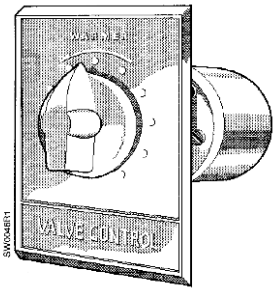
SIEMENS

Technical Instructions
Document No. 155-055P25
SW 151-1
April 1, 2005

Powers™ Controls

SW 151 Positioning Switch



Description

The SW 151 Positioning Switch (standard type) is used to deliver any manually selected pressure over a range of 15 psi. It has a wide variety of applications in pneumatic control systems. The adjustment knob can be turned approximately 300 degrees.

The bleed type switch changes the outlet pressure 3 psi for 300 degree knob rotation. The primary use is for manual reset of the RC-195 Receiver-Controller.

Several mounting arrangements can be used. Switches may be mounted on control panels with descriptive name plates, surface-mounted on a wall or duct, or placed directly on control center panels by omitting the dial faceplate. When the dial faceplate is omitted, an inscription covering switch function is made directly on the panel itself. The switch has a small body diameter which permits close center-to-center mounting. It can be used with panels up to 3/8-inch thick.

Three standard dial plates are available. A blank plate is also available which can be printed to order. A nomenclature plate is provided with space for indicating switch operation.

The positioning switch has solid brass body parts for maximum resistance against corrosion. In addition, a transparent face cover protects both the dial and nomenclature plates.

Product Numbers

Table 1.

Switches		Mounting Kits		Dial Plates		Nomenclature Plates	
Product Number	**Description**	**Part Number**	**Description**	**Part Number**	**Description**	**Part Number**	**Description**
151-142	Standard Switch	151-146	Panel Mounting (Table 2)	151-097	Blank **	151-098	Blank **
151-143	Bleed Switch			151-118	Warmer *	151-151	Humidity
		151-147	Surface Mounting (Table 3)	151-119	Close *	151-152	Static Pressure
				151-150	Increase *	786-102	Damper Control
		151-148	Graphic Panel (Table 4)			786-103	Valve Control
						786-104	Thermostatic Control

NOTE: For a complete installation, order: a switch, mounting kit, dial plate and nomenclature plate.

* Reversible plate: Clockwise on one side, counterclockwise on other side.

** See *Field Purchasing Guide* for “print to order” information.

Specifications

Operating

Output:	
Standard	0 to 15 psi (0 to 103 kPa) for 300° knob rotation
Bleed	7 1/2 to 10 1/2 psi (52 to 72 kPa) for 300° knob rotation
Capacity	625 SCIM (171 ml/s)
Medium	Air
Ambient Temperature	Maximum 160°F (71°C) Minimum -20°F (-29°C)
Maximum Air Pressure	30 psig (207 kPa)
Air Consumption	
(151-143)	35 SCIM (9.5 ml/s)
(151-142)	None

Physical

Dimensions	See Figures 7 and 8
Shipping Weight	2 lb (0.9 kg)
Air Connections	1/4-inch OD plastic tubing*
Color (knob and dial plate)	Gray

*Body tapping is 1/16 NPT

Application

Positioning switches have many applications in pneumatic systems. They may be used to control air-operated equipment directly, such as damper motors or valves, or they may be used to manually control a complete heating system. Positioning switches are also used in numerous special applications.

Operation

Standard Type

(See *Figure 1*)

An adjusting knob varies positioning switch control pressure. Turning the adjusting knob approximately 300° will gradually change the control pressure from 0 to 15 psi (maximum supply pressure). When the knob indicator is pointed up, the switch passes approximately 7-1/2 psi when using 15 psi supply. Assume a control pressure of 10 psi is needed from positioning switch. By turning the adjusting knob clockwise, increased spring pressure on the exhaust valve body seats the exhaust valve ball. Further rotation of the knob forces the push pin to unseat the supply valve ball. As air accumulates in the exhaust valve chamber, it exerts pressure on the diaphragm in opposition to that of the adjusting spring. The knob is turned until the branch pressure reads 10 lbs. At this position there is sufficient pressure in the exhaust valve chamber to seat the supply valve ball. Airflow then stops. If control pressure drops, the supply valve again opens to maintain constant pressure. When the adjusting knob is turned counterclockwise, the adjusting spring pressure is reduced. While the supply valve remains closed, the exhaust valve opens until the control air pressure reaches its new setting.

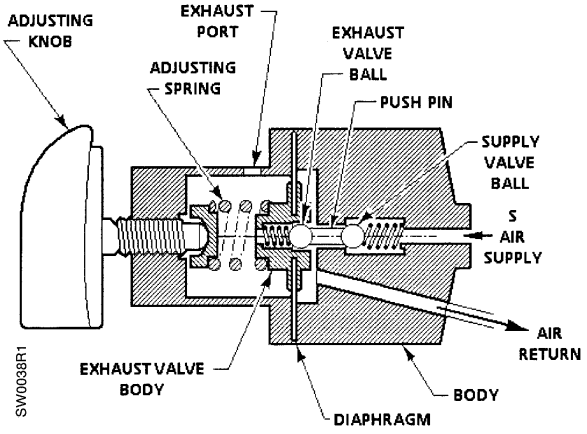


Figure 1. Standard Type.

Bleed Type

(See *Figure 2*)

An adjusting knob varies positioning switch control pressure. Turning the adjusting knob approximately 300° will gradually change the control pressure from 7-1/2 to 10-1/2 psi (max. supply pressure). When the knob indicator is pointing up, the switch passes approximately 9 psi when using a restricted supply. Assume a control pressure of 10 psi is needed from positioning switch. By turning the adjusting knob clockwise, increased pressure on the exhaust valve body seats the exhaust valve ball. As air accumulates in the exhaust valve chamber, it exerts pressure on the diaphragm in opposition to that of the adjusting spring. Any excess pressure above 10 psi would bleed off through the exhaust valve, and the air pressure would remain constant at 10 psi.

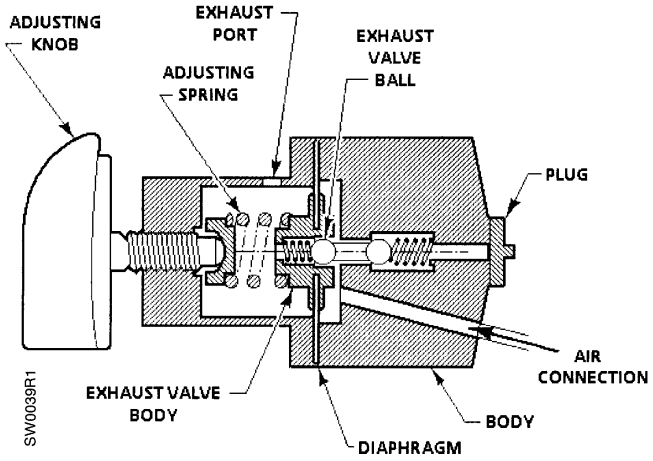


Figure 2. Bleed Type.

Installation

Flush Mounting on Wall

NOTE: See *Document No. 155-252P25* (TB-238) for recommendations for mounting these switches in electrical wall boxes or on walls with masonry or drywall construction.

Panel Mounting

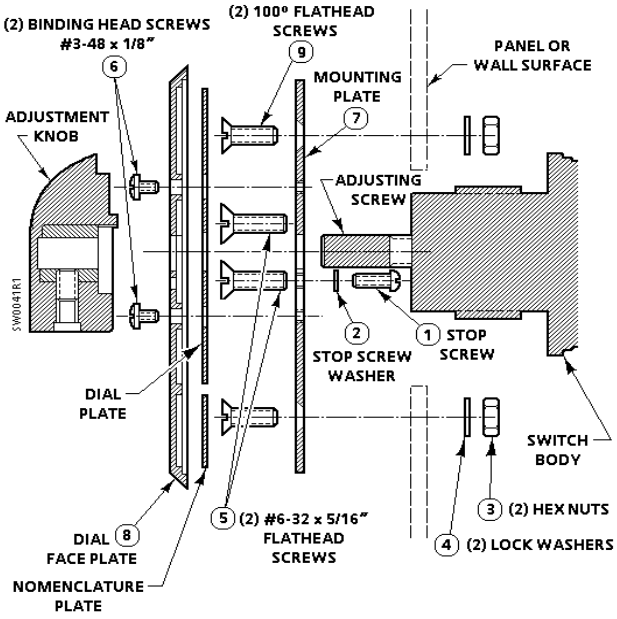


Figure 3. Panel Mounting (See Table 2).

Table 2. Panel Mounting Kit Number 151-146 (See Figure 3).

Item	Description	Qty	Material
1	No. 2-56 × 1/4 Round Head Screw	1	Brass
2	Washer	1	Brass
3	No. 6-32 Hex Nut	2	Brass
4	Lock Washer	2	Cad. Pl.
5	No. 6-32 × 5/16 Flat Head Screw	2	Brass
6	No. 3-48 × 1/8 Bind. Head Screw	2	Brass-Cad Pl.
7	Mounting Plate	1	Steel
8	Dial Faceplate	1	Polystyrene
9	No. 6-32 × 1/2 Flat Head Screw	2	Brass

1. Remove switch from box, being careful not to turn adjusting screw. The switch is shipped factory-set to be closed; that is, to pass no air. Remove knob from adjusting screw shaft.

2. Screw stop screw (1) to mounting plate (7). Stop screw hole is closest to adjusting screw. Make certain small stop screw washer (2) is in correct position. Fasten plate (7) to switch with two regular flat head screws (5). Make sure stop screw (1) fits into recess of switch body.

3. Connect 1/4-inch OD plastic tubing to fittings on switch body. Note “R”and “S” port markings. Connect other ends of connecting tubes to supply and return lines through hole in panel.

4. With stop screw (1) below adjusting screw shaft, attach mounting plate (7) to panel with two flat head screws (9).

5. Place desired dial and nomenclature plates in recesses in the dial faceplate (8). Then affix to mounting plate (7) with two binding head screws (6).

6. Tighten knob to shaft. Turn knob fully counterclockwise. Switch should pass 0 psi with 15 psi air supply.

The installation is now complete.

Panel Mounting, Continued

Figure 4 shows the minimum distances from center to center of switches in order to mount the maximum number of switches on a panel.

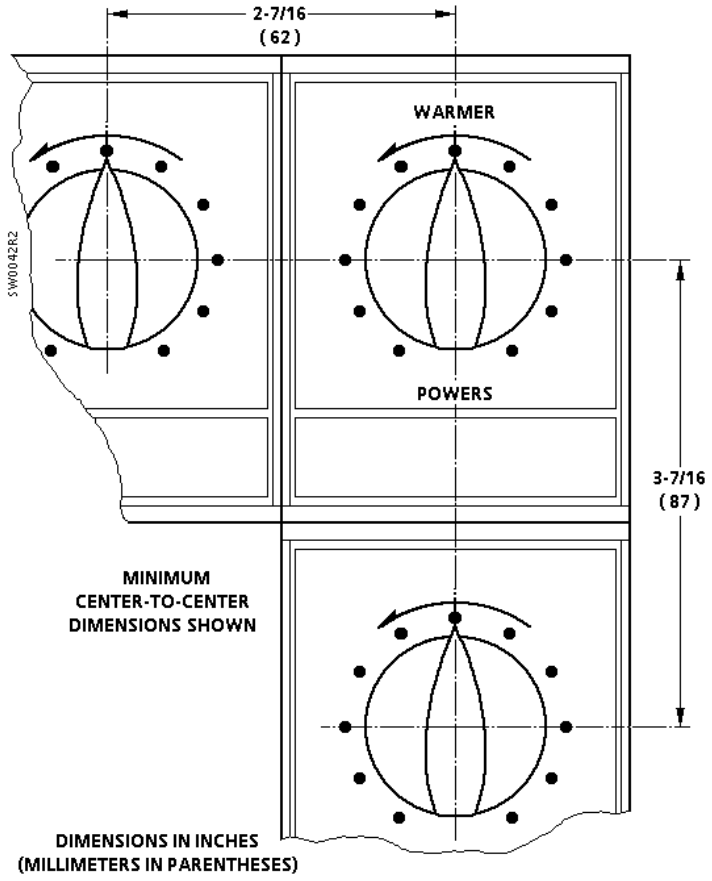


Figure 4. Panel Spacing.

Surface Mounting

1. Remove knob from switch.

2. Screw mounting bracket (10) to surface.

3. Screw stop screw (1) to mounting plate (7). Stop screw hole is closest to adjusting screw. Make certain small washer (2) is in place. Fasten plate (7) to switch body using two short flat head screws (5). Stop screw head fits recess in switch body.

4. With stop screw below adjusting screw shaft, screw mounting plate (7) to mounting bracket (10) using the two 100° flat head screws (9), hex nuts (3), and lock washers (4).

5. Place dial and nomenclature plates in recess of dial faceplate (8).

6. Tighten knob to shaft. Turn knob fully counterclockwise. Switch should pass 0 psi with 15 psi air supply.

The installation is now complete.

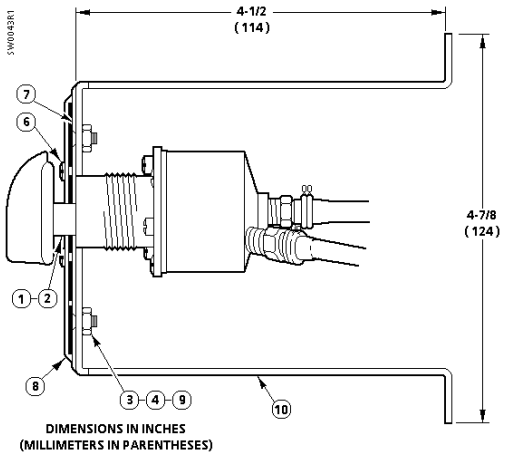


Figure 5. Surface Mounting (See Table 3).

Table 3. Surface Mounting Kit No. 151-147 (See Figure 5).

Item	Description	Oty.	Material
1	No. 2-56 × 1/4 Rd Head Screw	1	Brass
2	Washer	1	Brass
3	No. 6-32 Hex Nut	2	Brass
4	Lock Washer	2	Cad. Pl.
5	No. 6-32 × 5/16 Flat Head Screw	2	Brass
6	No. 3-48 × 1/8 Bind. Head Screw	2	Brass Cad Pl.
7	Mounting Plate	1	Steel
8	Dial Faceplate	1	Polystyrene
9	No. 6-32 × 1/2 Flat Head Screw	2	Brass
10	Mounting Bracket	1	Steel

Graph-O-Matic Panel Mounting

1. Remove switch from box, being careful not to turn adjusting screw. The switch is factory-set to be closed; that is, to pass no air. Remove knob from adjusting screw shaft.

2. Drill hole in panel using a No. 55 drill. Secure mounting plate (3) to panel with drive screw (6).

3. Screw stop screw (1) into round mounting plate (3). Make certain small stop screw washer (2) is in correct position. (See Figure 3).

4. Noting “R” and “S” port markings, connect 1/4-inch OD plastic tubing to switch. Join other ends of connecting tubing to supply and return line.

5. Push switch through hole and screw mounting plate (3) to switch body. Note clearance hole for stop screw (1) head. Tighten clamping nut (5) after positioning stop screw so it is directly beneath adjusting screw shaft.

6. Tighten knob to shaft. Turn knob fully counterclockwise. Switch should pass 0 psi with 15 psi air supply.

7. When switches are grouped together, provide a minimum center to center distance as shown in Figure 4.

The installation is now complete.

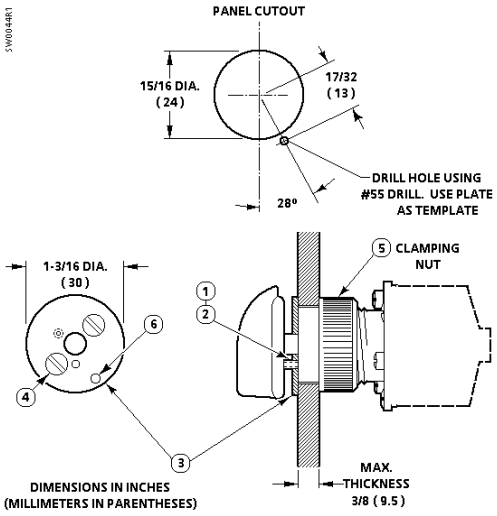
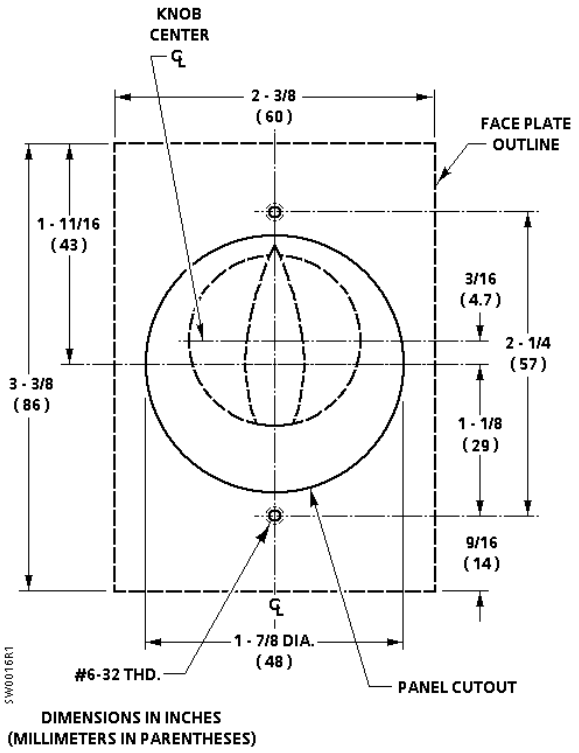


Figure 6. Graph-O-Matic Panel Mounting (See Table 4).

Table 4. Graphic Panel Mounting Kit No. 151-148 (See Figure 6).

Item	Description	Qty	Material
1	No. 2-56 × 3/16 Fat Head Screw	2	Brass
2	Washer	2	Brass
3	Round Mounting Plate	1	Steel
4	No. 6-32 × 5/16 Fat Head Screw	2	Brass
5	Clamping Nut	1	Brass
6	No. 11 × 1/8 Drive Screw	1	Steel

Dimensions



* For panels more than 0.106 inches (2.7 mm) thick. For thinner panels, drill 0.210-inch (5.3 mm) hole (No. 4 drill bit) and use two hex nuts (3) to secure the mounting plate (7) to panel.

Figure 7. Panel Mounting Dimensions.

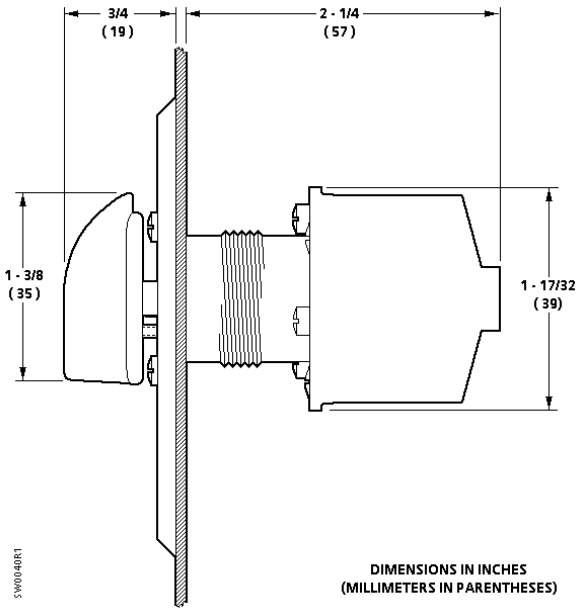


Figure 8. Switch Dimensions.

Construction

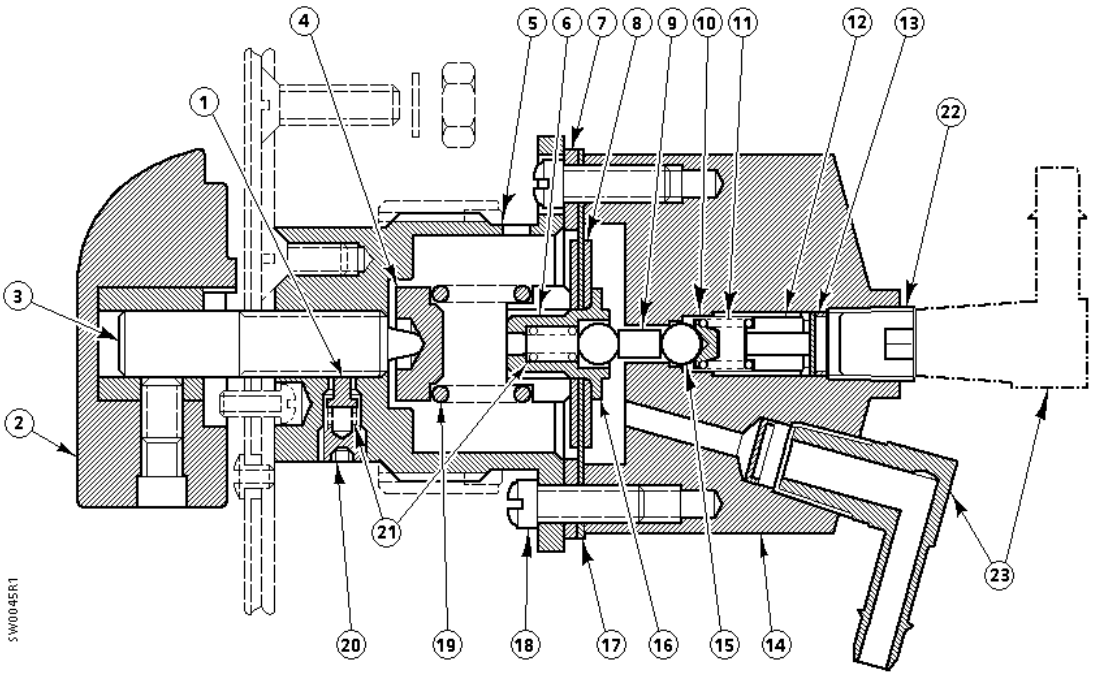


Figure 9. Construction.

Table 5. Product Numbers 151-142 and 151-143.

Item	Part No.	Description	Qty.	Material
1		Drag Pin	1	Nylon
2	151-113	Adjusting Knob	1	Plastic
3		Adjusting Screw	1	Cad. Pl. Stl.
4		Spring Thrust Flange	1	Brass
5		Spring Housing	1	Brass
6		Diaphragm Nut	1	Brass
7		Diaphragm Ring	1	Brass
8		Diaphragm Plate	2	Brass
9		Push Pin	1	Stl. Steel
10		Stool	1	Brass
11		Spring	1	Music Wire
12		Spring Adjusting Screw	1	Brass

Item	Part No.	Description	Qty.	Material
13	151-141	Filter (1 only-Bleed Sw.)	2	Phos. Brnz.
14		Switch Body	1	Brass
15		Ball Valve	2	Stn. Steel
16		Exhaust Valve Body	1	Brass
17		Diaphragm	1	Neoprene
18		No. 6-32 × 3/8 Screw	6	Brass
19		Spring (Standard)	1	Music Wire
19		Spring (Bleed)	1	Music Wire
20		No. 8-32 × 1/8 Set Screw	1	Steel
21		Spring	2	Stl. Steel
22	043-345	Plug (Bleed only)	1	Steel
23	141-207	Fitting (Bleed only Qty. 1)	2	Brass