

RETROLINE®

RC 195 Single Input Receiver-Controller

Product Description

The RC 195 Single Input Receiver-Controller is a pneumatic instrument that receives one input. It produces a pneumatic control signal based on the net pneumatic input and the mechanical settings such as setpoint and percent proportional band.

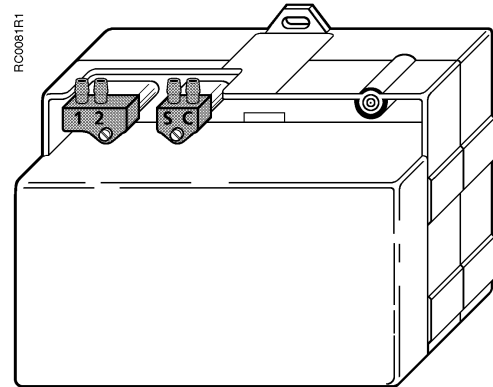
Contents

- RC 195 Single Input Receiver-Controller
- Custom labels for connector identification
- Stick-on scales for setpoint dial
- Scale conversion card

Troubleshooting

Before troubleshooting the operation of the RC 195 Single Input Receiver-Controller, check the following:

- supply pressure at the unit is 22 ± 2 psi (152 kPa)
- transmitter input being used is between 3 and 15 psi (21 to 103 kPa)
- only one restrictor supplies the transmitter
- transmitter calibration is correct



Product Numbers

195-1000

The RC 195 Single Input Receiver-Controller replaces the products listed in Table 1.

Table 1. Cross Reference.

Manufacturer	Product Number
Barber-Colman	RKS-1001 RKS-2001 RKS-5001
Honeywell	PR908A RP920A
Johnson Controls	T-5800-1

Table 2. Troubleshooting Guide.

Complaint	Check	Probable Cause	Corrective Action	
Control pressure stays close to zero	Rotate setpoint adjustment screw counterclockwise	Pressure increases	Transmitter sensing medium which is above (RA) or below (DA) the proportional band Receiver-Controller out of calibration	None Recalibrate
		Pressure remains unchanged	Plugged pilot relay restrictors	Replace pilot relay restrictors
			Receiver-Controller is defective	Replace Receiver-Controller
		Control pressure stays close to supply (main) pressure	Rotate setpoint adjustment screw clockwise	Pressure decreases
Pressure remains unchanged	Receiver-Controller is defective			Replace Receiver-Controller

Required Tools

- Flat-blade screwdriver
- Two No. 8 or No. 10 screws

Expected Installation Time

45 minutes

Prerequisites

- Clean, dry, oil-free air supply
- Constant air supply. The Receiver-Controller and transmitter are factory calibrated to use 22 ±2 psi (152 kPa) air supply.

Operation

The percent proportional band adjustment can be set to give the desired proportional band. The proportional band setting on the Receiver-Controller is adjustable from 2 to 20% of the primary input scale based on a control pressure of 5 psi.

Set at 2% (minimum), a 2°F change at the transmitter will vary the RC 195 Receiver-Controller control pressure 5 psi.

A 100°F transmitter span at 2%P.B. gives a throttling range of 2°F ($0.02 \times 100^\circ\text{F} = 2^\circ\text{F}$)

Set at 20% (maximum), a 2°F change at the transmitter will vary the RC 195 Receiver-Controller control pressure 5 psi.

A 100°F transmitter span at 20%P.B. gives a throttling range of 20°F ($0.20 \times 100^\circ\text{F} = 20^\circ\text{F}$)

Specifications

Operating

Action	
Input #1	Direct Action (DA)
Input #2	Reverse Action (RA)
Transmitter restriction	
Size	0.0075 inches (0.2 mm)
Flow	40 scim (11 cm ³ /s)
Supply pressure	
Operating	22 ±2 psi (152 ±14 kPa)
Proportional band (%PB) with 10 psi output/gain	Tables 8 and 9

Physical

Mounting	Vertical surface
Air connections	
Barb fittings for 1/4-inch (6 mm) O.D. plastic tubing	
Case material	Lexan, 20% glass filled
Dimensions	Figure 7
Weight	3.1 lbs. (1.4 kg)

Installation

General

Before beginning, determine which custom connector labels you need to fit your individual installation. See Figures 1 through 3. Place them on the RC 195 Receiver-Controller plug-in connectors.

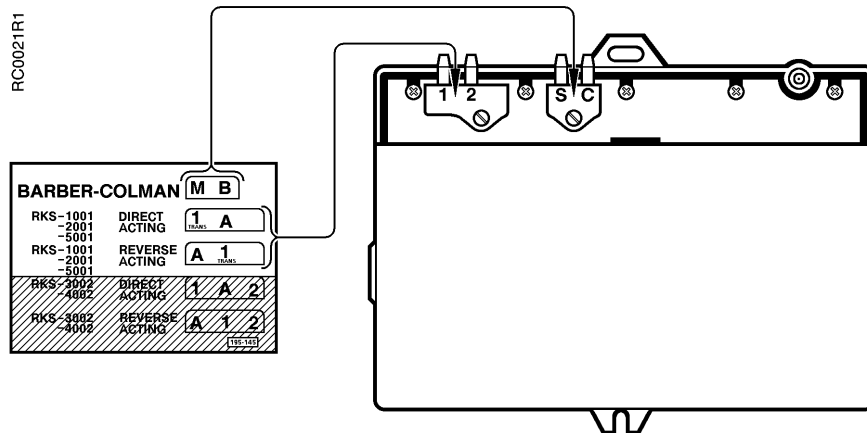


Figure 1. Custom Connector Labels for a Barber-Colman Installation (Shaded Labels are Not Used).

Installation, Continued

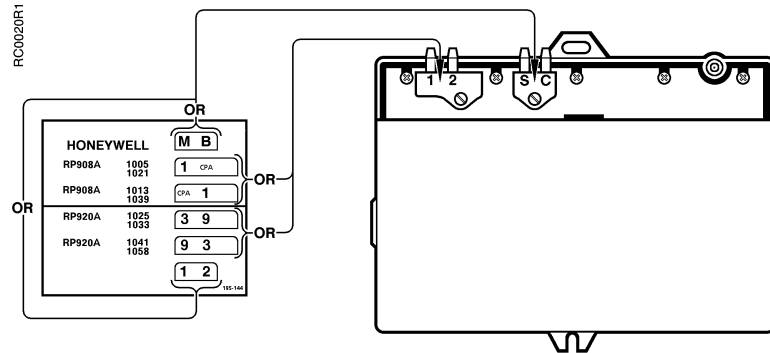


Figure 2. Custom Connector Labels for a Honeywell Installation.

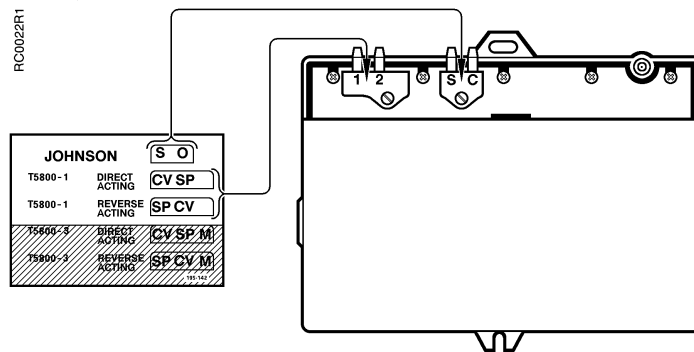


Figure 3. Custom Connector Labels for a Johnson Controls Installation (Shaded Labels are Not Used).

1. Remove the old receiver-controller from the wall.
2. Mount the receiver-controller in any position on any vertical surface using two No. 8 or No. 10 screws. The integral mounting tabs are located on the top and bottom of the case.

NOTE: 1. Mount the RC 195 as close as possible to the location of the old receiver-controller to alleviate any problems that may arise because of shortened piping lengths.

2. Small vibrations such as those from an air handling unit will not affect the operation of the instrument.
3. Remove the cover by pulling the cover to the right, lifting, then pulling to the left and lifting. You now have access to the percent proportional band adjustment, the authority slide, the setpoint dial, and setpoint adjustment screw.
4. Connect the transmitter tubing to the plug-in connector. See Tables 3 through 5 for equivalent markings.

Table 3. Port Designation Equivalents.

Connections	POWERS CONTROL® Designation	Barber-Colman Designations
D.A. primary input	1	1
R.A. primary input	2	1
Master input (reset)	none	none
Control signal output	C	B
Supply air	S	M
CPA input	1 or 2	A

Table 4. Port Designation Equivalents.

Connections	POWERS CONTROL® Designation	Honeywell Designations	
		RP908A	RP920A
D.A. primary input	1	1 (if DA)	3 (IF DA)
R.A. primary input	2	1 (if RA)	3 (if RA)
Master input (reset)	none	none	none
Control signal output	C	B	2
Supply air	S	M	1
CPA input	1 or 2	unmarked	9

Installation, Continued

Table 5. Port Designation Equivalents.

Connections	POWERS CONTROL® Designation	Johnson Controls Designations	
		DA	RA
D.A. primary input	1	CV	SP
R.A. primary input	2	SP	CV
Master input (reset)	none	none	none
Control signal output	C	O	O
Supply air	S	S	S
CPA input	1 or 2	SP	SP

5. Select the stick-on label that corresponds to the range of the transmitter piped to the plug-in connector 1 or 2. See Table 6 for DA scale ranges or Table 7 for RA scale ranges. Apply the label to the setpoint dial.

Table 6. Scale Ranges (DA) for Receiver-Controller Setpoint Dials.

English	Scale Identification	Metric
-40 to 120°F	A	-40 to 50°C
50 to 100°F	B	10 to 38°C
80 to 240°F	C	26 to 117°C
20 to 80% RH	D	-18 to 38°C
0 to 100°F	E	1° to 58°C
35° to 135°F	F	0 to 750 Pa
0 to 3 IWG	G	0 to 3.75 kPa
0 to 15 IWG	H	20 to 80% RH
0 to 0.5 IWG	J	0 to 125 Pa
Blank/10 divisions	K (DA)	Blank/9 divisions
-0.05 to 0.20 IWG	L	-12.5 to 50 Pa
-0.5 to 0.5 IWG	M	-125 to 125 Pa
0 to 10 IWG	N	0 to 2.5 kPa
Blank/20 divisions	P	Blank/15 divisions
0 to 50 psi	R	0 to 345 kPa
50° to 150°F	S	10° to 66°C
40° to 240°F	T	4°C to 116°C
-40° to 160°F	V	-40°C to 71°C
30 to 190°C	W	-1 to 88°C

Table 7. Scale Ranges (RA) for Receiver-Controller Setpoint Dials.

English	Scale Identification	Metric
-40 to 120°F	A	-40 to 50°C
50 to 100°F	B	10 to 38°C
80 to 240°F	C	26 to 117°C
20 to 80% RH	D	-18 to 38°C
0 to 100°F	E	1 to 58°C
35 to 135°F	F	0 to 750 Pa
0 to 3 IWG	G	0 to 3.75 kPa
0 to 15 IWG	H	20 to 80% RH
0 to 0.5 IWG	J	0 to 125 Pa
Blank/16 divisions	K (RA)	Blank/11 divisions
-0.05 to 0.20 IWG	L	-12.5 to 50 Pa
-0.5 to 0.5 IWG	M	-125 to 125 Pa
0 to 10 IWG	N	0 to 2.5 kPa
Blank/20 divisions	P	Blank/15 divisions
0 to 50 psi	R	0 to 345 kPa
50 to 150°F	S	10 to 66°C
40 to 240°F	T	4C to 116°C
-40 to 160°F	V	-40C to 71°C
30 to 190°C	W	-1 to 88°C

6. Check the supply pressure. The supply pressure must be a constant 22 ± 2 psi (152 kPa). If it is different or if a dual air supply is used, error will be introduced into the transmitted signal.

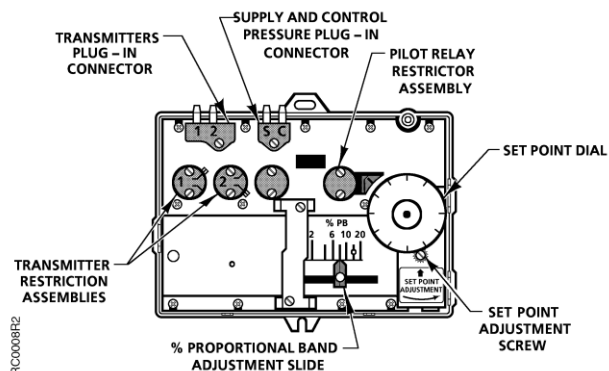


Figure 4. Single Input Receiver-Controller Connector, Restrictor, and Adjustment Locations.

Restrictors

NOTE: Before performing the following steps, ensure that the system does not have any external restrictors. If there are external restrictors do not use the internal restrictors on the RC 195 Receiver-Controller.

Installation, Continued

To use an internal restrictor, move the restrictor tab to the **IN** position. Restrictors are in the **OUT** position when shipped from the factory.

- If the transmitter input line is connected to **1**, use Restrictor 1.
 - If the transmitter input line is connected to **2**, use Restrictor 2.
1. Loosen both screws on the restrictor using two full turns.
 2. Move the restrictor tab back and forth between the full travel limits a minimum of two times or until there is no sensation of drag against the lever. This will allow the gasket to return to its proper position.
 3. Place the tab in the **IN** position.
 4. Tighten both screws with the restrictor lever fully in position against its stop. Do not overtighten the screws. The screws should be tight enough to provide a good seal without warping the restrictor assembly.

NOTE: When an input is not being used, the restrictor should be in the **OUT** position, and the input connection should be open to the atmosphere.

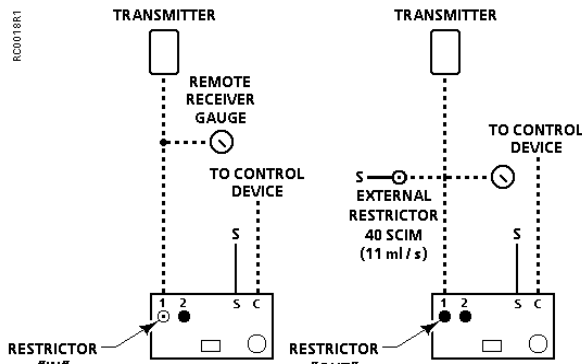


Figure 5. Examples of Piping with and without Internal Restrictors.

Calibration

The RC 195 Receiver-Controller ships factory-calibrated. See Figure 4 for locations when making adjustments to the receiver-controller.

Before making adjustments several calculations are necessary. Steps 1, 2, and 3 must be completed before installation and the values recorded for future reference.

1. Determine percent proportional band setting using Formula A or *Table 8*.

Formula A

$$\%P.B. = \frac{\text{Desired Throttling Range } (^{\circ}\text{F or } ^{\circ}\text{C})}{\text{Controlling Transmitter Span } (^{\circ}\text{F or } ^{\circ}\text{C})} \times \frac{* 5 \text{ psi or } 34.5 \text{ kPa}}{\text{Spring Range Final Controlled Device (psi or kPa)}} \times 100$$

* This is the control pressure change for which the percent proportional band scale is designed.

Table 8. Percent Proportional Band Equivalents.

Lever Markings (5 psi out)	Barber-Colman Honeywell Equivalent (10 psi out)
2	4
4	8
6	12
8	16
10	20
15	30
20	40

Example 1

Spring range: 5 psi (34.5 kPa)
 Desired throttling range: 10 °F (5.6°C)
 Transmitter span: 100°F (56°C)

Using Formula A:

$$\% P.B. = \frac{10^{\circ}\text{F}}{100^{\circ}\text{F}} \times \frac{5 \text{ psi}}{5 \text{ psi}} \times 100$$

Percent proportional band = 10%

For metric:

$$\% P.B. = \frac{5.6^{\circ}\text{C}}{56^{\circ}\text{C}} \times \frac{34.5 \text{ kPa}}{34.5 \text{ kPa}} \times 100$$

Percent proportional band = 10%

2. Determine setpoint conditions.

For most applications it is necessary to select one point called "Setpoint conditions" in order to establish the value of all variables.

For a single input receiver-controller, the setpoint condition equals the desired control point. This is expressed in percent RH, degrees Fahrenheit, inches W.G., or metric units.

Calibration, Continued

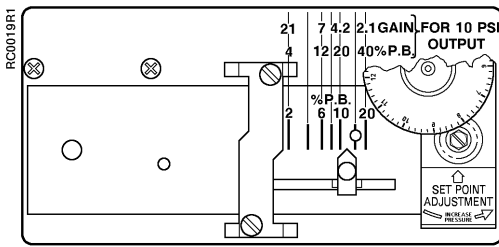


Figure 6. Percent Proportional Band Equivalents for 10 psi output or for Gain. (Label Affixed Inside the Receiver Controller Cover.)

3. Record data.

% PB/Gain = ____

Setpoint = ____

- a. Use Tables 9 and 2 to determine the equivalent of the percent proportional band/gain recorded above.

Table 9. Percent Proportional Band Equivalents for Johnson Control Gains.

Lever Markings (5 psi out)	Gain (Johnson Controls Equivalent)
2	20.8
4	10.4
6	6.9
8	5.2
10	4.2
15	2.8
20	2.1

- b. Set the percent proportional band adjustment slide to the lever marking for the equivalent values.
- c. Apply pressure to a selected input, and with a screwdriver, turn the setpoint adjustment screw until the control pressure reaches 8 psi (55 kPa) or the midpoint pressure of the spring range of the end device.

If you are controlling two actuators in sequence, use the following formula to find the control pressure desired.

Control pressure =

$$\frac{\text{High end of the higher spring range} - \text{Low end of the lower spring range}}{2} + \text{Low end of the lower spring range}$$

Example

N.O. valve spring range = 3 to 8 psi

N.C. valve spring range = 9 to 14 psi

$$\text{Control pressure} = \frac{14 - 3}{2} + 3 = 8.5 \text{ psi}$$

Set the control pressure to 8.5 psi.

- d. Calibrate the setpoint dial by pulling it up, turning it to agree with the transmitter input, and then releasing it.

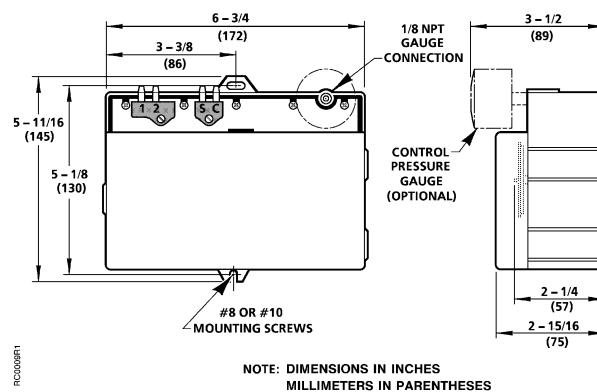
NOTE: Ensure that the setpoint dial scale matches the transmitter range.

- e. Turn the setpoint adjustment screw until the dial agrees with the desired setpoint.

NOTE: Whenever the proportional band is changed, the setpoint dial must be recalibrated.

Scale Conversion Card

The scale conversion card (Part No. 144-022) shows the relationship of pressure to transmitter range in both English and metric units.



NOTE: DIMENSIONS IN INCHES
 MILLIMETERS IN PARENTHESES

Figure 7. Dimensions of the RC 195 Single Input Receiver-Controller.

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