PRESSURE RELIEF PIN DEVICES & SPRING LOADED SAFETY VALVES FOR HIGH PRESSURE LIQUID SERVICE

HIGH-END TECHNOLOGY & CLEVER SOLUTIONS FOR CRITICAL APPLICATIONS

TAI Milano S.p.A.
High precision machining and latest generation systems for optical measurements ensure precision and accurate detection of all the parameters involved in the calculations of valve functional behavior.

(Lengths resolution in the order of 0.1 µm and of 0.0006° for the rotation angle)

More than 50 years of experience in safety valve production and continuous investments in the R&D sector have enabled TAI Milano to stay at the forefront in helping customers to guarantee safety even in the most severe equipment operating conditions.

Our working strategy has allowed us as TAI Milano to design and patent devices with innovative solutions.
**CRITICAL APPLICATIONS**

**3000H & 3000H-PRPD**

3000H and 3000H-PRPD Series safety valves are small angle type valves with clamped or flanged inlet and flanged outlet connections, direct acting spring loaded (3000H) and non-reclosing designed to function by buckling a pin (3000H-PRPD). They are designed for the protection of equipment/tubes containing liquids at high pressure.

<table>
<thead>
<tr>
<th>Main features</th>
<th>3000H</th>
<th>3000H-PRPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>Liquids</td>
<td>Liquids</td>
</tr>
<tr>
<td>Overpressure</td>
<td>10 %</td>
<td>0 %</td>
</tr>
<tr>
<td>Blowdown</td>
<td>10 %</td>
<td>non-reclosing device</td>
</tr>
<tr>
<td>Discharge coefficient</td>
<td>0.52</td>
<td>0.52</td>
</tr>
<tr>
<td>Set pressure range</td>
<td>100 to 856 bar</td>
<td>100 to 856 bar</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-100 to +100 °C</td>
<td>-100 to +100 °C</td>
</tr>
<tr>
<td>Set pressure accuracy</td>
<td>± 3 %</td>
<td>± 2.5 %</td>
</tr>
<tr>
<td>Max recommended continuous working pressure</td>
<td>90 %</td>
<td>97 %</td>
</tr>
</tbody>
</table>

A conventional valve, designed to operate at high set pressure values, shall have a high contact area between nozzle and disc in order to withstand the spring load during storage and/or start-up and/or off-design run. At the same time, large seat contact areas affect valve set pressure accuracy and stability, reclosing pressure and tightness. The 3000H Series valves fix the contact area size issue with a patented nozzle system that allows the nozzle to move axially as inlet pressure increases:

- for 3000H series means that the spring is loaded at the working deflection by pressure;
- for 3000H-PRPD series this means that the deformation of the pin at the set pressure will depend on the free stroke of the nozzle and will be such as to induce a plastic and unrecoverable deformation in the pin.

### SIZE AND MAXIMUM SET PRESSURE 3000H & 3000H-PRPD

<table>
<thead>
<tr>
<th>ORIFICE</th>
<th>AREA</th>
<th>INLET</th>
<th>FLANGED OUTLET</th>
<th>MAX SET PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm²</td>
<td>inch</td>
<td>Class</td>
<td>inch</td>
</tr>
<tr>
<td>B</td>
<td>28.27</td>
<td>1 to 2¹/₁₆</td>
<td>clamp</td>
<td>3</td>
</tr>
<tr>
<td>B₂</td>
<td>38.48</td>
<td>1 to 2¹/₁₆</td>
<td>clamp</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>28.27</td>
<td>1½</td>
<td>flanged ASME 900/1500</td>
<td>2</td>
</tr>
<tr>
<td>B₂</td>
<td>38.48</td>
<td>1½</td>
<td>flanged ASME 900/1500</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>28.27</td>
<td>1 to 1½</td>
<td>flanged ASME 2500</td>
<td>3</td>
</tr>
<tr>
<td>B₂</td>
<td>38.48</td>
<td>1 to 1½</td>
<td>flanged ASME 2500</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>28.27</td>
<td>1¹³/₁₆ to 2¹/₁₆</td>
<td>flanged API 10000</td>
<td>3</td>
</tr>
<tr>
<td>B₂</td>
<td>38.48</td>
<td>1¹³/₁₆ to 2¹/₁₆</td>
<td>flanged API 10000</td>
<td>3</td>
</tr>
</tbody>
</table>
### Part Name

<table>
<thead>
<tr>
<th>Materials</th>
<th>Temperature range</th>
<th>-46 to 100 °C</th>
<th>-100 to 100 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td></td>
<td>A 352 LCC</td>
<td>A 351 CF8M</td>
</tr>
<tr>
<td>Bonnet</td>
<td></td>
<td>A 351 CF8M</td>
<td>A 351 CF3M</td>
</tr>
<tr>
<td>Cap</td>
<td></td>
<td>A 351 CF3M</td>
<td>A 351 CK3MCuN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 995 Gr. 4A (duplex 22%Cr)</td>
<td>(austenitic 6%Mo)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 995 Gr. 6A (duplex 25%Cr)</td>
<td>A 494 CW6MC (Inconel® 625)</td>
</tr>
<tr>
<td>Inlet</td>
<td></td>
<td>AISI 316</td>
<td>AISI 316</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNS S31803 (duplex 22%Cr)</td>
<td>UNS N06625 (Inconel® 625)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNS S32750/60 (duplex 25%Cr)</td>
<td>UNS S31254 (austenitic 6%Mo)</td>
</tr>
<tr>
<td>Nozzle</td>
<td></td>
<td>UNS N07750</td>
<td>UNS N07718</td>
</tr>
<tr>
<td>Disc</td>
<td></td>
<td>UNS N06625+stellite</td>
<td>UNS N07750</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNS N07718</td>
<td>UNS N07718</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td>AISI 316</td>
<td>Inconel® X750</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inconel® 718</td>
<td>Inconel® 718</td>
</tr>
<tr>
<td>Pin</td>
<td></td>
<td>Nickel alloy</td>
<td>Nickel alloy</td>
</tr>
<tr>
<td>Body studs</td>
<td></td>
<td>A 320 L7 – A 194 7</td>
<td>A 320 L7 – A 194 7</td>
</tr>
<tr>
<td>Nuts</td>
<td></td>
<td>A193 B8M – A194 8M</td>
<td>A193 B8M – A194 8M</td>
</tr>
<tr>
<td>Rods</td>
<td></td>
<td>A 31803 (22%Cr)</td>
<td>A 453 Gr. 660A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNS S32760 (25%Cr)</td>
<td></td>
</tr>
</tbody>
</table>

### Main features for PAPOPRD 9000 & 9000R

- **Service:** Gases, liquids, mixtures and flashing liquids
- **Set pressure range:** [bar] 10 to 206
- **Temperature range:** [°C] -40 to +300
- **Set pressure accuracy:** % ± 2.5
- **Max recommended continuous working pressure:** % 97

---

Pin Actuated Pilot Operated Pressure Relief Device (PAPOPRD)
Non-reclosing devices operated by buckling pin are also available for our model 9000 and 9000R valves (API 526 compliant)