SAPP Process Control:
Level Trainer

JobMaster Self Assembly Process Plant

The JobMaster Process Control - Level Trainer simulates industrial plant systems found in oil & gas, chemical and food production plants around the world. This training system, part of the JobMaster Self Assembly Process Plant, makes an excellent platform for training in all aspects of industrial liquid level instrumentation and engineering. Trainees learn the theory and application, gaining skills in installation, calibration, tuning, optimization, maintenance and control using a safe medium, water.

The self-assembled trainer provides the flexibility to construct different designs, simulating a real world industrial plant environment for a wide range of educational experiences in process control studies.

The trainer arrives unassembled and as part of the learning process students build the platform, select and connect instruments and wiring, configure the panel mounted P.I.D. controller and commission the ‘plant process’.

The process control training software and can be integrated with multiple industrial-standard buses including the latest technologies from HART, Foundation Fieldbus, and Profield.

Learning Objectives

1. Understand the level transmitter working principles.
2. Prepare the engineering documentation:
   i. Process plant isometric drawing
   ii. Hook-up drawing
   iii. Instrument wiring diagram
3. Calibrate, operate and maintain instruments:
   i. Understand instrument calibration
   ii. Level sensors
   iii. Level transmitters
   iv. Transmitter signal and scaling
   v. 0 -100%
   vi. Operating range
   vii. Span
4. Install instruments:
   i. Install transmitter according to instrument hook-up drawing.
   ii. Connect transmitter tubing.
   iii. Wire transmitter to the controller.
   iv. Configure the local controller.
5. Inspect and test instruments:
   i. Transmitter wiring continuity check.
   ii. Transmitter accuracy inspection.
6. Plant commissioning and optimization:
   i. Plant testing and commissioning
   ii. PID tuning using different type of tuning method
      a. IMC
      b. Ziegler Nichols
      c. Cohen Coon
Specifications

Mechanical Construction:

Platform
- Dimensions: (LxWxH) 1000 x 2000 x 2000mm* 39.5” x 79” x 79”
- Material: Stainless Steel

Process pipeline
- Size: 1”
- Material: Stainless Steel

Water storage tank
- Dimensions: (LxWxH) 900mm x 500mm x 350mm 35.5” x 19.5” x 14”
- Capacity: 150L 40 gallons
- Material: Stainless Steel

Level-controlled tank
- Diameter: 200mm (7.8”)
- Height: 1,000mm (39”)
- Capacity: 22L (5.8 gal.)
- Level: 0 – 0.7m (0 - 27.5”)
- Material: Stainless Steel

Centrifugal pump
- Power consumption: 0.75kW
- Max. flow rate: 5 m³/hr
- Max. head: 20m

Instrumentation

Level transmitter
- Type: Differential pressure transmitter
- Cal. Range: 0 - 700 mm H₂O
- Out. Signal: 4-20mA, HART, Foundation Fieldbus, Profibus (optional)

Control valve
- Type: Pneumatically-operated globe control valve
- Size: DN20 or 1”
- Signals: 4-20mA, HART, Foundation Fieldbus, Profibus (optional)

Control System
(separate from SAPP Pressure Components and arrives assembled)

Physical construction
- Dimensions (HWD): 1220mm x 508mm x 432mm (48” x 20” x 17”)
- Material: Stainless Steel
- Panel-mounted P.I.D
- Optional:
  - Caster wheels for easy mobility
  - Top-mounted LCD touch-screen display
  - Wireless keyboard

P.I.D. / Controller
- I/O Signals: 4-20mA, HART, Foundation Fieldbus, Profibus (optional)
- Components:
  - Terminal blocks for 4 -20mA
  - Terminal blocks for HART
  - Terminal blocks for Foundation Fieldbus
  - Power supply conditioner for Foundation Fieldbus
  - Electrical starter
  - Electrical MCB
  - Relays
- Optional Control: PLC (Siemens, Beckhoff, Omron) or DCS Control (Emerson Delta V, ABB, Yokogawa, Honeywell)

Documentation
System includes 2 sets each of:
- Equipment operation manual
- Instrumentation manufacturer manual
- Student experiment manual
- Instructor experiment manual
- Installation manual
- Instrument calibration training manual (HART)
- Instrument calibration standard operating procedures (SOP)

JobMaster Process Control Trainers
- Process Control - Level
- Process Control - Pressure
- Process Control - Temperature
- Process Control - Flow
- Process Control - Chemical Analytical
- Process Control - Instrumentation

Requirements
- Power Supply: 120 VAC/50 Hz/15 A
- Air Supply: 50 psig/10 scfm
- Water Supply: 5 m³/hr Drain required

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