Model 8351

# Installation, Operation And Maintenance Instructions

Non-Indicating Pneumatic Pressure Controller

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## GENERAL DESCRIPTION

Models 8351 and 8351Type 2 single system controllers, either direct or reverse acting, of the non-indicating, pressure actuated type, having fixed high sensitivity and capsular spring action.

Valve movement for the various control combinations are shown below.

If it is desirable to close the diaphragm actuated valve in case of air failure, the valve must be reverse acting.

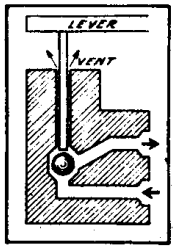
The control must be within the range of the instruments as stamped on the serial plate.

Valve Movement For Various Combinations Of Controller And Valve Actuations

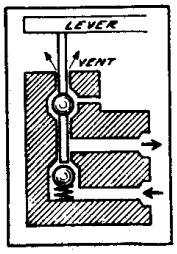
| Type Of Process | Controller Action | Valve Action | Process Above Or Below Control Point | |
|---|---|---|---|---|
| | | | Above | Below |
| Pressure Reduction | D | D | Air Closes Valve | Spring Opens Valve |
| | R | R | Spring Closes Valve | Air Opens Valve |
| Back Pressure Control | R | D | Spring Opens Valve | Air Closes Valve |
| | D | R | Air Opens Valve | Spring Closes Valve |

## AIR VALVES

*Direct Acting* – Compressed air flows to the diaphragm valve when the level releases the pin.




*Reverse Acting* – Compressed air flows to the diaphragm valve when the level bears against the pin.




## INSTALLATION

Mounting the Controller: Mount the controller in a vertical position on a panel or wall, which is reasonably free from vibration. Whenever possible, select a location with relatively constant temperatures.

If the controller is to be installed outdoors a cabinet should be provided for weather protection.

Pressure Control- Connect the controller to the apparatus or line, which is to be controlled with a ¼ inch line. The line must be clean and not subject to corrosion. There should be no scale, dirt nor foreign matter present that could clog the controller. A sediment trap should be installed near the apparatus. If there is any chance that liquid may condense in the line between the instrument and the apparatus, this line should be filled solid beforehand, driving out the air toward the highest point.

If the controlled medium is steam, a pigtail should be in the line from the apparatus.

If the controlled medium is corrosive, a seal filled with proper sealing fluid must be used.

If the pressure to be controlled fluctuates violently, a pulsation dampener must be used. (Example: on the fluid line from a reciprocating pump.)

Air Line Piping: A single system controller requires approximately 0.6 cubic feet of free air per minute.

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The air main should be sufficiently large to supply all controllers, with minimum pipe size of ¼ inch. Arrange the air lines so that they are pitched about one inch per foot, draining at the low point on the lines, away from the controller. Never use pipe tubing or fittings subject to corrosion.

Test all connections to make sure they are pressure tight.

NOTE: An Air Filter regulator should be placed in the air supply to the controller to remove moisture, oil, dirt, or other foreign particles commonly found in compressed air. The filter should be drained periodically. Proper precaution will help to ensure a supply of clean, dry air- a prerequisite for long, interrupted controller service.

Air pressure from the air supply main must be reduced in order to furnish the controller with air at a constant pressure of 18 PSI minimum and 25 PSI maximum.

Air line connections on the controller are 1/8 inch NPT. Either 1/8 inch brass pipe or annealed copper tubing ¼ inch O.D. by 3/16 inch I.D. may be used.

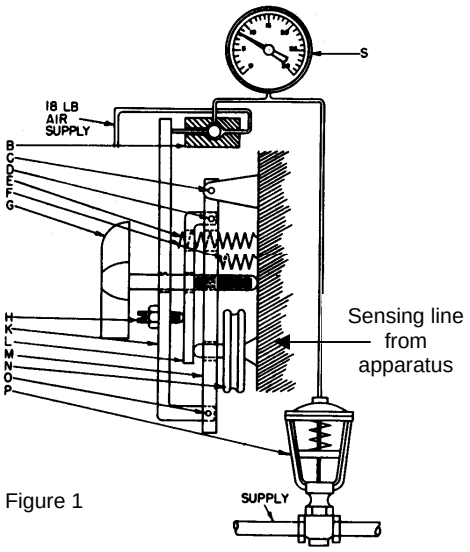


Figure 1

## OPERATION

Assume that the pressure of steam heated apparatus is to be controlled. The control system consists of a direct acting single system pressure controller and a direct acting diaphragm valve. Figure 1 is a diagrammatic drawing illustrating this application.

It will be noticed that the controller has a compound lever mechanism. The purpose of this lever mechanism is to multiply the expansion of capsular spring (N) to obtain the movement of lever (K) required to operate air valve (B).

The pressure in the apparatus is low and therefore there is very little pressure in the capsular spring (N) the spring is in a collapsed condition. The upper end of lever (K) is pressed against the pin of air valve (B) holding the valve ball against the 18 lb. air supply port. As no com-pressed air is admitted to the air valve and any compressed air on direct acting valve (P) having been vented the valve (P) is wide open. As the pressure rises, the pressure in the system increases and causes the capsular spring to expand until the upper end of lever (K) moves away from the pin of air valve (B) allowing the valve ball to move from its seat so a supply of the compressed air passes to valve (P) while some of the compressed air vents past the stem of the air valve (B). This arrangement permits the valve (P) to throttle over a small pressure range. Figure 1 shows the valve ball in its mid position and air gage (S) shows that 8 lbs. air pressure is on valve (P) holding it in a throttling position.

An increase in pressure will cause the upper end of lever (K) to move away from air valve (B) and allow the air valve ball to seat against the vent and so allow the air pressure to pass to valve (P), closing it.

If it is necessary to change the set point of the controller, turn the setting knob (G) counter clockwise for a lower pressure as indicated on the controller dial. In the case of Models 8351 Type 2 remove the cover. With a screw driver, turn the adjusting screw as required. As the controllers are non-indicating, it is necessary to set the pressure in accordance with an accurate gauge installed close to the controller. In changing the set point, turn the adjusting screw slightly, then wait until the pressure is being controlled and, if necessary, turn the adjusting screw further. Proceed in this matter until the desired setting point is attained

The construction of a direct acting controller is identical to a reverse acting controller, the only difference being that a direct acting controller has a direct acting air valve, 207788, while a reverse acting controller has a reverse acting air valve, 207857. To change the control action, remove screws, 209593, and replace the air valve with one of the desired action, being careful not to damage the gasket, 207468. Damaged gasket must be replaced.

## CAPSULE

To remove the tube systems from the Model 8351 remove the three screws holding the outlet fitting to the case and then pass the capsular spring out of the case through the resulting hole. To install a new capsule, pass the capsule through the case hole and fasten with the screws. When a new capsule is installed, it is necessary to set the controller to the control point.



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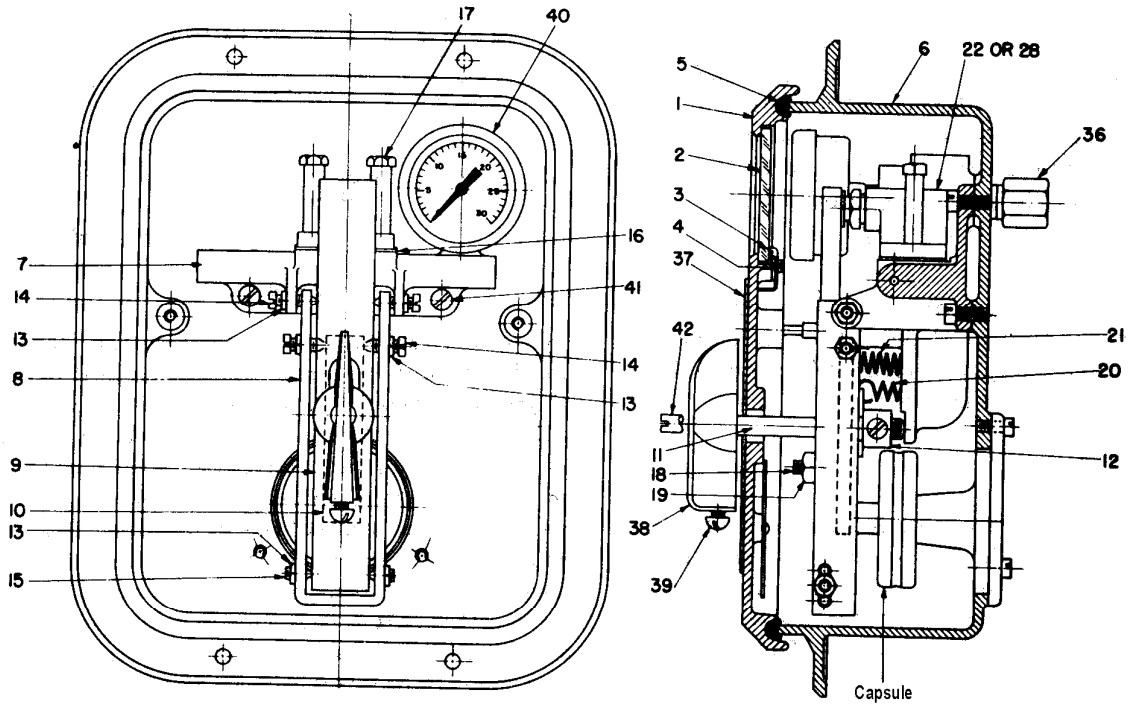


Figure 2

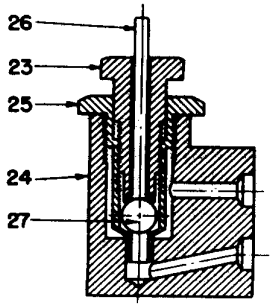


Figure 3

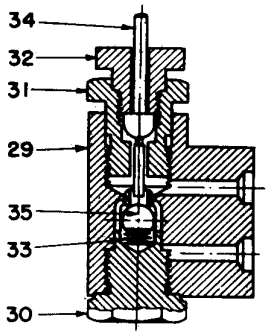


Figure 4



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## PARTS LIST
FOR MODELS 8351 AND 8351 Type 2

| KEY NO. | PART NO. | DESCRIPTION |
|---|---|---|
| (Fig. 2) | | |
| 1 | 212109 | COVER |
| 2 | 212113 | GLASS |
| 5 | ND-40177-001 | GASKET |
| 6 | 212108 | CASE |
| - | 212131 | MOVEMENT ASSY. |
| 7 | 212111 | BRACKET |
| 8 | 212114 | ADJUSTMENT LEVER |
| 9 | 212115 | VALVE LEVER |
| 10 | 213188 | LEVER |
| 11 | 217323 | SETTING SCREW |
| 12 | 212177 | STUD (Assemble with friction screw) |
| 13 | 90358 | LOCK NUT |
| 14 | 207074 | PIVOT SCREW |
| 15 | 202075 | HEADLESS PIVOT SCREW |
| 16 | 207468 | GASKET FOR AIR VALVE |
| 17 | 209593 | SCREW FOR AIR VALVE |
| 18 | ND-40219-028 | ADJUSTMENT SCREW |
| 19 | ND-32605 | LOCK NUT |
| 20 | 212129 | SPRING FOR SETTING LEVER |
| 21 | 212130 | SPRING FOR ADJUSTMENT LEVER |
| 22 | 207788 | DIRECT ACTING AIR VALVE ASSY |
| (Fig. 3) | | |
| 23 | 207512 | BUSHING |
| 24 | 207707 | BODY |
| 25 | 207708 | BALL RETAINER |
| 26 | 207792 | PIN |
| 27 | ND-32285 | BALL |
| (Fig. 2 & 4) | | |
| 28 | 207857 | REVERSE ACTING AIR VALVE ASSY. |
| 29 | 207764 | BODY |
| 30 | 207765 | BALL RETAINER |
| 31 | 207766 | BUSHING |
| 32 | 207767 | PIN RETAINER BUSHING |
| 33 | 207781 | SPRING |
| 34 | 207795 | PIN |
| 35 | ND-32285 | BALL |
| 36 | 213236 | STRAINER NIPPLE ASSY. |
| 37 | 212120 | DIAL |
| 38 | 219782 | SETTING KNOB |
| 39 | ND-40219-029 | SCREW FOR SETTING KNOB |
| 40 | 209484 | 30 LB. GAGE |
| 41 | ND-40103-051 | SCREW FOR MOUNTING MOVEMENT IN CASE |
| 42 | 217321 | SETTING SCREW |



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