601
Process Control Trainer, Basic

Product Dimensions
Product Dimensions: (L x W x H)
33.5in. x 48in. x 76in (860 x 1220 x 1930 mm)
375lbs. (170kg)

Shipping Dimensions
715lbs. (320kg)

FEATURES AND SPECIFICATIONS
- One-piece, welded, 1/8" wall, tubular steel frame.
- Four, 4" diameter casters, two with locks.
- Integral, 19" x 70" high, instrument mounting rack, with silk-screened instrument and controller panels.
- Rack-mounted, locking storage box for accessories.
- Front panel faces fabricated from marine-grade 1/2" plywood and covered with a .040" thick, high-durability, surface treatment.
- Clear, ½" diameter, PVC piping components throughout.
- Clear acrylic tank, 3 gallon capacity.
- Primary reservoir, 20 gallon capacity.
- Centrifugal pump, ½ HP.
- Circuit breaker with GFI circuit protection.
- Two solenoid valves, allowing for the creation of flow supply and demand disturbances both at the tank outlet and in a bypass surrounding the control valve.

GENERAL DESCRIPTION
A working, large scale, fluid process system allowing for hands-on training relating to the measurement and control of process variables including level, pressure and flow. The device allows for the creation of simple and advanced process loops using common, industrial-quality instruments and controllers. An "open architecture" allows for integration of alternate instrumentation as needed to address local training needs. Variable demand and supply disturbances can be inserted using solenoid valves in combination with metered ball valves.

The device includes the capability of establishing cascade, feedforward, feedback, feedback split range, ratio, and three-element control schemes. Clear PVC piping allows the student to see process changes based on control parameters or intentional disturbances. Quick-disconnects are provided allowing the training aid to be connected to other similar units or a temperature process trainer, facilitating more complex process systems.

The trainer can be configured to create one complex process loop, accommodating two students, which addresses pressure, level, and flow. Alternately, the device can be outfitted to address each of these three variables individually. Standard, user-supplied, or user-specified instruments of any brand can be easily installed, either on a mounting stanchion or on a built-in, 19in. instrument rack.

OPTIONS
#464-088 - Allen-Bradley CompactLogix PLC Package, Process Control
#581-007 - Instrumentation, 5th Ed.
#600-006A - Test and Calibration Package, Hand-Held, Economy
#600-007 - PLC Interface Panel
#600-010 - AC Variable Speed Drive Upgrade
#600-013 - Air Supply System, Quiet
#600-046 - Motorized Control Valve Option
#600-132 - Supplemental Process Gauge And Meter Panel
#600-205A - Hand-Held, Process Loop Calibrator, Economy
#600-801 - Data Acquisition Interface Panel
#616 - Calibration Workstation, Portable
#910 - Rolling Rack Assembly
#080-467-2 - Video on pressure measurement (ISA).
#080-467-3 - Video on level measurement (ISA).
#080-467-4 - Video on flow measurement (ISA).
#464-003 - Basic DC/AC/Analog Allen-Bradley SLC-500 PLC Package. - Allen-Bradley, Model SLC-5/03 PLC with features as follows: - 5/03 CPU with 8K memory. - 7-Slot rack. - DC Input card (16 inputs). - DC Relay output card (16 outputs). - AC Combination card (4 inputs and 4 outputs). - Analog Combination card (2 inputs, 2 outputs). - Power supply, 3A.
#464-009 - On-line/Off-line Programming Software w/Comp. Interface
Power distribution panel, mounted in instrument rack including on/off power switch, GFI receptacle, fuses for all circuits, and 12 electric “free line” connections to the front panel.

Front panel-mounted, operator control panel, including switches and pilot lights for: a pump, and two solenoid valves, as well as control relay connections for equipment, 24 VDC power supply terminals and electric “free line” connections. A regulator with gauge controlling a 0-60 psi air supply with associated fittings and a second instrument air gauge with associated fittings, is also mounted on this panel.

Master instrument air supply regulator.

24 VDC Power supply.

Five, process quick-disconnect hose fittings allowing for connection to other process trainers, and pump down.

Quick-disconnect fittings located throughout, allowing for attachment of instruments.

Variable-area flow meter.

Two orifice plates and associated flanges, with tubing connections.

Industrial-quality, pneumatic control valve.

Pipe stanchion, allowing for attachment of differential pressure transmitters and pressure transmitters at varying heights.

High-durability, powder coated surfaces throughout.

Provision for attachment to the Instrumentation and Calibration Bench.

Provision for integration with temperature trainer.

Packaging for shipment via motor freight.

SERVICE REQUIREMENTS

110/230 VAC, 50/60 Hz, water source, instrument air source.

COURSE CONTENT

The courseware, useful in both a instructor-led and or a self-directed format, includes one of several optional textbooks, a course guide and hands-on exercises.

Exercises include:
* Introduction to the Process Trainer, Basic
* Review of process instrumentation terms, abbreviations and designations.
* Calibration of a pressure gauge.
* Setting and adjusting pressure switches.
* Calibration of a pressure transmitter.
* Level measurement using a bubbler.
* Installation and calibration of a level measurement channel.
* Level measurement with zero suppression.
* Level measurement with a wet reference leg.
* Flow vs. Differential pressure for an orifice plate.
* Calibration of a flow transmitter.
* Calibration of a square root extractor.
* Installation and calibration of an electronic flow measurement channel.
* Review of process control theory, terms, abbreviations and designations.
* Introduction to the Honeywell UDC 3300 universal digital controller.
* Introduction to the Foxboro 762 digital controller.
* Determining a pressure process’ operation characteristics.

#581-012 - Textbook, "Industrial Control Electronics" (3rd edition) (Bartelt).
#582-002 - Textbook, "Measurement and Control Basics" (Hughes).
#583-002 - Textbook, "Fundamentals of Process Control" (Murrill).
#584-002 - Textbook, "Process Control Instrumentation" (Johnson).

#600-008B - Storage/Lockbox Accessory

#600-021 - Ultrasonic Level Detector Assembly, Advanced, Hart

#600-021EH - Ultrasonic Level Detector Assembly, Hart, Endress & Hauser Preference

#600-022 - Ultrasonic level detector assembly, economy.

#600-023 - Capacitance-type level detector/transmitter.

#600-024 - Orifice plate set, 3-piece (Supplemental)

#600-025 - Vortex-type flow meter.

#600-031 - Pitot tube flow assembly.

#600-032 - Venturi tube flow assembly.

#600-033 - Coriolis effect flow meter, Hart (Emerson, MicroMotion)

#600-033F - Coriolis effect flow assembly/transmitter (Fieldbus-capable).

#600-034 - Paddle-type flow measurement assembly/transmitter (Omega).

#600-035 - Turbine-type flow measurement assembly/transmitter (Omega).

#600-036 - Magnetic flow measurement assembly/transmitter (Rosemount).

#600-036A - Magnetic Flow Meter Assembly, Economy (4-20 mA Output)

#600-040 - Valve Positioner, Pneumatic

#600-041 - Control valve positioner, electro-pneumatic.

#600-041F - Valve Positioner, Digital, FIELDVIEW

#600-050 - Optional device interface panel. (for adding optional instruments/motorized valves).

#600-051 - Strip chart recorder, 2-pen (Yokogawa, SR 1000) (additional).

#600-052 - Paperless Strip Chart Recorder, 2-Inputs

#600-055 - Gauge pressure transmitter (Honeywell ST-3000) (additional).

#600-056 - Differential pressure transmitter, supplemental.

#600-058 - I/P converter (Control Air) (additional).

#600-059 - 3-Valve manifold (supplemental).

#600-060 - Industrial PID controller w/panel (Honeywell UDC-3500,1/4 DIN).

#600-097 - Discrete/Analog Allen-Bradley SLC-500 PLC Package (2 analog channels)

#600-098 - Discrete/Analog Allen-Bradley SLC-500 PLC Package (4 analog channels)

* #581-012 - Textbook, "Industrial Control Electronics" (3rd edition) (Bartelt).
* #582-002 - Textbook, "Measurement and Control Basics" (Hughes).
* #583-002 - Textbook, "Fundamentals of Process Control" (Murrill).
* #584-002 - Textbook, "Process Control Instrumentation" (Johnson).

#600-008B - Storage/Lockbox Accessory

#600-021 - Ultrasonic Level Detector Assembly, Advanced, Hart

#600-021EH - Ultrasonic Level Detector Assembly, Hart, Endress & Hauser Preference

#600-022 - Ultrasonic level detector assembly, economy.

#600-023 - Capacitance-type level detector/transmitter.

#600-024 - Orifice plate set, 3-piece (Supplemental)

#600-025 - Vortex-type flow meter.

#600-031 - Pitot tube flow assembly.

#600-032 - Venturi tube flow assembly.

#600-033 - Coriolis effect flow meter, Hart (Emerson, MicroMotion)

#600-033F - Coriolis effect flow assembly/transmitter (Fieldbus-capable).

#600-034 - Paddle-type flow measurement assembly/transmitter (Omega).

#600-035 - Turbine-type flow measurement assembly/transmitter (Omega).

#600-036 - Magnetic flow measurement assembly/transmitter (Rosemount).

#600-036A - Magnetic Flow Meter Assembly, Economy (4-20 mA Output)

#600-040 - Valve Positioner, Pneumatic

#600-041 - Control valve positioner, electro-pneumatic.

#600-041F - Valve Positioner, Digital, FIELDVIEW

#600-050 - Optional device interface panel. (for adding optional instruments/motorized valves).

#600-051 - Strip chart recorder, 2-pen (Yokogawa, SR 1000) (additional).

#600-052 - Paperless Strip Chart Recorder, 2-Inputs

#600-055 - Gauge pressure transmitter (Honeywell ST-3000) (additional).

#600-056 - Differential pressure transmitter, supplemental.

#600-058 - I/P converter (Control Air) (additional).

#600-059 - 3-Valve manifold (supplemental).

#600-060 - Industrial PID controller w/panel (Honeywell UDC-3500,1/4 DIN).

#600-097 - Discrete/Analog Allen-Bradley SLC-500 PLC Package (2 analog channels)

#600-098 - Discrete/Analog Allen-Bradley SLC-500 PLC Package (4 analog channels)

#600-102 - Function generator, (optional test instrument).  
#600-102E - Function Generator, Economy  
#600-104 - Differential pressure gauge, low range (0-200in. H2O) (Dwyer).  
#600-106 - U-tube manometer (-36in. - 0 - 36in. range).  
#600-121 - Supply pressure regulator, upgrade, w/filter, oiler.  
#600-130 - Pressure Gauge, Pipe-Mounted (0-30 psig  
#600-201 - Smart field communicator (for Honeywell ST 3000 Transmitters).  
#600-205 - Digital multimeter/process calibrator (alternate calibration instrument).  
#600-310 - Chart recorder supply pack, 12/pens/20 rolls, supplemental.  
#600-501 - Textbook series, 4-part, on process measurement and control (General Physics).  
#601-001F - Standard Instrument and Control Package (3-Variable) (Foxboro Preference).  
#601-001R - Standard Instrument and Control Package (3-Variable) (Rosemount Preference).  
#601-002 - Standard Instrument and Control Package (flow)  
#601-003 - Standard Instrument and Control Package (level)  
#601-004 - Standard Instrument and Control Package (pressure)  
#601-012 - Heat Exchanger Assembly  
#601-500 - Use/Exercise Guide (additional).  
#601-PAC - PROCESS CONTROL TRAINER, BASIC, Quick-Start Package (includes: #601, #601EH, #600-006A, #600-007, #600-010, #600-022)  

RELATED ITEMS  
#601D - Process Control Trainer, Downsized  
#602 - Process Trainer, Temperature  
#603 - Process Trainer, Advanced  
#607D - Process Trainer, Heat Exchanger, Downsized  

STANDARD ACCESSORIES  
This device has been designed for professionals for use under controlled circumstances for training only. DAC assumes no liability for injury resulting from the use or misuse of this product.

This device is being offered for training purposes only, and components cannot be used as replacement hardware in actual applications.

In accordance with DAC’s established policy of continuous improvement, these specifications and product descriptions are subject to change without notice. This information is the latest technical information as of the time of viewing or printing.