

## H-6485

### Instrumentation and Calibration Console

#### General

The Hampden **Model H-6485** Instrumentation and Calibration Console enables the demonstration of the principles of calibration and measurement of process instrumentation. After calibrating an instrument, it can be installed on a trainer and utilized in a real application.

The instrumentation and control console shall have a working surface of at least 72 inch (1.8m) long and includes storage for all devices that are not panel mounted. A standard 2 inch pipe fitting is supplied for mounting transmitters to be tested. A rack for supporting panel mounted equipment.

#### Specifications

The **H-6485** Instrumentation and Calibration Console consists of:

##### Enclosure:

14-gauge furniture stock steel finished in dark brown textured enamel.

##### Front & Rear Panel:

1/8" steel finished in instrument white enamel.

##### Binding Post:

Hampden HB-3M color-coded captive head non-jam 5-way (12 required)

##### Duplex:

Specification grade, 15A, black.

##### Power Supply A:

Hampden dual voltage isolated regulated power supply complete with electromagnetic circuit protector power switch and pilot light.

##### Voltage Control:

Switch for 24V.DC or 48V.DC

##### Load Regulation:

48V.DC-1A  $\pm 75\text{mV}$  for load changes from 0-1A

24V.DC-2A  $\pm 75\text{mV}$  for load changes from 0-2A

##### Line Regulation:

$\pm 20\text{mV}$  for 117 to 137 V.AC

##### Ripple:

Less than 10mV rms

##### Output:

Two sets of switch-controlled Hampden HB-3M binding posts

##### Manufacturer:

Hampden Engineering Corporation

##### Power Supply B:

Hampden 0-24V.DC-500mA isolated supply complete with electromagnetic circuit protector power switch and pilot light.

##### Potentiometers:

Voltage adjust and current adjust

##### Regulation:

$\pm 24\text{mV}$  for load changes from 0-500mA

$\pm 20\text{mV}$  for 117 to 137V.AC line change

##### Ripple:

Less than 10mV rms

##### Output:

One set of Hampden HB-3M binding post

##### Manufacturer:

Hampden Engineering Corporation

##### Main Air Supply:

0-100 psi regulator with 2½" test gauge.

##### Regulated Air Supplies:

Two 0-30 psi regulator, each with 4½" 0.5% accuracy test gauge and one quick disconnect.

One 0-20 psi regulator with 4½", 0.5% accuracy test gauge, and two quick disconnects.

##### Test Gauge:

One 0-30 psi 4½", 0.5% accuracy test gauge with air chamber and quick disconnect.

##### Test Instrument:

One digital voltmeter, 3½ digit LCD, .5% accuracy with ranges of 0-20V and 200V. Meter terminates to two Hampden HB-3M binding posts. Provided is one function push-button.

One digital ammeter, 3½ digit LCD, .5% accuracy with ranges of 0-20mA and 200mA. Meter terminates to two Hampden HB-3M binding posts. Provided is one function push-button.



Model H-6485 Instrumentation and Calibration Console

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

**Hampden**  
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# Instrumentation and Control Systems

Educational Training Equipment for the 21st Century

## Electrical Control:

One main electromagnetic circuit protector power switch and pilot light.

## Component Grounds:

Two Hampden HB-3M binding posts.

## Electrical Input:

120V.AC 60Hz single-phase to 3-point terminal strip.

This unit is available for operation on other voltages and frequencies.

## Air Input:

125 psi

## Test Cords:

8 - Hampden PC-3 cords, 3 ft. long, Black; 12 ft 1/4" tubing.

## Rack:

14-gauge steel, 10" high by 20" long. Designed to accept EIA standard relay back panels. Rack is mounted to a base using a ball bearing pad allowing the fixture to be rotated 360°. The base comes complete with four feet.

## Manual:

Operations and Service Manual complete with parts list, electrical circuits diagram, and pneumatic diagram.

The H-6485 bench shall consist of:

## Top:

Edge-grained maple, 72" x 30" x 1.75".

High pressure welds, using urea-formaldehyde resin, finished in water-clear lacquer.

## H-WB2D Two-Drawer Pedestal:

Constructed of industrial grade wood core flakeboard, 3/4", with interior exposed surfaces finished in white vinyl and exterior surfaces finished in English oak plastic laminate. Each of two drawers supplied are manufactured of 16-gauge formed steel with back welded in place and front formed back for securing to the drawer fronts. The drawer fronts are manufactured of 3/4" wood core flakeboard with all exposed surfaces either white vinyl, English oak plastic laminate, and black plastic edging. Each drawer

shall have a Hampden full-length black rigid vinyl drawer pull and master-keyed lock. Each drawer shall be provided with one pair of side mounted guides with ball bearing nylon rollers, positive stop with fingertip release, and "stay-closed" design. The cabinet door shall be constructed similar to the drawer fronts; provided shall be two self-closing hinges. The base of the pedestal shall be constructed of 14-gauge steel finished in flat black.

## H-WBPS Pedestal Assembly:

Constructed of 2" square tubing welded together with gusseted mounting plate and two levelers. Provisions are provided for securing directly to the floor. This unit is finished in flat black enamel.

## Vise:

3"

## Pipe and Base:

2" mounting flange threaded, 15" threaded pipe finished in flat black enamel.

## Option

### H-ICS-AV Audio Visual Package:

For use in conjunction with the Hampden **Model H-6485** Instrument and Calibration Console, is the **Model H-ICS-AV** Audio Visual Program covering the use and operation of sophisticated instruments and controllers, developed by USA Training Division of I.T.C.

Topics include:

#### *Principles of Calibration (ICS-1):*

- The importance of Calibration
- Accuracy and Precision in Calibration
- Recognizing Zero Shift and Span Error
- Other Instrument Errors
- Recognizing Non-Linearity, Implications of Non-Linearity

- Hysteresis
- Deadband
- Set-up and Test Equipment for Calibration
- Calibration Procedure

#### *Calibrating Pressure and Temperature Instruments (ICS-2):*

- Analog Electronic Pressure Transmitter Calibration
- Smart Pressure Transmitter Calibration
- Differential Pressure Transmitter Calibration
- Pressure Gauge Calibration
- Thermocouple Calibration Checks
- RTD Calibration Checks
- Thermocouple Transmitter Calibration
- RTD Transmitter Calibration

#### *Calibrating Flow and Level Instruments (ICS-3):*

- Differential Pressure Transmitter Calibration
- Magnetic Flowmeter Calibration
- Vortex Shedding Flowmeter Calibration
- Mass Flowmeter Calibration
- Hydrostatic Level Calibration
- Displacement Level Calibration

Specify **Model H-ICS-AV** at time of order.

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

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## H-ICS-AV Audio Visual Program Instrument Calibration Series

### Description

The Hampden **Model H-ICS-AV** Instrument Calibration Audio Visual Program shall consist of three VHS tapes, each running 45 to 60 minutes in length, complete with an accompanying text/handbook.

The following tapes with topics are provided:

#### **Unit 1: Principles of Calibration (ICS-1)**

##### *The Importance of Calibration*

- Calibration defined
- Range and span of input and signal
- Using input and signal spans to calibrate an instrument
- Calibrating each instrument in the loop
- Importance of recalibration

##### *Accuracy and Precision in Calibration*

- How to calibrate accurately
- The importance of gain in the calibration procedure
- The importance of precision process instruments
- Measurement standard

##### *Recognizing Zero Shift and Span Error*

- The relationship between input output and calibration
- Zero shift error in process instruments
- Span error in process instruments
- Detecting span error with input/output graphs

##### *Other Instrument Errors*

- Recognizing non-linearity
- Implications of non-linearity
- Hysteresis
- Deadband

##### *Set-Up and Test Equipment for*

- Calibration
- Simulating an instrument's function within a system
- Simulating instrument operation within a system

##### *Calibration Procedure*

- Elements of the calibration procedure
- Performing instrument calibration
- Adjustment Procedure

#### **Unit 2: Calibrating Pressure and Temperature Instruments (ICS-2)**

##### *Calibrating Pressure Instruments*

- Analog electronic and differential pressure
- Transmitters
- Smart transmitters
- Calibrating a pressure gage
  - selection of test equipment
  - proper set-up and connections
  - performing 5-point checks
  - use of input/output graphs
  - error analysis and adjustment

##### *Calibrating Temperature Instruments*

- Temperature sensors
  - thermocouples
  - RTDs
  - test equipment selection
  - using temperature bath
  - when to calibrate
- Calibration Procedure
  - selection of test equipment
  - proper set-up and connections
  - performing 5-point checks
  - use of input/output graphs
  - error analysis and adjustment
- Temperature Transmitters
  - With thermocouple input
  - With RTD input
  - When to calibrate
- Calibration Procedure
  - selection of test equipment
  - proper set-up and connections
  - performing 5-point checks
  - use of input/output graphs
  - error analysis and adjustment

#### **Unit 3: Calibrating Flow and Level Instruments (ICS-3)**

##### *Flow Instruments*

- Flow rate and differential pressure
- Calibrating a differential pressure transmitter
  - selection of test equipment
  - proper set-up and connections
  - performing 5-point checks
  - using 5-point check
  - using calibration chart
  - using input/output graphs
  - error analysis and adjustment

- Flow rate measurement using magnetic flowmeter
  - voltage and fluid velocity
  - the metering tube
  - selection of test equipment
  - proper set-up and connections
  - performing 5-point checks
  - use of input/output graphs
  - error analysis and adjustment
- Flow rate measurement using vortex shedder
  - velocity and vortex shedding
  - selection of test equipment
  - proper set-up and connection
  - performing 5-point checks
  - using calibration chart
  - use of input/output graphs
  - error analysis and adjustment
- Flow rate measurement using mass flowmeter
  - selection of test equipment
  - proper set-up and connection
  - performing 5-point checks
  - using calibration chart
  - use of input/output graphs
  - error analysis and adjustment

##### *Level Instruments*

- Hydrostatic level calibration
  - open tank and dip pipe
  - closed tank with dry leg
  - closed tank with wet leg
  - zero suppression and elevation
  - selection of test equipment
  - proper set-up and connection
  - performing 5-point checks
  - using calibration chart
  - use of input/output graphs
  - error analysis and adjustment
- Displacement level calibration
  - liquid-vapor interface
  - liquid-liquid interface
  - selection of test equipment
  - proper set-up and connection
  - performing 5-point checks
  - using calibration chart
  - use of input/output graphs
  - error analysis and adjustment

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