

**READ AND SAVE THESE INSTRUCTIONS**

**CARNES®**

**INSTALLATION and OPERATION MANUAL  
FOR  
ELECTRONIC (ANALOG) PRESSURE  
INDEPENDENT CONTROLS**

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# Installation Guide

## Mounting

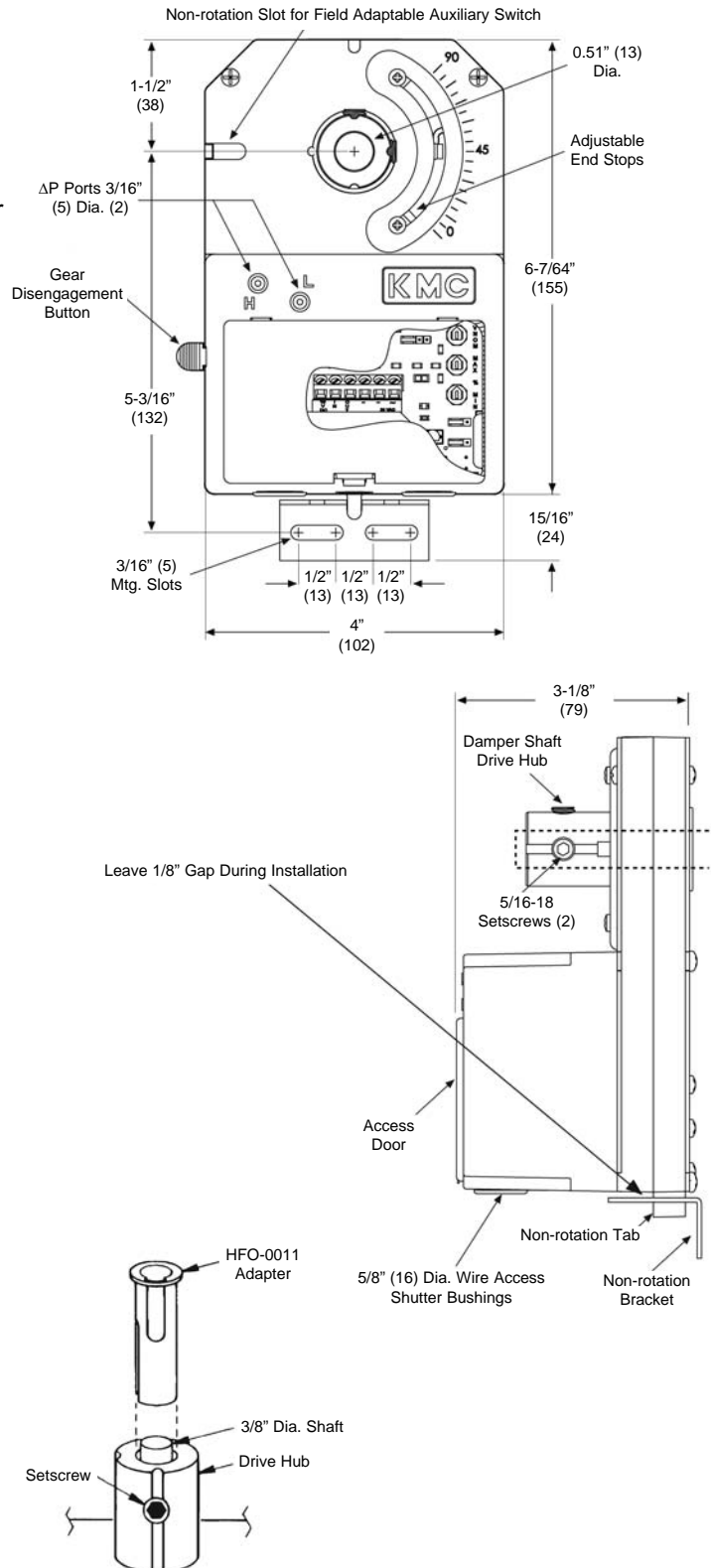
The CSP-5001 is designed to mount on a standard 1/2 in. (13 mm) diameter shaft or a 3/8 in. (9.5 mm) shaft using the HFO-0011 adaptor.

### Standard Instructions

1. Slide the CSP-5001 directly onto the 1/2 in. diameter damper shaft. The shaft must extend a minimum of 1-3/4 in. from the mounting surface. (For a 3/8 in. shaft, see the HFO-0011 Adaptor section below.)
2. Place the non-rotation bracket (supplied) on the non-rotation tab. Leave a gap of 1/8 in. between the bottom surface of the CSP-5001 and the bracket to allow for play during operation (see illustration).
3. Attach the non-rotation bracket to the mounting surface using (2) #8 or #10 self-tapping screws (not included).
4. Depress the gear disengagement button and:
  - A. Rotate the drive hub until the indicator stops at the "O" mark if the damper is clockwise to close.
  - B. Rotate the drive hub to the "90" mark if the damper is counterclockwise to close.
5. Position the damper to full close.
6. Torque the two 5/16-18 setscrews to 75-85 in. lb.

### HFO-0011 Adaptor

1. Mount the CSP-5001 actuator over the 3/8 in. shaft.
2. Slide the HFO-0011 over the shaft into the drive hub of the actuator.
3. Align the adaptor slots with the setscrews.
4. Partially tighten the setscrews.
5. Continue with Step 2 under the Standard Instructions section above.



# VAV Flow Controller-Actuator

CSP-5001



## Wiring

1. Remove the CSP's wiring access door by pulling back on the door's tab and lifting upward.
2. Access for wire or cable is via two 5/8 in. (16 mm) diameter snap-in shutter bushings located on the rear of the CSP's cover.
3. Connect conduit to the actuator if required (connectors are not supplied).
4. Refer to our website [www.carnes.com](http://www.carnes.com) for proper wiring.
5. Replace wiring access door.

## Air Flow Sensor Connection

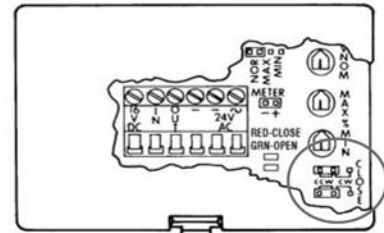
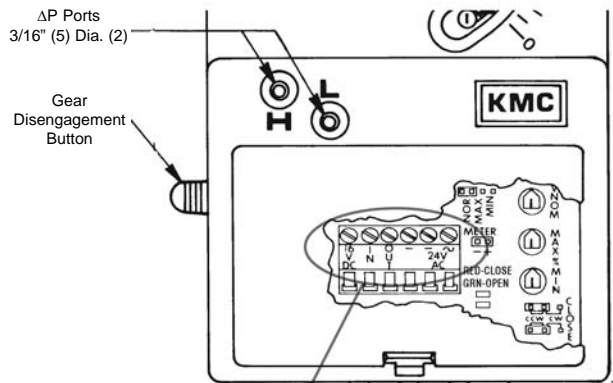
Using 1/4 in. OD control tubing, connect the CSP to the differential pressure flow sensor:

1. Connect the "H" port to the (high side) "H" of the sensor.
2. Connect the "L" port to the (low side) "L" of the sensor.

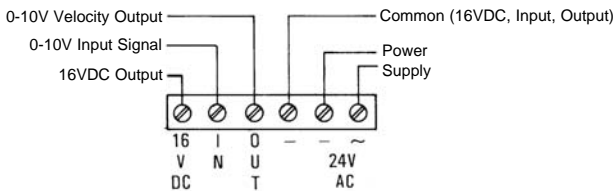
## Rotation Setup

To set the rotation direction of the controller:

1. Remove the access door by pulling back on the door's tab and lifting upward.
2. Position **BOTH JUMPERS** in either the CW or CCW positions as needed. See the diagram.



### WIRING





# VAV Flow Controller-Actuator

CSP-5001



## VNOM (CFM) Range Setting

The CSP range is factory-calibrated with the VNOM potentiometer centered. The CSP will have a range of 0-3,300 fpm with a 0-10 volt DC reset control signal.

**Leaving the VNOM at the factory setting is recommended! Changing the VNOM potentiometer from the factory setting will alter the calibration between the "IN" and "OUT" voltages.** However, the VNOM can be adjusted to match 0-10 volts to a specific velocity range if desired.

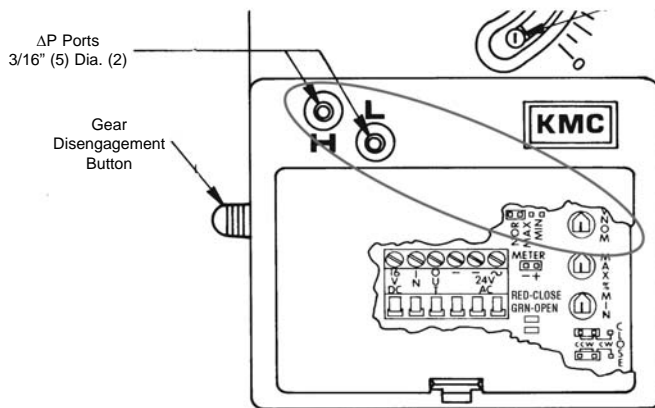
NOTE: In the controller, VNOM stands for "NOMinal Volumetric flow rate."

To set the VNOM range:

1. Remove the access door by pulling back on the door's tab and lifting upward.
2. Supply the desired velocity to the "H" and "L" ports.
3. Connect a voltmeter between the "OUT" and "-" terminals and adjust the VNOM potentiometer until the voltage equals 10 volts DC.

## Maintenance

No routine maintenance is required. Each component is designed for dependable, long-term reliability, and performance. Careful installation will also ensure long-term reliability and performance.



## CTE-5100 Series Thermostat Reference

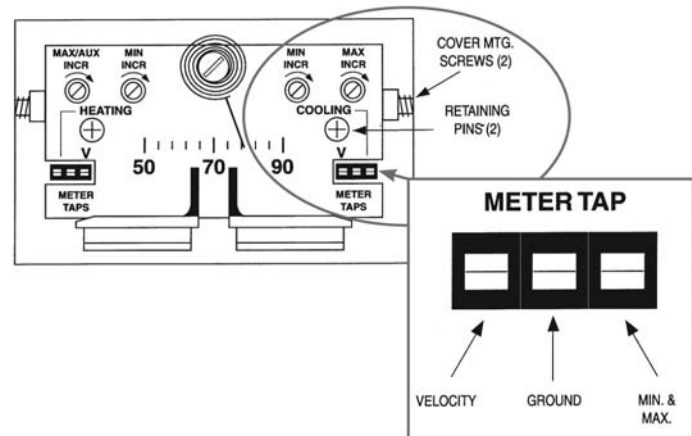
### Checkout and Calibration

The thermostat (CTE-5100 series) operates on a 16 volt DC power supply from the CSP controller and outputs a 0-10 volt DC signal on the T(x) terminals.

**NOTE:** Limits may be set at the CSP or the CTE thermostat. If setting the min./max. limits at the CTE thermostat, the CSP's Min. dial must be set fully CCW to 0 and the Max. dial set fully CW to 100. This will ensure that the CSP will not have any effect on the limits.

**Except with special applications (dual duct, auxiliary reheat CFM, etc.), max. and min. limits are made on the Cooling side of the thermostat.**

1. Required tools:
    - 1/16 inch hex key wrench
    - Small flat blade (1/8 inch) screwdriver
    - Digital voltmeter capable of displaying a 0-10 volt DC range which will display in hundredths of a volt
    - HSO-5001 test leads (optional for meter taps)
  2. Remove the thermostat cover by loosening the setscrews on each side of the thermostat (see illustration). Using a 1/16 inch hex key wrench, turn the setscrews **clockwise** until the cover is loose.
  3. Check voltages:
    - A. Verify 16 volts DC between (+) and (-) terminals.
    - B. Measure "T(x)" to "-" for output voltages. Use the calibration procedures below to adjust limits if desired. Adjust the setpoint above and below current room temperature and observe changes in appropriate "T" voltage. Remove setpoint slider stops (HFO-0027) if necessary.
- NOTE: Always adjust minimum flow limits first.**
4. Maximum limits will always be greater than minimum limits. (Maximum is additive to minimum.) If in doubt, turn maximum limit fully clockwise (increase) before proceeding.

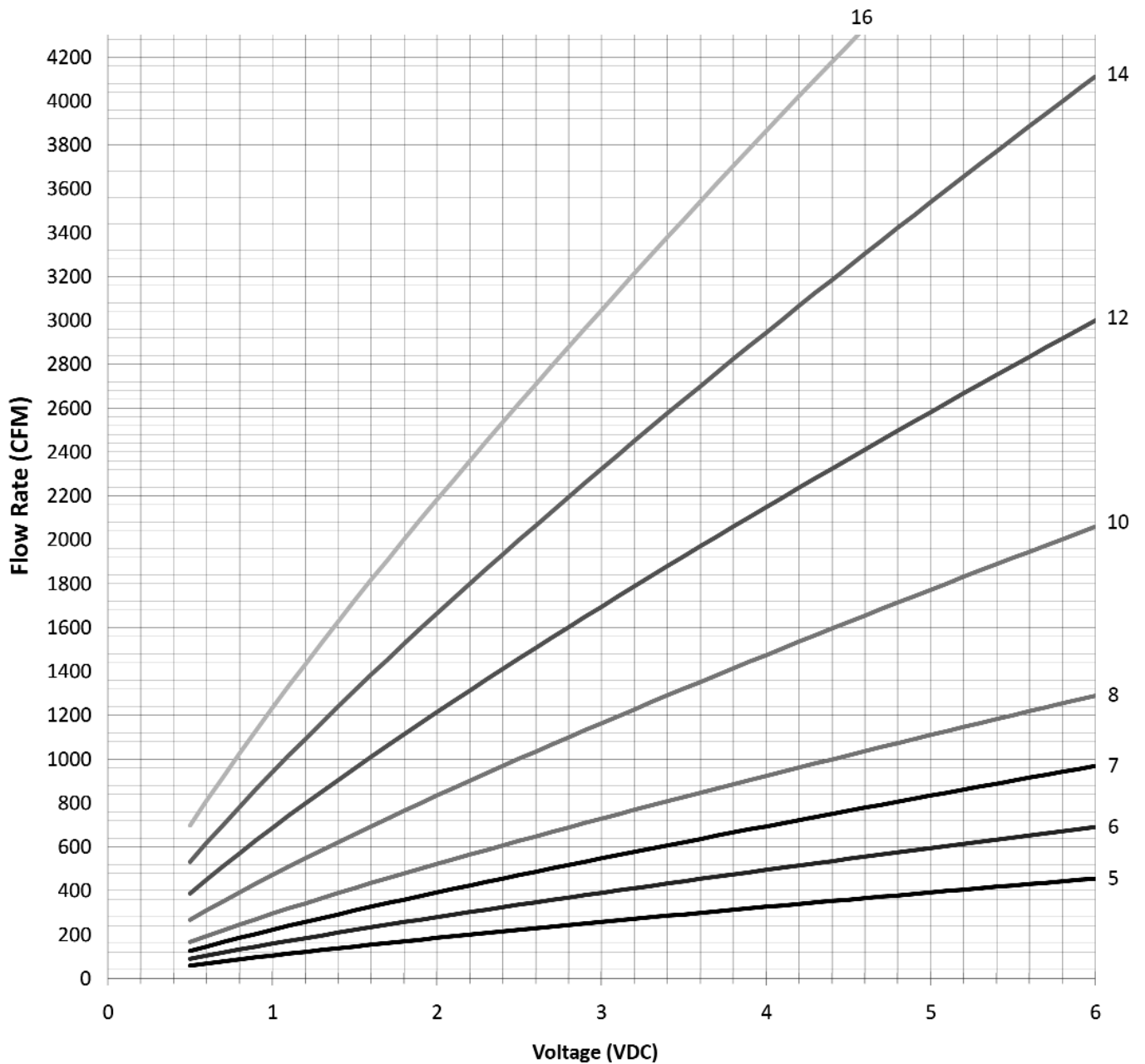
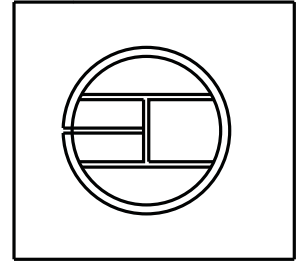


**NOTE:** Dials rotate approximately 200° (8:00 to 4:00). Turn clockwise to increase or counterclockwise to decrease. Do not use excessive force on dials. They should turn freely and effortlessly. **DO NOT force dial beyond a stop.**

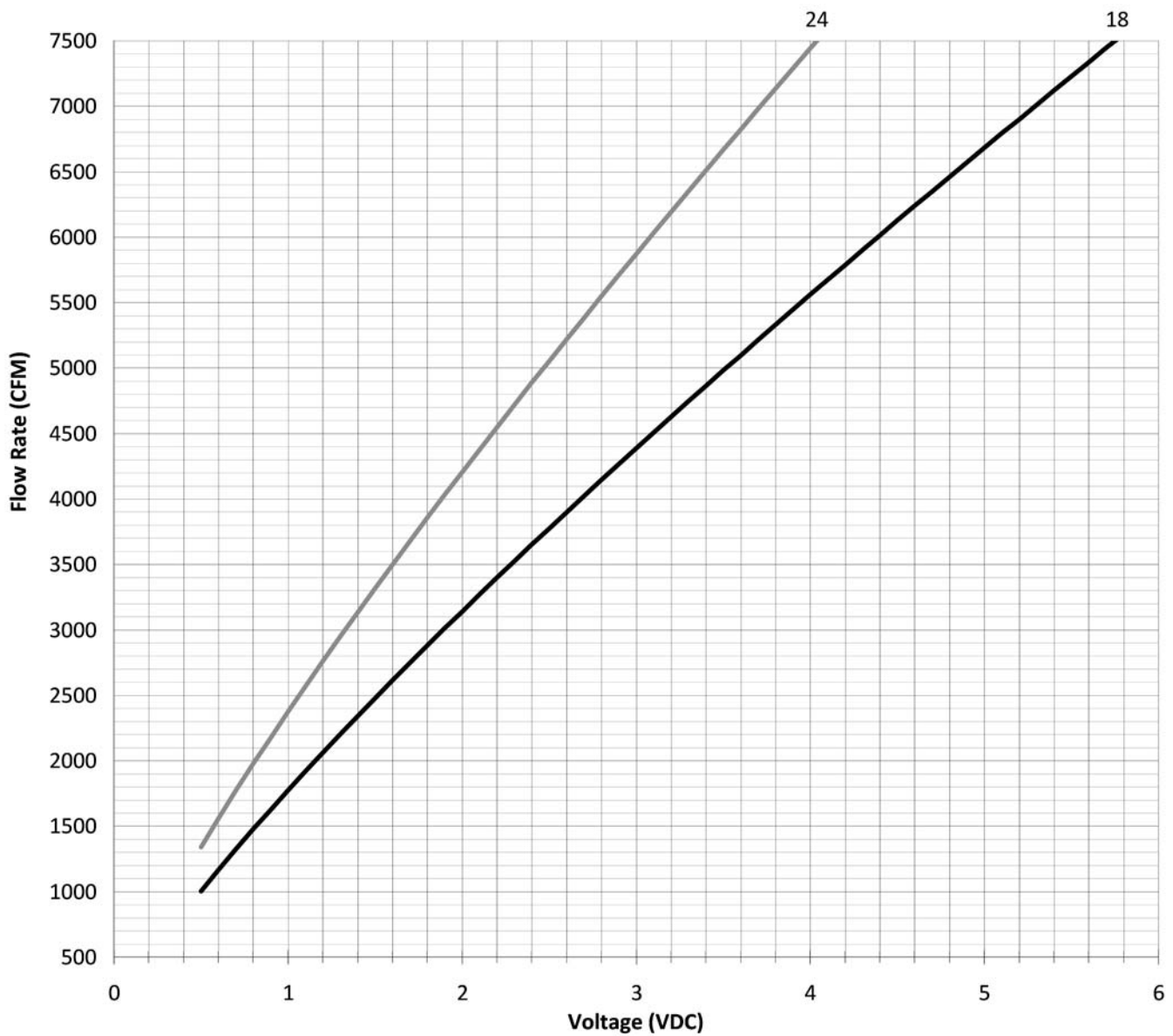
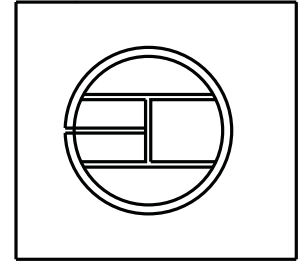
5. Connect voltmeter to the meter taps (using the HSO-5001 test leads adapter makes this easier).
  - A. Connect to the middle and right terminal (see illustration) for the minimum and maximum reading.
  - B. Connect to the middle and left terminal for measuring actual flow velocity. (The thermostat must be wired to a controller for this option.)
6. Adjust the minimum flow (on the **Cooling side** of thermostat).
  - A. Push the cooling setpoint slider all the way to the **right**. (This requests minimum flow, and is normally for heating mode or cooling is satisfied.)
  - B. Set the minimum flow voltage as desired using the Min. dial (on the **Cooling side** of thermostat).
7. Adjust the maximum flow (on the **Cooling side** of thermostat).
  - A. Push the cooling setpoint slider all the way to the **left**. (This requests maximum flow, and is normally for full cooling mode.)
  - B. Set the maximum flow voltage as desired using the Max. dial (on the **Cooling side** of the thermostat).
8. Adjust the cooling setpoint slider back to its original position and replace the cover.

## TRI-AVERAGING FLOW SENSOR (SIZES 5-16)

Calibration Chart for use with Models AV, AH, AK, AR, AD and Fan Terminal Models AS and AC.



TRI-AVERAGING FLOW SENSOR (SIZES 18 & 24)  
Calibration Chart for use with Models AV, AH, AK, AR, AD  
and Fan Terminal Models AS and AC.





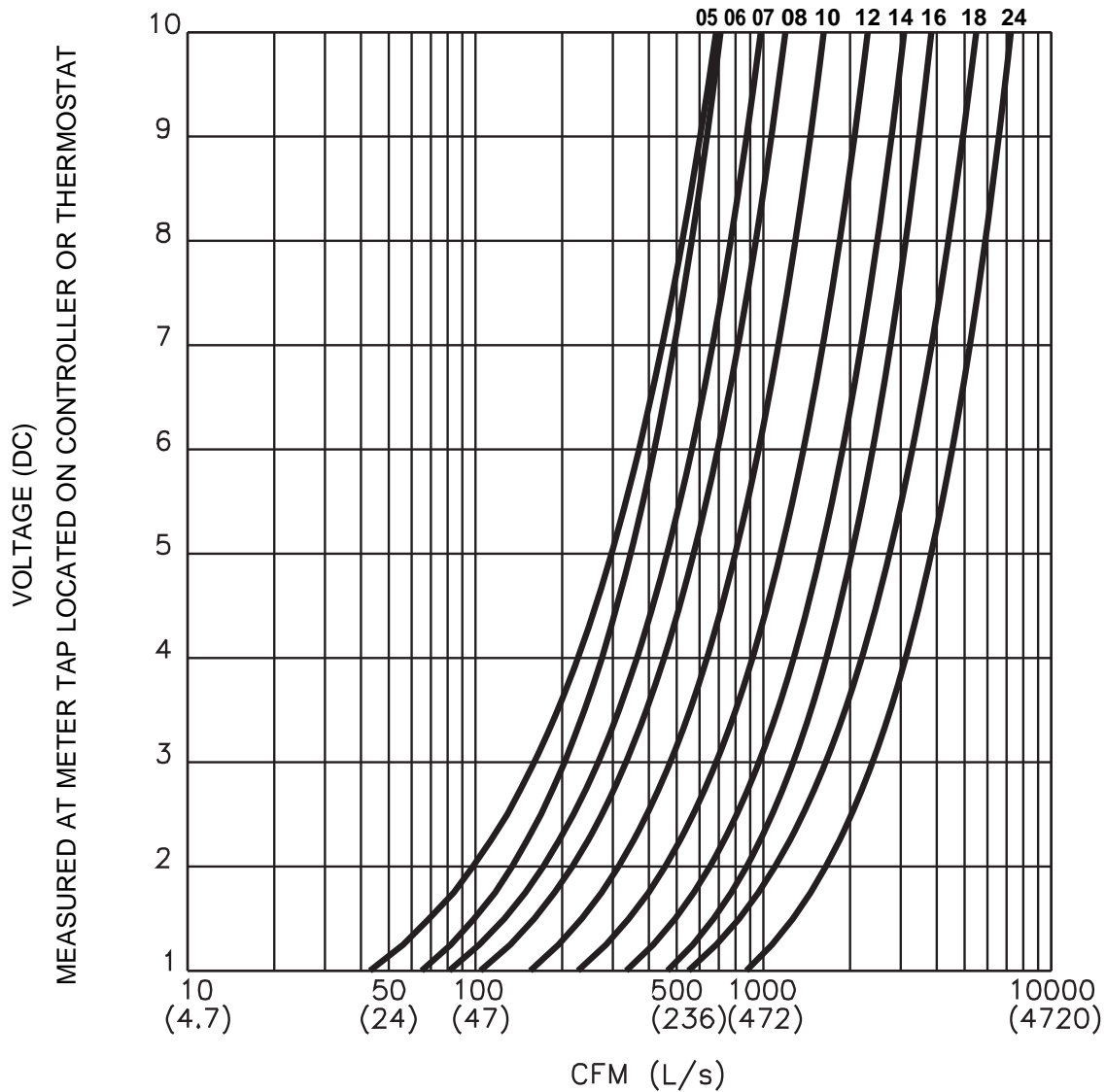
## Electronic Calibration Chart

Old Design (Orders Shipped Before 09/09)

### STANDARD SENSOR

Calibration Chart for use with Models AV, AH, AK, AR, AD  
and Fan Terminal Models AS and AC.

### CALIBRATION CHART

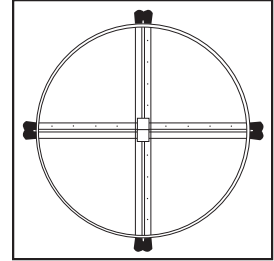


**Electronic Calibration Chart**

Old Design (Orders Shipped Before 09/09)

**CROSS FLOW SENSOR**

Calibration Chart for use with Models AV, AH, AK, AR, AD and Fan Terminal Models AS and AC.



**CALIBRATION CHART**

