Industrial Automation – Spring 2025

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Exercise Sheet: Week 2

Question 1

A PID-controller is used for controlling the heating of a batch in a chemical reactor to the operating temperature. The batch is always too cold when it is poured into the reactor and only heating is applied. However, the colder the batch is when the heating is started, the higher the final temperature goes. What is probably causing this problem? Explain the mechanism and suggest solutions both for the cases that the controller design can and cannot be modified.

Question 2

A sensitive liquid flow is heated by an inductive heater in a section of the tube where it is flowing. The disturbance from the current in the heater makes it impossible to place a temperature sensor close to the heating point. Instead, the sensor is placed a significant bit downstream (approx. 5m). Now it becomes difficult to control the temperature with the intended PID-controller. What is the problem? How can you solve it? Suggest as many possible methods as you can think of. The flow is constant and will not change.

Question 3

You are asked to select the components of the automation system for an elevator in a residential building with 5 floors.

a) What sensors & actuators do you need?
b) What type of PLC would you use for this application?
c) Can you estimate the number of input & output signals that need to be connected to the PLC?