

FAULT DIAGNOSIS UNIT FOR TEMPERATURE CONTROLLER

TEMP-DIAG is a setup for producing faults at different points of a temperature control process by PID. The faults are selected by the instructor using the switches located under a rear flap of the setup. For user safety, the circuit voltage does not exceed 24VAC. Students can take measurements or perform tests in complete safety, regardless of the fault type. Industrial terminals group the wiring of the different components to prevent wear of the screw terminals of the components.

Power supply 230VAC by 3m cable and mains plug 2P+E safely behind a panel.

Setup supplied wired and fully operational. Supporting material on CD includes the teaching file with the Student/Instructor practical works.

EDUCATIONAL OBJECTIVES

- To understand the wiring of a temperature control loop by PID
- To simulate the most frequent faults on an temperature controller with analogue signal.
- Analysing and interpreting the results.

TEACHING RESOURCES WITH PRACTICAL WORKS

Practical works

- Identification of the different components and production of electrical diagrams.
- Production of the wiring of the temperature control loop.
- Programming the PID.
- Measuring the analogue signal 4-20mA.
- Finding the different faults on the circuit using measuring devices.

Composition of the system

- 1 frame on wheels (two with brake) with dimensions H1800 x 800 x 700mm
 - 1 melamine shelf 750x400mm
 - 1 wiring frame equipped with:
 - 1 PID controller which is the corrector device inserted in the control loop, intended to control the temperature process. From the temperature sensor it receives a signal 4-20mA, image of the value to be controlled, compares it with the set point (previously programmed in the PID) and controls the process to reduce any deviation.
 - Self-adjusting and manual PID
 - 4-digit display for instant measurement
 - 4-digit display for the set point
 - Bargraph image of the power output
 - Input 4-20mA on safety terminals
 - Output 4-20mA on safety terminals
 - High and low alarm outputs on safety terminals
 - 1 Heater unit equipped with 75W lamp directly powered with 230V.
The Pt100 temperature probe, with a maximum diameter of 7mm, can be inserted sideways.
 - 1 Pt100 temperature probe
 - 1 conversion module PT/100-4-20mA.
This unit links the temperature probe on the input 4-20mA of the PID, the gain and zero adjustment of the signal with 2 potentiometers.
 - 1 power controller for the load varies the conduction angle of the thyristors according to the control current in 4-20mA.
 - 1 indicator connected to the alarm output of the PID
 - 1 emergency stop for the instructor.
- All the connections of the components (except the 230V power supply) are made to industrial terminals. The 230V terminals are not accessible.
Students produce the wiring diagram directly on the industrial terminals.
- 1 unit closed with flap containing:
 - 10 switches for creating faults
 - 1 main switch
 - 1 RC thermal-magnetic circuit-breaker 30mA-10A
 - 1 key operated switch with indicator for applying power to the wiring frame



ref. TEMP-DIAG

DESCRIPTION OF THE FAULTS



- Switch No. 1: fault creation on the input +4-20mA of the PID
- Switch No. 2: fault creation on the output +4-20mA of the PID
- Switch No. 3: fault creation on the input -4-20mA of the PID
- Switch No. 4: fault creation on the output -4-20mA of the PID
- Switch No. 5 to 7: fault creation on the wiring of the probe PT100.
- Switch No. 8: fault creation on the signal +4-20mA at the output of the interface PT100/4-20 mA.
- Switch No. 9: fault creation on the signal -4-20mA at the output of the interface PT100/4-20mA.
- Switch No. 10: fault creation on the alarm output of the PID