

# SELECTING TEMPERATURE PILOTS

Any of the Main Valves described in the Main Valve Section can be combined with any of the Pilots listed below, to produce the SPENCE Temperature Regulator. This Regulator is designed to control the flow of fluid to a heating or cooling element so as to maintain a constant, adjustable, precise predetermined temperature. Pilots fully stroke valve within 5°F. The table below lists the principal Temperature Pilots.

The Thermostats of these SPENCE Pilots are of the Vapor Tension Type. They are ruggedly constructed and will not be injured by overheating.

These SPENCE Temperature Pilots can be furnished with 150°F range of temperature adjustment on special order. It should be noted that since heavier Adjusting Springs are required for this greater range the regulation will not be quite so accurate.

## TEMPERATURE RANGES

20°F to 120°F	150°F to 300°F	Thermostats can be furnished for temperatures higher than 350°F on special order.
50°F to 150°F	170°F to 270°F	
70°F to 170°F	250°F to 350°F	
120°F to 220°F		

## TEMPERATURE REGULATOR PILOTS

Type	Service Conditions							Operating Characteristics	Main Valve
	Cast Iron		Cast Bronze <sup>a</sup>		Cast Steel		Delivery Pressure Maximum psi		
	Maximum Initial Pressure psi	Maximum Temperature °F	Maximum Initial Pressure psi	Maximum Temperature °F	Maximum Initial Pressure psi	Maximum Temperature °F			
T134	250	450	—	—	600	750	20	Cascade Control—Closes on rise in temperature—controls delivery pressure—decreases delivery pressure as temperature increases & vice versa—spring loaded pressure control.	E or C Series
T124	250	450	—	—	—	—	125		
T14	250	450	—	—	600	750	—	Closes on rise in temperature.	E or C Series
T14D	250	450	—	—	600	750	150	Closes on rise in temperature—controls delivery pressure at predetermined setting—spring loaded pressure control	E or C Series
T14D2	250	450	—	—	600	750	300		
T52	250	450	—	—	—	—	—	Opens on rise in temperature.	E or C Series
Safety Pilot	—	—	300	500	—	—	—	Prevents excessive temperature rise.	E or C Series

<sup>a</sup>Bronze Body Pilots are recommended for water service.

## AIR CONTROLLED TEMPERATURE PILOTS

SPENCE Air Control Pilots, listed below, have been developed to meet special conditions when used in conjunction with A Series Pressure Pilots. The fast bi-metal thermostats have a 200°F adjustable range and protection against damage from

over-heating. By cascading an air signal onto a pressure regulator, the EAT Series temperature control reduces steam pressure to an adjustable limit as well as regulating output temperature.

Type	Bulb Style	Bulb Material	Bulb Mounting	Range °F	Maximum Bulb Temperature °F	Control Mode	Action
T61	No. 736	Bronze	½ NPT	50-250	350	Proportional	Reverse*
	No. 737	St. Stl. <sup>1</sup>	½ NPT	50-250	350	Proportional	Reverse*
T64	No. 738	St. Stl. <sup>1</sup>	Sanitary Thermometer Bushing	50-250	350	Proportional	Reverse*
T60	No. 745	St. Stl. <sup>2</sup>	½ NPT Union Mounted	30-150	180	Proportional	Reverse*
				100-300***	350	Proportional	Reverse*

\* Rising output pressure on falling temperature. This action applied to an EA Series Regulator increases steam flow with decreasing temperature. Direct action available for cooling control.

\*\*Rate or reset available on application      \*\*\*Other ranges on application      <sup>1</sup>Type 304      <sup>2</sup>Type 347 or optional Type 316

## NOTES ON SELECTION OF PILOTS

**HEATING CONTROL** Single Pilot Types T134 and Combination Pilot Type T14D2 reduce the steam pressure as well as regulate the output temperature. A choice should be made according to the maximum required delivery pressure, i.e., the pressure needed in the heater to carry the peak load. Pilot Types T14D and T14D2 in cast steel are designed for initial steam pressures in excess of 500°F.

Of the Air Control Pilots, the Type T61 is the general choice. The Type T60 is used for temperature indication or for remote adjustment. The required heater pressure will determine the choice of the A Series Pilot. See Product Pages.

**COOLING CONTROL** Pilot Type T52 is employed With Type E or C Series Main Valves to control temperature by regulating the flow of a cooling medium. This Pilot opens the Main Valve on rising temperature and exercises no control over the delivery pressure. The Air Control Pilots can be furnished with increasing air signal on temperature rise for use in cooling control.

**TEMPERATURE RANGES** Selection of the following ranges of temperature adjustment is recommended for the services noted:

50°F to 150°F	Room or air duct control
120°F to 220°F	Domestic or laundry hot water service.
70°F to 170°F	Fuel oil preheating.
170°F to 270°F	Fuel oil heating.

# SIZING TEMPERATURE REGULATORS

## DATA REQUIRED FOR ORDERING

### 1. SERVICE

- (a) Fluid flowing through Regulator.
- (b) Type heater to be controlled.

### 2. INITIAL (INLET) PRESSURE

- (a) Maximum/Minimum.
- (b) Superheat, Gravity, etc.
  - (1) Steam Service—Total Temperature or Degrees Superheat, if any.
  - (2) Air, Gases, Water and Liquids—Temperature and Specific Gravity.

### 3. DELIVERY (OUTLET) PRESSURE

Maximum required on heater.

### 4. CAPACITY

Maximum required flow through Regulator or the following data leading to same:

- (a) Quantity and type of fluid to be heated or cooled.
- (b) Temperature rise or drop, °F.

### 5. THERMOSTAT CHARACTERISTICS:

- (a) Controlled Temperature, °F—Maximum/Minimum.
- (b) Operation—Open or Close on temperature rise.
- (c) Thermostat Bulb—Style Number and Material.
- (d) Flexible Tubing—Length and Material.

### 6. END CONNECTIONS

Screwed or Flanged. (If flanged, state drilling)

## EXAMPLE

Select size and type Regulator for heating 120 gpm water from 50°F entering temperature to 170°F final temperature in an instantaneous heater. Steam supply at 125 psi pressure to be reduced to 30 psi maximum in heater.

1. (a) Steam
  - (b) Instantaneous
2. (a) 125 psi
  - (b) None (saturated, 353°F total temperature)
3. 30 psi
4. See Capacity Tables in this Section.
  - (a) 120 gpm water.
  - (b)  $170 - 50 = 120^\circ\text{F Rise}$   
 $\frac{120}{2} \times 120 = 7200\#/Hr.$
5. (a) 170°F—Select standard Temperature Range from facing page to include this final temperature.
  - (b) Close on temperature rise.
  - (c) Style No. 700 bronze. (See Options Section)
  - (d) Ten (10) feet, brass—furnished unless otherwise specified.
6. Flanged, if 2½" size or larger.

## SELECTION OF TYPE AND SIZE OF REGULATOR

MAIN VALVE	PILOT
<b>A. TYPE</b> —See Selection Criteria for Steam, Air, Gases or Water and Liquids in beginning of this Section.	See Selection Criteria and Selection Charts opposite.
<b>B. SIZE</b> —See applicable Valve Capacity Tables in this Section.	
<b>C. MATERIAL</b> — See Main Valve Selection Chart in Technical Reference Section or individual Product Pages.	See Pilot Selection Chart opposite or individual Product Pages.
<b>D. ACCESSORIES</b> —See Accessories in Other Products Section.	

## SELECTION OF TYPE AND SIZE OF REGULATOR

MAIN VALVE	PILOT
<b>A.</b> Since maximum Delivery Pressure is less than 75% of minimum Initial Pressure and the least pressure drop exceeds required "minimal differential". <b>SELECT TYPE E</b>	Since maximum Initial Pressure 125 psi, Total Temperature 353°F maximum Delivery Pressure 30 psi <b>SELECT TYPE T124</b>
<b>B.</b> Using Capacity Tables in this Section, for 7200#/Hr and 125 psi initial pressure <b>SELECT 2" FULL PORT</b>	
<b>C.</b> For 125 psi, 353°F: <b>SELECT CAST IRON, NPT 250</b>	For 125 psi, 353°F: <b>SELECT CAST IRON</b>
<b>D.</b> None required in this case.	None required in this case.

**ECONOMICAL SOLUTION: 3" SPENCE TYPE ET124, CAST IRON BODY, NPT 250 ENDS TEMPERATURE RANGE 120-220°F EQUIPPED WITH 10 FEET OF BRASS FLEXIBLE TUBING AND STYLE NO. 700 BRONZE THERMOSTAT BULB.**

Temperature Regulators should always be protected by properly designed Strainers.