



**PRICE**<sup>®</sup>

# INDUCTION TERMINAL UNITS

## INSTALLATION MANUAL



Date: 04/11  
Reference #: F-56

[www.price-hvac.com](http://www.price-hvac.com)

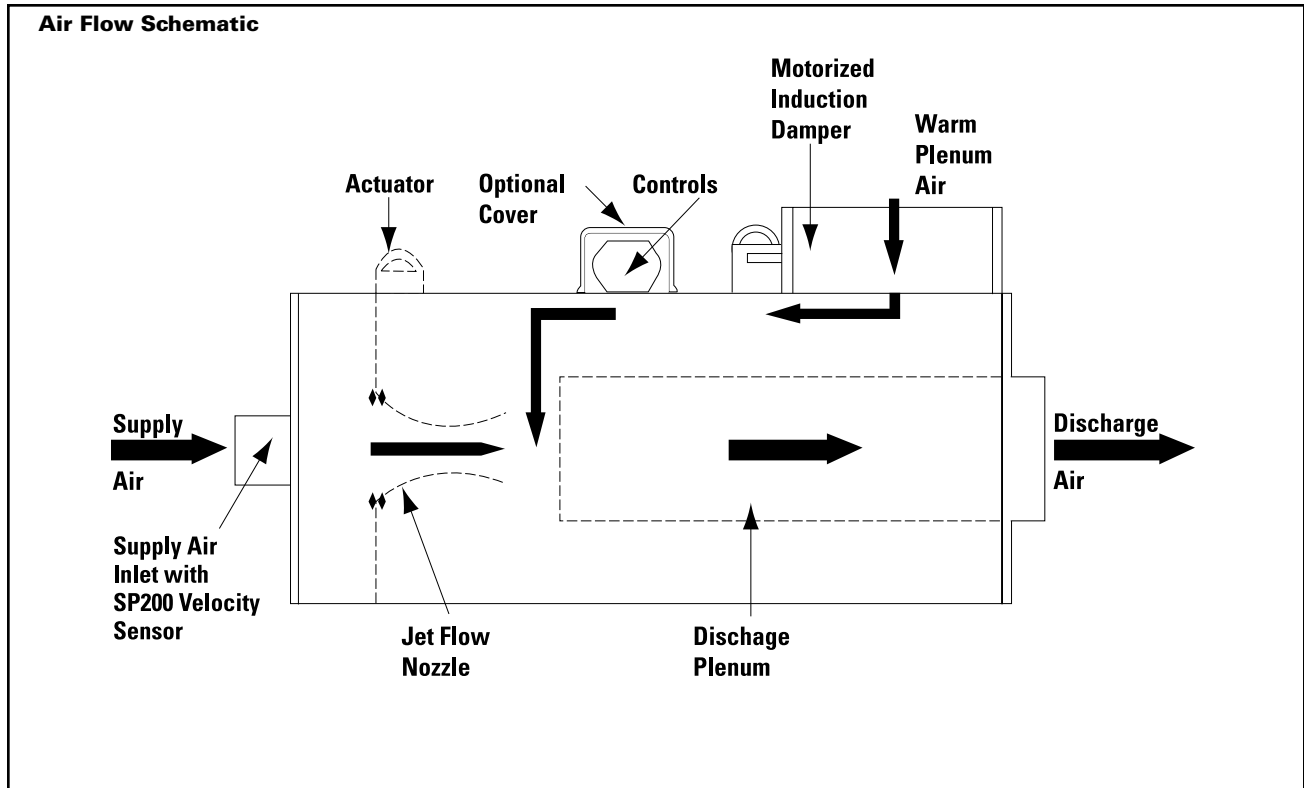


## General

Price induction terminals are available with pneumatic, electronic or direct digital (DDC) controls. In most cases pneumatic and electronic controls are factory supplied and mounted. In the case of DDC controls, the terminal unit controls are often supplied by the controls contractor and either factory or field mounted. For information concerning controls, components, sequence of operations, etc. for DDC controls supplied by the controls contractor, please refer to the documentation provided by the controls contractor.

The rotation of both the inlet nozzle and induction damper is always clockwise to the open position. An identification mark on the end of the shaft indicates the damper position. Capped tees are provided in sensing lines from the amplifying sensor. These allow field connection of a differential pressure gauge for accurate air flow measurement. (Not included with electronic controls.)

An optional metal control cover may be provided to protect the terminal unit control components. The protective cover is removable with two sheet metal screws.



The velocity sensor is normally supplied as standard with the terminal unit. However, in some cases a flow sensing device supplied by the controls contractor may be field or factory mounted. Refer to the submittal drawing for illustration.

# Control Assembly Label



**VAV SPECIFICATIONS /  
SPÉCIFICATIONS VAV**

Price Order No / No Comm de Price: 54399

Branch PO / BC de la Succ: T100200J


Customer PO / BC du Client: 3429

Job Name / Nom du Projet: Commerce Trust


Package Tag / Étiquette du Colis: \_\_\_\_\_

Unit Location / Localisation de l'Unité: VAV-59

**AIR FLOW /  
DIRECTION DE L'AIR**



**INSTALLED /  
INSTALLÉ:**



AIR DISTRIBUTION PRODUCTS /  
PRODUITS DE DISTRIBUTION D'AIR

Manufactured By / Fabriqué Par  
Price

**Special Instructions / Instructions Spéciales:** \_\_\_\_\_ SCHEM #CX49210

Fan Flow = 250 cfm

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| Item | Model /<br>Modèle | Size /<br>Grandeur | Controller /<br>Régulateur | Motor /<br>Moteur |
|------|-------------------|--------------------|----------------------------|-------------------|
| 1    | IPV8000           | 6                  | CP101 Controller           | EHP               |

| Air Volume (cfm / l/s) /<br>Volume d'Air (pcm / l/s) |                    | Reset<br>Span /<br>Plage<br>d'Opération | Damper /<br>Volet | Thermostat       | Coil<br>Serpentin | Application |
|--|--------------------|---|-------------------|------------------|-------------------|-------------|
| Min.   | Max.               |   |                   |                  |                   |             |
| 250<br>118   | 430 cfm<br>202 L/s | 8-13 psi                                | Norm.<br>Open     | Direct<br>Acting |                   | Cooling     |

031800

All Price induction terminal units are tagged with a control assembly label as shown on the left. This label identifies the model number, location tag #, controller type, actuator type, thermostat action, damper action, application and controller setpoints. Options, accessories and appropriate control diagrams are also identified. If field adjustment of the controller factory setpoints should become necessary, follow the appropriate procedure outlined in the manual.

**Note: All pneumatic controls must be calibrated in the position they are mounted.**

All factory supplied controllers are tagged with a controller label as shown below. This label identifies the required sensor velocity pressure for both the minimum and maximum controller setpoints.

| Price Order No. /<br>No. de Comm. de Price | Item | Model /<br>Modèle                                    | Size /<br>Grandeur        | Unit Location /<br>Localisation de l'Unité    |
|--|------|--|---------------------------|---|
| 54399                                      | 1    | IPV8000  | 16                        | VAV-59  |
| Damper / Volet                             |      | Air Volume (cfm / l/s) /<br>Volume d'air (pcm / l/s) | Settings / Réglages       |   |
| Norm. Open                                 |      | 250 cfm 430 cfm<br>118 L/s 202 L/s                   | 0.28 0.84 in<br>70 208 Pa | Reset Span /<br>Plage d'Opération<br>8-13 psi |

## Receiving Inspection

All Price induction terminal units are inspected before shipment. After unpacking the assembly, check it for damage. If any damage to the products is found, report it immediately to the delivery carrier. During unpacking and installation, **do not handle the unit by the inlet velocity sensor, damper shaft, or tubing connections. Damage may result.**

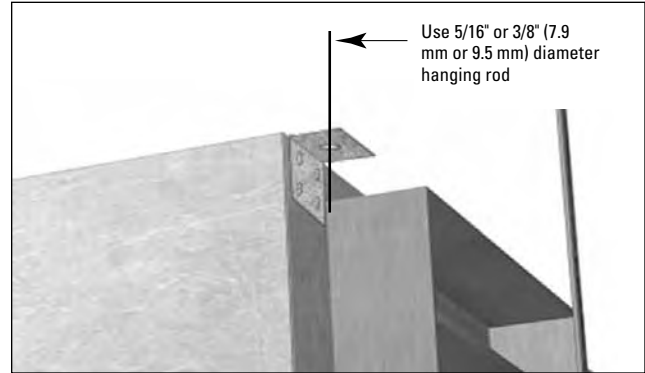
**WARNING: DO NOT ADJUST THE CONTROL COMPONENTS**

# Installation

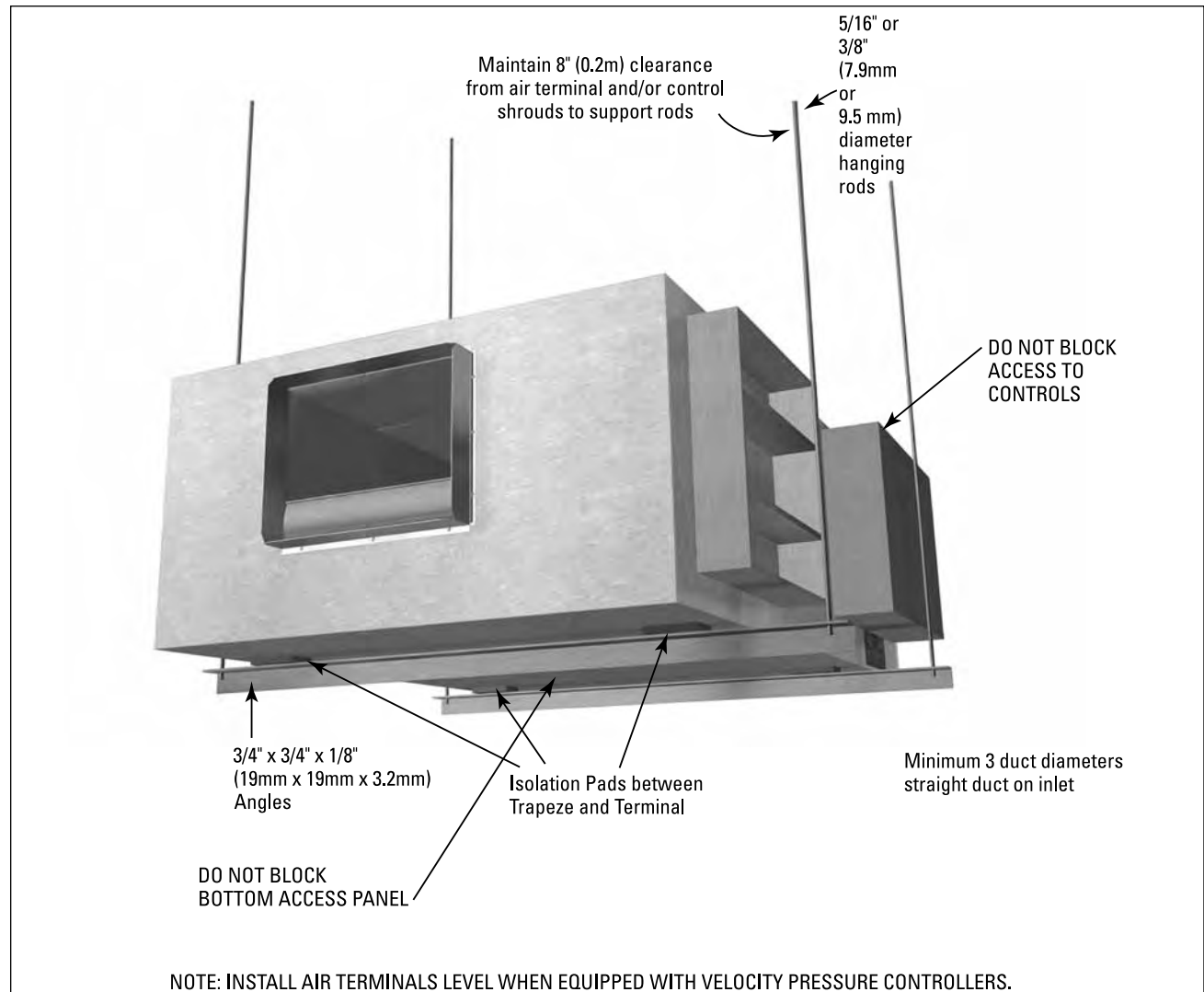
## Mounting The Unit

1. Use trapeze hangers or optional hanger brackets as illustrated. Hanging rods should be securely attached to joists or to mounting anchors which are properly secured to slab construction with lugs or poured in place anchors. Please note that induction terminals must be level within  $\pm 10$  degrees of horizontal, both parallel to the airflow and at right angles to the airflow.
2. Price Induction Terminal Units are designed to be mounted in the direction indicated by the Control Assembly Label found on the protective shroud.
3. Do not block the bottom access panel. Correct installation of the trapeze bars will not block access panel removal.
4. Do not install tight to slab, avoid contact with other obstacles such as rigid conduit and sprinkler piping. This can cause excessive vibration and noise transmission.
5. Install the unit in a location that allows free access to the unit as well as all control components.
6. Ensure main power to the terminal has been disconnected prior to performing any electrical work or inspection of the circuitry.
7. **WARNING:** Do not tamper with control components.

### Optional Hanger Brackets



### Trapeze Hangers



## Duct Connection

1. Recommend a minimum of 3 duct diameters of straight inlet duct, either sheet metal or flexible, same size as the inlet, between the unit inlet and any transition, take-offs or fittings. Use of transitions or elbows at the unit inlet to be avoided. Where flexible duct is used it should be pulled tight to eliminate sags or folds.
2. To control radiated noise in critical applications it is recommended that the inlet ducts be fabricated of minimum 24 gauge sheet metal in place of flexible duct.
3. To prevent excessive air leakage, all cleat joints should be sealed with an approved duct sealer. This applies to all accessory connections as well as the basic fan powered terminal unit.
4. Holes that are drilled in the duct for testing or balancing purposes are to be sealed with duct tape or duct sealer.

## Electrical Connection

**CAUTION: Disconnect all incoming power before any electrical installation or service is performed on the unit(s).**

1. All field wiring is to be in accordance with the National Electrical Code ANSI/NFPA No. 70 or the Canadian Electrical Code, Part 1, CSA Standard C 22.1.
2. Refer to the product identification label on each unit for information to determine the field wire size.
3. Check voltage requirements prior to power supply connection. Refer to the electrical label located near the electrical control box and also refer to the schematic drawing provided on the underside of the electrical control box cover.
4. If upon energizing the electric motor excessive noise is apparent, shut down the unit. Determine the cause by checking for packing materials, etc. and re-energize after corrective action has been taken.

## Control Connections

### Pneumatic

1. External control air connections are provided for main air and thermostat hook up. These are to be piped according to the label on the inlet panel.
2. Main air supply must be clean and dry, delivered at 15 to 25 psi (maximum 25 psi).
3. Ensure that lines are not crimped or cut when installed.

### Electronic

A wiring diagram is provided with each assembly. Follow the diagram for wiring of the thermostat and other accessories.

### Digital

If controls have been factory mounted, a wiring diagram will be included with the unit indicating the factory mounted components. For field wiring of room sensors and other accessories, refer to the controls contractor's documentation for all wiring information.

## Induction Performance

|                       | Inlet Static Pressure (in W.G.) Basic Assembly | 1 & 2 Row c/w H.W. Coil | Discharge Static Pressure (in W.G.) | % Primary Air   |     |     |     |     |    |    |    |    |    |
|-----------------------|--|-------------------------|-------------------------------------|---|-----|-----|-----|-----|----|----|----|----|----|
|                       |  |                         |                                     | 100   | 90  | 80  | 70  | 60  | 50 | 40 | 30 | 20 | 10 |
|                       |  |                         |                                     | Total Discharge Air (Expressed as a % of the Primary Max. Air Volume) |     |     |     |     |    |    |    |    |    |
|                       | 0.50   | 1.00                    | 0.10                                | 104   | 103 | 101 | 97  | 88  | 80 | 68 | 57 | 40 | 21 |
|                       | 0.75   | 1.25                    | 0.10                                | 104   | 104 | 104 | 100 | 91  | 83 | 70 | 59 | 42 | 20 |
|                       | 0.75   | 1.25                    | 0.30                                | 101   | 96  | 92  | 86  | 77  | 70 | 60 | 50 | 36 | 18 |
|                       | 1.00   | 1.50                    | 0.10                                | 105   | 106 | 107 | 103 | 95  | 87 | 75 | 60 | 43 | 21 |
| <b>Size 6 &amp; 8</b> | 1.00   | 1.50                    | 0.30                                | 102   | 99  | 96  | 90  | 82  | 73 | 62 | 52 | 37 | 19 |
|                       | 1.50   | 2.00                    | 0.10                                | 105   | 108 | 112 | 110 | 101 | 92 | 77 | 63 | 44 | 23 |
|                       | 1.50   | 2.00                    | 0.30                                | 103   | 101 | 99  | 94  | 86  | 78 | 66 | 55 | 40 | 20 |
|                       | 2.50   | 3.00                    | 0.10                                | 107   | 112 | 118 | 115 | 103 | 92 | 75 | 58 | 39 | 20 |
|                       | 2.50   | 3.00                    | 0.30                                | 104   | 105 | 106 | 102 | 92  | 82 | 69 | 55 | 38 | 19 |

|                         | Inlet Static Pressure (in W.G.) Basic Assembly | 1 & 2 Row c/w H.W. Coil | Discharge Static Pressure (in W.G.) | % Primary Air   |     |     |     |     |    |    |    |    |    |
|-------------------------|--|-------------------------|-------------------------------------|---|-----|-----|-----|-----|----|----|----|----|----|
|                         |  |                         |                                     | 100   | 90  | 80  | 70  | 60  | 50 | 40 | 30 | 20 | 10 |
|                         |  |                         |                                     | Total Discharge Air (Expressed as a % of the Primary Max. Air Volume) |     |     |     |     |    |    |    |    |    |
|                         | 0.50   | 1.25                    | 0.10                                | 107   | 101 | 93  | 85  | 80  | 73 | 58 | 42 | 27 | 14 |
|                         | 0.75   | 1.50                    | 0.10                                | 107   | 104 | 102 | 95  | 86  | 77 | 66 | 54 | 39 | 19 |
|                         | 0.75   | 1.50                    | 0.30                                | 104   | 99  | 94  | 88  | 79  | 72 | 62 | 51 | 37 | 18 |
|                         | 1.00   | 1.75                    | 0.10                                | 107   | 106 | 105 | 99  | 91  | 82 | 69 | 56 | 40 | 20 |
| <b>Size 10 &amp; 12</b> | 1.00   | 1.75                    | 0.30                                | 104   | 100 | 97  | 91  | 82  | 74 | 65 | 56 | 41 | 20 |
|                         | 1.50   | 2.25                    | 0.10                                | 107   | 108 | 111 | 107 | 98  | 89 | 75 | 63 | 45 | 23 |
|                         | 1.50   | 2.25                    | 0.30                                | 104   | 102 | 100 | 95  | 87  | 78 | 69 | 59 | 43 | 22 |
|                         | 2.50   | 3.25                    | 0.10                                | 107   | 113 | 118 | 116 | 105 | 94 | 79 | 64 | 45 | 23 |
|                         | 2.50   | 3.25                    | 0.30                                | 105   | 105 | 106 | 102 | 92  | 83 | 72 | 61 | 43 | 22 |

|                | Inlet Static Pressure (in W.G.) Basic Assembly | 1 & 2 Row c/w H.W. Coil | Discharge Static Pressure (in W.G.) | % Primary Air   |     |     |     |     |     |    |    |    |    |
|----------------|--|-------------------------|-------------------------------------|---|-----|-----|-----|-----|-----|----|----|----|----|
|                |  |                         |                                     | 100   | 90  | 80  | 70  | 60  | 50  | 40 | 30 | 20 | 10 |
|                |  |                         |                                     | Total Discharge Air (Expressed as a % of the Primary Max. Air Volume) |     |     |     |     |     |    |    |    |    |
|                | 0.50   | 1.50                    | 0.10                                | 104   | 103 | 102 | 96  | 86  | 75  | 65 | 55 | 40 | 20 |
|                | 0.75   | 1.75                    | 0.10                                | 104   | 103 | 102 | 98  | 92  | 85  | 71 | 58 | 40 | 20 |
|                | 0.75   | 1.75                    | 0.30                                | 105   | 101 | 97  | 91  | 83  | 75  | 60 | 45 | 30 | 15 |
|                | 1.00   | 2.00                    | 0.10                                | 105   | 105 | 105 | 102 | 94  | 86  | 73 | 58 | 41 | 20 |
| <b>Size 14</b> | 1.00   | 2.00                    | 0.30                                | 106   | 103 | 100 | 95  | 86  | 78  | 67 | 56 | 41 | 20 |
|                | 1.50   | 2.50                    | 0.10                                | 104   | 106 | 108 | 105 | 97  | 89  | 75 | 60 | 41 | 20 |
|                | 1.50   | 2.50                    | 0.30                                | 105   | 103 | 102 | 97  | 89  | 82  | 70 | 58 | 41 | 20 |
|                | 2.50   | 3.50                    | 0.10                                | 107   | 108 | 110 | 109 | 105 | 101 | 84 | 66 | 45 | 23 |
|                | 2.50   | 3.50                    | 0.30                                | 105   | 106 | 107 | 104 | 97  | 91  | 74 | 58 | 40 | 20 |

**Performance Notes:**

1. Induction value (percentage) based on maximum rated flow and a minimum of zero – induction percentages may vary at other flow settings.

## Air Volume Charts

| Unit Size | IPV Capacity |            |            |             |
|-----------|--------------|------------|------------|-------------|
|           | L/s Min.     | L/s Max.   | cfm Min.   | cfm Max.    |
| 6         | 31 - 212     | 75 - 212   | 66 - 450   | 158 - 450   |
| 8         | 62 - 378     | 151 - 378  | 132 - 800  | 320 - 800   |
| 10        | 104 - 637    | 258 - 637  | 221 - 1350 | 546 - 1350  |
| 12        | 146 - 991    | 373 - 991  | 310 - 2100 | 790 - 2100  |
| 14        | 207 - 1416   | 510 - 1416 | 439 - 3000 | 1080 - 3000 |

| Unit Size | IEV/IDV Capacity |                 |
|-----------|------------------|-----------------|
|           | L/s Min. - Max.  | CFM Min. - Max. |
| 6         | 31-212           | 66 - 450        |
| 8         | 62 - 378         | 132 - 800       |
| 10        | 104 - 637        | 221 - 1350      |
| 12        | 146 - 991        | 310 - 2100      |
| 14        | 207 - 1510       | 439 - 3000      |

The air volume ranges listed are recommended for optimum performance. Selection of air flow limits below the listed values is not recommended. Stability and accuracy may not be acceptable at lower than recommended air flow limits.

# Electronic Airflow Adjustment Procedure

In order to correct for poor inlet conditions (which cause inaccurate airflow sensing) or changing design parameters, it may be necessary to adjust the factory set minimum and maximum air flow rates of an induction terminal in the field. These adjustments are performed at the wall mounted thermostat. In the event that inlet conditions to the terminal are causing the inaccuracies, the calibration curves referred to in the procedures will no longer be valid. In this case, either a duct traverse or air outlet measurement will be required to establish true air volumes.

## Calibration Procedure for Velocity Adjustments made at Thermostat

### A. Required Tools:

1. Small flat blade ( $\frac{1}{8}$ " ) screwdriver.
2. Digital Voltmeter capable of displaying a 0 to 10 VDC range which will display in .01 VDC increments.
3. Test Leads (#HSO-5001).

### B. Remove Thermostat Cover

Thermostat Cover is removed by releasing the mounting screws on either side of the cover.

## CTE-5101 Cooling Thermostat

1. Be certain the ambient room temperature at the thermostat is within the range of the thermostat (55°F to 85°F) (13°C to 29°C).
2. Connect Digital Voltmeter to the meter taps (see (1) in fig. 1) on the face of the room thermostat using Kreuter test leads (PT#HSO-5001) (see fig. 2).
3. Adjust the cooling setpoint slider (see (2) in fig. 1) all the way to the right for minimum cooling.
4. Read the DC voltage across the meter taps on the cooling (right) side. Adjust the minimum setpoint (MIN INCR) Potentiometer (see (3) in fig 1) (clockwise to increase or counter-clockwise to decrease) to the desired DC voltage. The DC voltage may be determined from the calibration curves or by direct air flow measurement.

**Note: The minimum setpoint must be adjusted first. Adjustment of the MIN INCR Potentiometer directly affects the maximum setpoint.**

5. Adjust the cooling setpoint slider all the way to the left for maximum cooling.
6. Read the DC voltage across the meter taps on the cooling (right) side. Adjust the maximum setpoint (MAX INCR) Potentiometer (see (4) in fig. 1) (clockwise to increase or counter-clockwise to decrease) to the DC voltage equal to the desired flow (CFM). The DC voltage may be determined from the calibration curves or by direct air flow measurement.

**Note: The maximum setpoint must be adjusted last. Adjustment of the MIN INCR Potentiometer directly affects the maximum setpoint.**

7. Return the cooling setpoint slider to the desired setpoint. Insert setpoint slider stops if required. Replace the thermostat cover.

**Note: When thermostat setpoints are adjusted the induction damper actuator setpoints must also be adjusted.**

Fig. 1 CTE - 5101

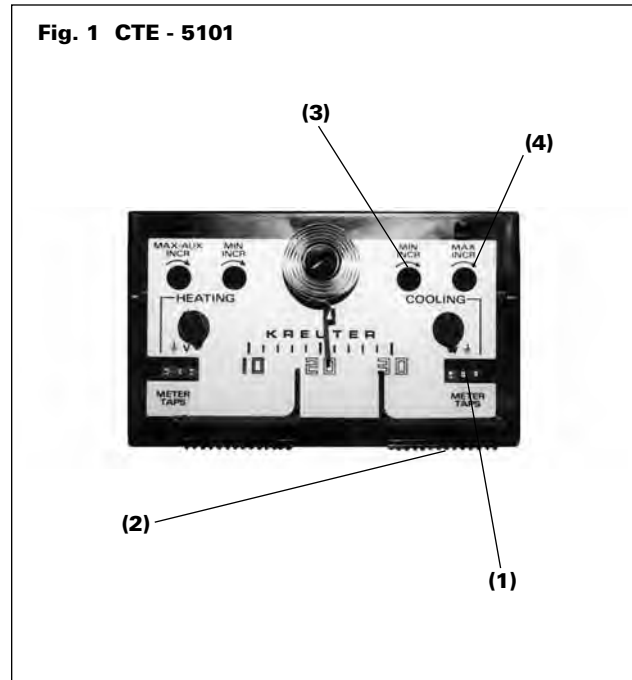
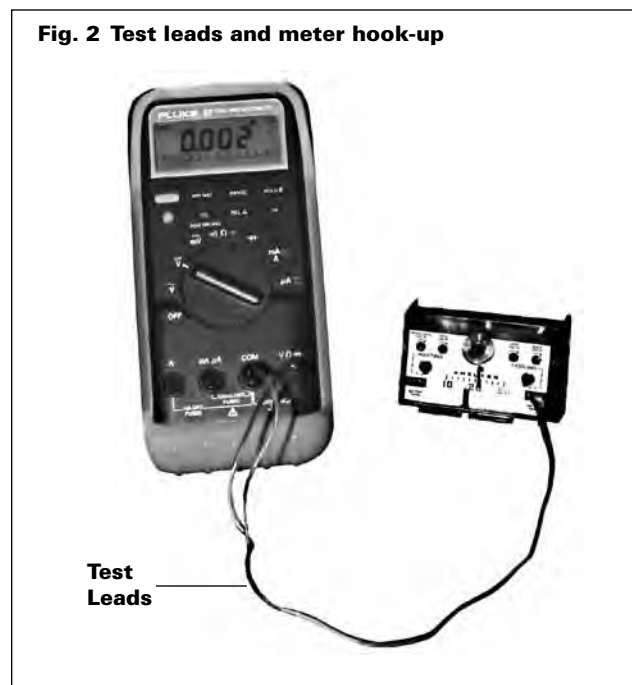


Fig. 2 Test leads and meter hook-up





# Airflow Adjustment Procedure

## CTE-5104 Cooling Thermostat with Reheat Cooling side of the thermostat.

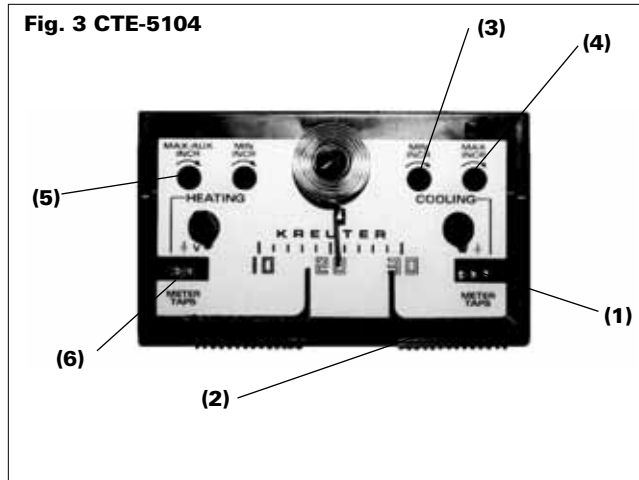
1. Adjust MIN/MAX settings using same procedure as CTE-5101

**Note: The maximum set point must be adjusted last. Adjustment of the MIN INCR Potentiometer directly affects the maximum set point.**

2. Adjust the of auxiliary set point if required: Read the DC voltage across the metre taps on the heating (left) side (6) Adjust the auxiliary setpoint (Max/Aux incr) potentiometer (5) (clockwise to increase or counter-clockwise to decrease) to the DC voltage equal to the desired flow (CFM) as indicated on the inside of the thermostat cover or as shown on the calibration curve (see page 9).
3. Return the Cooling Set Point Slider and Heating Set Point Slider to their desired set points. Insert or re-insert Set Point Slider stops if required. Replace thermostat cover.

1. Connect Voltmeter to "OUT" (1) and "GRD" (2).

Fig. 3 CTE-5104

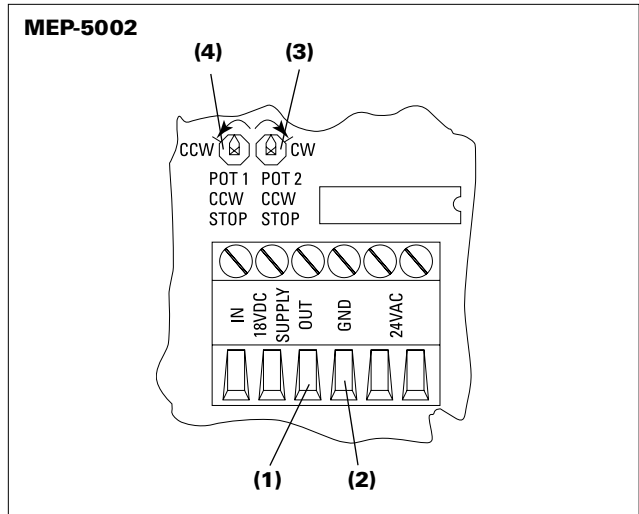


## MEP-5002 Induction Damper Actuator

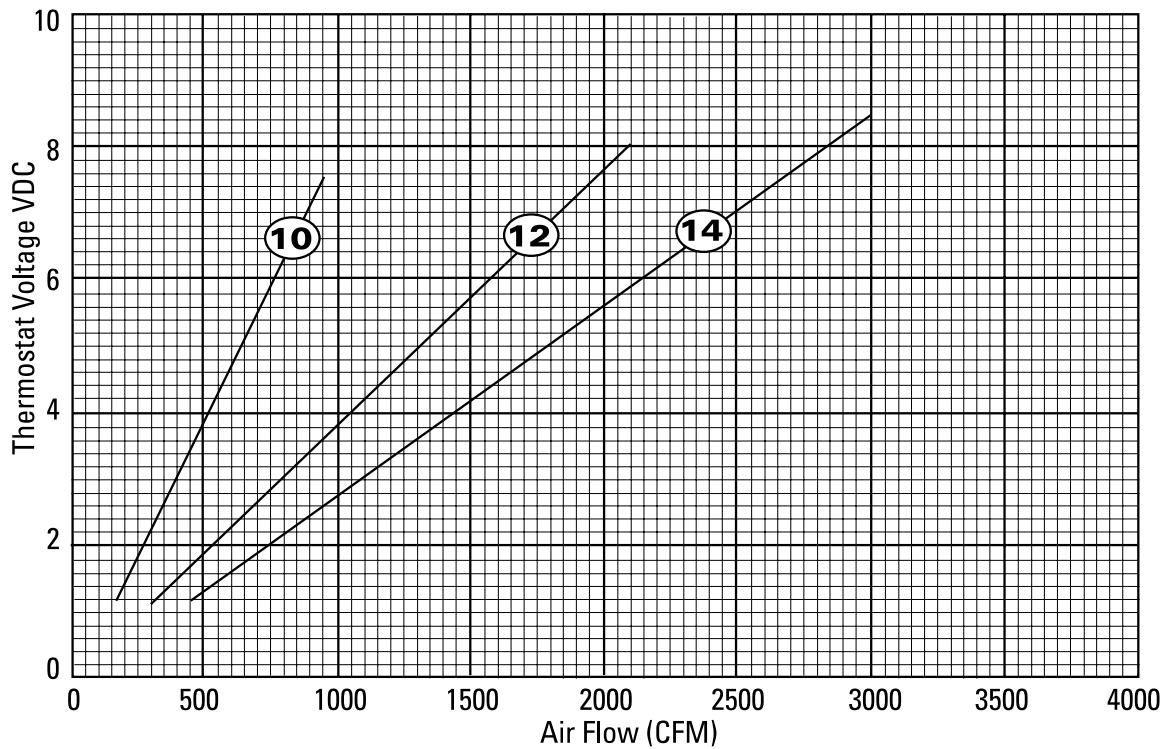
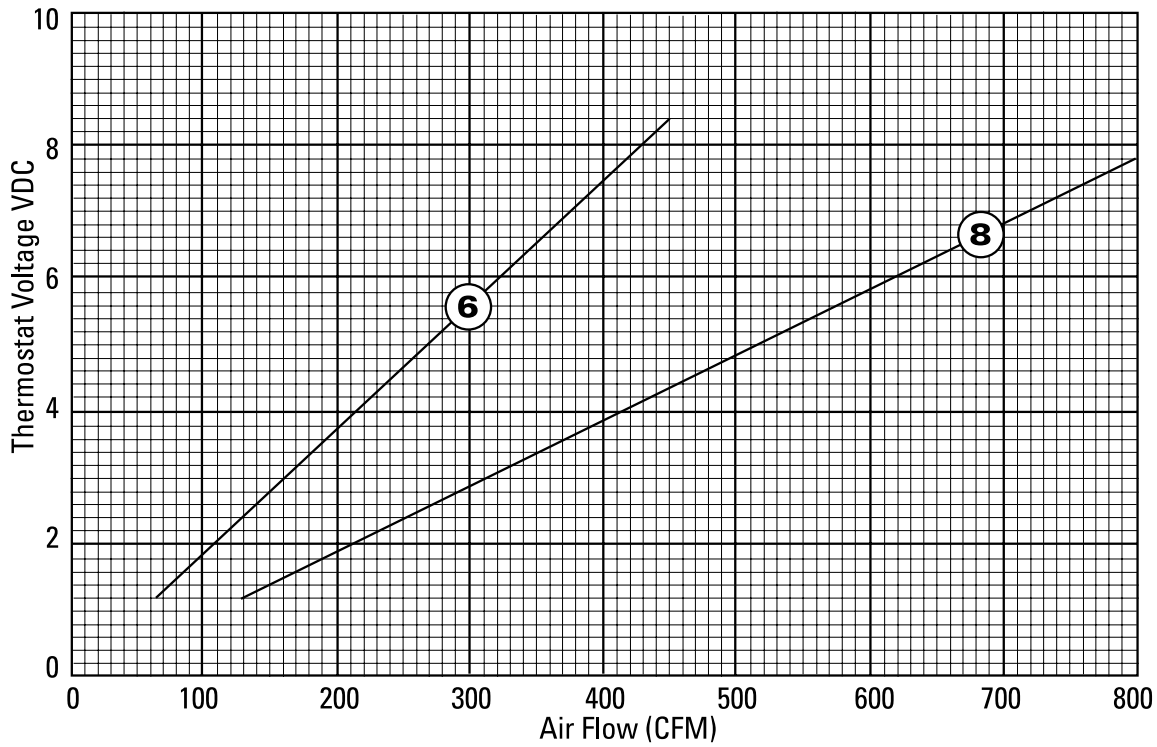
2. Depress clutch and rotate actuator to 0 degrees.
3. Adjust "P2" (3) potentiometer to minimum voltage to match the thermostat minimum.
4. Depress clutch and rotate actuator to 90 degrees.
5. Adjust "P1" (4) potentiometer to maximum voltage to match the thermostat maximum setting.
6. Re-check voltage settings by depressing clutch and verifying at 0 degrees and 90 degrees.
7. Tag MEP with a label indicating which unit it is to be installed.

**Note: MEP minimum setting must be slightly higher than the thermostat minimum setting and MEP maximum setting must be slightly lower than the thermostat maximum to allow full range of rotation for MEP.**

MEP-5002



# Electronic Calibration Curves and Equations



### Calibration Equations

| Size | Equation          |
|------|-------------------|
| 6    | VDC = CFM / 54.8  |
| 8    | VDC = CFM / 103.7 |
| 10   | VDC = CFM / 181.0 |
| 12   | VDC = CFM / 259.0 |
| 14   | VDC = CFM / 354.0 |

# Pneumatic Calibration Procedures

## CP101

### General

1. Reconnect the thermostat tube to the controller if it has been removed during the calibration procedure.
2. Disconnect the gauge and replace the caps on the tees.
3. Replace the protective cover.

### CP101 (If Supplied)

#### A. Nozzle Action

1. Nozzle action is factory set. To reset action, loosen damper selection switch screw and align desired action with the damper position. Retighten screw.
2. Actuator must be repositioned to provide appropriate fail safe position.

#### B. Reset Start Point

1. Reset start point is factory calibrated to the specified setting on the control assembly label.
2. To field adjust, remove the gauge tap cap at "G" and attach a 0 - 30 psi pressure gauge.
3. Adjust the thermostat pressure at "T" port to the desired start point value with a gradual switch or pressure regulator. (Start point is lowest span pressure).
4. Adjust reset start knob until the gauge pressure begins to increase slightly (greater than zero but less than 0.3).
5. Replace gauge tap cap.

#### C. Reset Span

1. Reset span is factory calibrated to the specified setting on the control assembly label.
2. To field adjust, remove the gauge tap cap at "G" and attach a 0 - 30 psi pressure gauge.
3. Adjust the thermostat pressure at "T" port to above 15 psi.
4. Adjust reset span knob until the gauge pressure is equal to the desired reset span (total span pressure, not end span pressure).
5. Replace gauge tap cap.

#### D. Air Volume Limits

1. Remove the caps from the tees in the HI (red) and LO (green) tubes leading from the air flow sensor in the assembly inlet. Connect a differential pressure gauge to the tees. A gauge with a 0 to 1 inch w.g. scale is recommended.
2. Refer to the calibration curve for the size assembly being serviced. From the curve read the differential pressure across the sensor for the required air flow.
3. Alternately, calculate the differential pressure from the equations on page 13.

## Induction Damper Actuator

The induction damper actuator is connected directly to the thermostat signal. For direct acting cooling the actuator operates between 8-13 psi. For reverse acting cooling the actuator operates between 3-8 psi.

## Direct Acting Cooling or

## Reverse Acting Heating

1. Adjust the minimum air flow limit first.
2. Set the thermostat signal to 0 psi or disconnect the thermostat tube from the controller.
3. Adjust the "LO STAT" dial on the controller (center knob) until the gauge reads the required differential pressure for minimum air volume. Turn the dial slowly, allowing time for the damper actuator to complete its travel in response to the adjustments.
4. Adjust the maximum air flow limit, after verifying the minimum air flow limit is set correctly.
5. Apply 15 psi minimum air pressure to the thermostat connection at the controller.
6. Adjust the "HI STAT" dial on the controller (outer knob) until the gauge reads the required differential pressure for maximum air volume. Turn the dial slowly, allowing time for the damper actuator to complete its travel in response to the adjustments.
7. Cycle the thermostat several times. This can be quickly accomplished by removing the cap from the gauge tap (Port G) and varying the bleed rate with finger pressure. Replace cap and check the air flow limits. If setpoints have changed, repeat steps 1 to 7.

## Reverse Acting Cooling or Direct Acting Heating

1. Adjust the maximum air flow limit first.
2. Set the thermostat signal to 0 psi or disconnect the thermostat tube from the controller.
3. Adjust the "LO STAT" dial on the controller (center knob) until the gauge reads the required differential pressure for maximum air volume. Turn the dial slowly, allowing time for the damper actuator to complete its travel in response to the adjustments.
4. Adjust the minimum air flow limit, after verifying the maximum air flow limit is set correctly.
5. Apply 15 psi minimum air pressure to the thermostat connection at the controller.
6. Adjust the "HI STAT" dial on the controller (outer knob) until the gauge reads the required differential pressure for minimum air volume. Turn the dial slowly, allowing time for the damper actuator to complete its travel in response to the adjustment.
7. Cycle the thermostat several times. This can be quickly accomplished by removing the cap from the gauge tap (Port G) and varying the bleed rate with finger pressure. Replace cap and check the air flow limits. If setpoints have changed, repeat steps 1 to 7.

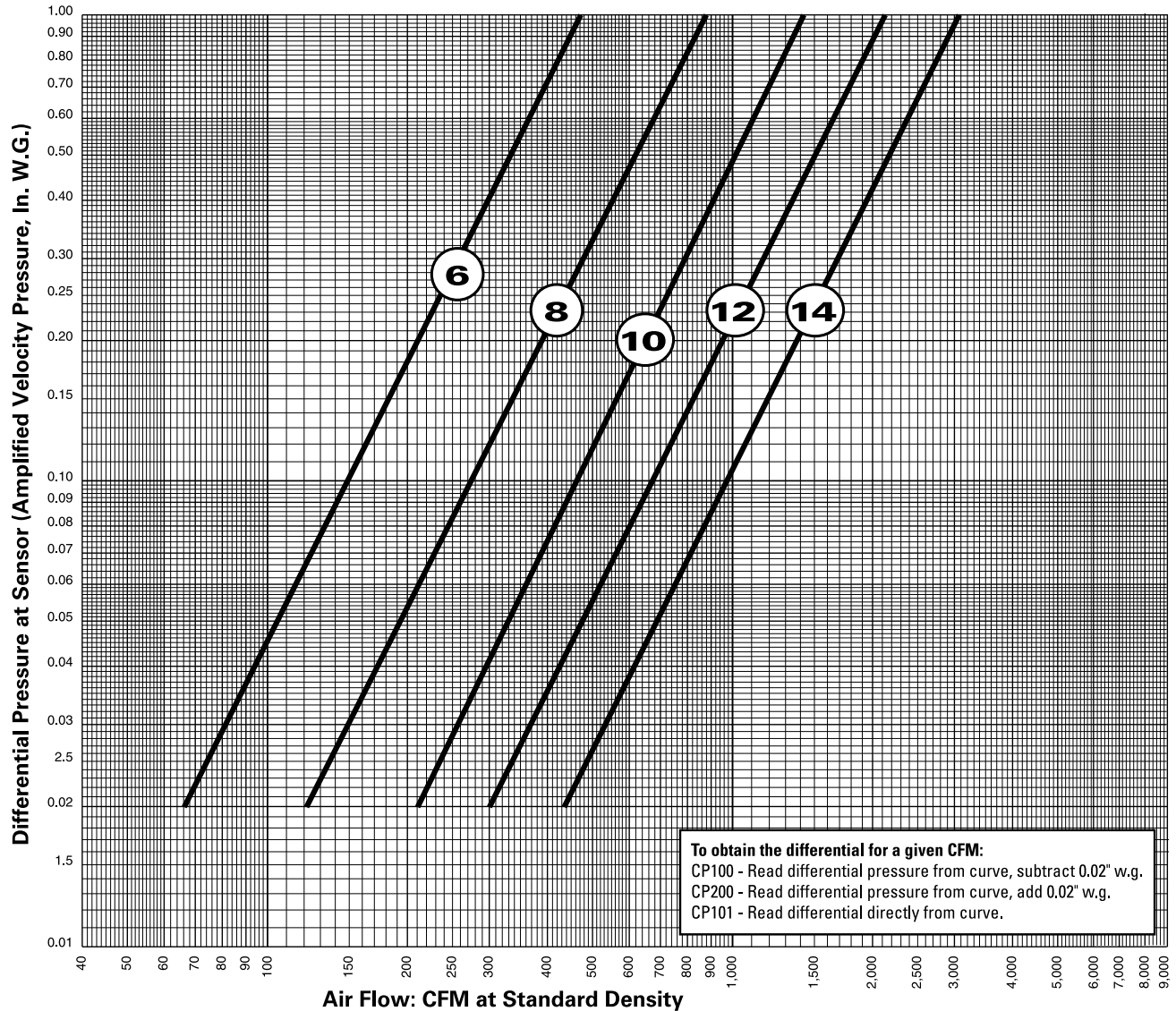
## General

1. Always adjust the "LO STAT" dial first.
2. After calibration is complete, reconnect the thermostat tube to the controller if it has been removed during the calibration procedure.
3. Disconnect the gauge and replace the caps on the tees.
4. Replace the protective metal cover.

# DDC Calibration Procedures

Refer to control contractor documentation for details.

# Airflow Sensor Calibration Curves



## Calibration Equation

$$VP = \left( \frac{Q}{K} \right)^2$$

- VP - differential pressure at sensor, inches w.g.
- Q - air flow rate, cfm at standard density.
- K - calibration constant

| Unit Size | K    |
|-----------|------|
| 6         | 468  |
| 8         | 890  |
| 10        | 1487 |
| 12        | 2141 |
| 14        | 3045 |

## NOTES

1. Gauge taps are normally supplied with the pneumatic controls to allow field measurement of the differential pressure at the sensor with a manometer, magnahelic or other measuring device.  
  
If the terminal velocity controls utilize a flow-through transducer, a proper velocity pressure reading will NOT be read at the gauge taps and the calibration curves CANNOT be used for field measurement. The flow-through transducer operates on the principle of mass flow rather than pressure differential.  
  
Controls utilizing a dead-ended pressure transducer will allow field measurement with the gauge taps and calibration curves provided.
2. Setting flow limits for a differential pressure of less than 0.02 inches is NOT recommended. Stability and accuracy of flow limits may not be acceptable due to low velocity pressure signal. Performance will vary depending on the terminal unit controls provided.
3. For field calibration of air flow limits refer to the control contractor's documentation.

# Electronic Controls Troubleshooting Guide

While this manual is a troubleshooting guide for induction terminal units it does not cover all the possible problems that may exist and some of the tests are based on the premise that the central air system is capable of supplying the terminal unit with the requested air flow. The following is a recommended step by step procedure for troubleshooting induction terminal units.

|   |   |
|---|---|
| <p><b>General</b></p>                     | <ol style="list-style-type: none"> <li>1. Locate the box in question and remove the shroud cover. Verify the wiring is correct for the application and control devices installed. Be certain all wiring terminations are tight and that there are no broken wires. Correct the wiring according to the control diagram found on the inside of the shroud cover if necessary.</li> <li>2. Verify the supply voltage is between 20 VAC and 28.8 VAC volts.</li> <li>3. Verify the cross flow sensor tubing for correct plumbing and tightness. No bends or kinks should be allowed. Do not alter the length of the tubing as a specific length with one brass elbow is required to maintain a specific flow across the sensor.</li> <li>4. Check damper/actuator shaft for movement. The shaft should be movable when the actuator clutch is depressed and static when the clutch is released. Clutch will not release gears if driven against either end stop</li> <li>5. Check DC voltage setting against the factory settings.</li> </ol>  |
| <p><b>Air Volume Not As Specified</b></p> | <ol style="list-style-type: none"> <li>1. Locate the box in question and remove the cover. Verify the tagging matches the tagging on the terminal unit. Attach a digital voltmeter to the meter taps on the face of the thermostat or at the controller.</li> <li>2. Verify the voltage output (DC volts) matches the flow settings on the label.</li> <li>3. If the minimum and maximum air flow settings do not correspond to the factory calibrated settings then recalibrate the thermostat (see airflow adjustment procedures).</li> <li>4. Verify the Controller/Actuator is capable of positioning the damper through its 90 degree travel from fully open to fully closed. Depress the clutch engagement button and rotate the damper through its rotation. If the damper is already at fully open or fully closed the clutch button may not depress. If the damper is fully closed adjust the thermostat to maximum. As the damper begins to open the clutch button may be depressed. If the damper is fully open move the thermostat to minimum. As the damper begins to close the clutch button may be depressed. Release the clutch button to allow the Controller/Actuator to resume modulating the damper.</li> <li>5. If the Controller/Actuator does not position the damper accordingly check for the following:             <ol style="list-style-type: none"> <li>a. Upstream velocities exceeding 3300 fpm.</li> <li>b. Mechanical stops limiting the travel of the damper in either direction.</li> <li>c. Binding of the damper blade or damper shaft preventing travel in either direction.</li> </ol> </li> <li>6. Check inlet configuration. Price recommends 3 duct diameters of straight inlet duct, same size as the inlet, between the inlet and any transition, take-off, or fitting. If a poor inlet condition is present, voltage setting may not be valid. A duct traverse may be necessary to achieve accurate settings.</li> </ol> |

# Pneumatic Controls Troubleshooting Guide

|   |  |
|---|--|
| <p><b>General</b></p>   | <ol style="list-style-type: none"> <li>1. Locate thermostat and cycle — direct acting stat will bleed on heating.</li> <li>2. Confirm box size and rating with drawing and box schedule (check label on terminal). Check position of controller to ensure it is installed level.</li> <li>3. For CP101 controller, check the damper selector switch at the face of the controller. Ensure that switch is set in the correct mode.</li> <li>4. Visually check piping and connections to box controls and motor.             <ul style="list-style-type: none"> <li>Blue — Main Air (M)</li> <li>White — Thermostat (T)</li> <li>Yellow — Actuator (B)</li> <li>Red — High Port (H)</li> <li>Green — Low Port (L)</li> </ul> </li> <li>5. Confirm caps are securely in place on the tees in the sensor lines between the sensor and the controller.</li> <li>6. Confirm that the "G" port cap on controller is in place.</li> <li>7. Confirm main air pressure (15 psi minimum - 25 psi maximum).</li> <li>8. Confirm thermostat pressure. Cycle thermostat from full cooling to full heating.</li> <li>9. Confirm actuator pressure from controller by cycling thermostat.</li> <li>10. Confirm actuator operation by stroking actuator with a hand pump noting at what pressure the actuator begins to stroke and is fully stroked.</li> </ol> |
| <p><b>If Velocity Pressure is Below Specified Value and the Nozzle is Fully Open</b></p>                                    | <ol style="list-style-type: none"> <li>1. Connect a differential pressure gauge (0 - 1.0" w.g.) to the tees in the sensor lines between the sensor and the controller.</li> <li>2. Check velocity pressure reading and compare with the value indicated on the controller label.</li> <li>3. If the velocity pressure is below the specified value and the nozzle is fully open, this would indicate insufficient inlet duct static pressure.</li> </ol>   |
| <p><b>If the Velocity Pressure Indicated by the Gauge Does Not Match the Specified Value.</b></p>                           | <ol style="list-style-type: none"> <li>1. If the nozzle of the control assembly is partially closed, this indicates the unit is under control.</li> <li>2. If the velocity pressure indicated by the gauge does not match the specified value, recalibrate the controller according to the procedures outlined in this manual.</li> </ol>  |
| <p><b>If Supply Air Flow Measured by Other Means is Incorrect</b></p>   | <ol style="list-style-type: none"> <li>1. If the supply air flow measured by other means (pitot tube traverse, summation of outlets) is incorrect, inspect the inlet connection to the control assembly.</li> <li>2. Price recommends a minimum of 3 duct diameters of straight inlet duct, <b>same size as inlet</b>, between the inlet and any transition, take off or fitting.</li> </ol>   |
| <p><b>If Velocity Pressure Indicated by the Gauge is Lower than Specified but Actual Air Supply Exceeds Design Flow</b></p> | <ul style="list-style-type: none"> <li>• Check the low pressure tubing connection on the controller to see if tubing is connected.</li> </ul>  |
| <p><b>If the Damper Remains Fully Open, but Sufficient Static Pressure Exists at the Inlet</b></p>                          | <ul style="list-style-type: none"> <li>• The HI sensor port or control line may be plugged. Clear the passage with compressed air.</li> </ul>  |
| <p><b>If the Damper Remains Fully Closed</b></p>  | <ul style="list-style-type: none"> <li>• The LO sensor port or control line may be plugged. Clear the passage with compressed air.</li> </ul>  |





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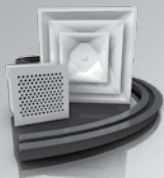
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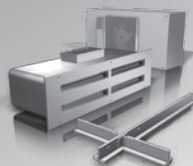
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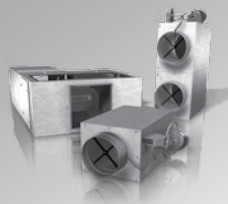
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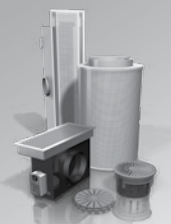
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