MOORE®

SERVICE INSTRUCTIONS
MODEL SERIES 67, 67R & 671 PRECISION RELAYS

SD67
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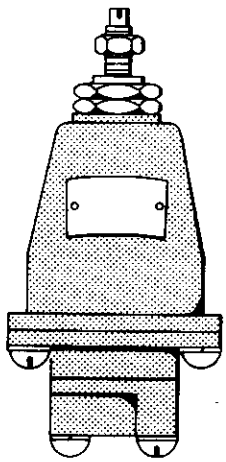

GENERAL DESCRIPTION

The Model Series 67 Precision Relays provide full-scale output changes in response to input signals compared at setpoint. Models 67 and 67R high-gain Relays throttle their outputs full scale as their input signals cross over setpoint. The Model 671 snap-acting Relay produces a full-scale output change when the input signal equals setpoint.

MODEL DESIGNATION

MODELS 67 AND 67R

67 R 100

Basic Model Series Number

Action
- R — Reverse Action
- No R — Direct Action

Gain
- 100 — 100:1
- 25 — 25:1

MODEL 671

671

Model Number
- Direct Action
- Snap-acting

GENERAL SPECIFICATIONS

MODELS 67-25 & 67R25

Input Range ..... 4" Hg Vacuum to 35 psig
Output Range ..... 0 psig to supply pressure
Supply Pressure ..... Minimum — Equal to output required
Normal — 18-20 psig
Maximum — 100 psig
Max. Input Pressure ..... 40 psig
Throttling Range ..... 0.63 psig — nominal (input change required for full-scale output change at setpoint)
Ambient Temp. Limits ..... -60° F to +180° F (-51°C to +82°C)
Flow Capacity @ 20 psig ... 0.7 scfm (supply and exhaust)

MODELS 67-100 & 67R100

Input Range ..... 4" Hg Vacuum to 16 psig
Output Range ..... 0 psig to supply pressure
Supply Pressure ..... Minimum — Equal to output required
Normal — 18-20 psig
Maximum — 100 psig
Max. Input Pressure ..... 25 psig
Throttling Range ..... 0.22 psi — nominal (input change required for full-scale output change at setpoint)
Ambient Temp. Limits ..... -60° F to +180° F (-51°C to +82°C)
Flow Capacity @ 20 psig ... 0.7 scfm (supply and exhaust)

MODEL 671

Input Range ..... 1 to 24 psig
Output Range ..... 0 psig to supply pressure
Supply Pressure ..... Minimum — 1 psi greater than input
Normal — 18-20 spig
Maximum — 100 psig
Input Differential Gap ..... 0.15 to 0.4 psi (the difference between actuating points on increasing and decreasing inputs)
Ambient Temp. Limits ..... -25° F to +180° F (-32° C to +82° C)
Flow Capacity @ 20 psig ... 2.7 scfm (supply and exhaust)

INSTALLATION

MOUNTING CONSIDERATIONS

Refer to Figure 1 for mounting dimensions. The Relay may be mounted in any position in a reasonably vibration-free location.

Relays are intended for panel mounting on panels of 1/4" maximum thickness. A 25/32" diameter hole is required for panel mounting. If wall mounting is desired, order the part number 2932-19 Mounting Bracket, and install as shown in Figure 1.

Caution

Exceeding the specified ambient temperature limits can adversely affect performance and may cause damage.

PNEUMATIC CONNECTIONS

All connections are 1/4" NPT and are made at the Relay connection block as shown in Figure 1. The recommended piping to the Relay is 1/4" O.D. tubing, although any scale-free piping may be used.

1. Blow out all piping before connections are made to prevent dirt or chips from entering the Relay.
2. Use pipe sealant sparingly, and then only on the male threads. A non-hardening sealant is strongly recommended.
3. Connect the Relay to a source of clean, dry, oil-free instrument air. See INSTRUMENT AIR REQUIREMENTS.

Caution

Pressure in excess of that specified in the following Table may cause damage.

TABLE. Maximum Pressure

MODEL	CONNECTION		
	INPUT	OUTPUT	SUPPLY
67-25	40 psig	100 psig	100 psig
67R25	40 psig	100 psig	100 psig
67-100	25 psig	100 psig	100 psig
67R100	25 psig	100 psig	100 psig
671	100 psig	100 psig	100 psig

INSTRUMENT AIR REQUIREMENTS

Connect the Relay to a source of clean, dry, oil-free instrument air. Failure to do so will increase the possibility of a malfunction or deviation from specified performance.

Caution

Synthetic compressor lubricants in the air stream at the Relay may cause the Relay to fail.

There are many types of synthetic lubricants. Some may not be compatible with the materials used in construction of the Relay. Wetting of these materials by such an oil mist or oil vapor, etc; may cause them to deteriorate. This may ultimately result in failure of the Relay. The following materials are in contact with instrument air: Models 67-25, 67R25, 67-100 and 67R100 — Aluminum, Brass, Chrome-Nickel Plate, Neoprene, Phosphor Bronze, Stainless Steel and Zinc Plate; Model 671 — Aluminum, Brass, Buna-N, Chromate Coating, Chrome-Nickel Plate, Duralumin, Neoprene, Stainless Steel and Zinc Plate.

The requirements for a quality instrument air supply can be found in the Instrument Society of America's "Quality Standard for Instrument Air" (ISA-S7.3). Basically this standard calls for the following:

Particle Size — The maximum particle size in the air stream at the instrument should be no larger than 3 microns.

Dew Point — The dew point, at line pressure, should be at least 10°C (18°F) below the minimum temperature to which any part of the instrument air system is exposed at any season of the year. Under no circumstances should the dew point, at line pressure, exceed 2°C (35.6°F).

Oil Content — The maximum total oil or hydrocarbon content, exclusive of noncondensibles, should not exceed 1 ppm under normal operating conditions.

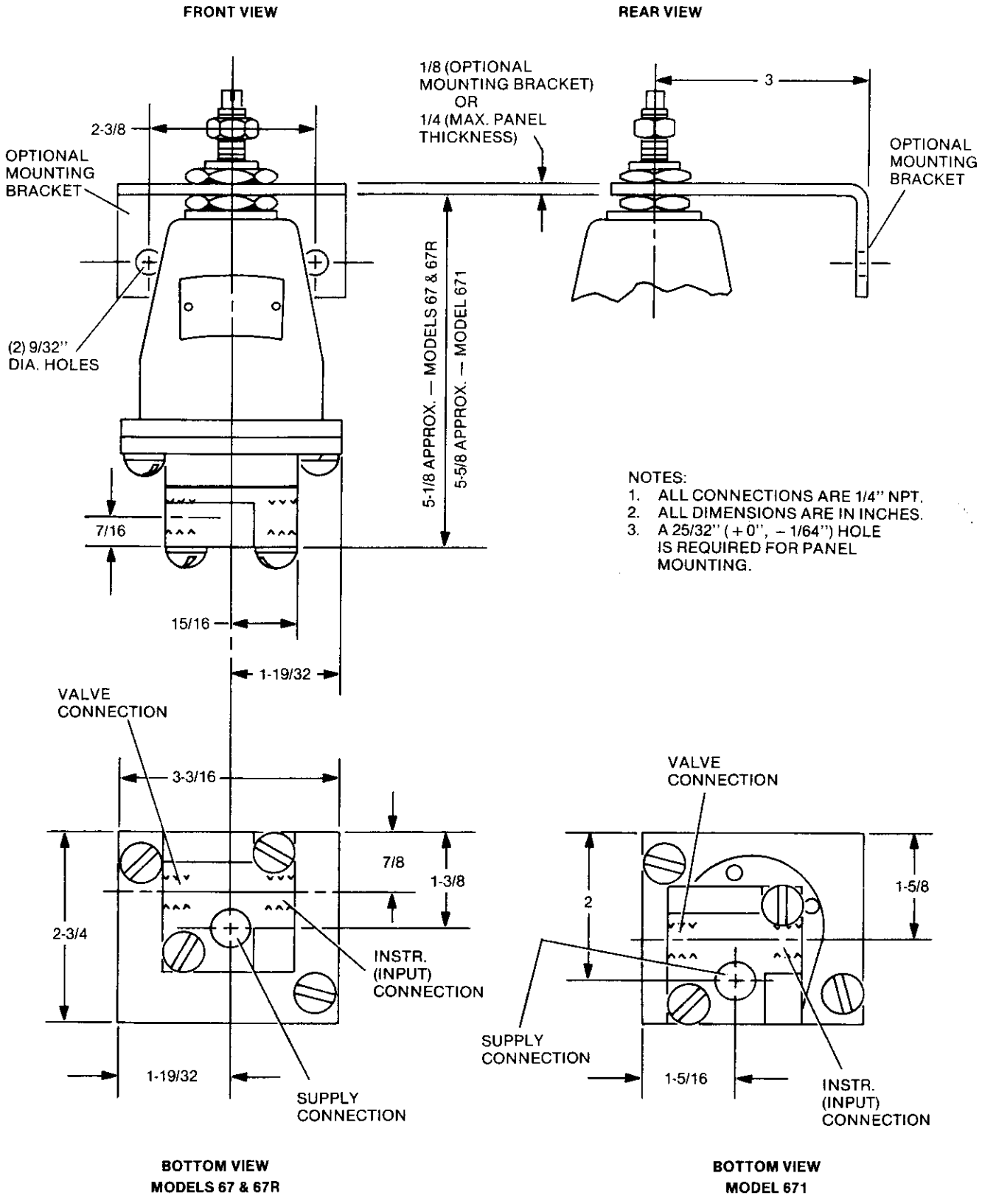

FIGURE 1 Mounting Dimensions and Connections — All Models

SETPOINT ADJUSTMENT

The setpoint adjustment can be made before or after the Relay has been installed. If the setpoint is to be adjusted prior to installation, make the adjustment with the Relay in the same position it is to be mounted. A setup equivalent to the one in Figure 2 is required to make the setpoint adjustment on all Relays.

Models 67-25 and 67-100

1. Remove setpoint spring force by turning the setpoint adjusting screw counterclockwise, until approximately 1" of threads is visible.
2. Turn on supply air. Output will go to full supply pressure.
3. Adjust input to desired setpoint value.
4. Turn the setpoint adjusting screw clockwise until the output just decreases to 0 psig.
5. Decrease the input 1 or 2 psi and then increase slowly to setpoint. No change in the output should occur.
6. Slowly increase the input above setpoint. The output should start to increase as the input crosses setpoint and will increase to full supply pressure as the input increases through the throttling range of the Relay.

Models 67R25 and 67R100

1. Remove setpoint spring force by turning the setpoint adjusting screw counterclockwise, until approximately 1" of threads is visible.
2. Turn on supply air. Output will be at 0 psig.
3. Adjust input to desired setpoint value.
4. Turn the setpoint adjusting screw clockwise until the output just increases to full supply pressure.
5. Decrease the input 1 or 2 psi and then increase slowly to setpoint. No change in the output should occur.
6. Slowly increase the input above setpoint. The output should start to decrease as the input crosses setpoint and will decrease 0 psig as the input increases through the throttling range of the Relay.

Model 671

1. Turn the setpoint adjusting screw clockwise to apply full setpoint spring force. Do not tighten.
2. Turn on supply air. Output will be 0 psig.
3. Adjust input to desired setpoint value.
4. Turn the setpoint adjusting screw counterclockwise until the output toggles to full supply pressure.
5. Decrease the input 1 or 2 psi, the output will toggle to 0 psig.
6. Slowly increase the input to setpoint. At setpoint the output should toggle to full supply pressure.

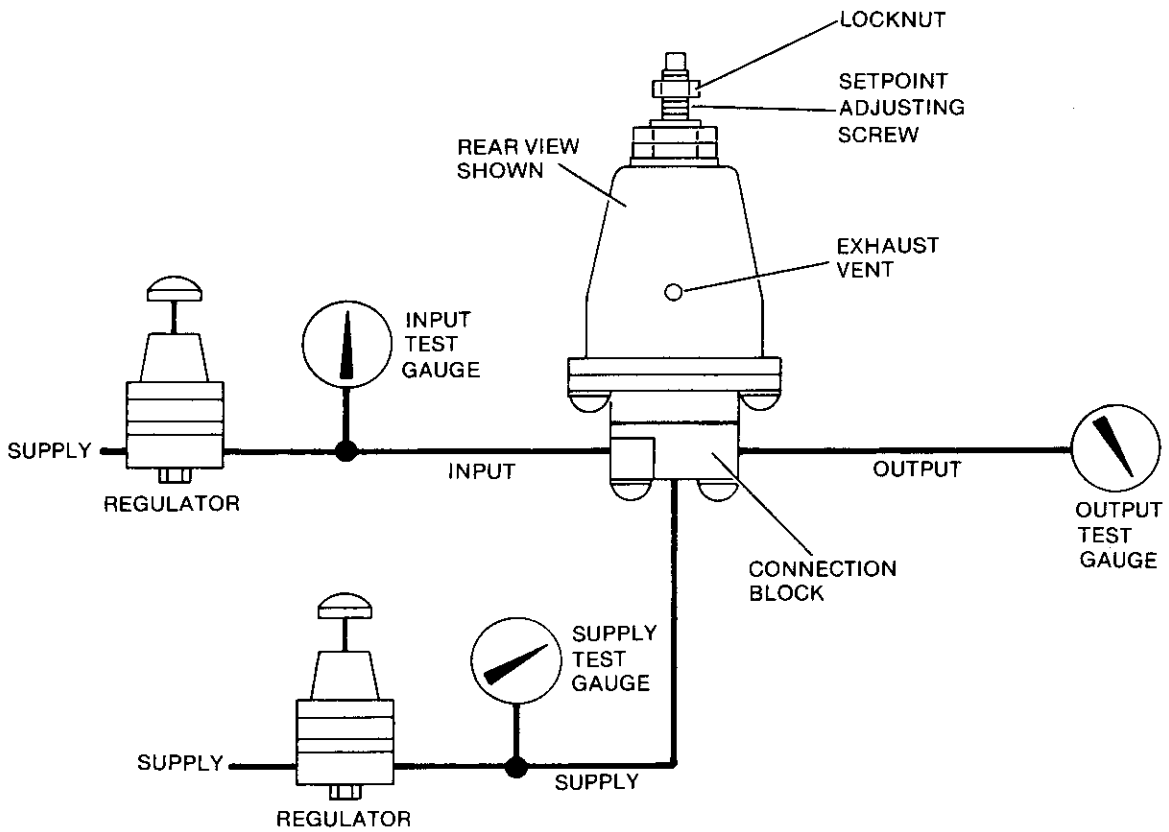

FIGURE 2 Setpoint Adjustment and Test Setup — All Models

PRINCIPLE OF OPERATION

MODELS 67-25 AND 67-100 (FGIURE 3)

The adjusting screw is used to establish the setpoint of the Relay. Clockwise adjustment increases the setpoint by loading the setpoint spring. The setpoint spring exerts a downward force on the outside of the bellows; this force is opposed by the upward force of the input on the inside of the bellows.

An increasing input above setpoint causes the output to be throttled from 0 psig to full supply pressure, within the throttling range of the Relay. For example, assume a setpoint of 12.0 psi and a throttling range of 12.0 to 12.6 psi. As the input increases from 12.0 to 12.6 psi, the upward movement of the bellows causes the valve plunger to open the supply port and close the exhaust port, throttling the output from 0 psig to full supply pressure.

As the input decreases from 12.6 to 12.0 psi, the downward movement of the bellows causes the valve plunger to close the supply port and open the exhaust port, throttling the output from full supply pressure to 0 psig.

MODELS 67R25 AND 67R100 (FIGURE 3)

The adjusting screw is used to establish the setpoint of the Relay. Clockwise adjustment increases the setpoint valve by loading the setpoint spring. The setpoint spring exerts a downward force on the outside of the bellows; this force is opposed by the upward force of the input on the inside of the bellows.

An increasing input above setpoint causes the output to be throttled from full supply pressure to 0 psig, within the throttling range of the Relay. For example, assume a setpoint of 12.0 psi and a throttling range of 12.0 to 12.6 psi. As the input increases from 12.0 to 12.6 psi, the upward movement of the bellows causes the valve plunger to open the exhaust port and close the supply port, throttling the output from full supply pressure to 0 psig.

As the input decreases from 12.6 to 12.0 psi, the downward movement of bellows causes the valve plunger to close the exhaust port and open the supply port, throttling the output from 0 psig to full supply pressure.

MODEL 671 (FIGURE 4)

The adjusting screw is used to establish the setpoint of the Relay. Clockwise adjustment increases the setpoint valve by loading the setpoint spring. The setpoint spring exerts a downward force on top of the diaphragm assembly (via the top diaphragm and spacers); this force is opposed by the upward force of the input on the bottom of the diaphragm assembly.

An increasing input equal to setpoint causes the output to go from 0 psig to full supply pressure (snap-acting). For example, assume a setpoint of 15 psi. When the input has reached 15 psi, the upward movement of the diaphragm assembly moves the valve plunger to close the exhaust port and open the supply port, increasing the output. The output is applied to the bottom of the top diaphragm, which further moves the

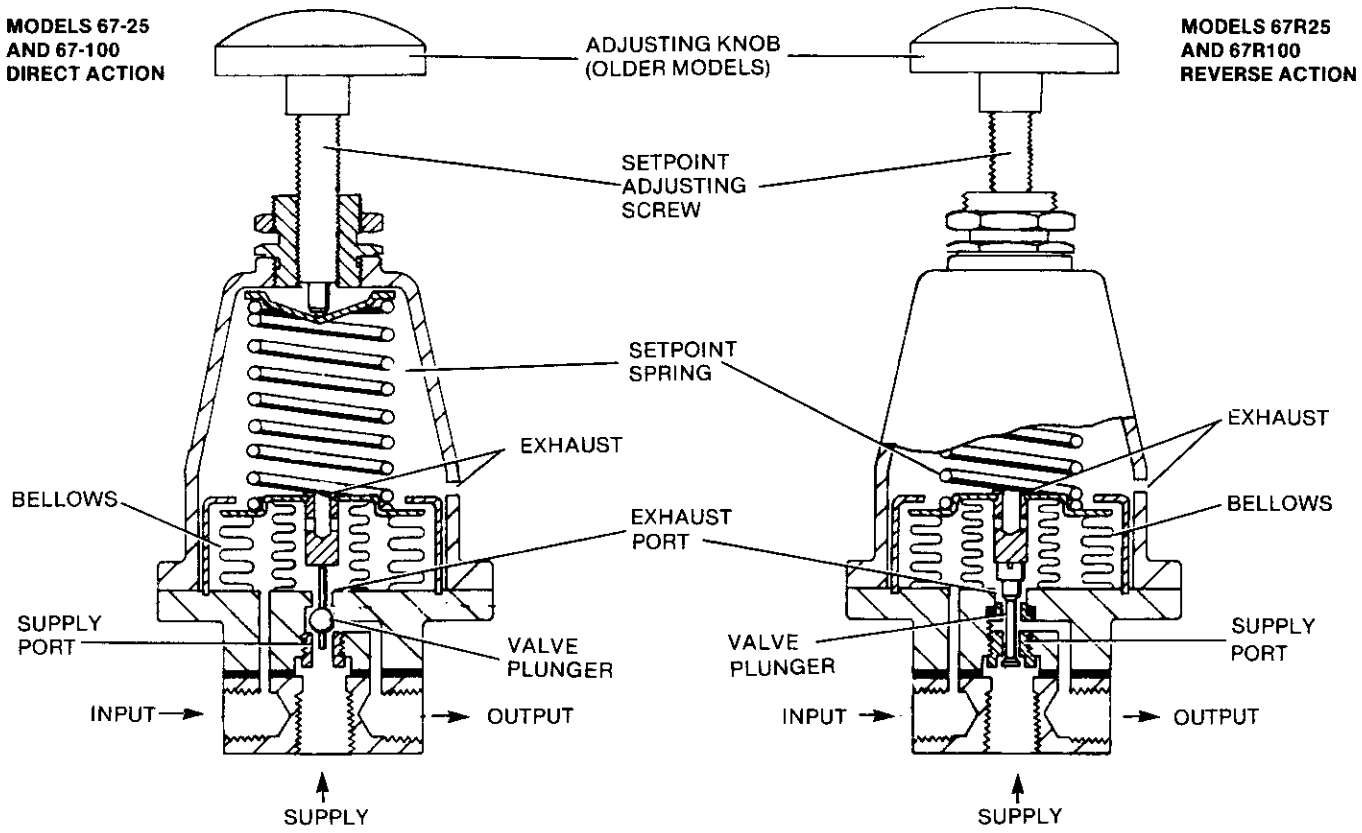

FIGURE 3 Schematics — Models 67-25, 67-100, 67R25 and 67R100

diaphragm assembly upward, to provide for the snap-acting output change from 0 psig to full supply pressure.

The output will go from full supply pressure to 0 psig (snap-acting) after the input has decreased from setpoint through the differential gap. For example, assume a setpoint of 15 psi and a differential gap of 0.4 psi. As the input decreases from 15 psi to 14.6 psi, no change in the output occurs. At 14.6 psi, the downward movement of the diaphragm assembly moves the valve plunger to close the supply port and open the exhaust port, decreasing the output. The output applied to the bottom of the top diaphragm decreases, allowing further downward movement of the diaphragm assembly, to provide for snap-acting output change from full supply pressure to 0 psig.

TYPICAL APPLICATION

Multi-Point Safety Shutoff

Figure 5 shows a typical application using one Model 67R and two Model 67 Relays. In this application, the object is to close the air-to-open shutdown valve when any of the Relay inputs goes beyond it's limit (setpoint). During normal operating conditions, the output of each Relay is equal to supply pressure and is connected, in series, through the Relays to hold the shutdown valve open. When the input to any Relay goes beyond it's limit, that Relay's output will go to 0 psig, and cause the shutdown valve to close.

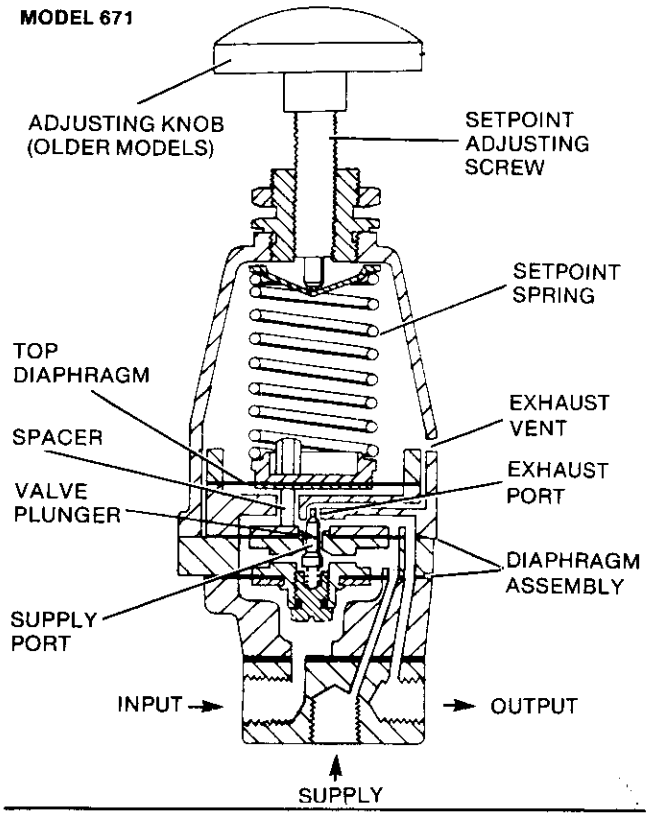

FIGURE 4 Schematic — Model 671

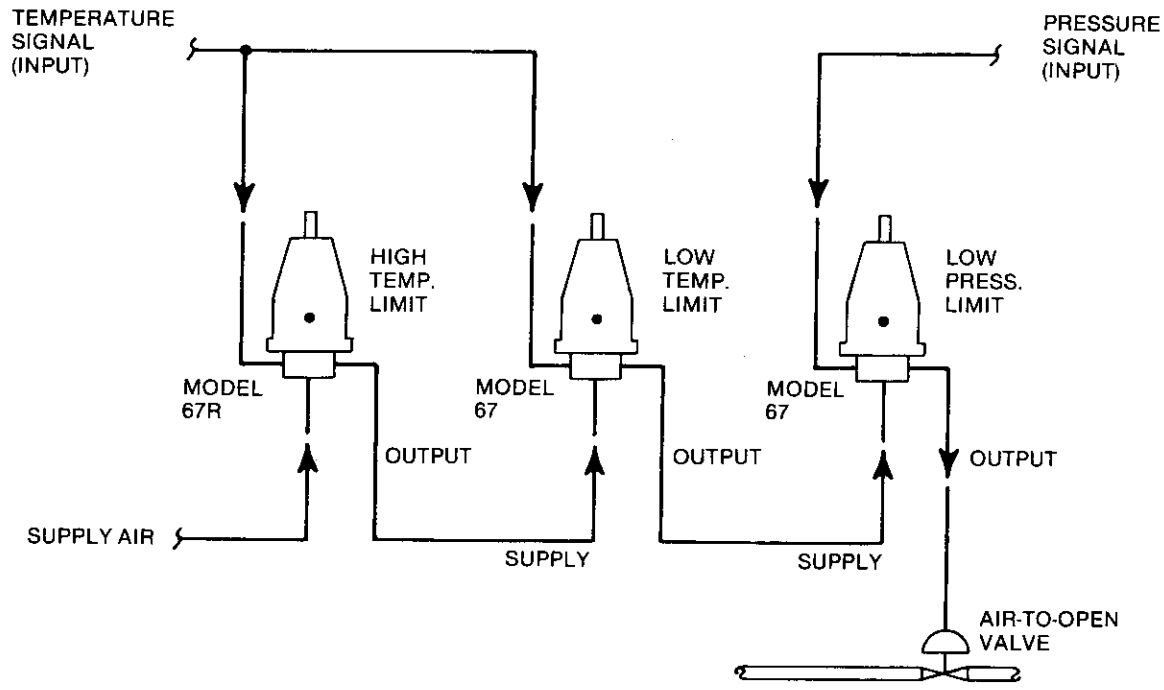

FIGURE 5 Typical Application

MAINTENANCE

GENERAL

Most problems associated with pneumatic instruments can be prevented by providing clean, dry, oil-free instrument air as described in INSTALLATION, INSTRUMENT AIR REQUIREMENTS. No routine maintenance procedures are recommended if these requirements are observed.

If it is necessary to disassemble a Relay, first turn the adjusting screw counterclockwise to remove the setpoint spring force.

CLEANING

Models 67-25 and 67-100

Figure 6 shows the disassembly of the parts that would normally require cleaning. Clean the plunger and plunger screw using a non-abrasive solvent. The plunger supply seat is in the plunger screw; the plunger exhaust seat is in the bellows assembly and can be reached with a tobacco pipe cleaner. Inspect the gasket for cuts, tears, etc., and replace if necessary.

Models 67R25 and 67R100

Figure 6 shows the disassembly of the parts that would normally require cleaning. The plunger is in two parts and must be taken apart to clean. The supply end of the plunger is slotted for disassembly with a small screwdriver. Clean the plunger and plunger screw using a non-abrasive solvent. Inspect the gasket for cuts, tears, etc., and replace if necessary.

Model 671

Figure 6 shows the disassembly of the parts that would normally require cleaning. Clean the plunger and plunger screw using a non-abrasive solvent. The plunger supply and exhaust seats are with the pilot valve assembly and can be reached with a tobacco pipe cleaner. Inspect the gasket for cuts, tears, etc., and replace if necessary.

LUBRICATION

The application of light grease to the setpoint adjusting screw threads will facilitate easy turning. Other lubrication is neither recommended nor required.

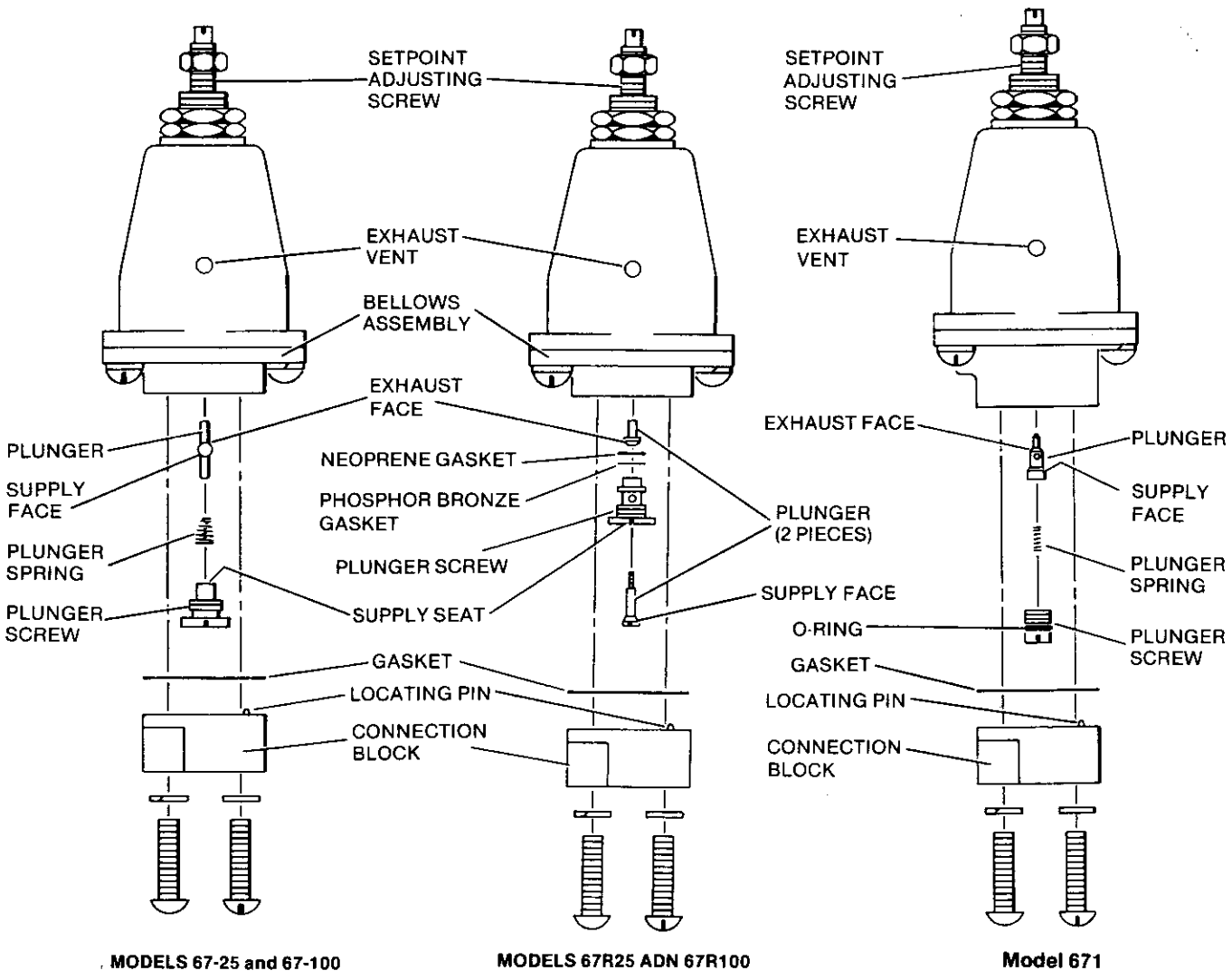

FIGURE 6 Disassembly For Cleaning

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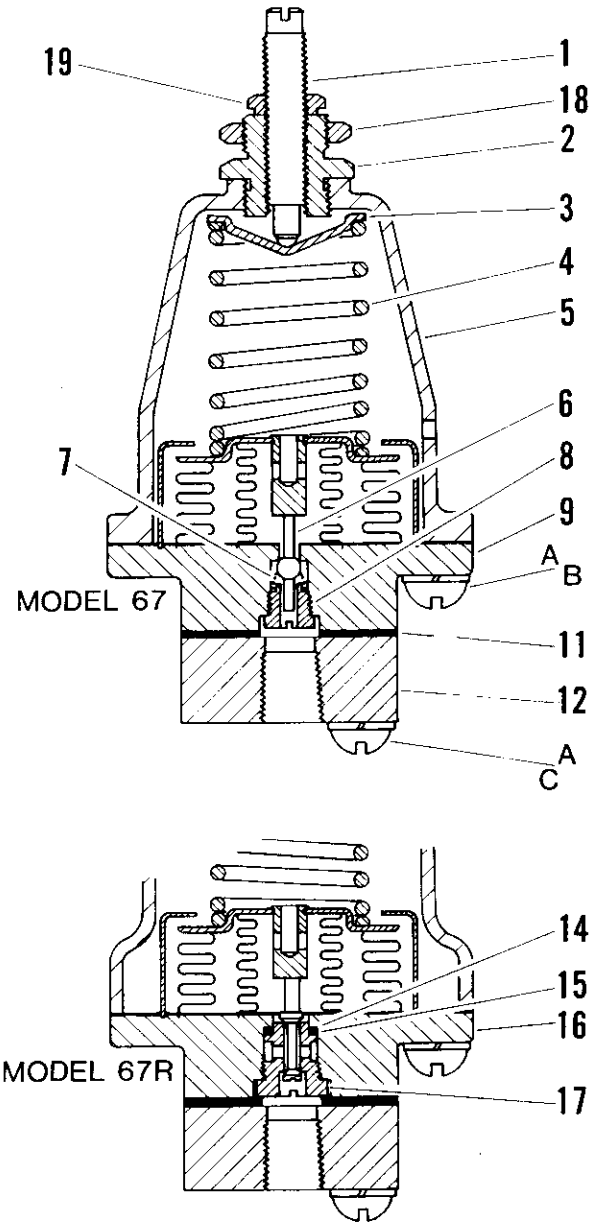
MOORE PRECISION RELAY
MODEL 67, 67R

Drawing No. 3512PL



MODELS	P/N
67-25	3512-60 Issue 18
67-100	3512-61 Issue 18
67R25	3512-62 Issue 18
67R100	3512-63 Issue 18

Item	Part No.	Description	Req'd 67	Req'd 67R
1	3512-16	Adjusting Screw	1	1
2	2155-165	Bushing	1	1
3	3512-19	Spring Seat	1	1
4	2837-19	Spring	1	1
5	3512-26	Housing	1	1
* 6	118-146	Pilot Plunger	1	—
* 7	3512-68	Spring	1	—
* 8	118-149	Plunger Screw	1	—
* 9a	2837-13	Bellows (Incl. Items 6, 7 & 8) (67-25)	1	—
* 9b	3512-30	Bellows (Incl. Items 6, 7 & 8) (67-100)	1	—
*11	118-12	Gasket	1	1
12	118-85	Block	1	1
*14	1053-5	Neoprene Washer	—	1
*15	1053-7	Washer	—	1
*16a	4905-1	Bellows (Incl. Items 14, 15 & 17) (67R25)	—	1
*16b	3512-33	Bellows (Incl. Items 14, 15 & 17) (67R100)	—	1
*17	1053-10	Pilot Valve	—	1
18	3603-14	Mounting Nut	1	1
19	3603-5	Locknut	1	1
A	1-7312	#5/16 Med. Lwr.	4	4
B	1-4165	#5/16-18 x 5/8 Rd. Hd.	2	2
C	1-4280	#5/16-18 x 1-1/4 Rd. Hd.	2	2

* Recommended on-hand spare parts. Always specify range, serial no., or other nameplate information when ordering Spare Parts.

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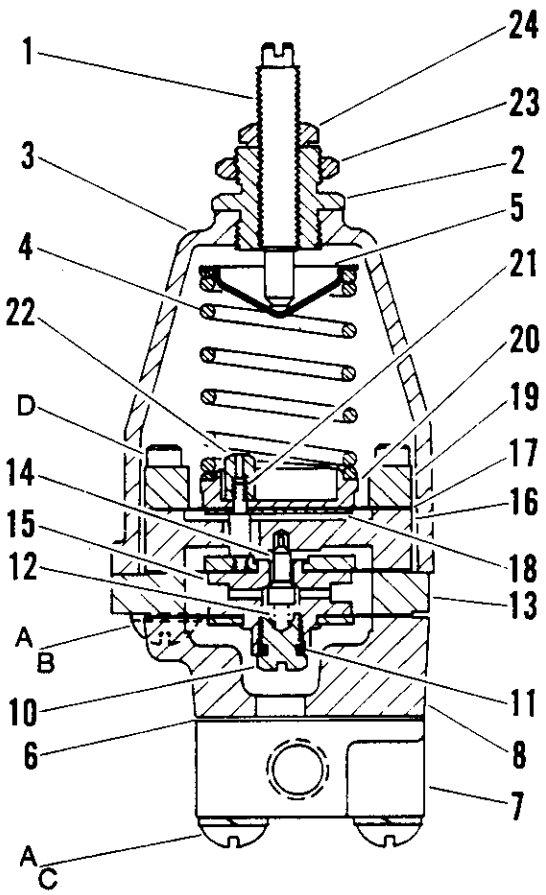
PRECISION RELAY MODEL 671

Drawing No. 12327PL

B/M 12327 - Issue 9



Item	Part No.	Description	Req'd
1	3512-16	Adjusting Screw	1
2	2155-165	Bushing	1
3	3512-26	Top Housing	1
4	12327-16	Spring	1
5	3512-19	Spring Seat	1
6	118-12	Gasket	1
7	118-85	Adaptor Block	1
*8a	6937-109	Pilot Valve (includes items 8b thru 22)	1
8b	6937-5	Pilot Valve Base	1
10	6937-11	Retaining Nut	1
*11	2938-1	"O" Ring	1
*12	6937-26	Plunger Spring	1
13	6937-9	Center Diaphragm Ring	1
*14	6937-7	Pilot Plunger	1
*15	6937-108	Diaphragm	1
16	6937-6	Exhaust Block	1
*17	6937-107	Upper Diaphragm	1
18	6937-87	Diaphragm Disc	1
19	6937-10	Diaphragm Ring	1
20	6937-14	Spring Seat	1
21	6937-31	Spacer	3
22	6937-32	Cap Nut	3
23	3603-14	Mounting Nut	1
24	3603-5	Locknut	1
	2932-19	Mounting Bracket (Optional)	1
A	1-7312	#5/16 Med. Lockwasher	4
B	1-4180	#5/16-18 x 3/4 Rd. Hd.	2
C	1-4295	#5/16-18 x 1.38 Rd. Hd.	2
D	1-2728	#10-32 x 1.5 Sh.	4

* Recommended on-hand spare parts. Always specify range, serial no., or other nameplate information when ordering Spare Parts.

WARRANTY

The Company warrants all equipment manufactured by it and bearing its nameplate, and all repairs made by it, to be free from defects in material and workmanship under normal use and service. If any part of the equipment herein described, and sold by the Company, proves to be defective in material or workmanship and if such part is within twelve months from date of shipment from the Company's factory, returned to such factory, transportation charges prepaid, and if the same is found by the Company to be defective in material or workmanship, it will be replaced or repaired, free of charge, f.o.b. Company's factory. The Company assumes no liability for the consequence of its use or misuse by Purchaser, his employees or others. A defect in the meaning of this warranty in any part of said equipment shall not, when such part is capable of being renewed, repaired or replaced, operate to condemn such equipment. This warranty is expressly in lieu of all other warranties, guaranties, obligations, or liabilities, expressed or implied by the Company or its representatives. All statutory or implied warranties other than title, are hereby expressly negated and excluded.

Warranty repair or replacement requires the equipment to be returned to one of the following addresses.

Equipment manufactured or sold by MOORE PRODUCTS CO.:

MOORE PRODUCTS CO.
Sumneytown Pike
Spring House, PA 19477

Equipment manufactured or sold by MOORE INSTRUMENT CO.:

MOORE INSTRUMENTS LTD/LTEE
2KM West of Mississauga Rd. Hwy. 7
Brampton, Ontario, Canada

Equipment manufactured or sold by MOORE PRODUCTS CO. (U.K.) LTD.:

MOORE PRODUCTS CO. (U.K.) LTD.
Copse Road
Lufton, Yeovil
Somerset, BA22 8RN
England

The warranty will be null and void if repair is attempted without prior authorization by a member of the MOORE PRODUCTS CO. Service Department.