P-06	Keywords	Y2	device	Z2/3	oil/natural gas	E25	general-purpose machinery

TLV Co., Ltd.

Steam Condensate Recovery Pump Requiring No Electricity (Mechanical Pump)

Features

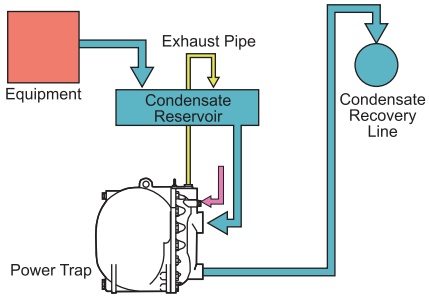
TLV PowerTrap® GP/GT Series

- **Broad Series Ranging from Small to Large**
  The lineup features a range of sizes from compact with a pumping capacity of 250 kg/h, to the largest at 9,000 kg/h. The lineup is available as the GP Series with a mechanical pump only, or as the GT Series with a built-in trapping mechanism, so an appropriate model can be selected based on the size of the steam-using equipment and its operating conditions, while combining condensate discharge and condensate pumping to reduce overall costs.

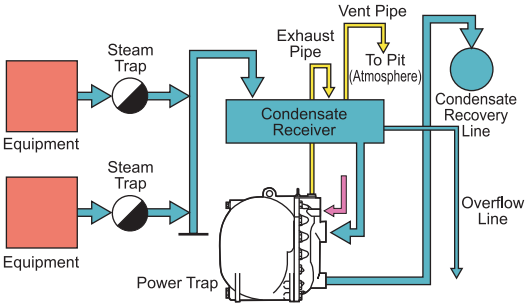
- **World's First Mechanical Pump with Built-in Steam Trap (GT Series)**
  Because the mechanical pump does not require electricity to recover condensate, running costs can be reduced below those of electric pumps. There is also no fear of cavitation, unlike electric pumps.

- **Compact GT5C Equipped with All the Features**
  The GT5C realizes simple piping and installation, as well as a 170 mm inlet for a low filling head. Additionally, the GT5C allows replacement of parts without disassembling the piping.

- **Eliminate Stall**
  The PowerTrap discharges condensate from steam-using processes even with no differential pressure, allowing it to eliminate stall, preventing water hammer and insufficient heating.



Closed System



Open System

Basic Concept or Summary

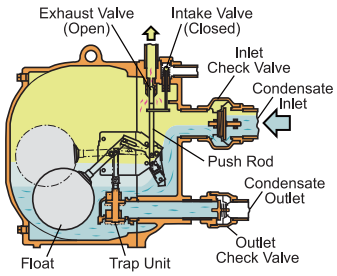
◆ Overview

During manufacturing and building heating and cooling, large amounts of steam are used as a heat source. The use of steam generates condensate. Because condensate is high-temperature when generated and can be re-used as water, it has been recovered with electric pumps. In order to recover this condensate without using electricity, new mechanical pump technology has been developed. Because of the easy installation, previously unrecovered condensate can be recovered and reused to conserve energy.

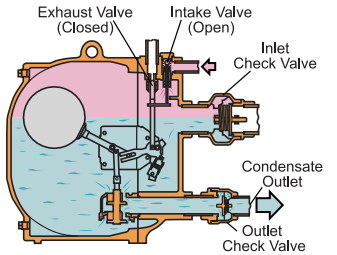
GP/GT Series

◆ Operation

1. The float rises when condensate enters the PowerTrap from the condensate inlet passing through the inlet check valve. Gas in the PowerTrap escapes through the exhaust valve.
   - For the GT Series, when the float rises the trap unit opens the valve. While P1 > Pb (Inlet pressure is greater than back pressure), condensate is discharged through the condensate outlet piping (trapping function).
   - For the GP Series, or for the GT Series when P1 ≤ Pb, condensate is not discharged and collects in the body.
2. When the float reaches its highest position, the push rod connected to the snap-action unit snaps up, closing the exhaust valve and opening the motive medium inlet valve. The motive medium increases the pressure inside the body above the back pressure, closing the inlet check valve and pushing the condensate in the body out through the outlet check valve into the recovery piping.



1.3 Filling (Exhaust) Process

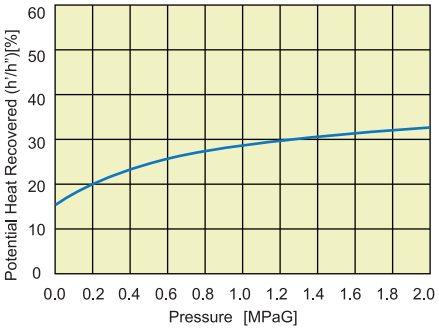


2. Pumping (Motive Supply) Process

3. As the condensate is discharged from the body, the float lowers with the level of the condensate. Once the float reaches its lowest point, the push rod connected to the snap-action unit snaps down opening the exhaust valve and closing the motive medium intake valve, returning to step 1.

Effects or Remarks

For heating processes and air conditioning which use steam for indirect heating, only about 70 % of the heat energy in the steam is put to use. The remaining 30 % or so of heat energy is discharged through the steam traps and is usually released to the atmosphere. However, the condensate generated from steam-using processes is still hot, and if that heat is put to use boiler fuel can be reduced by 20 – 30 %. (See the right graph) For instance, if 1 ton of 100 ºC condensate is recovered every hour, the amount of heat recovered it worth 1.6 million yen, with an equivalent reduction in CO_2 emissions of approximately 95 t -CO_2/year (operating 4,000 hours/year, with heat at 5 yen/1000 kilocalories). If that condensate can be recovered at 150 ºC, the yearly value increases to 2.6 million yen.



Potential Heat Recovery Guidelines for Condensate

Model		GT series	GP series
Built-in Steam Trap		○	—
Std. Pump Discharge Cap.		approx. 0.25 — 8 t/h	approx. 0.26 — 9 t/h
Maximum Discharge Capacity (Trap)		approx.1 — 40 t/h	—
Connection (Inlet / Outlet)		Screwed , Flanged	Screwed , Flanged
Body Material		FC250 / WCB / CF8M	
Size	Inlet (mm)	25 — 80	
	Outlet (mm)	25 — 50	
Max. Oper. Press. PMO (MPaG)		0.5 / 1.05 / 1.4	
Max. Oper. Temp. TMO (°C)		185 / 220	
Filling Head (mm)		Minimum: 155 — 710 Standard: 300 — 860	
Motive Medium		Saturated Steam	Saturated Steam, Compressed Air, Nitrogen
Pumped Medium		Steam Condensate	Steam Condensate, Water

See TLV product specification data sheet (SDS) for detailes.

Installation in Practice or Schedule

Domestic

- Introduced to large steam-using plants such as oil refineries, chemical, steel, and food. Additionally, many are used by buildings, hotels, etc. in air conditioning systems.
- One example is for air conditioning equipment at a pharmaceutical company. By installing PowerTraps, 6 million yen per year could be saved with an ROI of 2.4 years by recovering condensate that was previously unrecoverable due to poor return on investment.

Overseas

- Introduced to large steam-using plants worldwide such as oil refineries, chemical, steel, and food. Additionally, many are used by buildings, hotels, etc. in air conditioning systems.

Overseas subsidiaries in 12 countries and more than 100 international distributors in over 50 countries

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