

# TLV<sup>®</sup>

## PowerTrap<sup>®</sup>

Mechanical Pump & Pump/Trap

**GP Series**  
**GT Series**



# 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

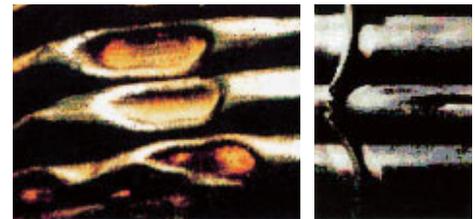
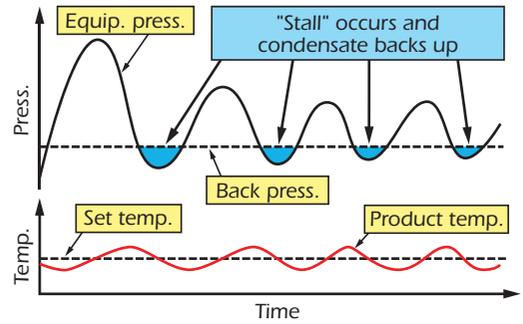
As the “stall” cycle repeats, the steam pressure in the equipment varies above and below the back pressure, causing product temperature and quality fluctuations.

### ● 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.



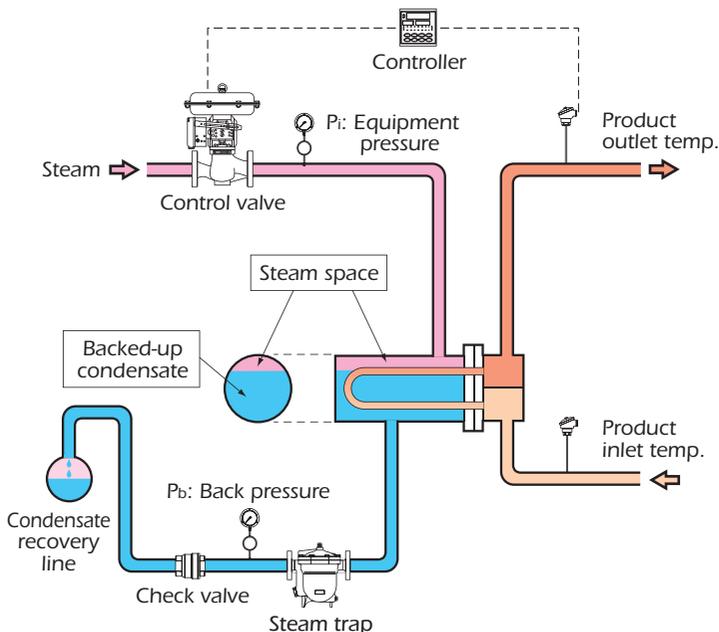
Water hammer damage to tubes and stays



Tube corrosion

**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.**

## ■ A Closer Look at the “Stall” Cycle



- ① When the demand for heating energy is high, the control valve is wide open,  $P_i$  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  $P_i$  drops.
- ③ If  $P_i$  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.  $P_i$  increases and, when it becomes greater than  $P_b$ , condensate is forced out through the trap, and the cycle begins again.

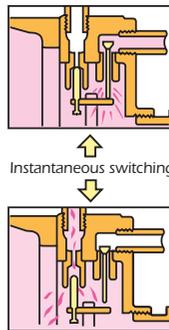
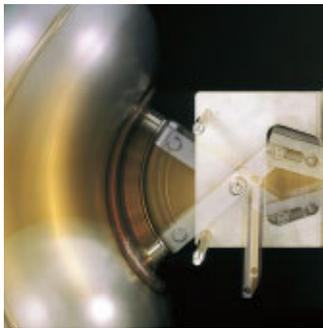
# PowerTrap Benefits

## 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

\* GP/GT14M, GP/GT14L, GP/GT10L, GP/GT5C: one year warranty  
\*\* GP/GT5C: one year warranty Contact TLV for full warranty details



## 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

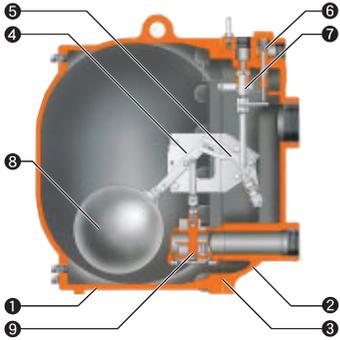


- One-piece pump assembly for easy installation, maintenance and retrofit to pump bodies of certain other manufacturers
- Lighter-weight model, with ASME certified fabricated steel body for increased cost effectiveness

# Construction

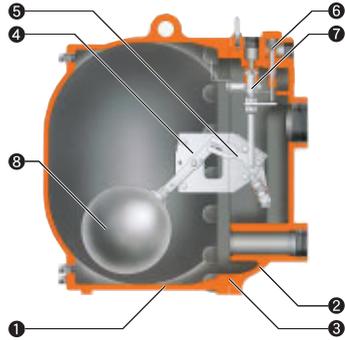
## GT14/GT14M/GT14L GT10/GT10L

Mechanical pump with built-in trap



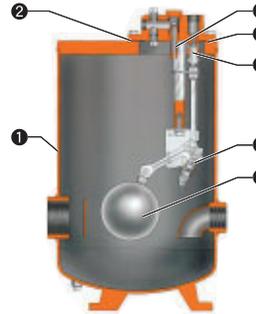
## GP14/GP14M/GP14L GP10/GP10L

Mechanical pump



## GP10F

Mechanical pump with retrofitable mechanism

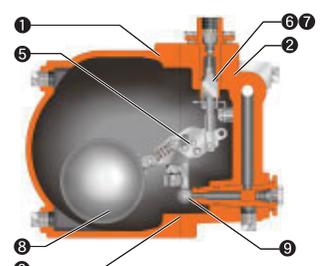


## GT5C

Compact mechanical pump with built-in trap

## GP5C

Compact mechanical pump



GT5C shown above  
GP5C not equipped with trap unit

## Materials

1	Body (except GP10F, GP/GT5C)	Cast Iron or Cast Steel*	4	Lever Unit (GP/GT14, GP/GT10 only)	Stainless Steel
	Body (GP10F)	Fabricated Carbon Steel**			
	Body (GP/GT5C)	Cast Iron or Stainless Steel			
2	Cover (except GP10F, GP/GT5C)	Cast Iron or Cast Steel*	5	Snap-action Unit	Stainless Steel
	Cover (GP10F)	Cast Steel**			
	Cover (GP/GT5C)	Cast Iron or Stainless Steel			
3	Cover Gasket (GP/GT14M, GP/GT14L, GP/GT10, GP/GT10L, GP10F)	Graphite Compound	6	Intake Valve Unit	Stainless Steel
	Cover Gasket (GP/GT14)	Graphite/Stainless Steel			
	Cover Gasket (GP/GT5C)	Fluorine Resin			
			7	Exhaust Valve Unit	Stainless Steel
			8	Float	Stainless Steel
			9	Trap Unit	Stainless Steel
			10	Check Valve***	Stainless Steel
			11	Air Vent Unit*** (GT5C only)	Stainless Steel

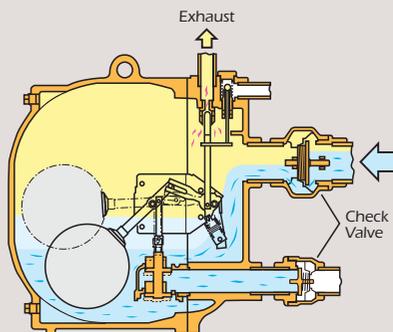
\* Cast stainless steel available as option \*\* Stainless steel available as option \*\*\* Not shown

# Operation

## Pump/Trap: GT10

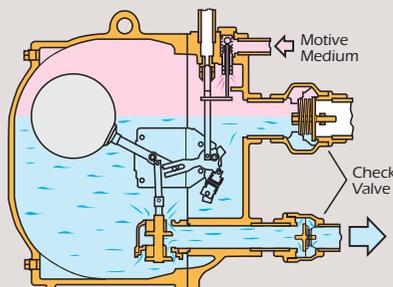
### 1 GT Trapping/Filling Cycle

When GT inlet pressure is greater than back pressure, the GT acts as a trap, continuously discharging condensate. When inlet pressure is less than back pressure, condensate cannot be discharged, so it accumulates in the body, causing the float to rise. As the float rises, the trap opens, although condensate still cannot be discharged.



### 2 GT Discharge Cycle

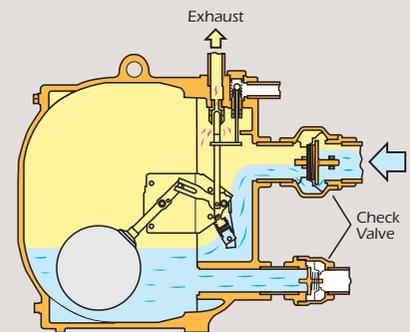
When the float reaches its highest position, the trap is fully open and the snap-action mechanism actuates, instantly both opening the motive medium intake valve and closing the exhaust valve. The motive medium pressure forces out the condensate, and the float falls. The snap-action mechanism resets, instantly opening the exhaust valve and closing the intake valve. The cycle then repeats.



## Pump: GP10

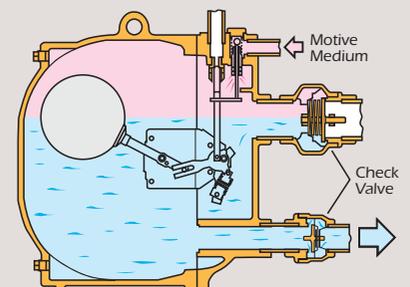
### 1 GP Filling Cycle

The pump body is equalized to the inlet receiver (usually atmospheric) by the open exhaust valve. This allows condensate to drain by gravity into the pump, where it accumulates and causes the float to rise.



### 2 GP Discharge Cycle

When the float reaches its highest position, the snap-action mechanism actuates, instantly both opening the intake valve and closing the exhaust valve. The motive medium pressure forces out the condensate, and the float falls. The snap-action mechanism re-sets, instantly opening the exhaust valve and closing the intake valve. The cycle then repeats.



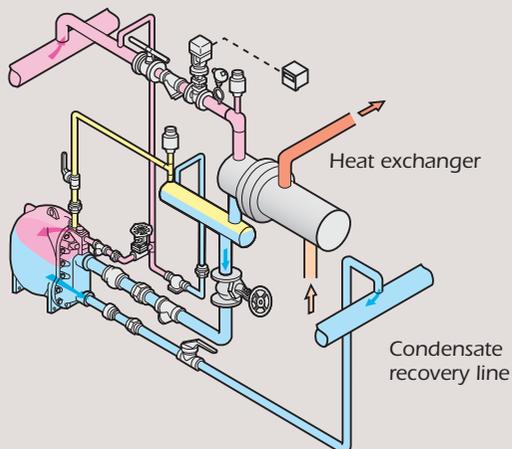
# Systems for Many Different Applications

The TLV PowerTrap series meets a variety of condensate processing needs.

	Closed System			Open System			
System Overview							
Benefits	<ul style="list-style-type: none"> <li>No need for external steam trap (GT model features built-in trap)</li> <li>No flash steam discharge</li> <li>Small reservoir</li> <li>Use with vacuum equipment possible</li> </ul>			<ul style="list-style-type: none"> <li>Collection of condensate from multiple equipment possible</li> <li>Can be used where trap is lower than receiver, such as equipment situated near grade (providing there is sufficient differential pressure)</li> </ul>			
Notes	<ul style="list-style-type: none"> <li>Only one piece of equipment possible per system</li> <li>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"; GT5C - 7")</li> </ul>			<ul style="list-style-type: none"> <li>Separate steam trap required for each piece of equipment</li> <li>Requires venting pipe to discharge flash steam to atmosphere</li> </ul>			
Approx. Max. Pump Discharge Capacity	<ul style="list-style-type: none"> <li>17,000 lb/h and less (GT10)</li> <li>12,000 lb/h and less (GT14)</li> <li>greater than 17,000 lb/h (install pumps in parallel)</li> </ul>	<ul style="list-style-type: none"> <li>less than 6,000 lb/h (GT14M)</li> <li>less than 4,000 lb/h (GT14L)</li> </ul>	<ul style="list-style-type: none"> <li>less than 3,000 lb/h (GT10L)</li> <li>less than 300 lb/h (GT5C)</li> </ul>	<ul style="list-style-type: none"> <li>18,000 lb/h and less (GP10, GP10F)</li> <li>13,000 lb/h and less (GP14)</li> <li>18,000 lb/h and greater (install pumps in parallel)</li> </ul>	<ul style="list-style-type: none"> <li>less than 7,000 lb/h (GP14M)</li> <li>less than 4,500 lb/h (GP14L)</li> </ul>	<ul style="list-style-type: none"> <li>less than 3,500 lb/h (GP10L)</li> <li>less than 320 lb/h (GP5C)</li> </ul>	
Model	Mechanical pump with built-in trap <b>GT14/GT10</b>	Mid-size mechanical pump with built-in trap <b>GT14M/GT14L</b>	Compact mechanical pump with built-in trap <b>GT10L/GT5C</b>	Mechanical pump <b>GP14/GP10/GP10F</b>	Mid-size mechanical pump <b>GP14M/GP14L</b>	Compact mechanical pump <b>GP10L/GP5C</b>	
Some Application Examples	Where there is <b>ALWAYS</b> a <b>negative</b> pressure differential (e.g. vacuum equipment), <b>GP14/GP14M/GP14L/GP10/GP10L/GP10F</b> can be used			Large process/flow, such as: re-boilers, large heat exchangers	Small to medium process/flow, such as: room heaters, small to medium heat exchangers	Large process trap discharges, such as: cylinder dryers, platen presses	Small to medium process trap discharges, such as: recovery: trace lines & mains, small to medium heat exchangers

## Closed System (GT)

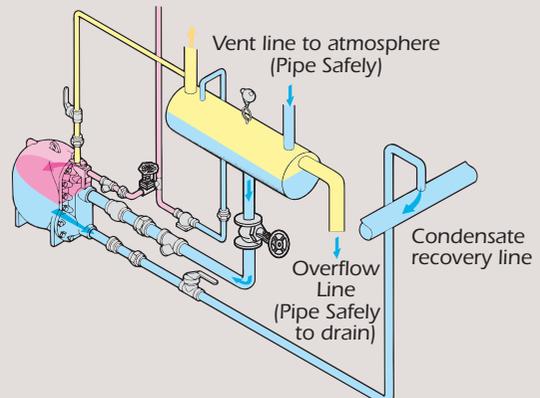
Sample Application:  
Condensate Drainage & Recovery from Heat Exchanger



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

## Open System (GP)

Sample Application:  
Condensate Recovery from an Open Tank



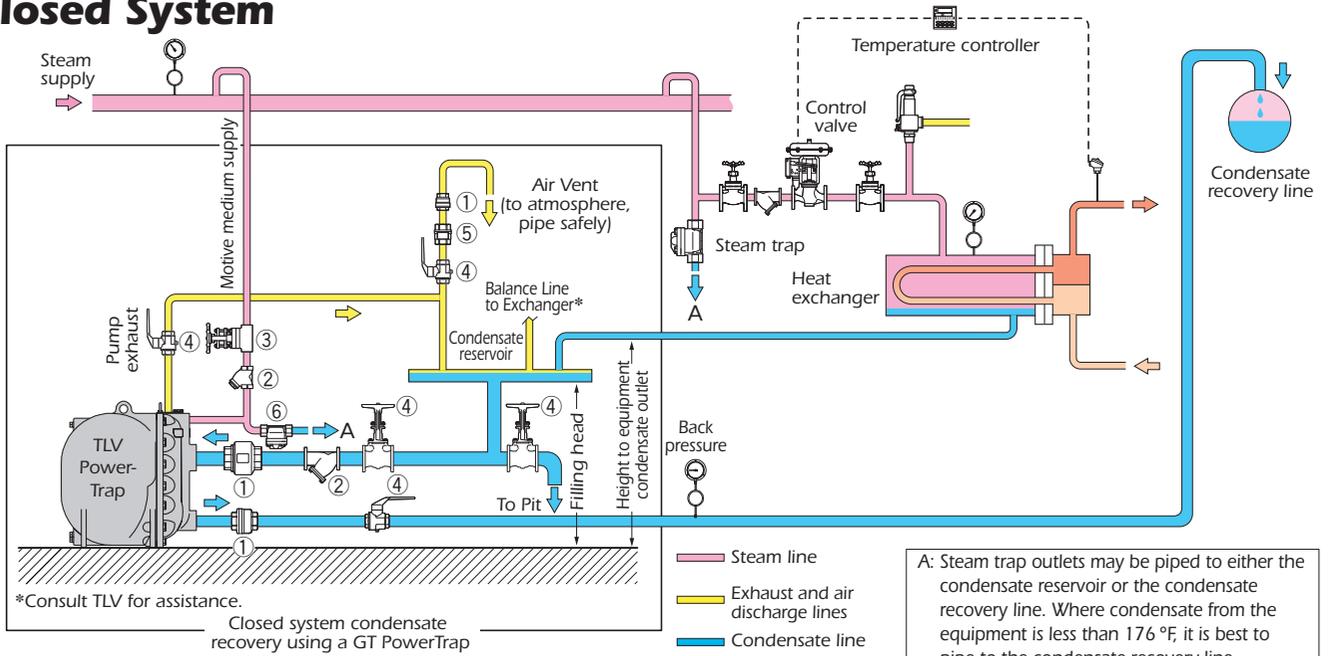
- Collection of condensate up to 212 °F possible
- Makes it easy to design systems that can easily obtain pressure differential

**CAUTION** Pipe all atmospheric discharge to a safe area

# Installation Piping Examples

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

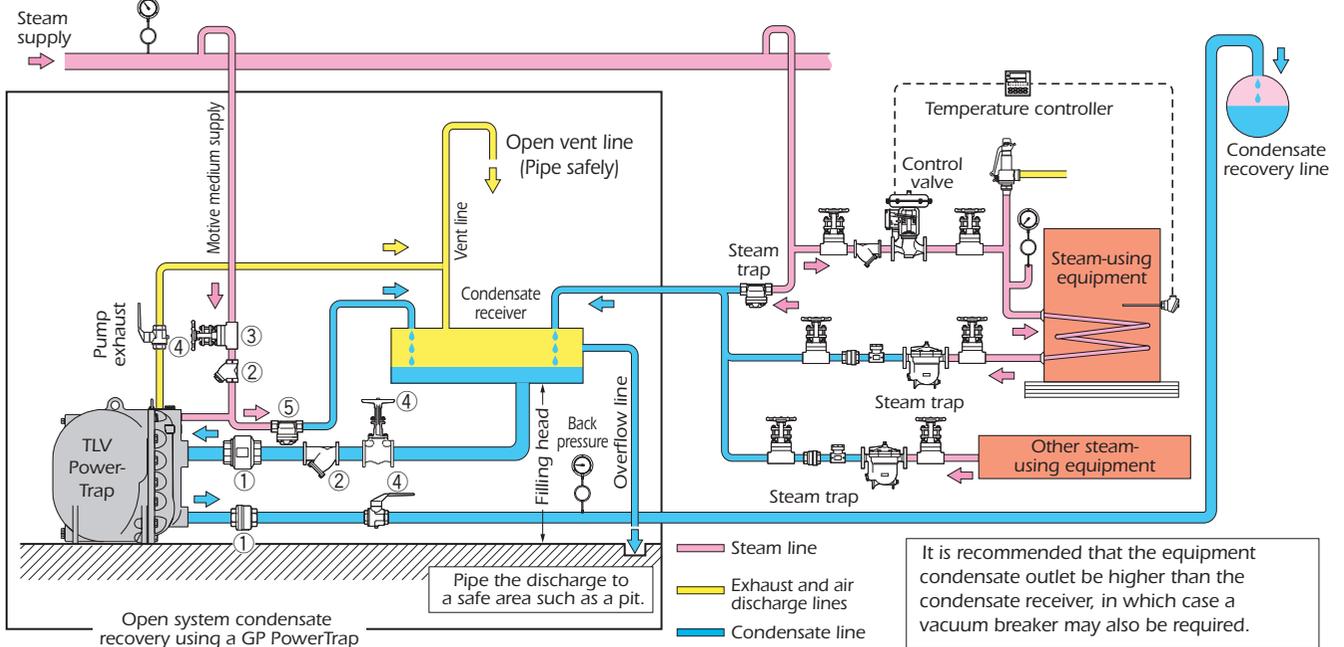
## ● Closed System



### ⚠ 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.

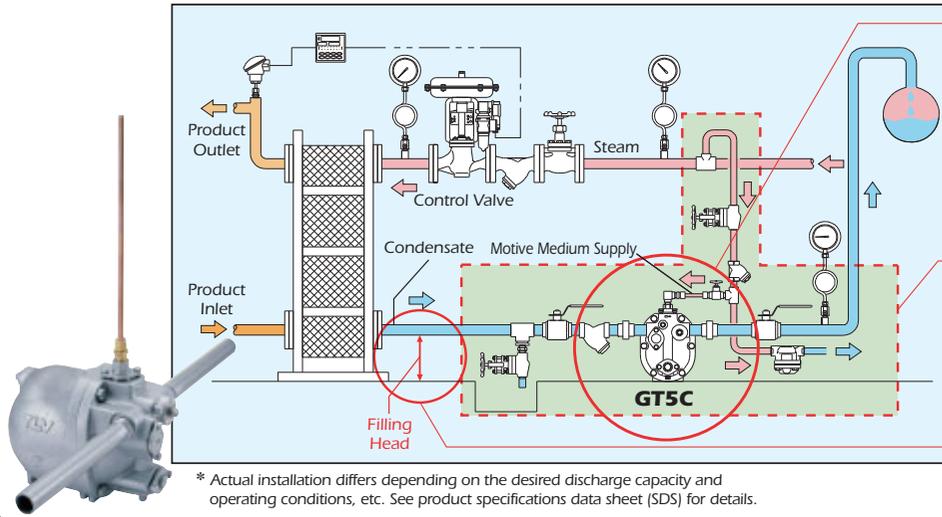
## ● Open System



### ⚠ 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\*



### 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

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

## 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.

Model	GT14		GP14		GT10		GP10		GT14M		GP14M		GT14L		GP14L		GT10L		GP10L		GP10F		GT5C		GP5C			
Approx. Max. Pump Discharge Capacity (lb/h)	12,000		13,000		17,000		18,000		6,000		7,000		4,000		4,500		3,000		3,500		18,000		300		320			
Approx. Built-in Trap Cap. (lb/h)	80,000		—		80,000		—		30,000		—		27,000		—		24,000		—		—		2,200		—			
Dimensions (in)																												
Connection*1	S	F	S	F	S	F	S	F	F				S	F	S	F	S		S		S		S		S			
Body Material & Weight (lb)	Cast Iron		Cast Steel		Cast Stainless Steel		—		—		—		—		—		—		Carbon Steel		154		44		44			
Size (in)	Pumped Med. Inlet		Pumped Med. Outlet		Motive Med. Inlet		Pump Exhaust Outlet		1 1/2				1, 1 1/2				3		1		1		1		1			
Max. Oper. Press. (PMO)	200 psig				150 psig				200 psig				150 psig				428 °F		75 psig		365 °F		—		—			
Max. Oper. Temp. (TMO)	392 °F				365 °F				428 °F				365 °F				428 °F		365 °F		—		—		—			
Max. Allow. Press. (PMA)	200 psig (C.I.)*2, 230 psig (C.S.)*2								230 psig (C.I.)*2, 300 psig (C.S.)*2								150 psig				—		—		—			
Max. Allow. Temp. (TMA)	428 °F								428 °F (C.I.)*2, 500 °F (C.S.)*2								428 °F				650 °F		428 °F		—		—	
Motive Med. Press.	100 - 200 psig				5 - 150 psig				5 - 200 psig				5 - 150 psig				5 - 75 psig		—		—		—		—			
Max. Allow. Back Press.	150 psig*3				143 psig*3				193 psig*3				143 psig*3				68 psig*3		—		—		—		—		—	
Motive Medium*4	GT Series: Saturated Steam								GP Series: Saturated Steam, Compressed Air, Nitrogen								—				—		—		—		—	
Pumped Medium*5	GT Series: Steam Condensate								GP Series: Steam Condensate, Water								—				—		—		—		—	
Filling Head*6 (in)	Standard 36 Minimum 30								Std. 25 Min. 14		Std. 25 Min. 12		Std. 25 Min. 18 (12 w/ CKF5M)		Std. 42 Min. 33		Min. 6		—		—		—		—		—	
Steam/Air Consumption*7	1.7 lb steam, 96 ft <sup>3</sup> compressed air*8 (GP Series)								—				2 lb steam, 100 ft <sup>3</sup> air*8				—		—		—		—		—		—	

\*1 S = screwed, F = flanged \*2 C.I. = cast iron, C.S. = cast steel \*3 Motive medium pressure minus back pressure must be greater than 7 psi

\*4 Do not use with toxic, flammable or otherwise hazardous fluids. \*5 Do not use for fluids with specific gravities under 0.85 or over 1, or for toxic, flammable or otherwise hazardous fluids. \*6 Measured from grade. \*7 At 15 psig back pressure, per 1,000 lb condensate. \*8 Equivalent consumption of air at 68 °F under atmospheric pressure. Full product details (sizes, pressures, capacities and materials) are included in the individual specification data sheets (SDS).



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.



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.

## TLV CORPORATION

13901 South Lakes Drive, Charlotte, NC 28273-6790

Tel: 704-597-9070 Fax: 704-583-1610

E-mail: [tlv@tlvengineering.com](mailto:tlv@tlvengineering.com) <https://www.tlv.com>

For Technical Service 1-800 "TLV TRAP"



Manufacturer  
**TLV CO., LTD.**  
Kakogawa, Japan  
is approved by LRQA Ltd. to ISO 9001/14001

ISO 9001  
ISO 14001

