

Powers™ Controls

RL 243 BR Balance Retard Relay



Product Number 243-0010

Description

The RL-243 Balanced Retard (BR) Relay is a pneumatic auxiliary device used to obtain special pneumatic signal outputs for use in a pneumatic control system. Standard applications include signal retarding, balancing action, and signal advancing. The relay can also be used to obtain several special control functions such as signal hesitation and pressure limiting. (See Figures 2 through 6.)

The relay operates on a force-balance principal and is provided with a Powers' two-valve design to assure stability and prevent unnecessary air consumption. Internal relief assembly prevents signal lock-up and assures fail-safe operation.

A single spring adjustment is provided to allow setting the relay for desired operation. The relay is also adaptable for flush panel mounting to facilitate manual readjustment if desired.

Integral brackets facilitate mounting and allow the relay to be mounted in any position.

Warning/Caution Notations

WARNING:		Personal injury/loss of life may occur if you do not perform a procedure as specified.
CAUTION:		Equipment damage may occur if you do not perform a procedure as specified.

Description, Continued

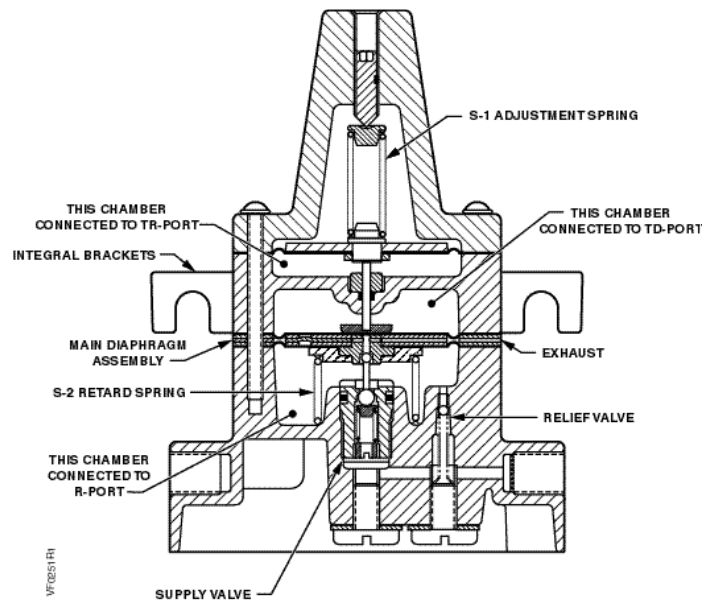


Figure 1. Balance Retard Relay.

The relay output at R port depends upon the force exerted by adjustment spring S-1 and signal pressures at TD and TR ports. TR port is reverse acting and will tend to reduce pressure available from adjustment spring S1. However, if S1 is greater than force TR, this difference (S1 - TR) is transmitted by the stem to the main diaphragm below.

This transmitted force from S1, plus direct acting pressure at TD port, must exceed the value of the constant retard spring (nominal 10 psi) before any output pressure can be generated. The output pressure will always equal the total downward force on the main diaphragm assembly (S1 - TR plus TD) less the nominal value of the internal retard spring as long as an equivalent air supply is available at port S.

Operation

The relay output pressure at port R is dependent upon the adjustable setting of spring S1, the interaction of pneumatic signals at ports TD and TR, and on the availability of a supply source at port S. A fixed internal spring is provided to allow retarding of the output signal. The basic relay formula can be expressed as follows:

$$R = TD - 10 + (S1 - TR)$$

Where (S1 - TR) cannot be less than zero

Where:

R is the output pressure

TD is a direct acting input variable

S1 is a setting of the adjustment spring

TR is a reverse acting input variable (opposing S1)

10 is the nominal value of internal retard spring S2

Specifications	Instrument Air Supply	
	Normal	25 psi (172 kPa)
	Maximum	30 psi (207 kPa)
	Ambient Temperature Range	
	Operating	40 to 120°F (4.4 to 49°C)
	Storage	-20 to 120°F (-29 to 49°C)
	Adjustments	
	Hysteresis	Spring S1 (adjustable 0-25 psi)
	Relief Valve Differential	Less than 0.5 psi (3.4 kPa)
	Less than 1.0 psi (6.89 kPa)	
Air Connections	1/8-inch NPT	
Mounting	Integral brackets for wall or panel	
Shipping Weight	2 lb (0.907 kg)	
Dimensions	See Figure 7	
Accessories	Panel Mounting Kit 243-071	For flush mounting with adjustable knob, dial plate and mounting bracket

Application

The balance retard relay can be piped and adjusted to obtain a number of different control characteristics. Typical applications where this relay can be applied include:

1. Retard relay (See Figure 2).
2. Balancing relay (See Figure 3).
3. Hesitation relay (See Figure 4).
4. Seasonal pressure limiting with dual pressure systems (See Figure 5).
5. Minimum pressure and hesitation output relay (See Figure 6).

Signal Retard Relay

Retard action is used whenever it is desired that the input signal pressure exceed the output pressure by a fixed pressure differential, throughout the entire modulating range of the output pressure. Spring S-1 can be adjusted to retard the output signal from 0 to 10 psi. A separate air supply can be omitted by connecting the input signal to ports TD and S.

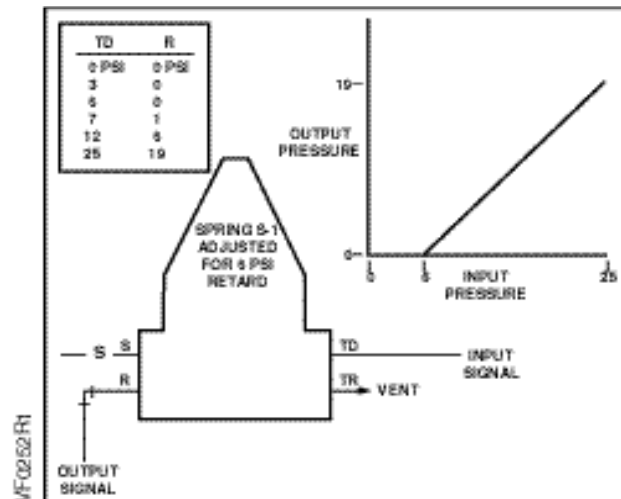


Figure 2. Signal Retard Relay.

Balancing Relay

Balancing action describes an application using a variable input at both TD (direct acting) and TR (reverse acting) ports. Whenever both input signals are equal, the output signal will remain at the adjusted balance pressure value (adjustable 0-15 psi). Whenever the input signals are unequal the relay output will differ from the adjusted balance point by the identical differential. Whenever TD exceeds TR the output will rise above the balance point. Whenever TR exceeds TD, the output will fall below the balance point.



CAUTION:

To obtain balancing action, the pressure at TR should not exceed the adjusted balance output pressure by more than 10 psi, and TR should not exceed TD by more than the adjusted balance pressure.

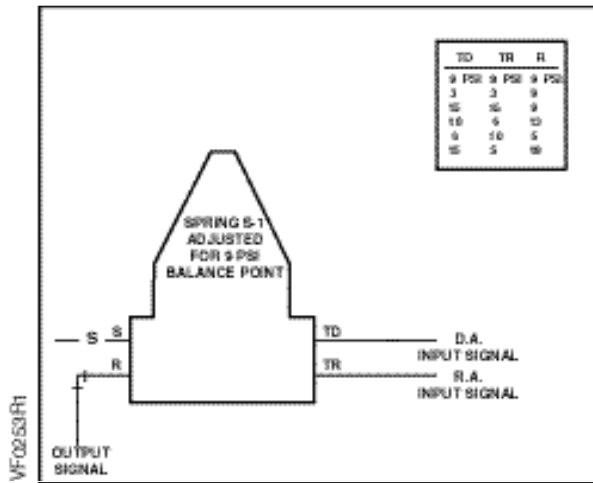


Figure 3. Balancing Relay.

Hesitation Relay

Relay will pass input signal directly to output until output pressure reaches a predetermined hesitation point (adj. 0 to 15 psi). As the input continues to rise, the output will remain stabilized at the hesitation pressure value until the input exceeds the output by 10 psi (nominal). A further increase in input pressure above this point will initiate an equal increase in output pressure. The hesitation span is fixed (nominal 10 psi) and corresponds to the value of the internal retard spring within the relay.

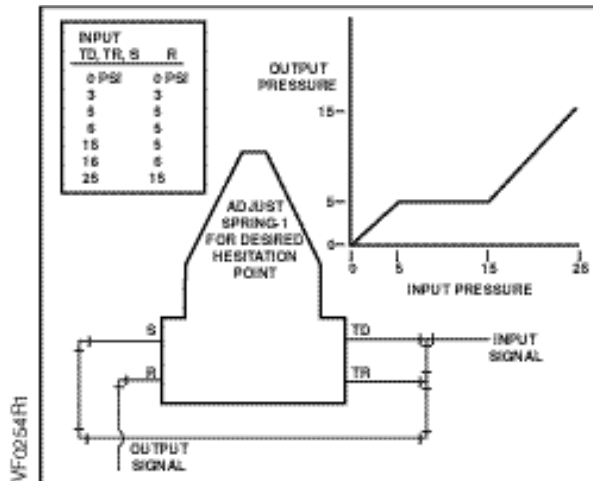


Figure 4. Hesitation Relay.

Seasonal Pressure Limiting with Dual Pressure Systems

Relay can be adjusted to limit air pressure output whenever the building dual pressure system is operating on the lower pressure. Nominal adjustment range is 8 to 15 psi. Whenever the dual pressure system is operating on the higher pressure, the relay output can always rise to a value equal to supply pressure less 10 psi.

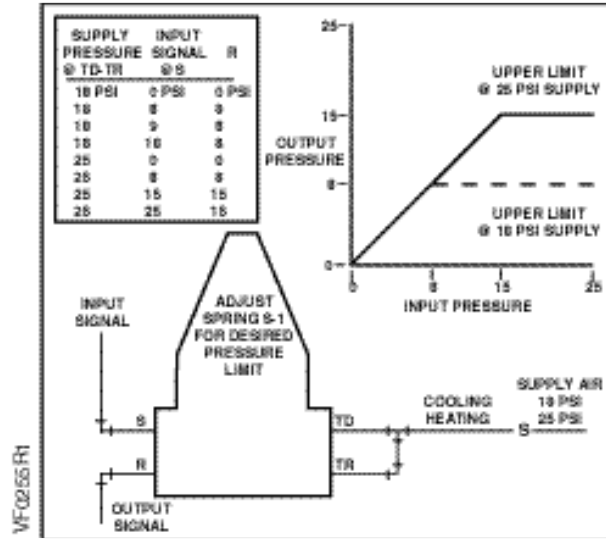


Figure 5. Seasonal Pressure Limiting with Dual Pressure Systems.

Minimum Pressure Relay with Hesitation Output

Relay output will always provide a minimum pressure as adjusted with spring S-1 (adj. 0-15). Relay output will not rise above minimum until input signal is 10 psi (nominal) above minimum setting. A continued rise in input pressure will initiate an equivalent rise in output pressure, maintaining a constant 10 psi differential between input and output. Air supply to S-port can be from EP valve or equivalent to provide interlock with system operation.

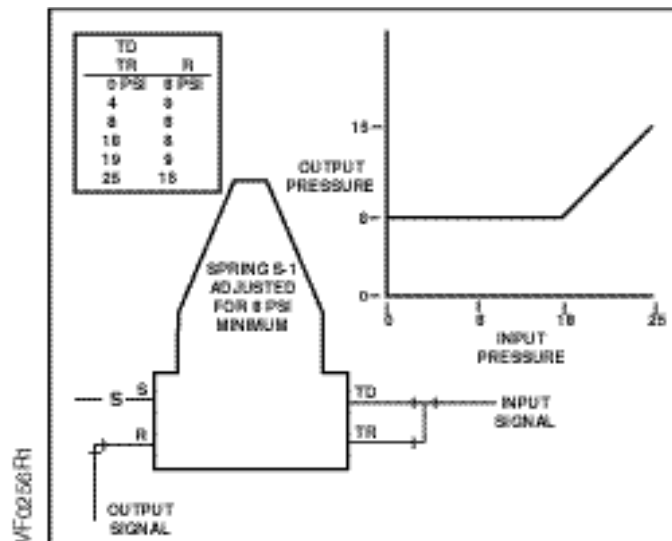


Figure 6. Minimum Pressure Relay with Hesitation Output.

Installation

The Balance Retard Relay with integral bracket can be installed on panels, ducts, unit ventilators, or any other vertical or horizontal surface. Relay also can be panel mounted to facilitate manual adjustment. *Technical Bulletin 148 (155-246)* shows mounting arrangement.

- Slotted base accommodates screws or bolts for direct horizontal mounting within panel or on a flat wall surface.
- Integral bracket allows vertical mounting within panel or on a flat wall surface.

Dimensions

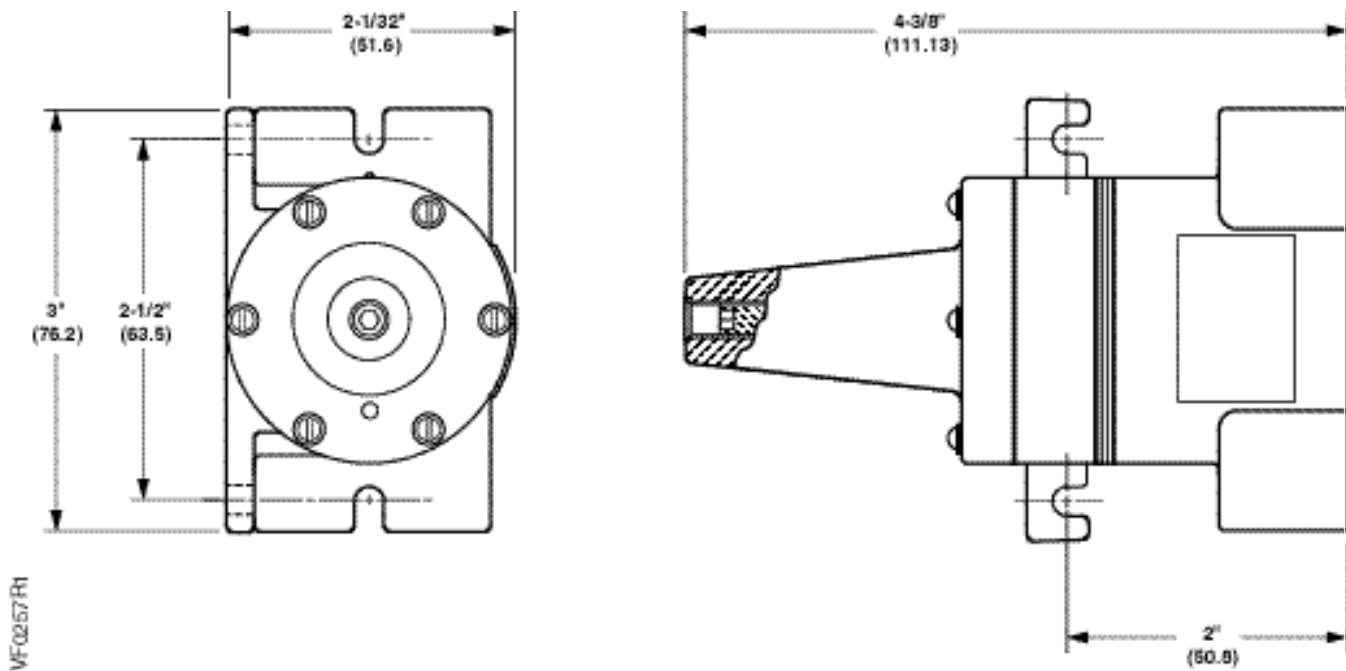


Figure 7. Dimensions in Inches (Millimeters).

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