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Technical Data

SD 4522D

SPENCE ENGINEERING COMPANY, INC. 150 COLDENHAM ROAD, WALDEN, NY 12586-2035

Airmaster T61, T62, T63 & T64 PNEUMATIC TEMPERATURE CONTROLLER

The T61 Series Temperature Regulator is ideal for wide ranging, fast changing loads on instantaneous heaters and other difficult process applications. The cascade principle, normally used only on instrument type regulators, is the basis for this inexpensive design. The T61, when used with a properly selected A Series Pilot or Control Valve, continuously adjusts a pressure regulator to the required heater pressure. This action, coupled with the fast response of a bimetallic thermostat, gives exceptional results. Added convenience and economy results from the wide (200°F) adjustable range and the low air consumption (.35 cfm). These controllers have adjustable proportional band as well as overtemperature protection.

SPECIFICATIONS

| | |
|--------------------------------------|----------------------|
| Max. Air Supply Pressure | 32 psi |
| Max. Signal Pressure | 2 psi below Supply |
| Mounting | 1/2" NPT |
| Air Connections | 1/8" NPT |
| Air Consumption, Maximum | 0.70 SCFM |
| Air Consumption, Normal | 0.35 SCFM |
| Proportional Band (Adjustable) | 1/4 to 2 psi per 1°F |
| Weight | 2 3/4 lb. |

TEMPERATURE RANGES

| | |
|-----------|---------------|
| T61 & T62 | 50° to 250°F |
| T63 | 150° to 300°F |

OPERATING PRINCIPLE

When used with Regulator

The regulator is operated by its initial steam pressure. It is normally closed, being held so by initial pressure on the disc and by an internal main spring. The pressure pilot is actuated by means of an air signal applied to its diaphragm. This signal is received from the temperature pilot as a result of the temperature bulb sensing a drop in temperature from the control setting.

When steam is turned on, it flows through the pressure pilot (Fig. 2) to the No 8B tee. Bleedport No. 4A restricts the flow, builds pressure under the diaphragm and opens the main valve. Restriction No. 5A steadies the operation of the regulator.

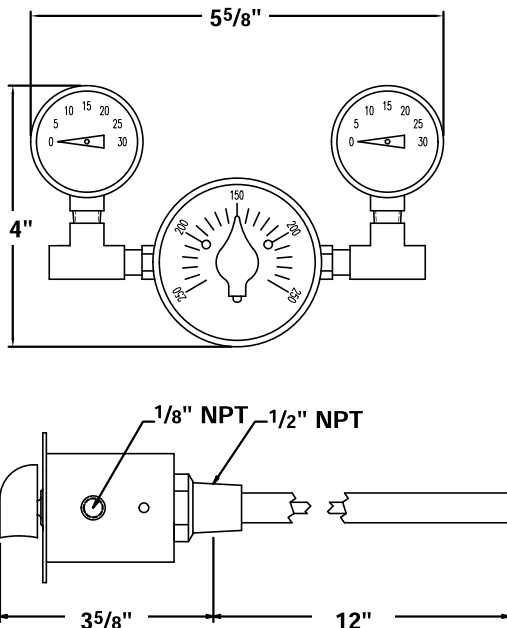
Steam flowing to the heater develops a rising delivery pressure which feeds back through the control pipe to the pressure pilot

diaphragm. As this pressure approached a balance with the air pressure signal supplied by the temperature pilot, the pressure pilot throttles. This, in turn, allows the main valve to assume a position to maintain the set temperature.

As the temperature at the outlet of the heater increases, it causes the T61 Pilot to reduce the loading air pressure and this, in turn, will cause the pressure regulator to modulate the steam flow to the heater.

When used with Pneumatic Control Valve

The T61 Series Pilot will send a proportional air signal from 0 psi to a maximum of 30 psi (not greater than 2 psi less than the supplied pressure) within a 10 degree span. The Pilot will increase signal as the temperature falls, which will either open or close the control valve, depending upon actuator configuration.



TYPE T61, T62 & T63 PILOT

SD 4522D/0503

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INSTALLATION

PLANNING

Locate the regulator in a horizontal pipe. Prevent water hammer and erratic operation by providing a trap ahead of the regulator. Avoid damaging effects of scale and dirt in pipelines by using a strainer to protect the regulator. Provide a three valve bypass to facilitate inspection of the regulator without interrupting service.

MAIN VALVE

Flush the main piping system thoroughly to clear it of welding beads, scale, sand, etc. Mount main valve with diaphragm chamber down and arrow on body pointing in the direction of flow. Screwed end valve should be mounted in unions.

PILOT

Mount the pilot with the bulb projecting entirely into the liquid or air being controlled. If the body is not in a horizontal position with air gages on top, the set screw (5) on bottom of body nearest the bulb may be loosened and body rotated to horizontal position. Retighten the set screw.

Connect a reliable source of clean compressed air (not to exceed 32 psi) to the inlet of the pilot. The supply air should be set at 2 psi above the maximum desired air signal. If air is available at a higher pressure, install a pressure reducing valve. **CAUTION:** Be sure to blow out all lines before making final connections.

Connect pilot outlet to 1/4" tap on top of pressure pilot.

START-UP AND SETTING

With supply air shut off, set temperature adjusting knob at the lowest temperature setting. Turn on supply air. The supply air should be set at 2 psi above the maximum desired air signal. If air is available at a higher pressure, install a pressure reducing valve. No more than 1 to 2 pounds should show on the control air gage (supplied with the T61 Pilot).

Gradually turn up temperature adjusting knob until rising loading air pressure causes regulator to open. Continue raising temperature setting in this fashion until desired control temperature is reached.

The T61 Pilot is factory set so that 5 degrees variation above and below the controlled temperature will cause the loading air pressure to vary approximately 8 pounds. The factory setting will usually produce satisfactory control.

If closer control is desired, the sensitivity of the T61 Pilot can be increased by turning the sensitivity screw (7) clockwise. This will cause the control temperatures to move to a position below the set point. This effect must then be corrected by readjusting the temperature adjusting knob (4).

Make these adjustments slowly, turning the sensitivity screw no more than 1/8 turn and allow two or three minutes after each adjustment for the system to settle out. Practical range of adjustment of the sensitivity screw is 1/2 turn from the factory setting.

After final setting is reached, it may be necessary to release the set screw in the temperature adjusting knob and reposition it so that the indicator is aligned with the temperature being controlled. At this point, the set screw is retightened.

If a hunt develops (a steadily swinging temperature) when the sensitivity is increased, the temperature pilot is being called on to function at a setting finer than the installation will permit. At this point, factors such as thermostat location, trapping and valve size should be reexamined.

If the regulator swings immediately on startup and does not settle out and decreasing the sensitivity by turning the sensitivity screw (7) counterclockwise cannot be tolerated, the installation as a whole should be restudied.

RECOMMENDED INSTALLATION

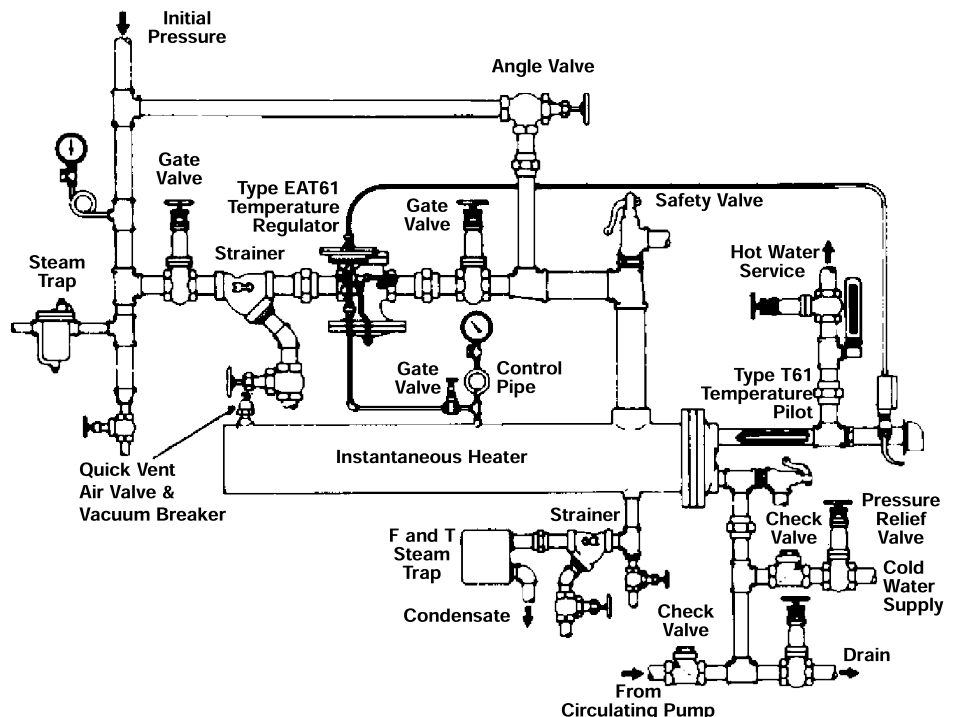


FIGURE 1

TROUBLE SHOOTING

FAILURE TO OPEN

1. Check supply gage to be sure it shows 2 psi higher than the required signal pressure.
2. Turn adjusting knob to top of temperature range. Pressure should go to within 2 or 3 pounds of supply pressure. If not, check for dirt in sensitivity screw and ball seating surface.

FAILURE TO CLOSE OR OVERRIDING DELIVERY PRESSURE

1. Adjusting knob may have been tampered with.
2. If air pressure will not bleed down when adjusting knob is turned to bottom of range, it is likely that vent is plugged. Sensitivity screw (7) improperly adjusted (open too wide).

ERRATIC CONTROL

1. Hunting
2. Gradual wandering over too wide a spread.
3. Fast over and under rides are the result of fast load changes, usually accentuated by the thermostat being located at a point where it cannot immediately sense a change in conditions.

INSTALLATION FAULTS

1. Poor circulation through heater. Constant circulation should be employed.
2. Traps on the return may be discharging erratically or may be improperly installed.
3. Sticky check valve.
4. High lift to condensate hot well. Gravity drainage from heater should be arranged or return pump installed.

DISMANTLING

1. Remove sensitivity screw (7) and clean.
2. Unlock knob set screw. Loosen and move adjusting knob (4) out to clear stop on dial plate and lock to shaft. Unscrew spool (3) from body by rotating adjusting knob counter-clockwise.

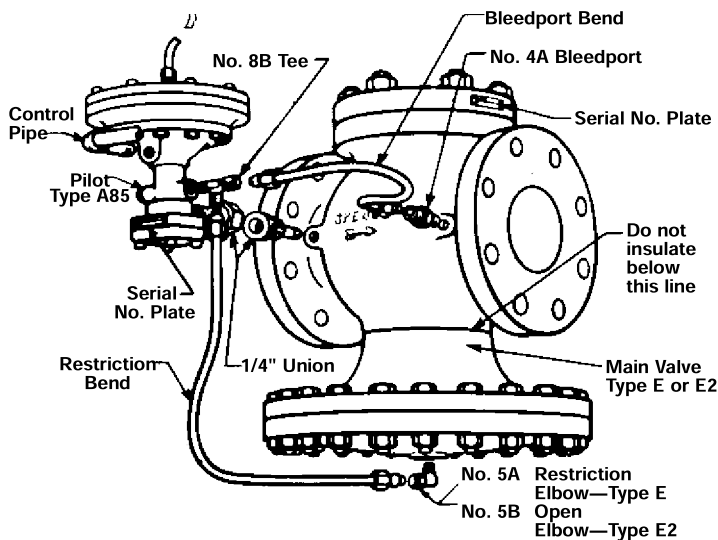


FIGURE 2

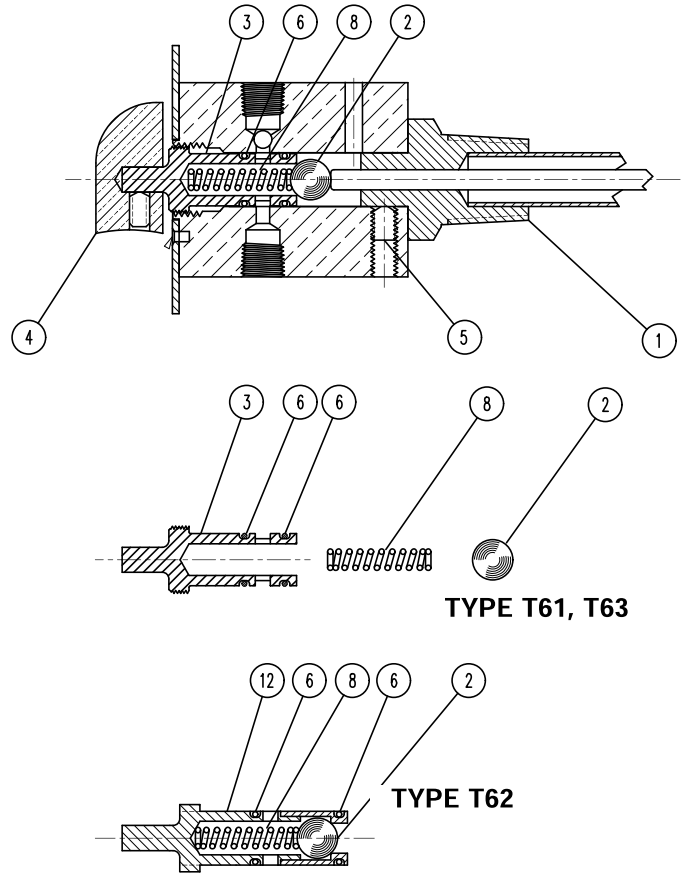


FIGURE 3

3. Care should be taken not to damage O-rings (6). Examine for nicks and other defects.
4. Examine spool (3) and ball (2) for defects.
5. Clean spool and ball with air pressure.
6. Reassemble.

TESTING & CALIBRATING

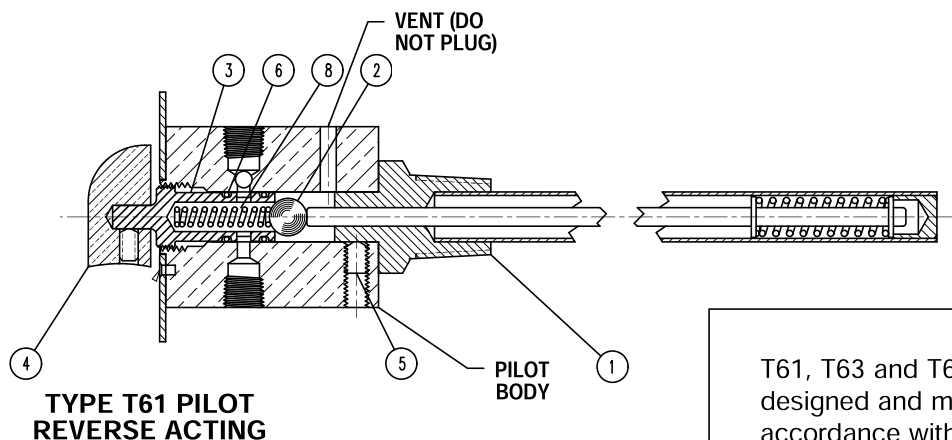
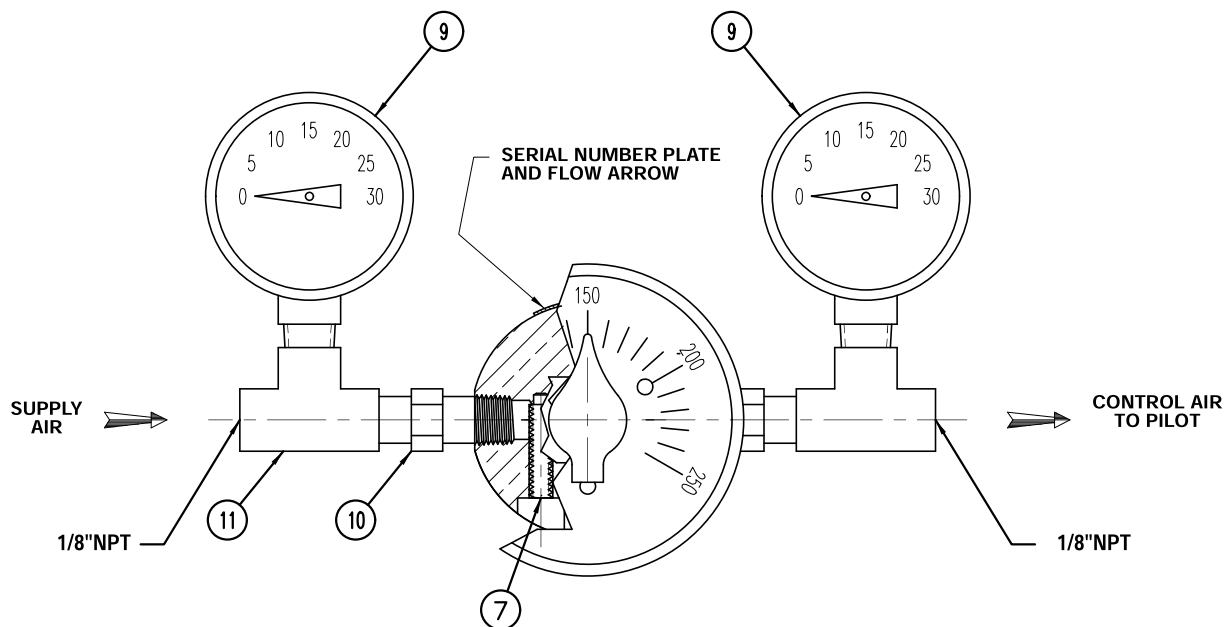
Reverse or Direct Acting

1. Plug the pilot control air port and apply supply pressure 2 psi above the control range to the supply air port.
2. Open the sensitivity screw (7) one turn while establishing a steady system temperature.

Reverse Acting (T61 & T63) Pilots Only

(Control pressure decreases with increasing temperature)

1. Turn the spool (3) clockwise to the point where the invar rod, ball and seat are in contact. The control gauge should show pressure near the top of the control range.
2. Turn the spool counter-clockwise until the control pressure is at the middle of the range.
3. Continue to turn the spool counter-clockwise until the low end of the range is reached. Adjust the sensitivity screw as required so this occurs within a 5° change on the dial. The control pressure should vary from the minimum to the maximum (15 or 30 psi) with a 10° change of the dial setting. When used with an A-pilot the minimum is 3 psi, when used with a control valve the minimum is the lower end of the bench range.



T61, T63 and T64 Pilots are designed and manufactured in accordance with Article 3, Section 3 of the Pressure Equipment Directive 97/23/EC.

| ITEM NO. | PART NAME | MATERIAL | PART NO. |
|----------|---|-----------|-------------|
| 1 | Bulb Assy. 50-250 (T61,T62 except SS) | Bronze | 07-40190-03 |
| | Bulb Assy. 150-350 (T63 & T61,T62 SS only) | St. Steel | 07-40191-03 |
| 2 | *Ball | St. Steel | 05-07709-00 |
| 3 | *Spool Reverse Acting - T61 & T63 | Brass | 04-07741-00 |
| 4 | Adjusting Knob | Plastic | 05-07927-00 |
| 5 | Body Set Screw | Steel | 05-11134-00 |
| 6 | *Spool Sealing Rings | Viton | 05-04004-00 |
| 7 | *Sensitivity Screw | Steel | 05-07930-0 |
| 8 | *Valve Spring | St. Steel | 05-05175-00 |
| 9 | Pressure Gauge | | 05-17460-00 |
| 10 | 1/8 Nipple | Brass | 05-17459-00 |
| 11 | 1/8 Tee | Brass | 05-17458-00 |
| 12 | Spool Direct Acting Assy. - T62 | Brass | 07-43770-00 |
| | Repair Kit - T61, T63, T64 (Reverse Acting) | | 08-11507-01 |

*These parts furnished in Repair Kit

T61-Reverse Acting
T62-Direct Acting
T63-High Temperature Reverse Acting
Reverse Acting-Air control signal decreases as process temperature increases.
Direct Acting-Air control signal increases as process temperature increases.

When ordering parts, it is essential that the pilot type, service and serial number be stated.

Select part by item number, but order by part number. Specify complete part number when ordering.

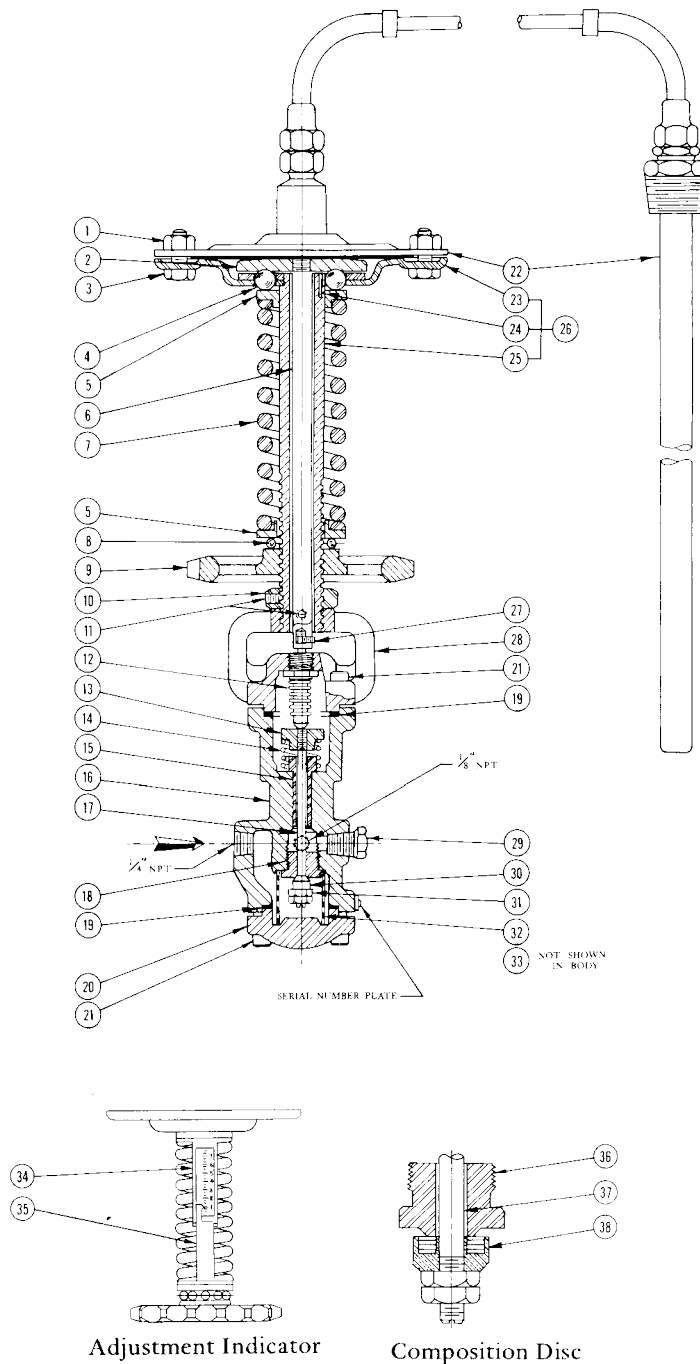


**SPENCE ENGINEERING
COMPANY**
Walden, NY 12586

Parts List TYPE T52 PILOT

When ordering parts it is essential that the pilot type, service and serial number be stated.

Select parts by item number but order by part number. Specify complete part number when ordering.



| Item No. | Part Name | Remarks | Material | Part No. |
|----------|----------------------|-------------|-----------|-----------|
| 1 | Diaphragm Nut | | Steel | 5-02992-0 |
| 2 | Pressure Plate | | Iron | 5-03602-1 |
| 3 | Diaphragm Bolt | | Steel | 5-05634-0 |
| 4 | Bearing Ball | | Steel | 5-00553-0 |
| 5 | Spring Button | | Steel | 4-01052-0 |
| 6 | Stem | | Alum. | 4-05654-0 |
| 7 | Adjusting Spring | | Steel | 5-05122-0 |
| 8 | Thrust Bearing | | Steel | 5-00550-0 |
| 9 | Handwheel | | Iron | 4-02502-0 |
| 10 | Barrel Nut | | Steel | 4-02908-0 |
| 11 | Bonnet Set Screw | | Steel | 5-04874-0 |
| 12 | Bellows Assembly | A, B | Bronze | 7-60302-0 |
| 13 | Pusher Plate | B | Steel | 4-03718-0 |
| 14 | Valve Spring | A, B | Inconel | 5-04985-0 |
| 15 | Bushing | See Item 16 | St. Steel | 4-01080-0 |
| 16 | Body & Bushing | | Iron | 8-10107-0 |
| | Body & Bushing | | Bronze | 8-10109-0 |
| 17 | Valve Stem | B | St. Steel | 4-05229-0 |
| 18 | Seat Ring | B | St. Steel | 4-04057-0 |
| 19 | Gasket | A, B | Asbestos | 5-02378-0 |
| 20 | Blind Flange | | Iron | 4-02151-0 |
| | Blind Flange | | Bronze | 4-02153-0 |
| 21 | Bl. Flg. Bonnet Bolt | | Steel | 5-04803-0 |
| 22 | Thermostat Assembly | As Required | — | — |
| 23 | Cowl | See Item 26 | Steel | 4-01525-0 |
| 24 | Groove Pin | See Item 26 | Steel | 5-03243-0 |
| 25 | Barrel | See Item 26 | Alum. | 4-01247-0 |
| 26 | Cowl Assembly | | Steel | 7-00334-0 |
| 27 | Stem Set Screw | | Steel | 5-04872-0 |
| 28 | Bonnet | | Iron | 4-00976-0 |
| | Bonnet | | Bronze | 4-00978-0 |
| 29 | Pipe Plug - 1/4 NPT | | Steel | 4-03772-0 |
| | Pipe Plug - 1/4 NPT | | Brass | 4-03771-0 |
| 30 | Disc | B | St. Stl. | 4-01772-0 |
| 31 | Stem Nut | B | Bronze | 5-02886-0 |
| 32 | Screen - Water | B | Monel | 4-04701-0 |
| | Screen - Steam | | Monel | 4-04700-0 |
| 33 | Pipe Plug - 1/8 NPT | | Steel | 4-03769-0 |
| | Pipe Plug - 1/8 NPT | | Brass | 4-03770-0 |

A - Recommended Spare Parts

B - Furnished in Repair Kit:

8-09126-0 Stainless Steel Disc - Water Screen

8-09161-0 Composition Disc - Water Screen

Use pilot setting instruction Form S.I.O.I. 86A

ADJUSTMENT INDICATOR

| | | | |
|----|------------------------|-------|-----------|
| 34 | Adj. Indicator Plate | Alum. | 5-03512-0 |
| 35 | Adj. Indicator Pointer | Alum. | 5-03513-0 |

COMPOSITION DISC

| | | | |
|----|-------------------|-----------|-----------|
| 36 | Seat Ring | St. Steel | 4-04060-0 |
| 37 | Stem | St. Steel | 4-05381-0 |
| 38 | Comp. Disc Ass'y. | Brass | 7-53512-0 |