



SPENCE ENGINEERING COMPANY, INC.
Walden, New York 12586

INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS TYPE ET14 AND E2T14

INTEGRALLY MOUNTED TEMPERATURE REGULATORS

A. INTENDED PURPOSE

The Types ET14 and E2T14 Regulators are designed to control the temperature of storage-type heaters.

These regulators do not control reduced pressure. If initial steam pressure exceeds the pressure rating of the heater, a safety valve should be installed.

B. PLANNING THE INSTALLATION

1. Locate the regulator in a straight run of horizontal pipe as shown in Fig. 1.
2. For safety and economic life, provide a drip leg, steam trap and strainer ahead of the regulator.
3. Provide a three-valve by-pass to facilitate inspection of the regulator without interrupting service.
4. Allow sufficient clearance above and below the regulator to permit disassembly.
5. Provide a safety valve if required (See Section A).
6. Liquid heating systems require a relief valve to prevent over-pressure due to thermal expansion.
7. Thermostat Installation:
 - a. Mount the bulb in a horizontal position if possible. Otherwise, mount with the tip end of the bulb lower than the capillary end.
 - b. Storage heaters generally provide a thermostat tap located as shown in Fig. 1.
 - c. If a pumped recirculation loop is used, mount the thermostat bulb in the tank outlet pipe so that its entire length is exposed to the flow.

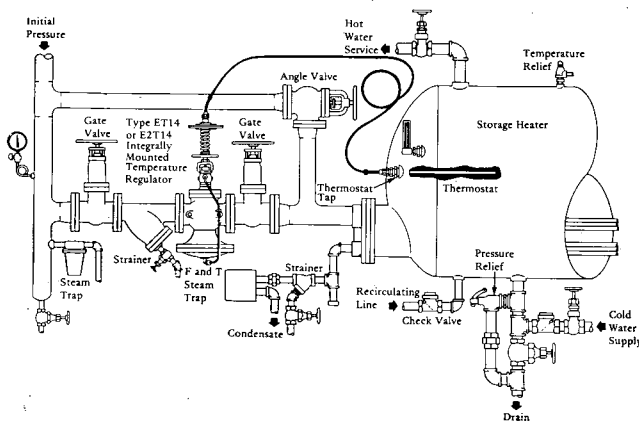


Fig. 1 - Recommended installation of a Spence Type ET14 or E2T14 integrally mounted temperature regulator on a storage heater

C. INSTALLING MAIN VALVE

1. Flush the piping system to remove dirt and debris.
2. Mount the main valve with diaphragm down and the arrow on the valve body pointing in the direction of flow.

D. INSTALLING PILOT

1. Remove protective covers from main valve top flange and pilot flange. Mount pilot to main valve as shown in Fig. 3.
2. Screw No. 211 bleedport fitting into the 1/8 N.P.T. pipe tap on the outlet side of the main valve body. Note the orifice in this fitting - vital to the operation of the regulator. Screw No. 8B tee fitting into the No. 211 fitting (Refer to Fig. 2).
3. Screw No. 4B coupling fitting into 1/8 N.P.T. pipe tap in pilot.

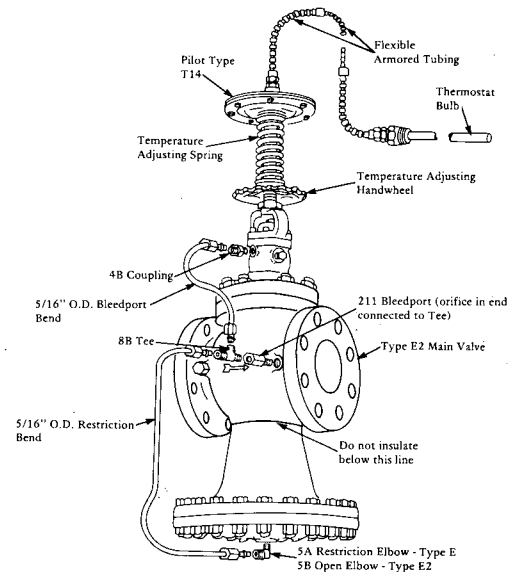


Fig. 2 - Regulator assembly for Type ET14 or E2T14 with integrally mounted pilot

4. Screw No. 5A elbow fitting (No. 5B for E2 Valve) into 1/8 N.P.T. pipe tap on underside of the main valve diaphragm. Note the orifice in the No. 5A fitting. (No. 5B fitting for E2 Valve has no orifice).
5. Connect the two tubing bends provided as shown in Fig. 2.

E. INSULATION

1. Insulation may be applied to the globe and flanges of the main valve. Do not insulate the diaphragm chamber or any part of the pilot (See Fig. 2).

F. START-UP PROCEDURE

1. Close by-pass valve and open outlet stop valve.
2. Crack inlet stop valve. Blow down strainer. (Caution: Never open a regulating valve without positive indication that the inlet side is free of condensate.)
3. Open inlet stop valve gradually. Turn temperature adjusting handwheel to obtain desired control set point (See Fig. 2). Turning the handwheel up raises the temperature set point.

G. OPERATION

1. The main valve is normally closed, held so by an internal spring and initial pressure on the disc. The pilot is open when the thermostat temperature is below the setting of the temperature adjusting spring (See Fig. 2).
2. Steam enters the pilot via the main valve top flange and flows through to the tubing bends. The bleedport restricts this flow, builds pressure under the main valve diaphragm, and causes the main valve to open. The elbow fitting at the main valve diaphragm stabilizes the regulator.
3. As the temperature of the heated medium rises, vapor pressure generated in the thermostat bulb is transmitted to the pilot diaphragm via the capillary tubing. As the vapor pressure approaches a balance with the thrust of the temperature adjusting spring, the pilot throttles. This reduces the loading pressure on the main valve diaphragm. The main valve, in response, positions itself to provide the flow required to maintain the set temperature.

H. MAINTENANCE

1. Under normal conditions, periodic dismantling of the regulator is not recommended. A valve kept relatively free of dirt will function for years with minimal attention.
2. The following inspections should be made after the first few days of operation and twice a year thereafter:
 - a. Check the 211 bleedport and 5A elbow for dirt accumulations. Clean as required.
 - b. Inspect all joints for leakage. Keep bolts and fittings tight. Never allow a leak to persist.
3. Never attempt to disassemble a thermostat element. To replace a thermostat, follow procedure below exactly.

I. THERMOSTAT REPLACEMENT

1. Cool the thermostat bulbs of original and replacement elements below the low end of their temperature range (See range tag on flexible tubing). Maintain bulbs at this temperature during replacement process.
2. Refer to Fig. 3. Back off temperature adjusting handwheel to remove all tension on temperature adjusting spring.
3. Remove diaphragm nuts (Fig. 3) and detach thermostat assembly from pilot. Similarly detach shipping plate from replacement thermostat.
4. Install replacement thermostat on pilot and install shipping plate on original thermostat.

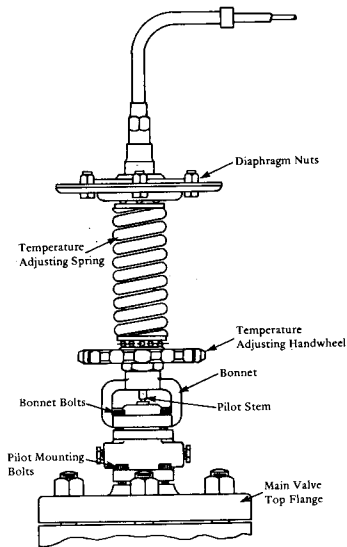


Fig. 3 - Type T14 Pilot

J. DISMANTLING AND GRINDING

1. To dismantle Main Valve:
 - a. Remove pilot, bends and elbow fitting.
 - b. Remove top flange.
 - c. Connect adjustable pressure source (air or water) to 1/8 N.P.T. tap on underside of diaphragm.
 - d. Apply about 60 psig to Type E (10 psig to Type E2) to jack open main valve. Remove stem nuts.
2. To Dismantle Pilot:
 - a. Remove bonnet bolts (Fig. 3) and remove top works.
 - b. Lift out disc. Clean its flutes and seating surfaces.
3. To Grind Main Valve or Pilot Disc:
 - a. Use very fine (400 grit) compound with light pressure. Grind sparingly. Heavy pressure can damage the material and cause leakage.
 - b. Reface a damaged surface before grinding it in.
 - c. After grinding, clean parts with kerosene or trichlor solvent.

K. TROUBLE SHOOTING GUIDE

1. Erratic Temperature Control:
 - a. Heater return trap discharging erratically or improperly installed (Inspect trap).
 - b. Thermostat bulb improperly installed (See Section B-1).
 - c. Pilot disc sticking (Inspect & clean as required).
2. Underheating:
 - a. Pilot setting incorrect (Readjust pilot).
 - b. Restricted supply steam (Check for partially closed stop valve, clogged strainer, or obstructed pipe).
 - c. 211 bleedport omitted or 5A elbow fitting clogged (Inspect each orifice).
 - d. Pilot disc sticking (Check & clean as required).
 - e. Heater improperly trapped (Inspect trap).
 - f. Defective thermostat (See Section L).
3. Overheating:
 - a. Pilot setting incorrect (Readjust pilot).
 - b. 211 bleedport fitting clogged (Inspect orifice).
 - c. By-pass valve leaking (Inspect by-pass valve).
 - d. Defective thermostat (See Section L).
 - e. Main valve or pilot held open by foreign matter.
To pinpoint problem:
 1. Close stop valves and remove bleedport tubing bend. Back off temperature adjusting handwheel.
 2. Crack inlet stop valve.
 3. If steam issues from 8B tee, the main valve is hung open.
 4. If steam issues from 4B coupling, the pilot is hung open.
 5. Close inlet stop valve and replace bleedport tubing bend.
 6. Steam may wash away the foreign matter if the valve is made to open wide. Otherwise dismantle valve to clear the problem.

L. THERMOSTAT OPERATIONAL CHECK

1. Remove thermostat bulb from heater.
2. Mark pilot steam where it emerges from the bonnet (Fig. 3).
3. Alternately heat and cool bulb at least 10° F above and below its setting. If the element is operative, the motion of the mark will be apparent.