The ThermoProtec™ boiler protection high-flow thermostatic mixing valve is used in hydronic heating systems with non-condensing boilers, including solid fuel, biomass, gas, LP or oil-fired. It can be installed with steel, cast iron and copper tube style boilers, automatically controlling the return water temperature, preventing condensation of the water vapor contained in the flue gas. The 280 series ThermoProtec™ valve mixes by-pass flow from the boiler with return flow from the system, sending a fixed temperature flow to the boiler which protects against corrosion from condensation occurring when a minimum flue gas temperature is not otherwise maintained.

Changeable thermostatic sensor cartridge changes valve temperature setting. The thermostatic sensor cartridge can easily be removed for maintenance or to change the valve set temperature, without removing the valve body from the piping.

**Function**

The ThermoProtec™ boiler protection high-flow thermostatic mixing valve is used in hydronic heating systems with non-condensing boilers, including solid fuel, biomass, gas, LP or oil-fired. It can be installed with steel, cast iron and copper tube style boilers, automatically controlling the return water temperature, preventing condensation of the water vapor contained in the flue gas. The 280 series ThermoProtec™ valve mixes by-pass flow from the boiler with return flow from the system, sending a fixed temperature flow to the boiler which protects against corrosion from condensation occurring when a minimum flue gas temperature is not otherwise maintained.

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Wood biomass and condensation build-up
Wood contains a variable moisture content depending on the type (logs, pellets, woodchips, etc.). Water vapor is released during the solid fuel drying phase inside the combustion chamber. The presence of cold surfaces in the boiler or flue gas chimney can lower the temperature of the flue gas down to the dew point, causing condensation. Water vapor condenses on the boiler surfaces, together with soot and part of the unburnt hydrocarbons contained in the flue gas, producing tar deposits. These substances stick to the walls of the boiler, covering most of the inner surfaces. In addition to being dangerous due to its flammability, tar is damaging to the integrity of the boiler and limits the efficiency of the flue gas-system water exchanger.

By keeping the boiler walls at the highest possible temperature, the boiler protection valve limits the formation of these substances thereby increasing combustion efficiency, controlling emissions into the environment and prolonging boiler life.

Operating principle
The thermostatic sensor, completely immersed in the medium, controls the movement of a shutter that regulates the by-pass flow from the boiler and toward the system. At boiler startup, the boiler protection thermostatic mixing valve recirculates the by-pass flow from the boiler to bring the boiler up to temperature as quickly as possible (fig. 1). When the by-pass flow from the boiler $T_f$ exceeds the setting of the boiler protection mixing valve $T_{set}$, the valve's return from the system port starts opening to produce the water mixing $T_{mix}$: in this phase the system loading begins (fig. 2). When the mixed flow to the boiler temperature $T_{mix}$ is greater than the set point of the boiler protection mixing valve by approximately 18°F (10°C), the by-pass flow from the boiler port closes and water returns to the boiler at the same temperature as the return flow from the system (fig. 3).

Characteristic components
- Flue gas and emission control
- Accumulation of ash and residues
- Primary and secondary air
  - Combustion efficiency
- BOILER PROTECTION VALVE
- Zone of condensation forming
  - Tar deposits
  - Corrosion
  - Reduction in heat exchanger efficiency
  - Flammability

By-pass from boiler
- Valve body
- Spring
- Thermostatic sensor
- Temp gauge pocket wells (4)
- Shutter
- System return
- Plug

System return open
- by-pass open
- system return closed

System loading
- by-pass open
- system return open

By-pass closing
- by-pass closed
- system return open
**Construction details**

**Brass body**
The brass body prevents the formation of ferrous residues in the system, prolonging boiler operating life.

**Thermostatic sensor replacement to modify the setting**
The thermostatic sensor can be easily replaced for maintenance or set point change without removing.

<table>
<thead>
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<th>Code</th>
<th>Description</th>
<th>Temperature</th>
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<tbody>
<tr>
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<tr>
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</tr>
<tr>
<td>F29635</td>
<td>140°F</td>
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</tr>
<tr>
<td>F29636</td>
<td>160°F</td>
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</tr>
</tbody>
</table>

**Temperature gauge pocket wells**
The boiler protection mixing valve body features temperature gauge pocket wells on front and rear sides, allowing installation of a temperature gauge (code F29571) for monitoring the working temperatures: by-pass from boiler, return from system, and mixed to boiler.

**Hydraulic characteristics**

![Hydraulic characteristics graph](image)

**Application diagrams**

**Non-condensing boiler, direct supply to the system**

*Use safety devices according to local regulations*

*Air purge recommended for boiler loop*
ThermoProtec™ 280 series
Boiler protection thermostatic mixing valve. Connections 1" to 1-1/4" NPT male or sweat with union. Brass body. Brass lower body plug. PSU shutter. Stainless steel spring. EPDM seal. Wax thermostatic sensor. Suitable for water and glycol solutions. Maximum percentage of glycol 50%. Maximum working pressure 150 psi (10 bar). Working temperature range 40–212°F (5–100°C). Set point temperature 130°F (55°C) standard; 115°F (45°C); 140°F (60°C); and 160°F (70°C) optional. Sensor cartridge accuracy ±4°F (±2°C). Hot inlet from boiler complete closed temperature Tset +18°F (10°C).

We reserve the right to change our products and their relevant technical data, contained in this publication, at any time and without prior notice.