

Product Name :
Process Plant Trainer (Process Control Trainer)

Product Code :
NLAB-TECHNICALAB33004

Description :

Process Plant Trainer (Process Control Trainer)

Technical Specification :

A bench mounted process plant trainer with multiple streams both interacting and noninteracting. The process plant incorporates a miniature three-stage plate heat exchanger heated from a hot water circulator, two independent feed tanks, a holding tube with product divert valve and two variable-speed peristaltic pumps. Temperature, level, flow and conductivity control loops can be implemented. Manual control, single feedback loops, through to sophisticated cascade loops and distributed supervisory control of the whole process by a remotely located computer can be demonstrated. The effect of 'dead time' and heat recycle can be demonstrated. An electrical console provides measurement and control of the process plant and enables a variety of control techniques including manual operation, on/off control, control from an external signal and control from a PC or PLC. The equipment incorporates electrical fault simulation and control, data logging software, and a USB computer interface.

Features
Multiple inputs, multiple sensors, multiple control strategies - Manual control, single feedback loops, through to sophisticated cascade loops
Temperature, level, flow and conductivity control loops can be implemented
Effects of 'dead time' > Operational sequencing, including startup and shutdown
Recycle implications on process control
On/off, proportioning, PID, PLC, SCADA
Fault simulation and diagnosis
Includes computer interface (USB) plus sophisticated based educational and data logging software. Description

The process is modelled on an industrial high temperature short time (HTST) pasteurisation process. In this process the product stream has to be kept at a predetermined temperature for a minimum time, usually for bacteriological purposes. This is effected by the use of a holding tube, which delays the product stream, thus posing particular process control problems and introducing the concept of 'dead time'.

Other reasons why the HTST process is a particularly suitable basis for teaching process control are the use of a three stage heat exchanger (recycle, heating and cooling) and the use of a divert valve to reject inadequately treated product. Again these important industrial principles pose real process control problems and help maintain the students' interest.

Further process control problems are illustrated by the use of two feed tanks, with different level sensor types.

Solenoid driven valves control the filling and emptying of these tanks. These enable different level control strategies to be developed and provide startup and shutdown operational sequencing capability.

The unit includes a wide range of instrumentation for temperature and flow measurement. It also includes a conductivity sensor, enabling simple process concentration experiments to be performed.

The unit comprises:

Feed system with peristaltic pump

Water heating unit with peristaltic pump

Water cooling system

Plate heat exchanger with holding tube

Flow sensor in feed line

Conductivity sensor

Four temperature sensors

Level sensor in product tank

High/low level switches in washing/reagent tank

2-way solenoid valves for filling feed tanks and cooling water to exchanger

3-way solenoid valves for selecting feed tank and diverting waste product

Connections to the electrical console.

Technical Specifications

Flow rate ranges: Value

product stream: 0-480ml/min: 0-480ml/min

washing reagent: 0-480ml/min

heating fluid: 0-600ml/min

Max temperature of heating fluid: 80°C

Heat exchanger: plate type

Feed and reagent vessel capacities: 5.7 litres (each)

Heating vessel capacity: 3.7 litres 1 off

Signal voltages: 0-5V

Level sensor range: 0-250mm

Flow sensor range: 0-500ml/min

Temperature sensor range: 0-100°C

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