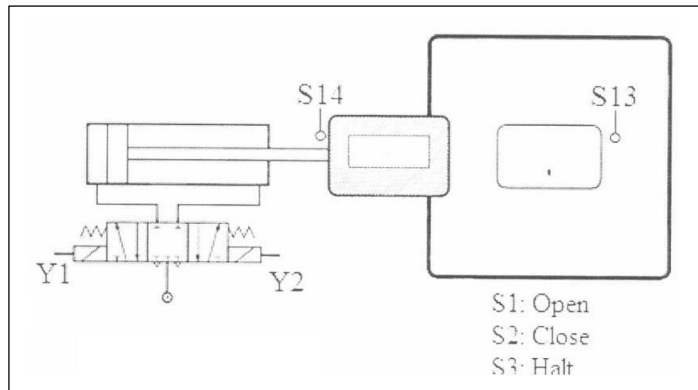


**2nd Year (Electrical Engineering)**  
**Course: Systems Dynamics & Control Components (ECS2005)**

**Topic #1 (Furnace door control)**

In its initial position, the furnace door is closed. Pressing switch S1 triggers solenoid valve Y2 to open the door. Limit switch S14 or stop switch S3 deactivate solenoid valve Y2. If the furnace door has been stopped by limit switch S14 or stop switch S3, the door is closed automatically



by solenoid valve Y1 after a delay of 6 seconds. The closing procedure can also be commenced by means of button S2. Stop button S3 can be used to halt the closing of the door. If a total opening time of 30 seconds is exceeded through repeated operation of the stop button, this button is disabled and the furnace door closes automatically. Closing of the door is completed by deactivating solenoid valve Y1 when limit switch S13 is reached.

**Create an assignment list of the inputs and the outputs, draw up a terminal diagram, and write a PLC program in ladder diagram mode.**

**Topic #2 (Pump control)**

Four tanks which can be emptied manually are filled from a common reservoir via four pumps, one to each tank. Every tank has a signal sensor for indicating when they are full and empty.

Description of function:

The pumps have the following in-circuit power ratings:

Pump 1: 3 kW

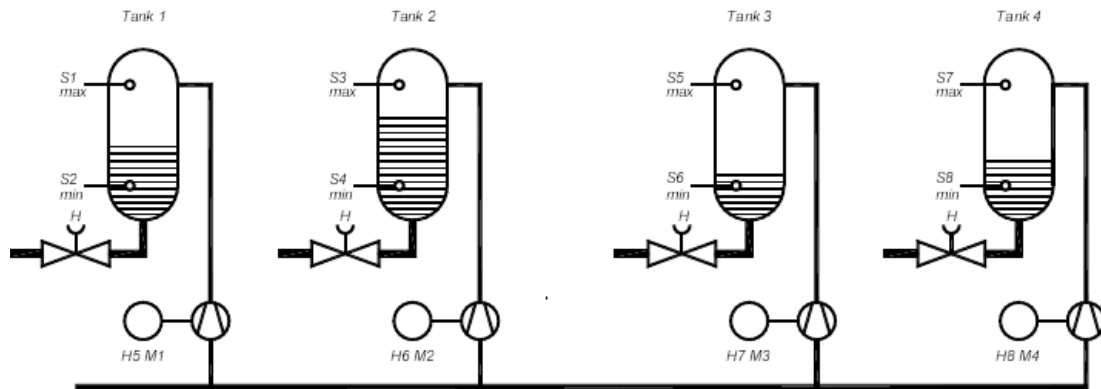
Pump 2: 2 kW

Pump 3: 7 kW

Pump 4: 5 kW

As soon a tank is notified to be empty, the control system should cause it to fill up again. Total power consumption must not exceed 10 kW.

**Create an assignment list of the inputs and the outputs, draw up a terminal diagram, and write a PLC program in ladder diagram mode.**



### Topic #3 (Continuous Bottle- Filling Control)

Implement a control program that detects the position of a bottle via a limit switch, waits 0.5 seconds, and then fills the bottle until a photo sensor detects a filled condition. After the bottle is filled, the control program will wait 0.7 seconds before moving to the next bottle. The program will include start and stop circuits for the out feed motor and the start of the process.

**Create an assignment list of the inputs and the outputs, draw up a terminal diagram, and write a PLC program in ladder diagram mode.**

