READ AND SAVE THESE INSTRUCTIONS

INSTALLATION, OPERATION & MAINTENANCE MANUAL FOR

PRESSURE INDEPENDENT PNEUMATIC CONTROLS

CARNES COMPANY 448 S. Main St., P. O. Box 930040, Verona, WI 53593-0040 Phone: (608)845-6411 Fax: (608)845-6470 www.carnes.com

GENERAL

Unless otherwise specified, the terminal unit is supplied with a Carnes OEM reset constant volume controller and a Carnes 8-13 psi pneumatic damper actuator.

The air consumption of each controller is 15 SCIM (0.008 SCFM) excluding the room thermostat. Air consumption of the controller plus the reversing relay is 30 SCIM (0.016 SCFM) excluding the room thermostat

CALIBRATION

Where conditions exist that require field calibration of adjustment of the reset controller, the following procedure is recommended.

TOOLS NEEDED: 0.0" - 2.0" Pressure gauge or incline manometer and a 1/4" nut driver.

It may be necessary to remove an optional controls enclosure cover to access the control components. Remove the 1/4" sheet metal screws on the control components. Replace the cover and sheet metal screws upon completion of calibration.

1. Remove the caps from the high and low sensor signal tubes located on the opposite side of the inlet as the green and yellow tubing connections.
2. Connect the pressure gauge or incline manometer to the sensor tubes. The high pressure side of the gauge to the same sensor tube as the green controller tubing connection (total pressure signal) and the low pressure side of the gauge to the same sensor tube as the yellow controller tubing connection (static pressure signal).
3. Refer to the calibration chart for pressure setting at a required CFM and unit size.

CAUTION: *CFM adjustments are to be made with fingers only! Knobs break if over-tightened.*

NORMALLY OPEN DAMPER - BEIGE CONTROLLER (Figure 1)

The BEIGE reset controller is suitable for use with a direct acting thermostat (DANO). When the controller is provided with a reversing relay, the beige controller is suitable for use with a reverse acting thermostat (RANO).

4. Set zone temperature to full heating. Adjust minimum airflow by turning the CFM knob stamped "LO" located in the center of the beige controller. Turn clockwise to increase airflow and counterclockwise to decrease airflow.
5. Set the zone temperature to full cooling. Adjust maximum airflow by turning the CFM knob stamped "HI" located on the outer rim of the beige controller. Turn clockwise to increase airflow and counterclockwise to decrease airflow.

(BEIGE, Normally Open Damper Controller Shown)

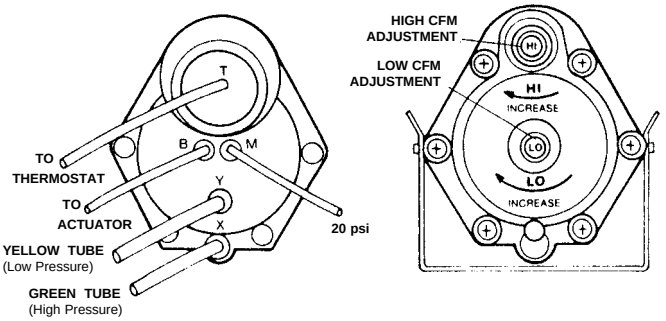


Figure 1

NORMALLY CLOSED DAMPER - GREY CONTROLLER (Figure 2)

The GREY reset controller is suitable for use with a reverse acting thermostat (RANC). When the controller is provided with a reversing relay, the grey controller is suitable for use with a direct acting thermostat (DANC).

4. Set the zone thermostat to full cooling. Adjust maximum air flow by turning the CFM know stamped "HI" located in the center of the grey controller. Turn counter-clockwise to increase airflow and clockwise to decrease airflow.

5. Set the zone thermostat to full heating. Adjust minimum airflow by turning the CFM knob stamped "LO" located on the outer rim of the grey controller. Turn counter-clockwise to increase airflow and clockwise to decrease airflow.

6. Remove pressure gauge or manometer, replace sensor caps and adjust thermostat to desired setpoint temperature. Some setting time may be required for the terminal unit to respond properly to the controller after the replacement of the sensor caps or adjustment of the thermostat.

(GREY, Normally Closed Damper Controller Shown)

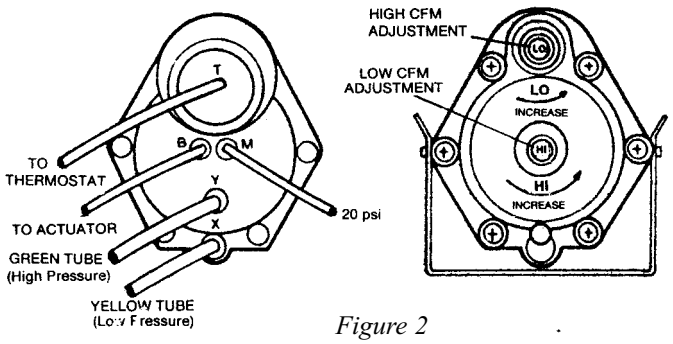


Figure 2

REVERSING RELAY ADJUSTMENT

For those applications that require a reversing relay:
--Direct acting thermostat and normally closed damper.
--Reverse acting thermostat and normally open damper.
--Dual duct units with adjustable mixing sequences.

Reversing relays are factory set for nominal "sum" of 16 psi. A thermostat pressure of 8 psi applied to port "3" or "S" yields 8 psi output of port "1" or "B". The output pressure decreases as the input thermostat pressure is increased and the output pressure increases as the input thermostat is decreased. The "sum" of the input and output pressures always totals 16 psi.

To check or re-set the reversing relay, the following procedure is recommended:

TOOLS NEEDED: (2), 0 psi - 30 psi control air gauges and a #2 slotted screwdriver.

1. Connect a 20 psi main control air supply to port "M" of the reversing relay. *(Figure 3)*

2. Monitor the input pressure at port "3" or "B" and the output pressure at port "1" or "B" with 0-30 psi gauges.

REVERSING RELAY
(Optional)

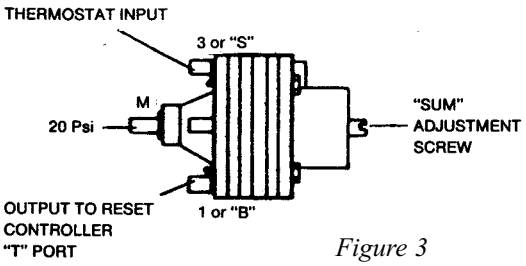


Figure 3

(Actual component may vary from that pictured above.)

3. Adjust the black adjustment screw, located on the end opposite of the port connections, to increase or decrease the "sum" value of the reversing relay.

4. Increasing the input-output "sum" moves the curve to the right on the airflow chart and decreasing the input-output "sum" moves the curve to the left on the airflow chart. *(Figure 4)*

DANO (999-2825) Reset Controller w/ REVERSING RELAY (999-3142)

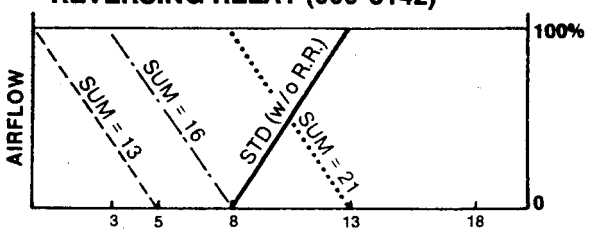
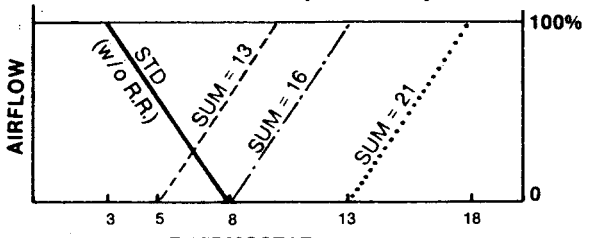


Figure 4

RANC (999-2826) Reset Controller w/ REVERSING RELAY (999-3142)



TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	CORRECTION
Damper actuator will not stroke.	*1. Insufficient main air supply pressure.*	1. The controller must receive 15-30 psi compressed air from the main supply to port "M".
	2. Low inlet static pressure.	2. Measure the CFM delivered by the unit with the damper in the full open position. If the CFM is low increase the system static.
	3. Leak in the control line.	3. Replace tubing.
	4. Leak in the actuator.	4. Apply 13-20 psi air to the actuator with a squeeze buld. 4A. If the actuator does not stroke, manually move linkage. If it is jammed, see 10 or 11 below. If actuator still does not stroke, replace actuator. 4B. If actuator strokes but does not remain fully stroked or bleeds faster than pressure can build replace actuator.
	5. Pneumatic control line connections reversed.	5. Be sure all connections are shown in the pneumatic control piping diagram on the side of the unit.
	6. Incorrect reset controller calibration.	6. Refer to calibration procedure.
	7. Wrong controller.	7. Be sure controller and thermostat match (i.e., Reverse acting controls with a reverse acting thermostat and direct acting controls with a direct acting thermostat.)
	8. High and Low pressure sensor tubes are reversed to the controller.	8. Be sure all connections are as shown in the pneumatic control piping diagram on the side of the unit.
	9. Caps missing from sensor tubes.	9. Replace caps. (Part No. 999-6505).
	10. Damper linkage jammed or binding.	10. Adjust linkage for free operation.
	11. Debris inside terminal unit.	11. Disconnect duct and remove debris from inside.
	12. Faulty controller.	12. Replace controller.
Damper actuator remains full stroked at all times.	*1. Low inlet static pressure.*	1. Measure the CFM delivered by the unit with the damper in the full open position. If the CFM is low, increase the system static.
	2. Pneumatic control line connections are reversed.	2. Be sure all connections are as shown in the pneumatic control piping diagram on the side of the unit.
	3. High and Low sensor tubes are reversed to the controller.	3. Be sure all connections are as shown in the pneumatic control piping diagram on the side of the unit.
	4. Caps missing from sensor tubes.	4. Replace caps. (Part No. 999-6505)
	5. Incorrect reset controller calibration.	5. Refer to calibration procedure.
	6. Debris inside terminal unit.	6. Disconnect duct and remove debris from inside.
	7. Wrong controller.	7. Be sure controller and thermostat match. (i.e., Reverse acting controls with a reverse acting thermostat and direct acting thermostat with a direct acting thermostat.)
	8. Faulty controller.	8. Replace controller.
Low air flow through box on a call for max. CFM.	*1. Thermostat not set to call for maximum CFM.*	1. Adjust thermostat to call for full cooling.
	2. Low inlet static pressure.	2. Measure the CFM delivered by the unit with damper in the full open position. If the CFM is low, increase the system static.
	3. Incorrect reset controller calibration.	3. Refer to calibration procedure.
	4. Debris inside terminal unit.	4. Disconnect duct and remove debris from inside.
	5. Wrong controller.	5. Be sure controller and thermostat match. (i.e. Reverse acting controls with a reverse acting thermostat and direct acting controls with a direct acting thermostat.)
	6. Faulty controller.	6. Replace controller.
Low air flow through box on call for min CFM.	*1. Low inlet static pressure.*	1. Measure the CFM delivered by the unit with damper in the full open position. If the CFM is low, increase the system static.
	2. Incorrect reset controller calibration.	2. Refer to calibration procedure.
	3. Debris inside terminal unit.	3. Disconnect duct and remove debris from inside.
	4. Wrong controller.	4. Be sure controller and thermostat match. (i.e., Reverse acting controls with a reverse acting thermostat and direct acting controls with a direct acting thermostat.)
	5. Faulty controller.	5. Replace controller.
Reset controls unit but delivers incorrect CFM.	*1. Less than optimal unit installation.*	1. Refer to installation instructions.
	2. Incorrect reset controller calibration.	2. Refer to calibration procedures.
Unit does not respond to changes in thermostat setting.	*1. Low main air pressure.*	1. The controller must receive 15-30 psi compressed air from the main supply to port "M".
	2. Low inlet static pressure.	2. Measure the CFM delivered by the unit with damper in the full open position. If the CFM is low, increase the system static.
	3. Improper tubing hook-up.	3. Be sure all connections are as shown in the pneumatic control piping diagram on the side of the unit.
	4. Incorrect reset controller calibration.	4. Refer to calibration procedure.
	5. Wrong controller.	5. Be sure controller and thermostat match. (i.e., Reverse acting controls with a reverse acting thermostat and direct acting controls with a direct acting thermostat.)
	6. Faulty controller.	6. Replace controller.

CARNES® COMPANY

448 S. Main St.
P. O. Box 930040
Verona, WI 53593-0040

Telephone: 608/845-6411
Fax: 608/845-6470
www.carnes.com