

NanoMAX Multivariable Process Control and Instrumentation Training System

The NanoMAX Multivariable Process Control and Instrumentation Trainer simulates industrial plant systems found in oil, gas, chemical, food and other production plants around the world. This training system is an excellent platform for training students in all aspects of multi-variable process control and monitoring. The NanoMAX features fully assembled industrial components including a water storage tank, a level tank, a pre-heater tank, a tube heat exchanger, a water cooling tower, and pumps and instruments for the measurement of level, flow, temperature and pressure.

The curriculum that accompanies the hardware system, focuses on the key parameters common to many industrial, scientific, and commercial process plants: Liquid Flow, Liquid Level, Liquid Temperature, and Air Pressure. In this multivariable unit, flow, temperature and pressure sensors, and level transmitters, are attached to liquid and air tanks and pipes to capture and transmit data to a PID control system. Trainees can use PID parameters to maintain liquid level, flow, pressure as well as temperature. Internal heating and cooling systems are used to adjust the temperature of the liquid as it flows through the scaled model. Students are exposed to the relationship between the variables to better calculate process specifications and troubleshoot potential problems.



Standard Features

- Designed for practical, hands-on training on Industrial Processes
- Multivariable – for study of Level, Flow, Temperature, and Pressure all in one unit
- Manual parameter input via control system (HMI/SCADA)
- Mobile structure, easy to setup and operate
- Uses safe and non-corrosive process medium (Water and Air)

Skills to Prepare Students for In-Demand Professions:

- Process Engineer & Operator
- Electrical Engineer & Technician
- Instrument Engineer & Technician
- Control System Engineer
- Agricultural Engineer
- Health, Safety and Environment Executive

Specifications

Control Panel with PLC

- PLC: Siemens S7
- HMI: 9" touch screen
- SCADA software

Level Tank/Pressure Vessel

- Capacity: 3 L / 101 fl. oz.
- Level Measurement: 0 – 300 mm H₂O
- Pressure Measurement: 0 – 2 bar

Water Tanks

- Capacity: 406 – 507 fl. oz.
12 -15 L
- Material: Stainless Steel
- Electrical Heater 240 VAC

Flow Transmitter

- Type: Vortex
- Output: 4 – 20 mA
- Measurement Range: 0 – 2 m³/hour

Temperature Sensor RTD

- Type: PT-100
- Output: 4 – 20 mA
- Measurement Range: 0 – 100 °C

Proportional Control Valve

- Input: 4 – 20 mA
- Power Supply: 24 VDC

Feed Water Pumps (Hot & Cold Water)

- Type: Centrifugal
- Power Supply: 240 VAC
- Flow Rate: 1 – 2 m³/hour

Curriculum

Solution includes a comprehensive training program covering:

- Fundamentals of Process Control
- Control Theory
 - Level
 - Flow
 - Temperature
 - Pressure
- Principles of Instrumentation
- Plant Commissioning and Optimization

Curriculum Details:

- Type PDF
- Languages English
- Hours of Instruction 30 hours

Curriculum Includes:

- Plant Operation Manual
- Instructor Training/Experiment Manual
- Student Experiment Manual

System Includes:

- NanoMax Trainer
- Equipment Installation Manual

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Trainer Specifications

Dimensions: 43.31" L x 27.56" W x 70.87" H
1100mm L x 710mm W x 1750mm H
Weight: 176 ~ 264 lb./ 80 - 120 kg
Material: Mild Steel Powder Coat
Process Pipeline ½", Stainless Steel

Operational Requirements

Power Supply: 240 VAC 50/60 Hz 30 A
Air Supply: 50 psig/10 sfc
Water Supply: Required
Drainage System: Required



Curriculum Outline

Section #1: Fundamental to Process Control

- Basics of Control Theory
- Process Control Terms
- Controller and Tuning
- Process Control Loop
- Introduction to Measurement
 - Level
 - Flow
 - Temperature
 - Pressure

Section #2: Process Measurement

- Properties of Matter
 - Liquid
 - Air
- Principle of Instrumentation
 - Level Measurement
 - Differential Pressure Transmitter
 - Level Gauge
 - Flow Measurement
 - Vortex Flowmeter
 - Temperature Measurement
 - Resistance Temperature Detector (RTD)
 - Pressure Measurement Study
 - Pressure Transmitter/Transducer
 - Pressure Gauge
- Final Control Elements

Section #3: Plant Commissioning and Optimization

- Plant Optimization
 - Process Control Loop
 - Process Behavior
 - Effect of Disturbance in Process
- Characteristic of Proportional (P), Integral (I), and Derivative (D)
- PID Tuning using Various Methods
 - Ziegler-Nichols
 - Cohen Coon
- Activity
 - Plant Start Up and Commissioning
 - Process Control Loop
 - Understand the Process Behavior
 - Proportional, Integral & Derivative
 - Control Loop Tuning – Ziegler-Nichols and Cohen Coon

Ordering Information

Hardware

NanoMAX Multivariable Trainer, 220V 00-0107-0220

Curriculum

MultiVariable Curriculum including Liquid Level, Liquid Flow, Liquid Temp and Air Pressure for NanoMax 77-8073-0005

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