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**RAPID PRESSURE RISE RELAY****SCOPE**

General considerations.

**APPLICATION**

The rapid pressure rise relay (RPRR), when properly mounted on a transformer, minimizes the possibility of transformer tank damage resulting from internal pressure buildup by detecting rates of pressure increase in excess of the safe limits established by the transformer manufacturer.

The 900 series RPRR is calibrated for use under oil and the 910 series RPRR is calibrated for use in the gas space. The design of both units is such that they will not be actuated by vibration, mechanical shock, or pump surges.

**OPERATION**

Changes in transformer internal pressure deflect a sensing bellows and responding control bellows that are part of a closed hydraulic system filled with silicone oil. A temperature compensating control orifice in the line of one of the control bellows causes differential deflection of the two control bellows when fluid flow in the system exceeds calibrated values. As this differential deflection occurs, a linkage positioned on these control bellows actuates a snap switch, tripping a circuit breaker that de-energizes the transformer. When equilibrium between the two control bellows is reached, the snap switch resets automatically.

For the 900 series oil space mounted units, a valve is supplied that allows for manual bleeding of air from the media sensing chamber exposing the sensing bellows to insulating fluid only. This valve is not required for 910 series gas space installations.

**INSTALLATION**

Units are available with either a four bolt mounting flange or with a 2 ½ NPT male pipe thread. The units may be mounted horizontally or vertically, however units mounted horizontally must have the connector pointed straight down.

**MATERIALS**

Bellows Protective Shield:	Steel or Brass
Bleed Valve:	Nickel Plated Brass
Finish:	Two-Part Epoxy Paint over Chromate Conversion coating
Control Bellows:	Phosphor Bronze
Cover Gasket:	Nitrile Rubber
Fluid Manifold:	Brass
Hardware:	Stainless Steel
Housing and Cover:	Die Cast Aluminum
Hydraulic Fluid:	Silicone Oil
O-Ring Seal:	Fluorocarbon Rubber (Viton)
Sensing Bellows:	Brass
Vent:	Brass and Copper

**MOUNTING**

Flange Mount: Four ½ inch diameter bolt slots equally spaced on a 4-inch bolt circle.

Thread Mount: 2½ NPT tapered pipe male thread with 3-inch hex wrench flat.

**STANDARD OPERATING TEMPERATURE**

-40 TO 180 °F (-40 to 82 °C)

Special units available for operation at -67 °F (-55 °C)

**SWITCH RESPONSE CHARACTERISTICS**

Refer to Figure 1.

**SWITCH RATINGS**

15 Amp @ 125, 250, 480 VAC

.5 Amp @ 125 VDC (Non-inductive)

.25 Amp @ 250 VDC (Non-inductive)

**CONNECTOR OPTIONS**

Mil Spec MS3102E16-10P Circular 3 Pin

QualiTROL Style Circular 3 Pin

QualiTROL Style Circular 3 Pin ANSI

Flying Leads

**HOUSING**

External chamber is vented to maintain atmospheric pressure.

**RESISTANCE TO VIBRATION**

Switch operation not affected when subjected to 50/60 Hz., or whole multiples thereof.

**Note:** Vibration amplitude of installed relay should be minimized. The natural frequency of the mounted relay must not be 50/60 Hz, or whole multiples thereof.

**MAXIMUM RATED PRESSURE (Sensing Bellows)**

-14.7 to 20 psig

**CALIBRATION AND TEST**

<b>900 SERIES</b>			
<b>TEST SEQUENCE</b>	<b>PSIG START</b>	<b>PRESSURE RISE RATE (PSI/SEC)</b>	<b>ACCEPTANCE LIMITS (SEC)</b>
1	0	5	.40-.54
2	5	5	.38-.56
3	10	5	.38-.56
4	0	5	.38-.56
5	0	.725	< 15
6	0	.22	> 30

<b>910 SERIES</b>			
<b>TEST SEQUENCE</b>	<b>PSIG START</b>	<b>PRESSURE RISE RATE (PSI/SEC)</b>	<b>ACCEPTANCE LIMITS (SEC)</b>
1	0	5	.26-.34
2	5	5	.26-.34
3	10	5	.26-.34
4	0	.725	2-3.5
5	0	.53	2.5-5.5
6	5	.53	2.5-5.5
7	10	.53	2.5-5.5
8	0	.22	> 10

<b>910 SERIES (ABB-SO. BOSTON)</b>			
<b>TEST SEQUENCE</b>	<b>PSIG START</b>	<b>PRESSURE RISE RATE (PSI/SEC)</b>	<b>ACCEPTANCE LIMITS (SEC)</b>
1	0	5	.24-.36
2	5	5	.24-.36
3	10	5	.24-.36
4	0	.725	2-3.5
5	0	.35	4-10
6	5	.35	4-10
7	10	.35	4-10

Units are calibrated to the values shown in the table above. Each test sequence is followed by at least a 45 second delay; except sequence #3; which is followed by at least 90 seconds. On 910 Series models, there is also a 90 second minimum delay following sequence #7. Calibration data is recorded and archived.

Units are retested after a minimum of 6 hours to verify that test values have not drifted out of specification. Units are tested at ambient temperature unless otherwise specified.

A confidence test; commonly referred to as a field test; may be performed on the switch mechanism using the test fixture and procedure described in Figure 2. Qualitrol also offers a field test kit (KIT-013-1) for this purpose. In either case, the approximate nature of the test and variations in operator dexterity preclude its use as a method of calibration. The factory calibration procedure is more closely replicated by Qualitrol fixture FIX-601-2.

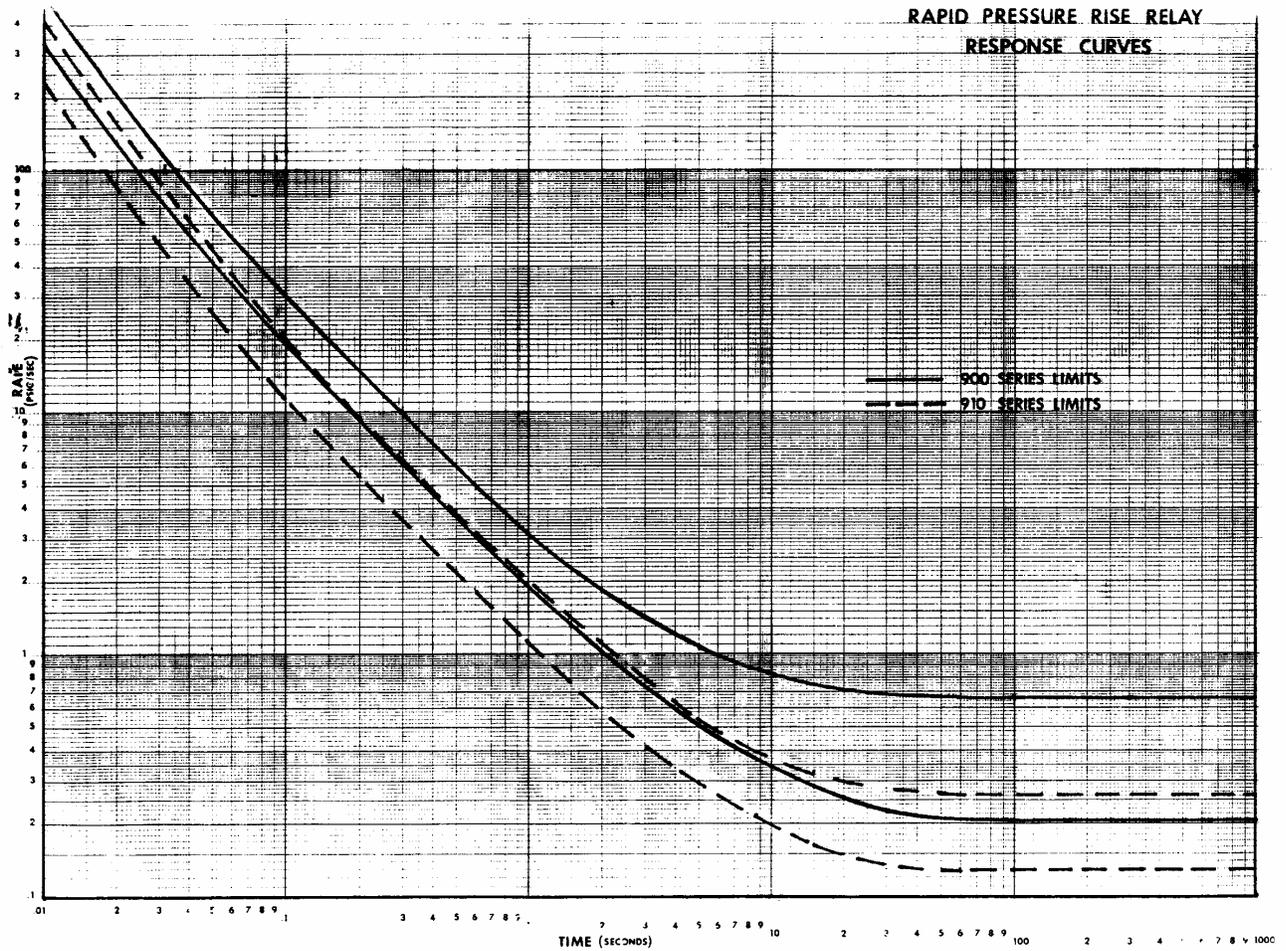
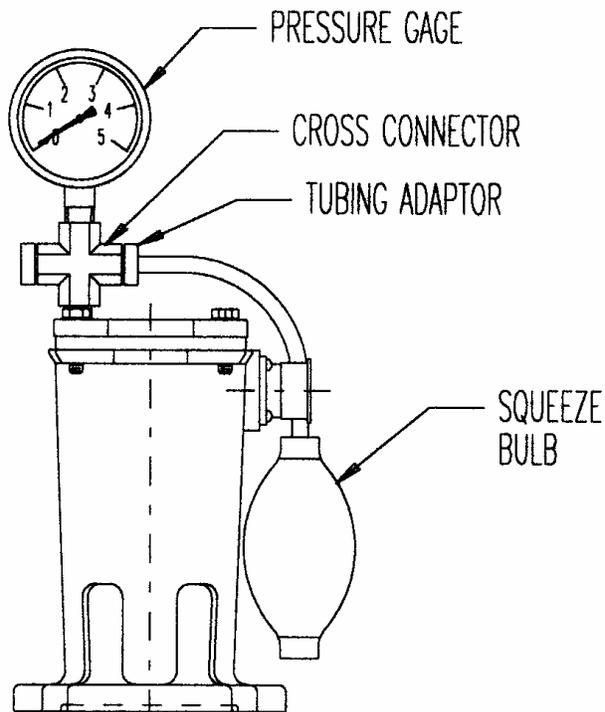


Figure 1 – Response Curve

**CONFIDENCE TEST PROCEDURE**

(or use QUALITROL KIT-013-1)

1. Connect a test light circuit to the appropriate connector pins as shown below.
2. Remove the pipe plug or vent from the cover of the relay and install the test fixture as shown below.  
**CAUTION:** Where elbow vents are used, note orientation before removal to assure proper re-installation.
3. Place finger over the open port of the cross connector and operate the squeeze bulb to attain operating test pressure (3.25-3.50 psi for 900 series and 2.50-2.75 for 910 series) on the gauge and hold this pressure for a minimum of 45 seconds by squeezing the bulb as necessary.
4. After 45 seconds, remove finger quickly from the open port, allowing the air to escape rapidly from the relay housing. The red light should glow.
5. Allow one (1) minute for the mechanism to stabilize.
6. Repeat steps 3 and 4 for non-operating values (1.25-1.50 psi for 900 series and 0.75-1.00 for 910 series). This time the red light must not glow when pressure is released from the housing.
7. Any unit not passing these tests should be considered out of specification.
8. Re-install pipe plug or vent.



LIGHT CIRCUIT CONNECTIONS

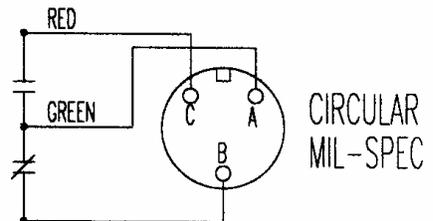
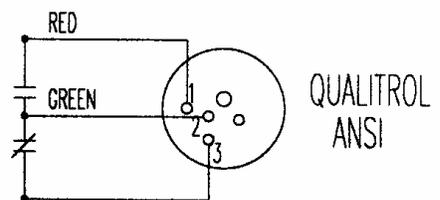
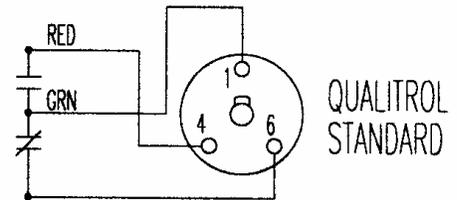


Figure 2 – Confidence Test Assembly & Wiring