Effective Condensate Processing Improves Plant Efficiency

Increased productivity and product quality, plus reduced energy consumption and water treatment are some of the many benefits of condensate drainage and recovery. The TLV GP/GT PowerTrap series provides the perfect solution for optimizing condensate processing in many applications.

1 Handling Heat Exchanger “Stall”
- Stabilized temperature control improves product quality
- Elimination of water hammer prevents equipment damage and improves safety
- Prevention of corrosion caused by condensate accumulation

2 Effective Condensate Recovery
- Energy recovered from condensate reduces boiler fuel costs
- Reusing water reduces water treatment costs
- Reduces effluent treatment and disposal costs

3 No Cavitation
- Recovery of hot condensate up to 428 °F possible without cavitation
- Low filling head capability permits drainage from near-grade equipment outlets.
- Eliminates the seal, bearing and impeller damage that can occur in standard centrifugal pumps

4 No Electricity Required
- Ideal for use in areas requiring explosion-proof equipment, and areas with no electrical supply
- Reliable mechanical operation eliminates the need for complex level controls
- Quick and easy to install and maintain
TLV’s PowerTrap Series—
The Total Solution to Heat Exchanger “Stall”

**Importance of “Stall” Prevention**

“Stall” prevents condensate from being discharged from heating equipment. It results in:

- **Process Temperature Swings**
  
  As the “stall” cycle repeats, the steam pressure in the equipment varies above and below the back pressure, causing product temperature and quality fluctuations.

- **Water Hammer Damage**
  
  Water hammer can occur when backed-up condensate re-evaporates, or as incoming hot steam hits cooler backed-up condensate and instantly condenses.

- **Tube Corrosion and Damage**
  
  Backed-up condensate in the equipment can form carbonic acid, which results in tube corrosion. Equipment temperature fluctuations can cause thermal shock and fatigue damage to tubes.

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**TLV’s PowerTrap series provides complete condensate drainage, the key to eliminating “stall” and its related problems. Optimum performance can now be yours with the PowerTrap.**

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**A Closer Look at the “Stall” Cycle**

1. When the demand for heating energy is high, the control valve is wide open, \( P_1 \) is greater than \( P_b \) and condensate is discharged from the trap.

2. When the demand decreases, the control valve throttles in order to reduce the heating energy, and \( P_1 \) drops.

3. If \( P_1 \) drops to \( P_b \) or below, the trap can no longer discharge condensate against the back pressure. Condensate then backs up in the heat exchanger, and the equipment becomes condensate logged. This condition is known as “stall”.

4. When condensate is backed-up inside the equipment, the product temperature falls. The system compensates by opening the control valve again. \( P_1 \) increases and, when it becomes greater than \( P_b \), condensate is forced out through the trap, and the cycle begins again.
**PowerTrap Benefits**

1. **Built-in Steam Trap Improves Performance (GT Series)**
   - Automatically switches between pump and trap operation, in response to process conditions
   - Internal trap mechanism always matches pump output, with no damage to trap, and eliminates need for sizing
   - No need for external steam trap means simplified compact design and lowered installation costs
   - Trap valve and valve seat are both stainless steel for minimum leakage and maximum life

2. **Snap-action Mechanism Maximizes Life**
   - Heat-treat hardened stainless internals
   - Lifetime warranty* nickel-based alloy compression coil spring
   - The two year warranty** snap-action mechanism simultaneously opens or closes motive medium inlet and exhaust valves, preventing erosion and resultant leakage

3. **Low-maintenance Design Reduces Labor**
   - Easy inline maintenance, without removal of piping*
   - Fast and easy cleaning of intake valve by simply opening a plug to remove (GP/GT14, GP/GT10, GP10F, GP/GT5C)
   - Non-cavitating design eliminates the seal, bearing and impeller damage that can occur in standard centrifugal pumps
   - * GP10F: GP/GT5C: motive medium piping must be removed

4. **Stainless Steel Check Valves* for Durability**
   - Center guided check valves CK3MG and CKF3MG are used for maximum reliability even with dirty condensate (GP/GT14, GP/GT10, GP10F, GP/GT10L)
   - Newly developed swing type check valve CKF5M enables use with a filling head as low as 12” (GP/GT14L, GP/GT10L), 14” (GP/GT14M)
   - Last longer than bronze check valves
   - Quiet operation
   - * GP/GT5C are equipped with internal stainless steel check valves

5. **Economical Unit with Retrofittable Mechanism**
   - One-piece pump assembly for easy installation, maintenance and retrofit to pump bodies of certain other manufacturers
   - Lighter-weight model, with ASME certified fabricated steel body for increased cost effectiveness
When the float reaches its highest position, the trap is fully open and the snap-action mechanism actuates, instantly both opening the motive medium intake valve and closing the exhaust valve. The motive medium pressure forces out the condensate, and the float falls. The snap-action mechanism resets, instantly opening the exhaust valve and closing the intake valve. The cycle then repeats.
Systems for Many Different Applications
The TLV PowerTrap series meets a variety of condensate processing needs.

<table>
<thead>
<tr>
<th>System Overview</th>
<th>Closed System</th>
<th>Open System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits</td>
<td>• No need for external steam trap (GT model features built-in trap)</td>
<td>• Collection of condensate from multiple equipment possible</td>
</tr>
<tr>
<td></td>
<td>• No flash steam discharge</td>
<td>• Can be used where trap is lower than receiver, such as equipment situated near grade (providing there is sufficient differential pressure)</td>
</tr>
<tr>
<td></td>
<td>• Small reservoir</td>
<td>• Separate steam trap required for each piece of equipment</td>
</tr>
<tr>
<td></td>
<td>• Use with vacuum equipment possible</td>
<td>• Requires venting pipe to discharge flash steam to atmosphere</td>
</tr>
<tr>
<td>Notes</td>
<td>• Only one piece of equipment possible per system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Equipment has minimum height requirement to ensure that condensate flows naturally, by gravity (approx.: GP/GT14, GP/GT10 - 32”; GP10F - 40”; GP/GT14M - 14”; GP/GT14L - 12”; GP/GT10L - 12” or 20”; GP5C - 7”)</td>
<td></td>
</tr>
<tr>
<td>Approx. Max. Pump Discharge Capacity</td>
<td>• 17,000 lb/h and less (GT10)</td>
<td>• 18,000 lb/h and less (GP10, GP10F)</td>
</tr>
<tr>
<td></td>
<td>• 12,000 lb/h and less (GT14)</td>
<td>• 13,000 lb/h and less (GP14)</td>
</tr>
<tr>
<td></td>
<td>• greater than 17,000 lb/h (install pumps in parallel)</td>
<td>• 18,000 lb/h and greater (install pumps in parallel)</td>
</tr>
<tr>
<td>Model</td>
<td>Mechanical pump with built-in trap GT14/GT10</td>
<td>Mechanical pump GP14/GP10/GP10F</td>
</tr>
<tr>
<td></td>
<td>Mid-size mechanical pump with built-in trap GT14M/GT14L</td>
<td>Mid-size mechanical pump GP14M/GP14L</td>
</tr>
<tr>
<td></td>
<td>Compact mechanical pump with built-in trap GT10L/GT5C</td>
<td>Compact mechanical pump GP10L/GP5C</td>
</tr>
<tr>
<td>Where there is a negative pressure differential (e.g. vacuum equipment), GP14/GP14M/GP14L/GP10/GP10L/GP10F can be used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some Application Examples</td>
<td>Large process/flow, such as: re-boilers, large heat exchangers</td>
<td>Large process trap discharges, such as: cylinder dryers, platen presses</td>
</tr>
<tr>
<td></td>
<td>Small to medium process/flow, such as: room heaters, small to medium heat exchangers</td>
<td>Small to medium process trap discharges, such as: recovery: trace lines &amp; mains, small to medium heat exchangers</td>
</tr>
</tbody>
</table>

Closed System (GT)
Sample Application: Condensate Drainage & Recovery from Heat Exchanger

Open System (GP)
Sample Application: Condensate Recovery from an Open Tank

- Collection of condensate up to 365 °F possible
- Prevents clouds of steam from affecting the work environment

**CAUTION** Pipe all atmospheric discharge to a safe area
### Installation Piping Examples

(For explanation purposes only, not intended as installation designs.)

#### Closed System

1. Check valve
2. Strainer
3. Gate valve or needle valve
4. Gate valve or ball valve
5. Air vent
6. Steam trap

#### Open System

1. Check valve
2. Strainer
3. Gate valve or needle valve
4. Gate valve or ball valve
5. Steam trap

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**CAUTION**

- In closed system applications where steam condensate is pumped, use steam as the motive medium.
- The height of the condensate outlet on the equipment must be at least: filling head + diameter of reservoir.
- Please read the instruction manual to ensure safe usage.

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_A: Steam trap outlets may be piped to either the condensate reservoir or the condensate recovery line. Where condensate from the equipment is less than 176 °F, it is best to pipe to the condensate recovery line._

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**CAUTION**

- The vent pipe and overflow pipe should discharge to a safe place.
- Please read the instruction manual to ensure safe usage.
**Installation Piping Example for GT5C**

* Actual installation differs depending on the desired discharge capacity and operating conditions, etc. See product specifications data sheet (SDS) for details.

**Easy Maintenance**
- Inlet/outlet check valves and motive medium intake valve unit are removable while connected to the piping
- The unit can be disconnected by removing only two bolts
- The body can be disassembled by removing six bolts while still connected to the piping

**Simple Installation**
- Only motive medium intake pipe - no exhaust pipe necessary
- Inlet/outlet piping is linear, streamlined and efficient
- Built-in air vent and check valves minimize external installation

**6” Filling Head**
- Usable with low condensate outlet heat exchangers

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**Specifications**

Values attained using a TLV CK3MG (screwed) or CKF5M/CKF3MG (flanged) check valve, unless otherwise indicated. GP/GT5C have a built-in check valve.

<table>
<thead>
<tr>
<th>Model</th>
<th>GT14</th>
<th>GP14</th>
<th>GT10</th>
<th>GP10</th>
<th>GT14M</th>
<th>GP14M</th>
<th>GT14L</th>
<th>GP14L</th>
<th>GT10L</th>
<th>GP10L</th>
<th>GT5C</th>
<th>GP5C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. Max. Pump Discharge Capacity (lb/h)</td>
<td>12,000</td>
<td>13,000</td>
<td>17,000</td>
<td>18,000</td>
<td>6,000</td>
<td>7,000</td>
<td>4,000</td>
<td>4,500</td>
<td>3,000</td>
<td>3,500</td>
<td>18,000</td>
<td>300</td>
</tr>
<tr>
<td>Approx. Built-in Trap Cap. (lb/h)</td>
<td>80,000</td>
<td>—</td>
<td>80,000</td>
<td>—</td>
<td>30,000</td>
<td>—</td>
<td>27,000</td>
<td>—</td>
<td>24,000</td>
<td>—</td>
<td>—</td>
<td>2,200</td>
</tr>
</tbody>
</table>

**Dimensions (in)**

- Connection
  - S: Screwed, F: Flanged
- Body Material & Weight (lb)
  - Carbon Steel: 44 44
  - Cast Stainless Steel: — — — — — — — — 110 108
  - Carbon Steel: 40 40
- Size (in)
  - Pumped Med. Inlet: 3 3 2, 3 3 2, 3 3 2, 3 3 2
  - Pumped Med. Outlet: 1 1 1 1
  - Motive Med. Inlet: 1 1/2 3/4 1/2
  - Pump Exhaust Outlet: 1 1/2 1 1/2
- Max. Oper. Press. (PMO)
  - GT Series: Saturated Steam, GP Series: Saturated Steam, Compressed Air, Nitrogen
  - PMO: 200 psig 150 psig 200 psig 150 psig 75 psig
- Max. Oper. Temp. (TMO)
  - GT Series: Saturated Steam, GP Series: Saturated Steam, Compressed Air, Nitrogen
  - TMO: 392 °F 365 °F 428 °F 365 °F 428 °F
- Max. Allow. Press. (PMA)
  - GT Series: Saturated Steam, GP Series: Saturated Steam, Compressed Air, Nitrogen
  - PMA: 200 psig (C.I.)*, 230 psig (C.S.)*
  - 230 psig (C.I.)*, 200 psig (C.S.)*
  - 230 psig (C.I.)*, 200 psig (C.S.)*
  - 150 psig
- Max. Allow. Temp. (TMA)
  - GT Series: Saturated Steam, GP Series: Saturated Steam, Compressed Air, Nitrogen
  - TMA: 428 °F 428 °F 428 °F 428 °F 428 °F
- Motive Medium Press.
  - GT Series: Saturated Steam, GP Series: Saturated Steam, Compressed Air, Nitrogen
  - 100 - 200 psig
  - 3 - 150 psig
  - 5 - 200 psig
  - 5 - 150 psig
  - 5 - 75 psig
  - GT Series: Saturated Steam, GP Series: Saturated Steam, Compressed Air, Nitrogen
  - 150 psig
  - 143 psig
  - 143 psig**
  - 68 psig**
- Filling Head (in)
  - Standard 36
  - Minimum 30
  - 1.7 lb steam, 96 ft³ compressed air (GP Series)**
- Steam/Air Consumption
  - GT Series: Saturated Steam, GP Series: Saturated Steam, Compressed Air, Nitrogen
  - 1.7 lb steam, 161 ft³ compressed air (GP Series)**

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**CAUTION**

To avoid abnormal operation, accidents or serious injury, DO NOT use this product outside of the specification range. Local regulations may restrict the use of this product to below the conditions quoted.

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**CAUTION**

DO NOT DISASSEMBLE OR REMOVE THIS PRODUCT WHILE IT IS UNDER PRESSURE. Allow internal pressure of this product to equal atmospheric pressure and its surface to cool to room temperature before disassembling or removing. Failure to do so could cause burns or other injury. READ INSTRUCTION MANUAL CAREFULLY.

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Specifications subject to change without notice.