Hoffman Controls

Installation & Operating Instructions

201-7BR(DA) Series
Replacement Flow Controllers

Description

The 201-7BR(DA) Controls are designed to directly replace the former 201-5 and 201-7 Series products which are no longer in production.

The former 201-5 and 201-7 Series products would accept a maximum damper shaft extension of 1.25". The replacement model(s) utilize the new 241-2 Series actuator design. It is inverted on a special mounting bracket and accepts longer shafts.

NOTE

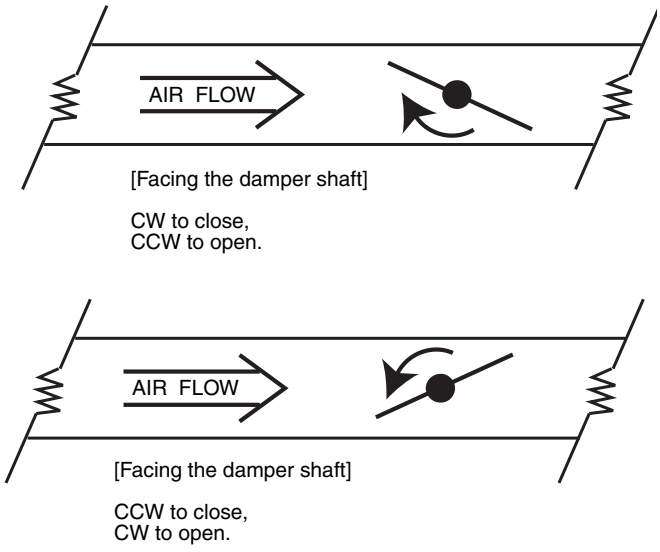
Carefully follow these installation instructions to ensure proper operation of the assembly.

Equipment Required

1. Screwdriver (1/8" blade)
2. Digital voltmeter
3. Allen wrench (1/8")

Accessories Included

- Angled shaft 3/8" adapter – one
- Stop pin – one



Damper Direction of Rotation
Figure 1

General Instructions

1. Disconnect power to the existing control.
2. Cut the existing pneumatic tubing attached to the transducer assembly.

CAUTION

Do not to cut the assembly itself or attempt to pull the existing tubing off the transducer as damage will result. Transducer ends are delicate and provide a calibrated orifice for precise control.

3. Note the terminal number and corresponding color code of all wires connected to the existing control. If an auxiliary interface is plugged into the existing control it must be removed and re-mounted on replacement. It is not necessary to remove the wiring to the interface card. Remove all wires from the main control logic. Loosen the set screws holding the coupling to the damper shaft. Remove the obsolete control.

NOTE

Installation & Operating Instructions reference to "CW" or "CCW" "direction of rotation" is done in reference to the Controller end view of the damper shaft or as viewed from the Logic board side of the mounted Controller. References to Actuator terminal board "CW" or "CCW" connections or the Actuator rotation as viewed from its CW-COM-CCW terminal board side will be exactly opposite the "direction of rotation" viewpoint (see Figures 1 and 2).

Table 1
Facing the Mounted Control

Direction	Actuator Terminals	Logic Wire Color
CW to Close (factory wired)	CW	RED
	CCW	GREEN
CCW To Close (optional)	CW	GREEN
	CCW	RED
In All Cases	COM	BLACK

Stop Pin – Insertion Instructions

1. Note the required rotation direction for the damper closure (CW or CCW, looking into the damper shaft). See Figure 1.
2. The 201-7BR(DA) is factory wired for a "CW to Close" damper action. If your application is "CCW to Close" or if Stop Pins are required, read the following:

NOTE

The 24V AC source is available at Terminals #1---#2 & #3---#4 on the main Logic board (see Figures 3 and 4).

- Disconnect Red-Blk-Grn from Actuator terminal block (see Figure 2).
- To turn the damper CW MAX: Connect COM & CCW to 24V AC.
- To turn the damper CCW MAX: Connect COM & CW to 24V AC.

3. Damper CW to Close

   The 201-7BR(DA) is factory wired for "CW to Close" damper action. No Stop Pin is required if 90° travel of the damper is required.

   If 45° or 60° travel is required:

   a. Rotate the damper CW MAX.

   b. Insert Stop Pin in either the 45° or 60° slot on the Actuator side (see Figure 2). Be sure the Stop Pin passes completely through the actuator assembly. Lightly tap the Stop Pin to seat it correctly.

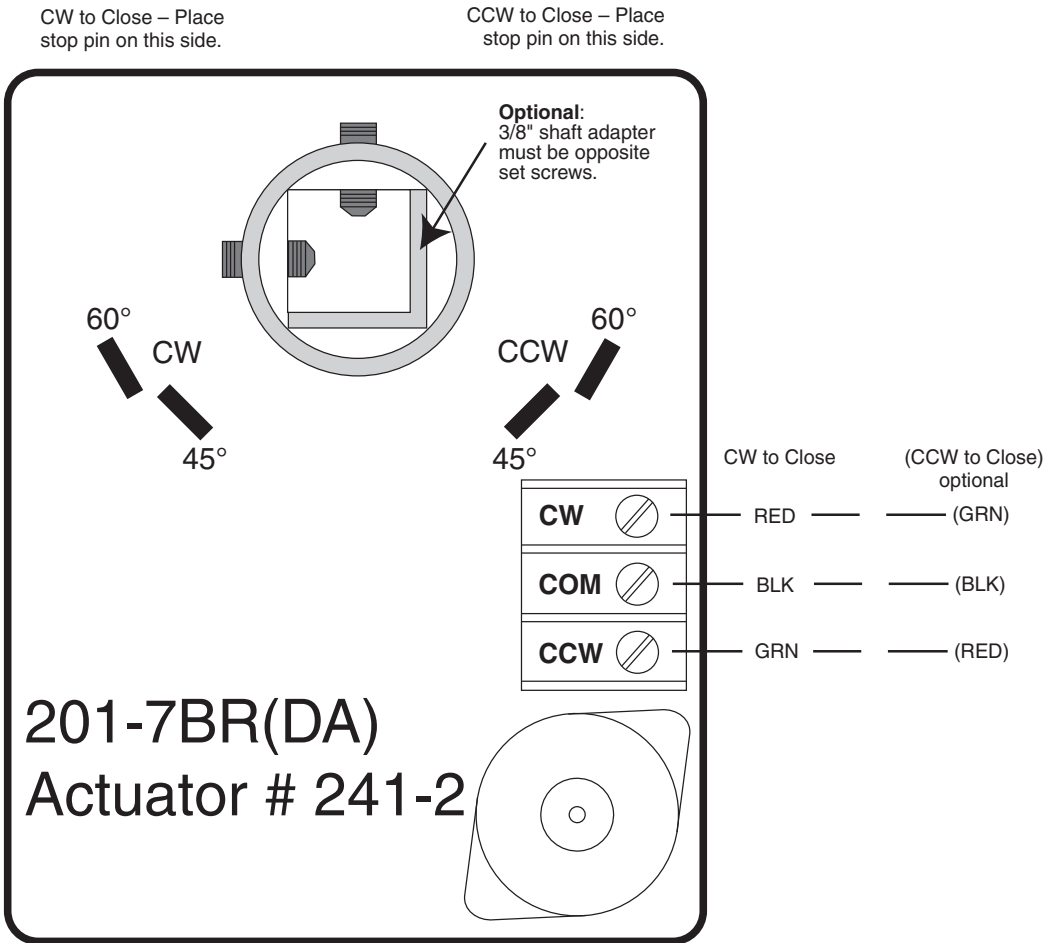
   c. Rotate the damper CW until the shaft is against the stop. This is the CCW open position of the damper.

4. Damper CCW to Close

   If the application is CCW to Close the damper , the Red and Green wires at the Actuator terminals must be reversed. Red to CCW terminal, Green to CW terminal. No Stop Pin is required if 90° damper travel is required.

   If 45° or 60° travel is required:

   a. Rotate the damper CCW MAX. See Step 2 Note.



Motor Actuator
Figure 2

b. Insert Stop Pin in either the 45° or 60° slot on the Actuator side (see Figure 2). Be sure the Stop Pin passes completely through the actuator assembly. Lightly tap the Stop Pin to seat it correctly.

c. Rotate the damper CW until the shaft is against the stop. This is the CW open position of the damper.

Mounting the Control

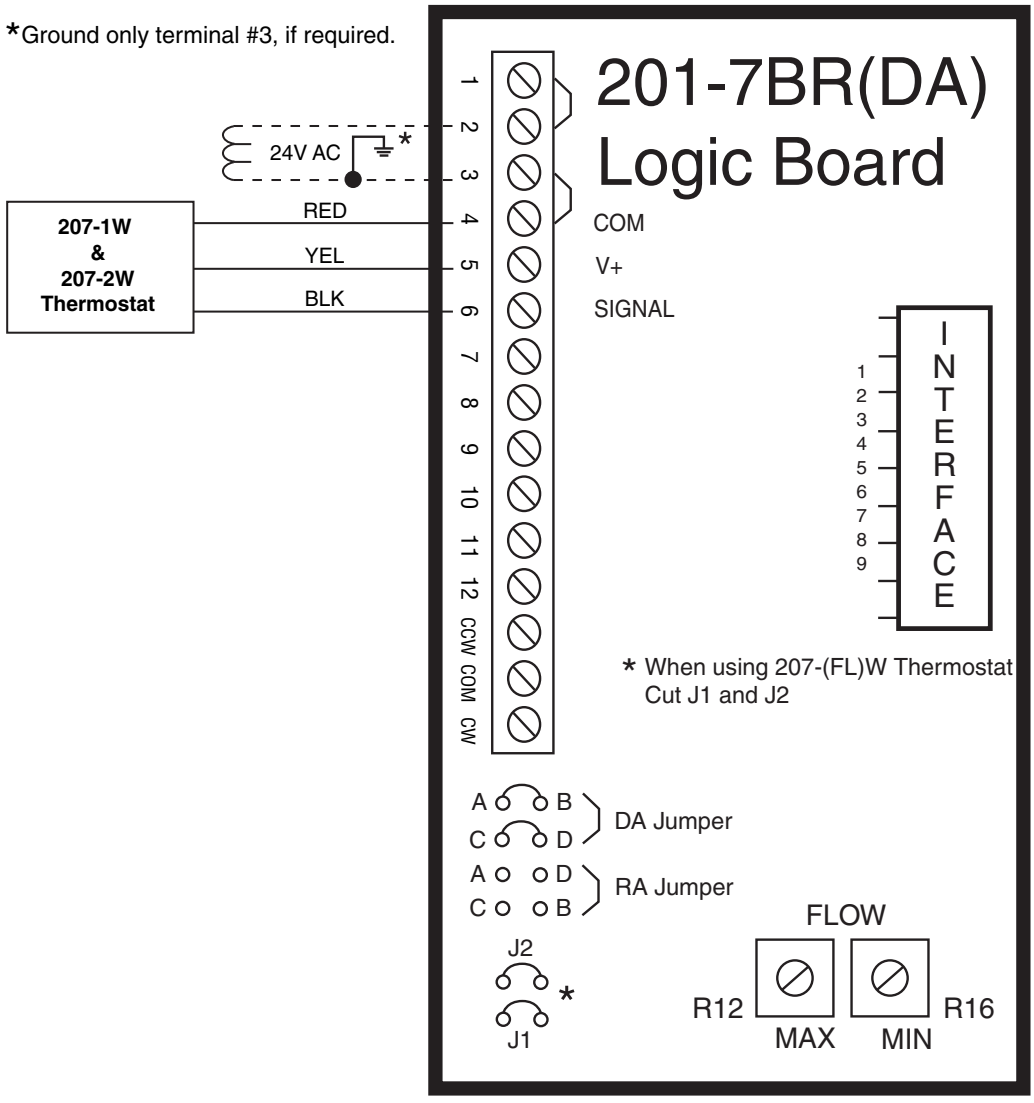
NOTE

Ensure the Actuator has been positioned to the full Close "CW to Close" or "CCW to Close" direction-of-rotation, as required, before installing on the "fully closed position" damper shaft.

1. If the damper shaft is 3/8" in diameter, you will need to insert the angled adapter into the actuator damper shaft hole. Be sure the adapter is opposite the set screws. No adapter is needed for 1/2" shaft size (see Figure 2).

2. Slide the entire control assembly in place, positioning the logic as required and secure assembly with screw or bolt to the terminal box.

3. With the damper in the fully closed position, firmly tighten the two set screws into the damper shaft. Install a #8 x 3/4" sheet metal screw through the brass eyelet and tighten. If using a nut and bolt, it is recommended that a self locking nut be used in order to prevent distortion of the brass eyelet. Do not use any other method of mounting, or install any additional holes in the bracket.



Wiring Diagram for 207-1W and 207-2W Series Thermostats
Figure 3

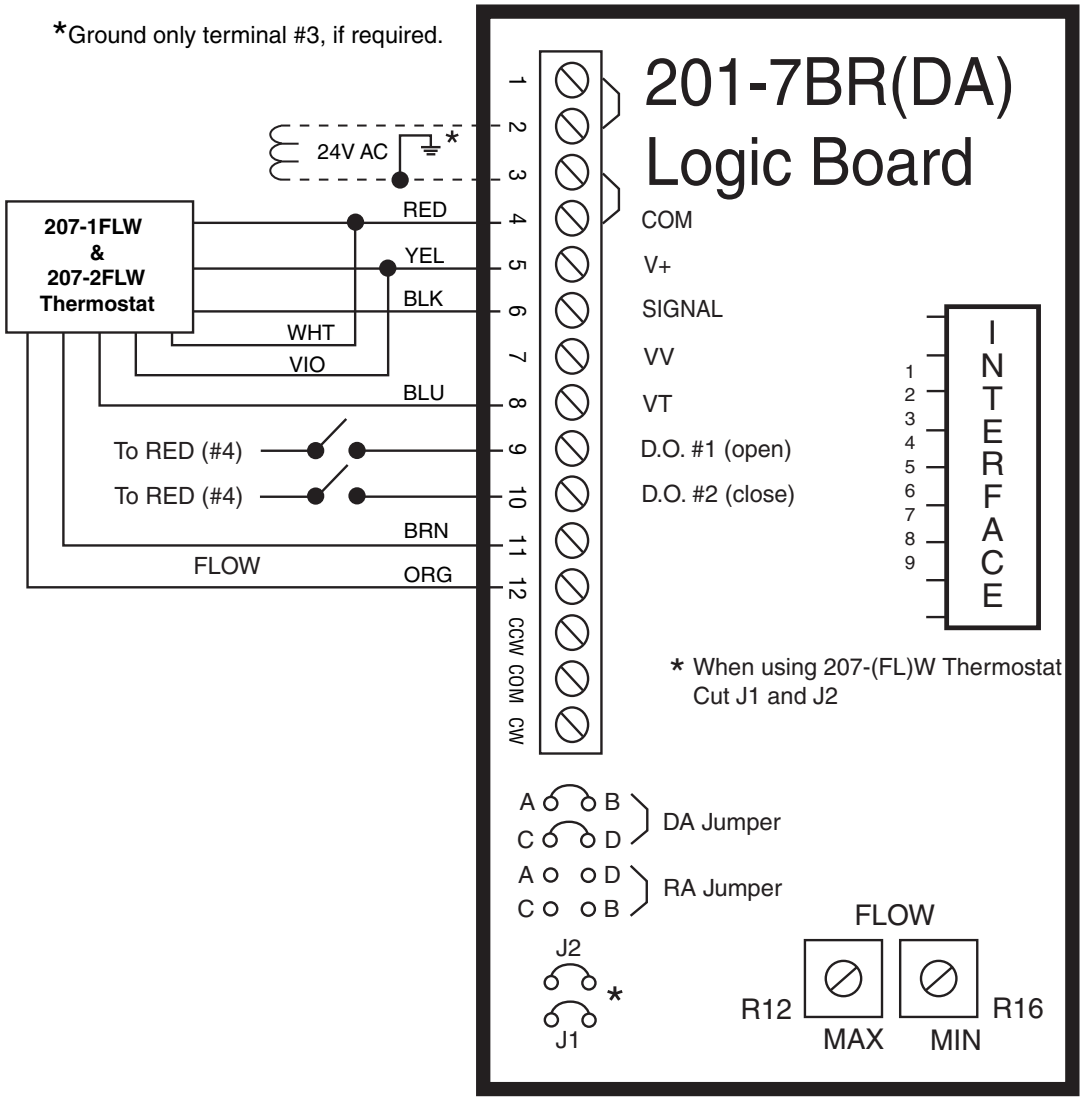
4. If an Interface card has been previously used, re-install it into the female receptacle on the new Control Logic board. If the interface card has nine male pins and the logic has an eight pin female connector, insert the card so that the pin 1 aligns on both the Interface card and the Logic. This will leave an extra male pin (#9) not mated to the Logic board. If wiring was previously disconnected rewire as originally installed.

Pneumatic Connections

Inspect the existing pneumatic tubing that runs from the velocity pickup probe in the duct to the control logic. If any cracks or crimps are found replace the tubing. When attaching new tubing to the control logic, be sure it is firmly seated. Exercise care when attaching tubing to prevent damage to the velocity pickup probe.

Damper Override

Damper Override inputs #1 and #2 allow thermostatic inputs to be overriden in favor of "full Open" or "full Close" operation, i.e., closing damper in case of fire. A user installed N.O. contact between Logic terminal #4 and terminal #9 will cause the damper to Open when made. A user installed N.O. contact between Logic terminal #4 and terminal #10 will cause the damper to Close when made. These Open/Close actions will take place regardless of the "CW to Close" or "CCW to Close" programming of the Controller (see Figure 4).



Wiring Diagram for 207-1(FL)W and 207-2(FL)W Series Thermostats
Figure 4

Mode Reversal

To change the mode of operation from DA (direct acting) to RA (reverse acting), either:

1. Cut the two (2) DA jumpers and solder jumpers into the two (2) RA positions, or
2. Reverse the Red and Yellow Thermostat leads into terminals #4 and #5 (see Figures 3 and 4).

Wiring

Rewire the 24V AC power, thermostat, etc., to the control. Be sure the correct placement of all wires (refer to Figures 3 and 4).

Flow Limit Calibration

Equipment Required

- Digital Voltmeter (DVM), accurate to 3 places, i.e., 13.1V-DC.
- 207 Series or 207-1(FL)W or 207-2(FL)W Series Thermostat.
- Air flow/air flow measuring instrumentation is not required.

Connections (207 Series)

1. Set DVM to read DC Volts, 0—-20V-DC scale.
2. Connect DVM (+) Red lead to "Vt" terminal #8 and (–) Black lead to "Red" terminal #4 on 201 Logic board.
3. Connect 207 Series Thermostat leads Red to RED terminal #4, Yellow to YEL terminal #5 and Black to BLK terminal #6 on 201 Logic board (see Figure 3).
4. Connect 24V-AC power supply, 20VA minimum, to 24V-AC input terminals #2 and #3 on 201 Series Logic board.
5. DVM should read between 11.1 and 16.5V-DC.

Adj. Min/Max Flow Levels (207 Series)

NOTE

Thermostat ambient air temperature must be 70°F to 80°F for these adjustments.

1. Determine the voltage required to limit the "Min" and "Max" flow levels from the Velocity (FPM) vs. Velocity Volts Curve (Figure 5). FPM may be determined using the formula

$$\text{FPM} = \frac{\text{Air Flow (cfm)}}{\text{Duct Area (ft}^2\text{)}}$$

2. Turn both "Min" and "Max" Flow pots fully CW.
3. Set 207 Series Thermostat setpoint to 65°F for DA (Cool) or 85°F for RA (Heat) control.
4. Adjust "MAX" Flow pot R12 CCW until DVM reads the desired voltage selected from the Curve, i.e., 2500 FPM Max Limit = +15.3VDC (see Figure 5).
5. Set 207 Series Thermostat setpoint to 85°F for DA (Cool) or 65°F for RA (Heat) control.
6. Adjust "MIN" Flow pot R16 CCW until DVM reads the desired voltage selected from the Curve, i.e., 400 FPM Min Limit = +12.1VDC.
7. Limit setting is now complete.

Connections for (207-1(FL)W or 207-2(FL)W Series)

1. Set DVM to read DC Volts, 0—-20VDC scale.
2. Connect DVM (+) Red lead to "Vt" test post (–) Black lead to "GND" test post on FL board inside Thermostat.
3. Connect 207-1 or 207-2 Series Thermostat leads Red to RED terminal #4, Yellow to YEL terminal #5, Black to BLK terminal #6, Orange to ORG terminal #12, Brown to BRN terminal #11 and Blue to VT terminal #8 on 201-Logic board (see Figure 4).
4. Ensure J1 and J2 jumpers are cut on 201 Series Logic board (see Figure 4).
5. Connect 24V-DC power supply, 20VA minimum, to 24V-AC input terminals #2 and #3 on 201 Series Logic board.
6. DVM should read between 11.1 and 16.5V-DC.

Adj. Min/Max Flow Levels (207-1(FL)W or 207-2(FL)W Series)

NOTE

Thermostat ambient air temperature must be 70°F to 80°F for these adjustments.

1. Determine the voltage required to limit the "Min" and "Max" flow levels from the Velocity (FPM) vs. Velocity Volts Curve (Figure 5). FPM may be determined using the formula

$$\text{FPM} = \frac{\text{Air Flow (cfm)}}{\text{Duct Area (ft}^2\text{)}}$$

2. Turn both "Min" and "Max" Flow pots fully CW inside Thermostat.
3. Set 207 Series Thermostat setpoint to 65°F for DA (Cool) or 85°F for RA (Heat) control.
4. Adjust "MAX" Flow pot inside Thermostat CCW until DVM reads the desired voltage selected from the Curve, i.e., 2500 FPM Max Limit = +15.3V-DC.
5. Set 207 Series Thermostat setpoint to 85°F for DA (Cool) or 65°F for RA (Heat) control.

6. Adjust “MIN” Flow pot inside Thermostat CCW until DVM reads the desired voltage selected from the Curve, i.e., 400 FPM Min Limit = +12.1V-DC.
7. Limit setting is now complete.

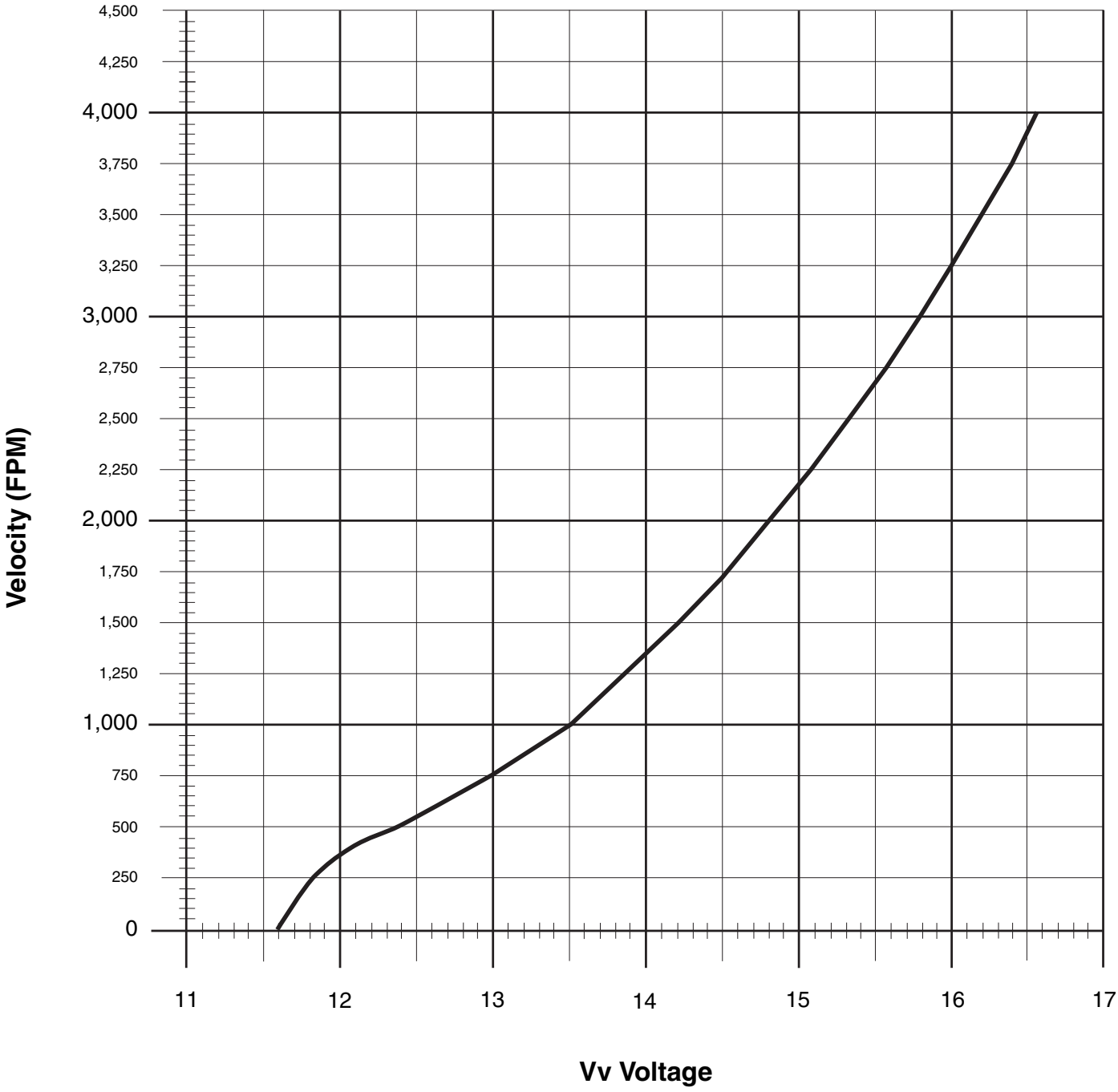
Summary

1. Flow limits may be adjusted without air flow across the Sensor.
2. Flow limits may be adjusted in any °F temperature if a 207 Series Thermostat Simulator (Part No. 207-TSA) is used for calibration.

Specifications

201-7BR(DA) Series

Volts, Input (–15%, +20%)	24V AC
Frequency	50/60 Hz
Power	5VA
Velocity Range, FPM	0 – 4000
Span, V DC/°F	5.4V DC/2.3°
Dead Band, FPM/°F	70 FPM/0.1°
Torque	
Run	35 in.-lb.
Stall (Minimum)	45 in.-lb.
Minimum Shaft Extension	1.75”
Maxaimum Shaft Extension	2.50”



Velocity (FPM) vs. Velocity Volts
Figure 5

Troubleshooting Guide

General

This procedure should be used to troubleshoot the Series 201-7BR(DA) Direct Acting (cooling) Controller when used with a 207 Series Thermostat. The following equipment is required:

- Digital Voltmeter (DVM), accurate to 3 places, i.e., 13.1V-DC
- 207 Series or 207-1(FL)W or 207-2(FL)W Series Thermostat
- Air flow/air flow measuring instrumentation is not required.

Pre-Troubleshooting Checklist

1. Determine if a 24V AC power supply, –15%, +20%, is wired to terminals 2 and 3 on the 201-7BR(DA).
2. Determine if the Controller has been installed properly on the terminal box.
3. Determine if the Minimum and Maximum flow limits have been properly set.
4. Determine if the Thermostat is wired correctly.
5. Space temperature must be between 70°F and 80°F.

Troubleshooting Thermostat Circuit

(Procedure is the same for 207-1W or 207-2W and 207-1(FL)W or 207-2(FL)W Thermostats.)

1. Apply 24V AC power to Controller.
2. No airflow is needed.
3. Measure voltage between terminals #4 (–) RED and #5 (+) YEL on the Controller.

   Reading should be +20V DC ± .2V DC (power supply to Thermostat). If not, replace Controller.
4. Turn setpoint on Thermostat to 65°F. Measure voltage between terminals #4 (–) RED and #6 (+) BLK on the Controller.

   Reading should be 9.75V DC or less. If not, proceed to Step 5.
5. Turn setpoint on Thermostat to 85°F. Measure voltage between terminals #4 (–) RED and #6 (+) BLK on the Controller.

   Reading should be 10.0V DC or more. If not, proceed to Step 6.
6. If either or both voltages in Steps 4 or 5 are not correct, the following voltages should be checked at the Thermostat.
   a. Voltage between RED (–) test post and YEL (+) Thermostat post should be 20V DC ± .2V DC.
   b. Turn setpoint at Thermostat to 65°F.

      Voltage between RED (–) test post and BLK (+) lead should be 9.75V DC or less.
   c. Turn setpoint at Thermostat to 85°F.

      Voltage between RED (–) test post and BLK (+) lead should be 10.0V DC or more.
   d. If any of these voltages are not correct, check wiring between Thermostat and Controller for correct installation or shorts.

   If wiring is proper, replace Thermostat.

Troubleshooting Temperature and Velocity Circuits

(This procedure should follow the troubleshooting of the Thermostat circuit.)

If the air volume requirement through the terminal box is between the minimum and maximum flow limits, and the terminal box is under control, the Vt and Vv voltages will be equal to within ± .2V DC. These voltages are measured between terminals #4 (–) RED and #7 (+) Vv or #8 (+) Vt and should be between 11.1 and 16.5V DC. If Vt and Vv voltages are not equal, check the following:

1. Airflow needed.
2. If Vv voltage is above 17V DC, replace Controller.
3. Turn setpoint on Thermostat to 65°F, Vt should go to its high limit. If not, replace Controller.
4. Turn setpoint on Thermostat to 85°F, Vt should go to its low limit. If not, replace Controller.
5. If air damper is fully open and Vv is below Vt, determine if there is enough air volume coming to the terminal box to satisfy the need.
6. Check the tubing between the velocity pickup in the duct and Velocity Sensor for leaks, kinks and plugging. If the tubing needs replacing, carefully cut tubing lengthwise and gently remove from Sensor. Sensor ends are delicate and provide a calibrated orifice for precise control.
7. Check damper coupling to determine if it is loose on damper shaft. If loose, reposition damper to give full travel between mechanical stops and tighten set screws.
8. If performing Steps 5, 6, or 7 does not correct the problem, replace the Controller.