VMAL AUTOMATIC CONDENSATE TRANSFER PUMP VCOP

Use a Condensate Recovery System?

When steam is used for indirect heat transfer in heat exchangers, reactors, and other process heating equipment, it releases its latent heat to the process and condenses into a liquid known as condensate.

Although the steam has changed phase, the condensate still contains a significant amount of thermal energy. High-pressure condensate remains at a temperature close to that of the original steam and typically retains approximately 15–20% of the fuel energy used to generate the steam.

By recovering and returning this hot condensate to the boiler feedwater system, valuable energy can be reused instead of being wasted. An efficient condensate recovery system can reduce fuel consumption by up to 20%, while also lowering water treatment costs, reducing make-up water requirements, and improving overall boiler plant efficiency.

VCOP CONDENSATE TRANSFER PUMP

VCOP-K SIMPLEX CONDENSATE PUMP SYSTEM

VMAL Automatic Condensate Transfer Pump VCOP

The VMAL VCOP Condensate Transfer Pump is designed for the efficient transfer of high-temperature liquids, including condensate, thermal oils, and other process fluids, to locations at higher elevations or against higher system pressures.

The pump is manufactured as standard in carbon steel, with stainless steel construction available upon request for specific applications.

The VMAL VCOP operates using steam, compressed air, or other suitable gases as the motive force, eliminating the need for electric power and avoiding cavitation problems commonly associated with conventional centrifugal pumps handling hot condensate.

Designed for reliable and maintenance-friendly operation, the pump is suitable for transferring a wide range of non-corrosive liquids in industrial steam and process systems.

Package Type Condensate Transfer Pump

The VMAL condensate pump is designed to recover and transfer condensate back to the boiler feedwater system using steam or compressed air as the motive force. It provides an efficient solution for handling high-temperature condensate without the risk of cavitation.
The pump can operate with either steam or compressed air and can be configured in multiple-pump arrangements to accommodate high condensate flow rates. By returning hot condensate to the boiler feedwater system, the VMAL condensate pump helps maximize energy recovery, reduce fuel consumption, and improve overall boiler efficiency.

Unlike conventional electric pumps, which may experience cavitation due to flash steam generated from high-temperature condensate, the VMAL mechanical condensate pump operates reliably under these conditions, ensuring safe and efficient condensate recovery.

LIMITTING CONDITION	
Maximum motive pressure	10 bar
Minimum motive pressure	0.5 bar
Pump discharge per cycle - DN25 to DN50	16 L
Pump discharge per cycle - DN80	25 L
Pump discharge per cycle - DN100	325 L
Max Operating temperature	185 ºC
Flowrate capacity	up to 16000 kg/h
Electricity	220VAC/50Hz

Model: VCOP- Carbon steel Condensate transfer pump
VCOPS-Stainless steel Condensate transfer pump
VCOP-K- Simplex Condensate transfer pump system
VCOP-KD- Duplex Condensate transfer pump system
VCOP-KT- Triplex Condensate transfer pump system

Size: DN25; DN40; DN50; DN80; DN100

Connection: Flanged EN1092-1 PN16
Flanged ASME B16.5 Class 150
Others on request

Installation: Horizontal installation

Motive gas: Steam, compressed air or other gases

BODY LIMITING CONDITIONS					
VCOP			VCOPS		
	ALLOW PRESS.	RELAT. TEMP.		ALLOW PRESS.	RELAT. TEMP.
PN16	16 bar	50 ºC	PN16	16 bar	50 ºC
	14 bar	100 ºC		15 bar	100 ºC
	13 bar	195 ºC		12.7 bar	200 ºC
	12 bar	250 ºC		12 bar	250 ºC
ANSI150 LB	16 bar	50 ºC	ANSI150 LB	16 bar	50 ºC
	13 bar	195 ºC		12,6 bar	200 ºC

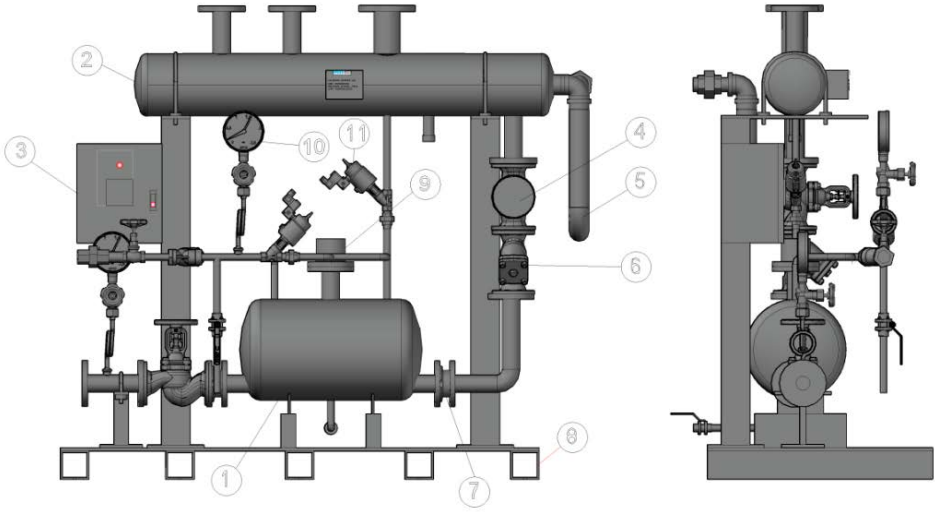
Operating Principle

Condensate discharged from steam traps during the production process enters the condensate recovery system through the inlet receiver. The condensate then flows by gravity through the pipeline and a check valve before entering the condensate pump vessel. As condensate accumulates, the vessel gradually fills.
When the condensate level reaches the high-level set point, the level controller detects the liquid level and sends a signal to the control valve. The valve opens, allowing motive steam or compressed air to enter the pump vessel. The resulting pressure forces the condensate out of the pump and transfers it to the boiler feedwater tank.

As the condensate level decreases and reaches the low-level set point, the level controller sends a signal to close the control valve, shutting off the motive steam or compressed air supply. Condensate then begins to refill the vessel, and the pumping cycle repeats automatically.

The operating frequency of the pump depends on the condensate flow rate entering the pumping station. To accommodate different condensate loads, the system can be configured as a single-, double-, or triple-pump station.

The total volume of condensate transferred through the pumping station is measured and displayed by an integrated flow counter. This allows operators to easily monitor the amount of condensate recovered and calculate the associated energy savings without the need for additional flow meters or monitoring equipment.



MATERIALS	
POS. No	**DESIGNATION**
1	VCOP Pump
2	Receiver
3	Controller
4	Globe valve
5	Overflow
6	Y Strainer
7	Wafer check valve
8	Metal Frame
9	Level switch
10	Pressure gauge
11	Control valve

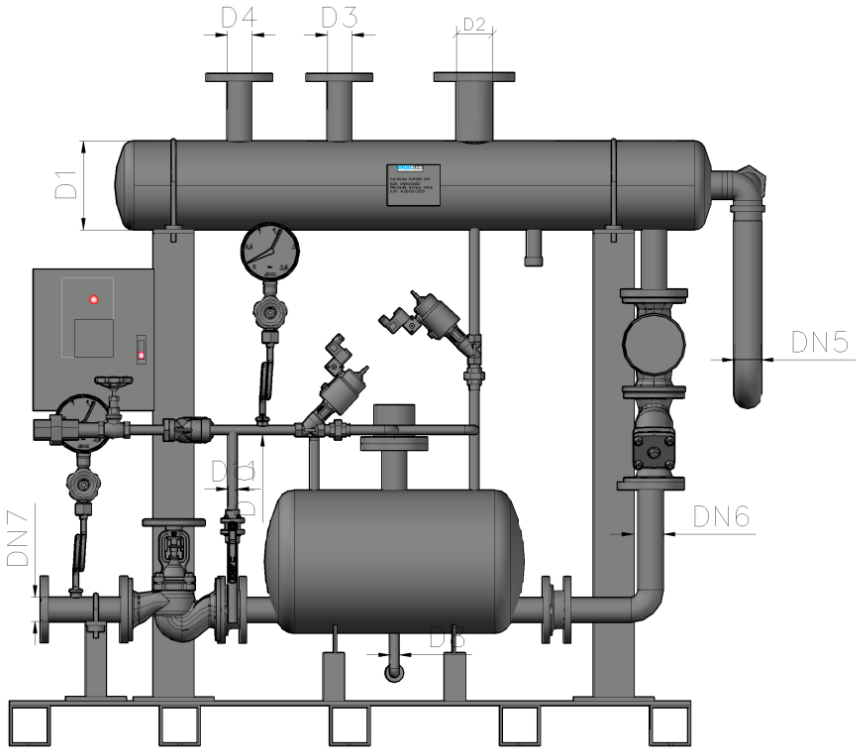
LIMITTING CONDITION	
Receiver - Max. Operating pressure	0,5 bar

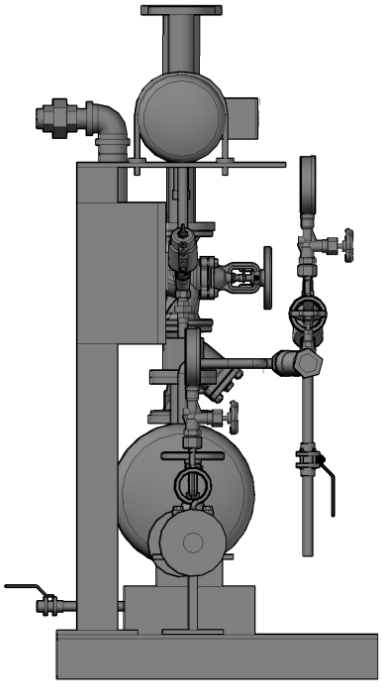
Features & Benefits

- Highest reliability and availability due to zero moving parts
- High motive inlet pressure up to 10 kg/cm
- Recovers valuable thermal energy from hot condensate
- Decrease chemicals
- Eliminates cavitation issues associated with conventional electric pumps
- Reduces boiler fuel consumption and make-up water requirements
- Provides reliable condensate transfer under high back-pressure conditions
- Enables easy monitoring of condensate recovery and energy savings through the integrated flow counter, Optional Modbus RS485 communication for remote monitoring of total condensate flow.
- Available in single, double, or triple-pump configurations to meet varying condensate loads
- Skid mounted system- Easy to install
- Weather proof IP 65 design- suitable for outdoor installations

Model & Connection

MODEL	Condensate inlet to Receiver (D3 XD4)	Condensate outlet Inlet & Outlet of Pump (D6 XD7)	Motive steam input (D10)	Receiver Vent (D2)	Pump Drain (D8)	Overflow (D5)	Steam trap Line (D11)	Pump Vent (D9)
VCOP DN25	DN50 X 2	DN25 X DN25	DN15	DN80	DN15	DN50	DN15	DN15
VCOP DN40	DN50 X 2	DN40 X DN40	DN15	DN80	DN15	DN50	DN15	DN15
VCOP DN50	DN50 X 2	DN50 X DN50	DN15	DN80	DN15	DN50	DN15	DN15
VCOP DN80	DN65 X 2	DN80 X DN80	DN15	DN100	DN15	DN50	DN15	DN15
VCOP DN100	DN80 X 2	DN100 X DN100	DN15	DN50	DN15	DN50	DN15	DN25





Capacity chart for VCOP (VMAL Condensate Pump)

FLOW RATE (kg/h) Installation with 300 mm filling head above the pump cover (600mm filling head for DN100XDN100)						
Motive Pressure (bar)	**Total Lift (bar)**	**DN25XDN25**	**DN40XDN40**	**DN50XDN50**	**DN80XDN80**	**DN100XDN100**
2	0.5	1190	2860	3790	5400	12285
	1	1150	2550	3460	4520	11070
3	0.5	1260	3000	4080	5980	13770
	1	1200	2770	3830	5100	12555
	1.5	1170	2560	3600	4840	11745
	2	1050	2320	3410	4350	10260
4	0.5	1300	3100	4290	6390	14850
	1	1240	2920	4090	5510	13500
	1.5	1200	2670	3790	5200	12285
	2	1090	2460	3520	4570	11205
	3	940	2090	2880	2810	10125
5	1	1270	3030	4290	5830	14175
	1.5	1230	2760	3950	5480	12015
	2	1130	2560	3600	4743	10935
	3	980	2230	3040	3260	10800
6	1	1300	3130	4460	6090	14850
	1.5	1250	2830	4070	5700	14040
	2	1150	2650	3670	4880	12555
	3	1020	2340	3170	3620	11475
	4	990	1980	2630	3530	11340
7	1	1320	3210	4210	6310	15255
	1.5	1270	2890	4170	5900	14445
	2	1180	2720	3720	5000	13095
	3	1050	2440	3280	3930	12015
	4	1020	2030	2680	3630	11880
8	1	1340	3280	4320	6400	15795
	1.5	1280	2940	4260	6070	14985
	2	1200	2780	3770	5100	13500
	3	1070	2520	3380	4200	12420
	4	1040	2080	2720	3710	12285
9	1	1350	3340	4420	6510	16200
	1.5	1290	2980	4340	6210	15390
	2	1220	2840	3820	5190	13905
	3	1100	2600	3460	4440	12825
	4	1060	2120	2760	3780	12690
10	1	1370	3400	4510	6620	16470
	1.5	1310	3020	4410	6340	15795
	2	1230	2890	3850	5270	14310
	3	1120	2660	3540	4647	13230
	4	1080	2150	2800	3850	13095

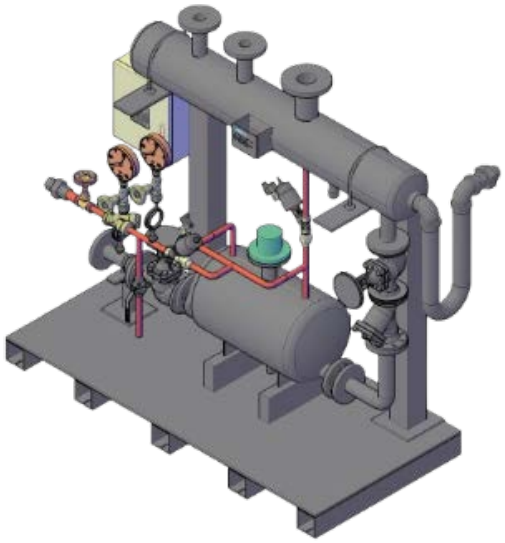
Information Required for Condensate Pump Selection

To ensure proper sizing and selection of the condensate transfer pump, please provide the following operating data:

1. **Motive Steam Pressure** (bar)
   - Steam pressure available for driving the condensate pump.
2. **Back Pressure** (bar)
   - Total discharge pressure, including factors such as:
     - Vertical lift (discharge height)
     - Piping distance
     - Elbows and fittings
     - Isolation and control valves
     - Additional condensate return connections
     - Other system pressure losses
3. **Maximum Operating Pressure of the Heating Process** (bar)
   - Maximum steam pressure supplied to the heat exchanger, process equipment, or boiler system.
4. **Condensate Load / Flow Rate** (kg/h)
   - Maximum condensate generation rate to be handled by the pump.

Example:

Motive fluid: Saturated Steam
Filling head: 300mm
Available pressure: 8 bar
Vertical lift after pump: 6m
Return piping pressure: 1,5 bar
Piping friction pressure drop: Negligible
Maximum Operating Pressure of the Heating Process: 3barg
Condensate load: 3000 kg/h



Calculations:

Total back pressure: 1,5 bar + (6 m x 0,0981) = 2,09 bar.
Assuming steam as motive medium at a pressure of 8 bar and a total backpressure of 3 bar, then according to Table **"Capacity chart for VCOP"** a DN 80 x 80 pump, with a capacity of 4200 kg/h, is the recommended size.