

## H-ICS-8189-4 Instrumentation & Controls Trainer

### Purpose

The **Model H-ICS-8189-4** Trainer provides experience in setting up, tuning, operating, and troubleshooting actual instrument and control systems of the type used in the power and process industries. By simulating a different process loop, this unit provides instruction in the measuring and transducing of such physical variables as pressure, temperature, flow and level. Students and trainees learn instrumentation and control techniques of standard commercial manufacturers, such as Yokogawa, and Rosemount. Various types of closed-loop control: on/off, proportional, proportional plus integral, and proportional plus integral plus derivative, as well as a variety of final control devices, including electric, pneumatic and electronic are covered.

### Description

The system consists of two clear process tanks (one for flow/temperature and one for level/pressure), two reservoir tanks, two pumps and other instrumentation mounted on or inside the mobile bench. This trainer provides measurement and control of flow, temperature, level and pressure utilizing microprocessor based controls.

In level loop, water is pumped through the delay loop to the level tank. The water level in the level tank is controlled by changes in the control valve. The 4-20 mA input loop consists of a level transmitter, recorder, and controller. The output signal is a 4-20 mA control signal, driving the valve toward either the open or closed position.

In pressure loop, water is pumped into a tank, creating an air pressure whose value depends on the water level in the process tank. The 4-20 mA input loop includes the pressure transmitter, recorder and controller. The 4-20 mA output loop contains the controller, recorder and I/P valve positioner.

In flow loop, water is pumped at a rate determined by the position of the control valve and of a hand-operated stop valve. Flow is sensed by an orifice differential pressure transmitter. The 4-20 mA output loop contains the controller, recorder, and a current-to-pneumatic converter positioner to control the position of the valve.

In temperature loop, heated water temperature is sensed by a temperature transmitter. Water temperature is controlled by: (1) the voltage applied to the heater coil through the power controller; and (2) whether the water is made to flow through the heat exchanger. A temperature transmitter drives the controller input. The 4-20 mA output loop includes the controller, recorder, and power controller. An additional contact-closure output operates the three-way valve, or the valve may be manually switched to provide the process disturbance.



**MODEL H-ICS-8189-4** Instrumentation and Control Trainer  
Dimensions: 75"W x 62"H x 30"D - Shipping Weight: 1175 lbs

All Hampden units are available for operation at any voltage or frequency



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## Specifications

### Construction:

- Mobile bench with doors and control panel. The bench is finished in instrument tan enamel and the control panel in instrument white enamel

### Casters:

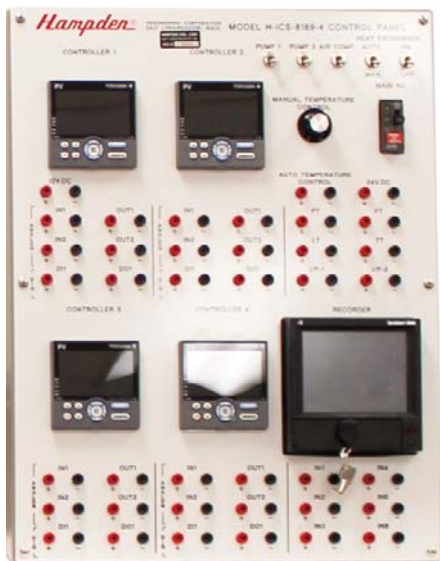
- Two stationary, two swivel with locks

### Bench Top:

- 75" x 30" x 1 1/16". Unit consists of a 1/16" thick white plastic laminate fastened to 1" thick medite.

### Instrumentation:

- Yokogawa advanced hybrid controller with USB communications port
- Monarch paperless recorder with 6 input channel
- Smart d/p cell transmitters, level/flow
- Smart electronic gauge pressure transmitter
- Rosemount temperature transmitter



MODEL H-ICS-8189-4 Control Panel

### Plumbing:

- All piping on the mobile bench is clear PVC. Fittings are PVC and piping inside the trainer is copper.

### Components:

- Main circuit breaker with ground fault interrupter protection
- Globe style control valve with I/P valve positioner
- Pumps control switches
- Oil-less air compressor switch
- Heat exchanger manual/auto and on/off switches
- Manual/Auto temperature control.
- Oil-less air compressor rated 1.9 CFM at 100 psi complete with three gallon tank and regulator with gauges
- Storage tanks, each 11 gallon with fill and drain ball valve with hose fitting. Included with the heated storage tank is a temperature switch (set for 120°F for maximum hot water temperature) and a low level float switch.
- Clear process tanks, each 5 gallon with fittings for overflow, manual load needle valves, level, pressure, flow, temperature transmitters, and overflow switches. Pressure tank includes a pressure switch and a pressure relief valve.
- Pumps, rated 360 gph at 9' head
- Three-way valve with 50' dead time flow circuit
- Orifice plate assembly with quick-connect fittings
- Power cord, 8ft.
- Cord storage rack

## Faults

Fault package providing 12 instructor insertable faults with switches located in a locked compartment.

## Services Required

### Electrical:

120V AC 1Ø 60Hz via 3/c power cord.

### Water:

Cold - normal cold water service

**Drain:** Floor

## Options

### Model H-ICS-8189-CC:

Computer Workstation

### Model H-ICS-8189-CCS:

Computer Control System with program and interface hardware

### Model H-ICS-8189-PO:

Color Ink-jet Printer

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