SpenoMatic energy solutions

MECHANICAL CONDENSATE RECOVERY UNITS

INSTALLATION AND MAINTENANCE INSTRUCTIONS

SPENOMATIC ENERGY SOLUTIONS

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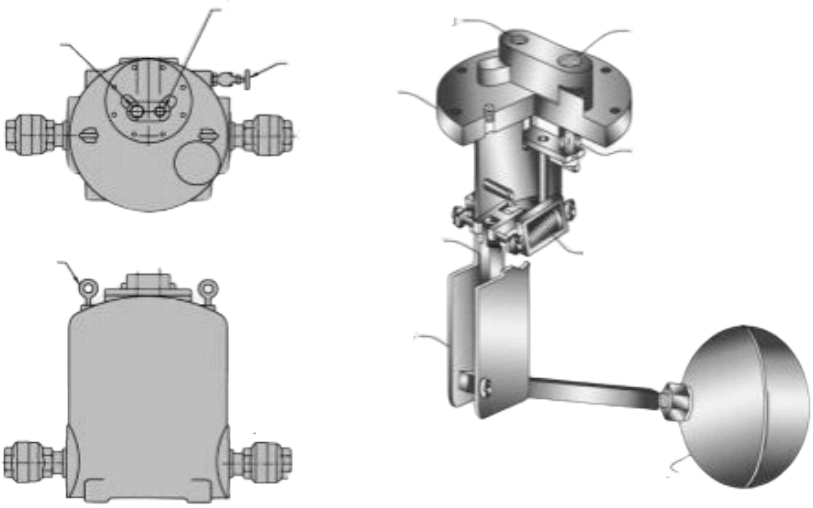
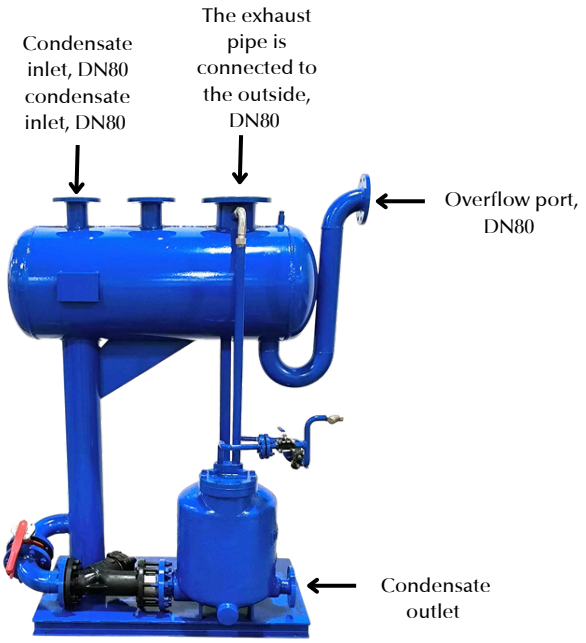
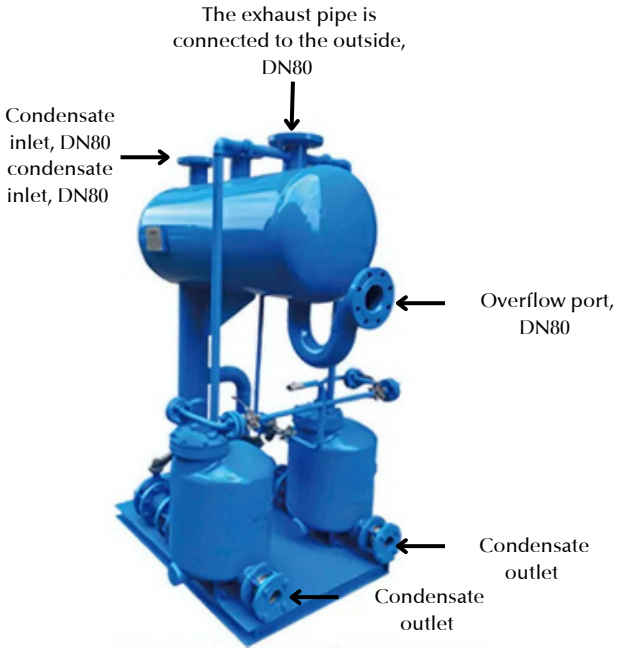
MECHANICAL CONDENSATE RECOVERY UNITS



Top view of the recovery pump, overall diagram (2) Internal view of LPMP type condensate recovery pump



Simplex Pump



Duplex Pump

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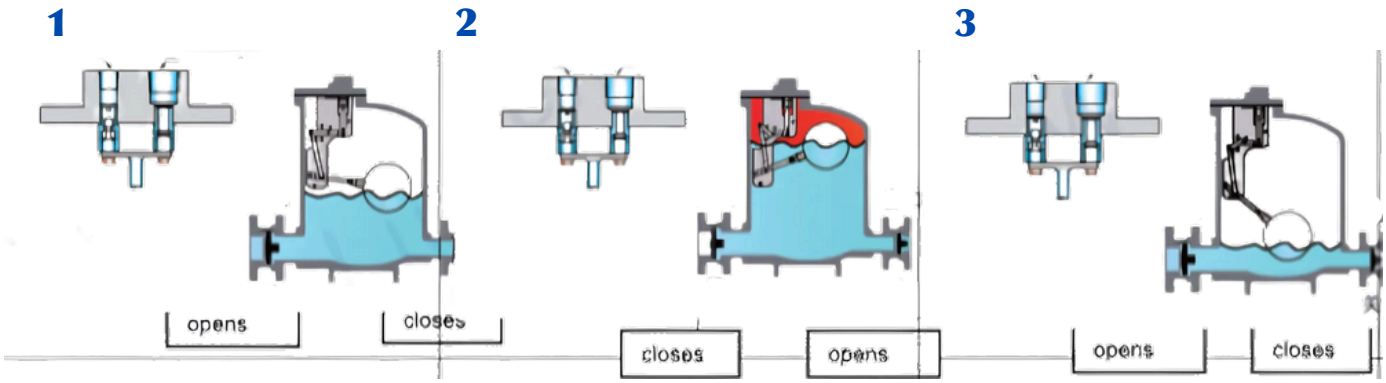
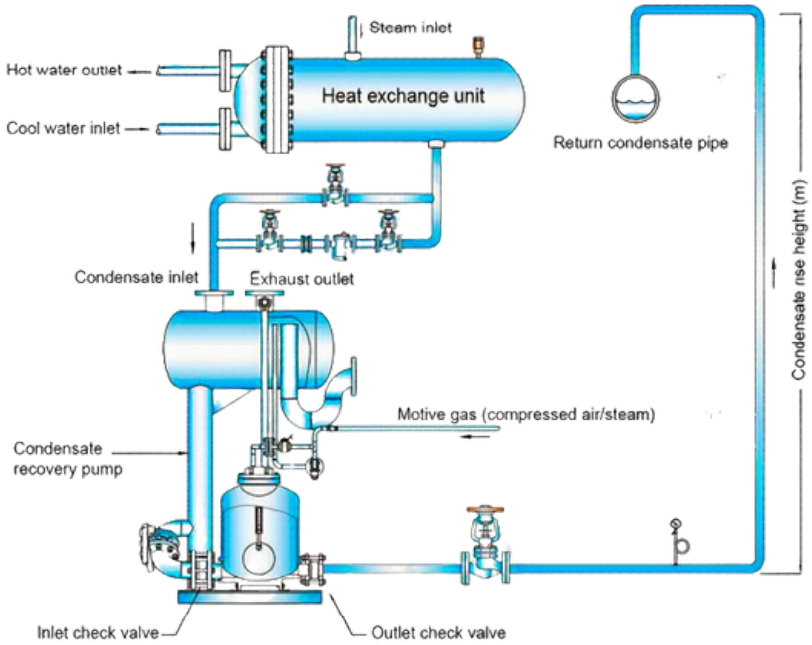
Working Principle



1. When the equipment is started, the exhaust (gas) port is opened and the power gas (gas) source inlet is closed. The condensate water enters the pump body through the check valve, causing the float to rise.
2. The steam (gas) inside the pump body is discharged through the exhaust (gas) port when the pump body is filled with condensate, the pump interconnection device opens the inlet of the power steam(gas) source while closing the exhaust (gas) port; this rapid change shifts the pumps operation from water injection circulation to drainage circulation; the condensate is discharged and enters the recovery system.
3. When the liquid level of the pump drops, the linkage device of the pump will open the exhaust (gas) port and close the power gas (gas) source port, and the condensate water will enter the pump body through the inlet check valve for another working cycle.

Installation

Typical Installation



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1. Install the pump below the equipment that needs drainage, so that the drain is vertically upwards, and the pump should be installed at the recommended water injection height (the vertical distance between the pump and the bottom of the water tank).

2. To avoid overflow of equipment when the pump is draining water, an open water tank or overflow pipe is installed above the pump, as shown in the figure above. All devices on the inlet pipe must be straight through.

3. Connect the check valve to the pump but ensure that the direction of the fluid is correct as it flows through the valve. To achieve optimal performance, the horizontal pipe before the inlet check valve and after the outlet check valve should be as short as possible. Connect the outlet discharge pipe to the condensate recovery main or other equipment.

4. Connect the operating power inlet pipe of the pump cover to the power air source (steam, air, or other gases). When steam is used as the power source, a filter and steam trap should be installed upstream in the inlet piping. The drain pipe of the steam trap should be connected to a water collection tank or connecting pipe before the pump. 5. The exhaust pipe should be vertical and upward to the atmosphere. If it must be horizontal, thepipeshouldbetilted upward so that it can drain to the pump or water tank by itself

Utility Needed

1. Connect the power source (steam, air, or other gas) to the power inlet pipe of the pump cover
2. Connect the water supply pipe above the sink
3. Connect the discharge pipe to the condensate recovery main or other equipment.
4. Connect the overflow pipe to the drain.

Startup Process

Note: Ensure that steam, air or other gas pipes are closed before performing installation or any maintenance work to prevent injury.

1. Slowly input the driving gas (steam, air or other gases) to pressurize the steam valve of the condensate recovery pump. Check whether the steam trap is working (for driving gas steam).

2. Open the stop valve in the condensate inlet pipe and discharge pipe.

3. Open the valve before the system to allow the condensate to enter the water tank and fill the pump body. When the pump is full, it starts to drain.

4. Observe for any abnormal movements, the condensate recovery pump should cycle periodically and the exhaust sound at the end of each cycle should be audible. If any irregularities are found, recheck the correct installation of the pump according to the installation and maintenance guide. If necessary, contact us.

5. If a U-shaped overflow pipe is installed, check whether there is a water seal on the U-shaped pipe to prevent steam from being discharged, and fill the pipe with water if necessary

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Maintenance

Check and repair the connecting rod mechanism
Note: Before removing the pump cover and connecting rod assembly, ensure that the pump is completely isolated from the system and that the internal pressure has been released. Before performing any maintenance, close all steam pipes, drain pipes, and condensate inlet and outlet pipes.

1. Separate all the connecting pipes on the pump cover, remove the cover bolts, and remove the pump cover and mechanism assembly from the pump body, paying attention to the position of the pump cover.

2. Observe whether the connecting rod assembly is attached with dirt and rust and whether it is movable.

3. Observe the compressed spring. If it is damaged, remove the clamp. If necessary, replace the new spring and install the clamp.

4. Check the steam valve and exhaust valve.

5. Remove three fixing bolts and remove the partition.

6. Check whether there is any wear on the surface of the steam valve seat (the steam valve core must be removed to check the valve seat). Clean the surface of the valve seat and then reassemble it. If necessary, replace the valve with a new one.

7. Replace the damaged sealing ring in reverse order.

8. When re-installing the pump cover and connecting rod assembly, the pump cover must be started again in the direction of (1) above and in accordance with the starting procedure.

Fault diagnosis

If the size of the condensate recovery pump is selected properly but does not function properly it may indicate an incorrect installation of the equipment. If the pump operates occasionally or not at all it is usually due to changes in the supply system or differences in back pressure conditions compared to the original design parameters. Once the cause of the system failure has been identified make the necessary corrections in the following order.

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Note: Installation and fault diagnosis must be carried out by qualified maintenance personnel without disassembling any connection ports of the pump or pipeline system it is essential to ensure that the pump has been depressurized and to close the steam supply line to prevent accidental discharge. When removing any connection joints, the pipes or bolts must be removed slowly if there is still pressure inside the pipe, it will be evident during the process of removing the pipeline system that depressurization must be performed before each connection head is removed.

Symptom	Cause	Examine and Repair
1. At startup, the pump cannot move	(A) The steam supply line is closed	(A) Open the supply steam piping and pressurize the pump
	(B) The condensate inlet pipe is closed	(B) Open all valves to allow condensate to enter the pump body
	(C) The condensate discharge pipe is closed	(C) Open all valves to allow condensate to be discharged from the pump body
	(D) The supply pressure is lower than the back pressure	(D) Check the supply pressure andstatic back pressure, and adjust the supply pressure to an appropriate level.
	(E) The installation direction of the check valve is wrong	(E) Check the flow direction. If the installation is wrong, correct it
	(F) Air lock in the pump	(F) In an open circuit system,ensure that the drain pipe is directly connected to the atmosphere and can drain by gravity to the pump or catch basin. In a closed circuit system, separate the pump from the pressure discharge system (close the drain circuit), remove the air vent on the pump cover. Operators must stay away from the drain vent. If the pump starts circulating, it is due to an air lock. Recheck whether the drain circuit is installed according to (installation guide).Install a thermal static pressure relief valve at a high point in the drain pipe. Ensure that the circuit can drain by gravity.

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Symptom	Cause	Examine and Repair
2. The supply pipe/pipeline is overflowing, but the pump can still circulate normally (the periodic exhaust can be heard)	(A) The pump diameter is too small	(A) Check the product manual displacement table, increase the stop valve diameter,and install another pump if necessary.
	(B) The water level is too low	(B) Check the water level requiredforthe product manual displacement table.Reduce the height of the pump to achieve the desired water level.
	(C) The supply steam pressure does not reach the set pressure	(C) Check the set pressure of the supply steam and the maximum back pressure during operation. Compare with the product manual. Increase the steam pressure as needed to meet the load conditions.
	(D) The condensate inlet pipe is in a throttling state	(D) Check that all equipment is fully accessible. If filters are installed,clean the filters and ensure that all valves are open.
	(E) The import and export check valve is stuck (in the normally open state)	(E) Isolate the check valve, releasethe pipeline pressure, remove the valve cap and observe the valve core, valveseat and valve stem. If necessary,clean the surface of the valve seat,then reassemble or update the check valve
3. The equipment in the supply pipeline overflows and the pump stops circulating (the periodic exhaust is not heard)	(A) The emission pipe is closed or blocked	(A) Check the supply pressure and static back pressure when the pump is discharged.(When the pump is discharged) If they are equal, it may be that the valve on the discharge pipe is closed or blocked. Check all valves on the pump outlet side to determine that the discharge piping is not blocked.
	(B) The check valve of the discharge pipe is stuck and cannot be opened	(B) After checking 3A, isolate the drain pipe check valve and relieve the drain pipe pressure. Remove the valve cap and observe the valve core, seat and stem. If necessary, clean the surface of the valve seat and then reassemble or replace it.
	(C) Insufficient steam supply pressure	(C) If the steam supply pressure islower than the back pressure, adjust the pressure to an appropriate level.
	(D) The imported check valve is blocked and cannot be opened	(D) If no movement is heard from the connecting rod mechanism and no condensate flows out of the drainport, this may indicate a problem with the condensate inlet piping. Ensure that all valves leading to the pump are open.If so, check if the inlet check valve is stuck and cannot open. Isolate the pump and check valve from the piping and depressurize the system. Remove the valve cover, inspect the valvecore,seat, and stem, clean the seat surface,and reinstall it properly. If necessary,replace with a new one. Install the drain/loop piping and open the piping.
	(E) Filter blockage	(E) Close the stop valve in front of the filter. Remove the cover and filter screen. Clean the filter screen, if it is damaged, replace it with a new one,push the filter screen into the cover,then put it back in the filter, open the stop valve.

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4.After the pump is discharged,the recovery pipe makes a creaking sound or has an impact sound	(A) A vacuum zone is formed at the pump outlet due to the acceleration or deceleration of a large amount of water in the discharge pipe (usually due to several rises and falls of a long horizontal pipe.	(A) Install a vacuum break valveatthetop of the discharge pipe.Forapressurized recovery system, aliquidseparator should be installed downstreamof the vacuum break valve.
	(B) Pump leakage	(B) When draining the pump, check the condensate inlet pressure and static back pressure. If the inlet pressure equals or exceeds the static backpressure, this may cause the check valve to remain open. In an open system, check if there is a leaking steam trap discharging to the condensate inlet piping, which can cause an increase in pressure at the inlet pipe. Replacethefaultysteam trap.

5.Empty the pipe to discharge a large amount of flash steam (only open system)	(A) Faulty steam trap discharge to condensate inlet piping	(A) Check whether there is a leakingsteamtrap to drain condensate water recoverypipe. Repair or replace damaged steamtrap
	(B) A large amount (more than 20kg/hr) of secondary steam is discharged from the pump	(C) Isolate the pump, remove the pumpcoverand connecting rod assembly. Removethedrain valve core and valve seat toobservethe surface of the valve seat. Cleanitandreassemble it. If it has beendamaged,replace with a new valve
	(D) Steam valve leakage and/or wear	(D) Slowly open the steam supplylineandclose the condensate inlet andoutletlines. Observe whether there is anysteamleakage. If there is a leak, it indicatesthat the steam valve is in trouble.Repairor replace the steam valve.
	(E) Crankshaft mechanism damage 1) Spring fracture 2) Float ball rupture 3) Connecting rod assembly jam	(E) Open the steam supply piping andslowlyopen the pumps drain pipe to fillthepump,observe the drain outlet. The operatormuststay away from the drain outlet;ifnocondensate flows out of the drain outlet,itindicates a problem with the connectingrod.Close the steam supply piping andthecondensate inlet pipe, remove the pumpcoverand connecting rod assembly to inspectforanyobvious damage to the spring and float.Checkif the connecting rod is stuck or ifthereissignificant increased friction, repairorreplace any damaged components.
	(F) Water vapor lock-up caused by emptying/circulating process (open or closed cycle system)	(F) If the connecting rod assemblyismovingbut no liquid flows out from the drainpipefitting, slowly open the pumps dischargelineand observe its operation. Personnelmuststayaway from the drain fitting. Ifthepumpcirculation is normal, it may be a faultwiththe drain/circulation line, and recheckthedrain/circulation line accordingtotheinstallation and maintenance manual.Thedrain/circulation line must be abletodrainwater by itself to prevent water vaporlock-upin the pump. A thermoelectric exhaustvalveshould be installed at a high pointinthecirculation line.