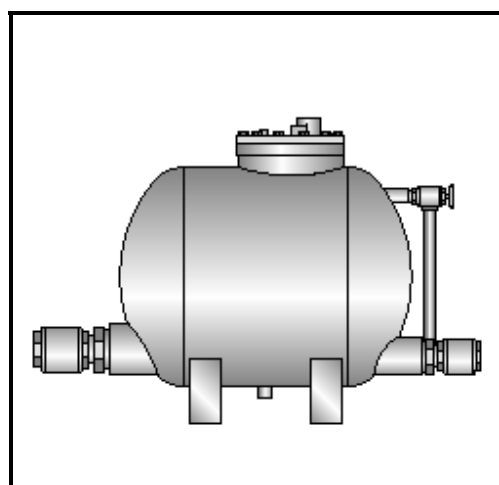
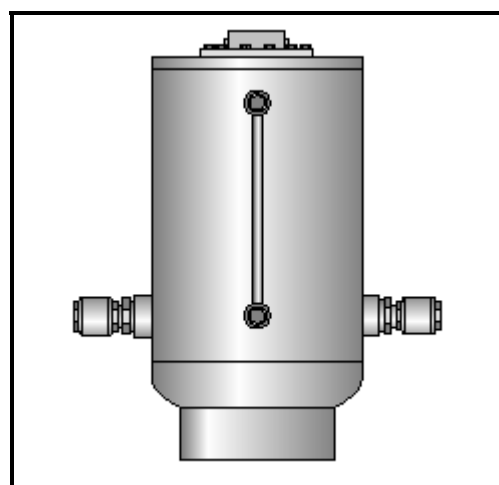
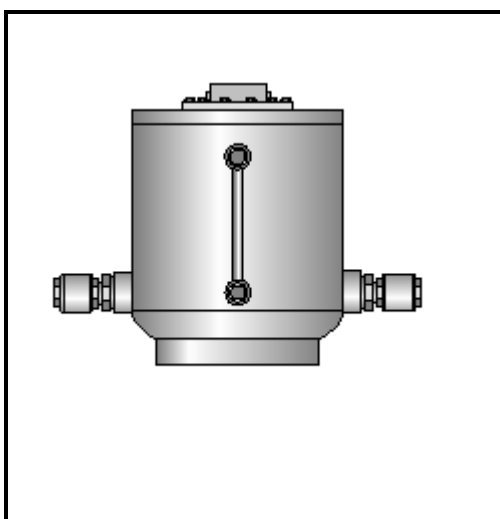

Installation, Operation, and Maintenance Manual

CEMLINE CORPORATION®

Non-Electric Condensate Pumps (Series CCP)



CEMLINE CORPORATION

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Disclaimers

This Installation, Operation, and Maintenance Manual is intended to be as complete and up to date as possible. It covers the installation, operation, and maintenance procedures for CEMLINE CORPORATION's CCP Series Non-Electric Condensate Pumps. CEMLINE reserves the right to update this manual and other product information concerning installation, operation, and / or maintenance, at any time and without obligation to notify product owners of such changes.

CEMLINE is not responsible for inaccuracies in specifications, procedures, and / or the content of other product literature supplied by the manufacturers of components used in CEMLINE Non-Electric Condensate Pumps (i.e.: pump mechanisms, valves, check valves, gauge glasses, etc.). CEMLINE strives to use only the highest quality components in building the CCP Series Non-Electric Condensate Pumps. However, CEMLINE has no direct control over their manufacture, or their consistent quality.

CEMLINE is not responsible for injury to personnel or product damage due to the improper installation, operation, and / or maintenance of CEMLINE Non-Electric Condensate Pumps. All installation, operation, and maintenance procedures should only be performed by trained / certified personnel. All personnel performing these procedures should completely and carefully read and understand all supplied materials before attempting the procedures. All personnel should pay strict attention to all Notes, Cautions, and Warnings that appear within the procedures detailed in this manual.

CEMLINE welcomes user input as to suggestions for product or manual improvement.

General Information

This Installation, Operation, and Maintenance Manual is designed as a procedural guide for all CEMLINE CORPORATION Non-Electric Condensate Pumps. Covered in this manual are:

- ❖ Series CCP – Non-Electric Condensate Pumps.

Energy and Power Sources

For Moving Condensate

All CEMLINE Non-Electric Condensate Pumps can be configured and manufactured to use one (1) of two (2) possible energy sources for moving condensate:

steam; or
pneumatic (air).

Note: Most CEMLINE Non-Electric Condensate Pumps use steam as the motive source for moving condensate. Therefore, procedures detailed in this manual will be focused towards the installation, operation, and maintenance of steam powered units. When procedures differ substantially for the installation, operation, and maintenance of units powered by air, notes will be included giving specific instructions for those units.

The following table lists the range of acceptable pressures at the inlet for each energy source.

Energy Source	Minimum Pressure (PSI)	Maximum Pressure (PSI)
Steam	5	250
Pneumatic (Air)	5	250

Note: Consult the design specifications for each unit, as well as the nameplate attached to the exterior of the tank and individual specification tags on pressure related components and controls, for design and maximum pressure for the unit.

Construction

All CEMLINE Non-Electric Condensate Pumps are constructed from superior materials and utilize only the highest quality components. Each condensate pump vessel meets or exceeds all applicable American Society of Mechanical Engineers (A.S.M.E.) Code regulations.

Tanks

Depending on the series purchased, CEMLINE Non-Electric Condensate Pumps are equipped with either Carbon Steel or Stainless Steel tanks, ranging in capacity from 18 to 240 gallons. Each tank is designed and constructed in strict accordance with the latest A.S.M.E. Code regulations, stamped in accordance with the applicable section of the A.S.M.E. Code, and accompanied by the applicable certificates. Each tank is manufactured using pressure vessel quality plate and welded by certified welders. All tanks are registered with the National Board of Boiler and Pressure Vessel Inspectors.

Components

All other components included in CEMLINE Non-Electric Condensate Pumps have been specifically selected to meet the individual design specifications of each unit. Each component is judged to be of highest quality to provide long life and superior performance.

Advantages and Benefits of CEMLINE Non-Electric Condensate Pumps

- ❖ Tank offer years of reliable, trouble free service.
- ❖ High quality design, construction, and components.
- ❖ Built and "Packaged" to meet exact customer design specifications.
- ❖ CEMLINE "Packaged" units helps keep installation time to a minimum.
- ❖ Offers a wide range of configurations and capacities.
- ❖ Configured to utilize either steam, or pneumatic (air) as the motive source.

Warranty Information

Steel tanks are warranted for one (1) year from date of purchase. The stainless steel pump mechanism is warranted for three (3) years or 1 millions cycles, whichever comes first. All other components used in CEMLINE Non-Electric Condensate Pumps are warranted for one (1) year from startup or eighteen (18) months from date of purchase, whichever comes first.

Contact Information

For information concerning warranty information, or for questions pertaining to the installation, operation, or maintenance of CEMLINE Non-Electric Condensate Pumps, contact:

CEMLINE CORPORATION
P. O. Box 55
Cheswick, PA 15024

USA Phone: (724) 274-5430
USA Fax: (724) 274-5448
www.cemline.com

To order replacement parts, contact CEMLINE CORPORATION at the address listed above, or call toll free:

USA Phone: (800) 245-6268

Please include the model and serial number of the unit for which parts are being ordered. If ordering by phone, please have this information readily available.

General Notes and Warnings

Notes

- ❖ This manual is intended to cover installation, operation, and maintenance procedures for CEMLINE CORPORATION CCP Series Non-Electric Condensate Pumps. Since each unit is built to meet customer specifications, instructions may seem general in nature at times.

If questions are not answered by this manual, or if specific installation, operation, and / or maintenance procedures are not clearly understood, contact CEMLINE for clarification before proceeding.

- ❖ All installation, operation, and maintenance procedures should be performed by experienced, trained, and certified personnel only. Personnel should be trained in correct piping procedures and methods, and should be experienced in working with steam or pneumatic (air) and hot condensate systems.
- ❖ CEMLINE Non-Electric Condensate Pumps are designed for indoor use only, while outdoor use is only suitable in special circumstances. Each unit requires at least two feet (2') of clearance around and above the unit. It should be located on a level surface (no more than one-half degree [$1/2^\circ$] of slope), capable of supporting the total weight of the unit when filled to capacity.

The unit should be mounted to the floor following applicable architectural and local code requirements for the specific installation site. Skid Mounted CCP series units should be mounted to house keeping pads, providing a minimum of one inch (1") clearance between the floor and the unit.

In areas prone to seismic activity, it is recommended that the unit be mounted to the floor according to recommended procedures for the site / location to make the units less susceptible to seismic damage.

- ❖ Outdoor use is not as common, but applications have existed. Special coatings may be applied upon request if the pump will be in harsh environment. The coating will help to prevent oxidation and corrosion. Performance will be slightly impacted if the pump is in a cold or wet environment.
- ❖ Inspection procedures, troubleshooting, and periodic maintenance, as well as suggested intervals, are detailed on pages 19 to 23 of this manual.
- ❖ CEMLINE Non-Electric Condensate Pumps are available in a wide range of operating pressures and temperatures. For the specific ranges for your unit, refer to the design specifications and accompanying literature supplied with the unit.

- ❖ If the unit is damaged during installation, operation, or maintenance, follow the following steps.
 1. Turn off the motive force inlet steam / pneumatic (air) inlet valve(s).
 2. Turn off the condensate inlet / outlet valves.
 3. Contact in-house maintenance personnel or CEMLINE CORPORATION for instructions.

- ❖ For all piping connections, the use and / or type of joint compound or sealer on the joints should be determined by referring to local codes, accepted standards, and / or the requirements of the installing contractor.

Warnings

As with any piece of equipment that utilizes steam, pneumatics (air) under pressure, or condensate, ***the potential exists for severe personal injury*** if proper installation, operation, and maintenance procedures are not followed. Listed below are specific warnings pertaining to CEMLINE Non-Electric Condensate Pumps. In addition, throughout this manual, warnings are restated when procedures are described pertaining to areas of potential danger. ***All warnings should be carefully read and understood.*** All precautions contained in the warnings should be carefully followed to reduce the chance of injury.

Note: Throughout this manual, warnings will be denoted by the symbol ▼.

All documentation for each major component has been included with the unit. It is strongly recommended that each document be reviewed ***before*** attempting any installation, operation, or maintenance procedures.

The documentation for each major component may also contain warnings and cautions. These warnings and cautions may be specific for the particular component, and therefore not covered in this general Installation, Operation, and Maintenance Manual. They should also be carefully reviewed before attempting installation, operation, or maintenance procedures.

▼ Areas of potential danger:

1. all steam / pneumatic (air) / condensate lines, joints, valves, and pressure regulators; and

▼ Before attempting any installation, operation, or maintenance procedures pertaining to the unit:

1. assure that the incoming steam (pneumatic {air} / or condensate) has been turned off at the manual shutoff valve;

2. if the unit has been in operation, allow the condensate in the pump and all components and surfaces (incoming condensate line, outlet condensate line, the incoming steam line, etc.) to cool before starting the procedure;

▼ Steam, pneumatic (air) or condensate present situations that can be *very dangerous* due to the fact they are under pressure and at very high temperatures. To avoid possible injury or death, use common sense and follow all accepted and recommended procedures when performing installation, operation, and maintenance procedures.

Product Features and Specifications

Congratulations on purchasing a CEMLINE CORPORATION Non-Electric Condensate Pump. The unit purchased will offer years of superior dependable service.

CEMLINE Non-Electric Condensate Pumps, employing a stainless steel pump mechanism, are the most economical method of moving condensate when steam, or pneumatic (air) are used as the energy source. All CEMLINE Non-Electric Condensate Pumps are ready for installation. All components are sized, mounted, and piped prior to shipment. Each unit is built to exact customer design specifications and requires only connection to steam/pneumatic (air), and condensate to be ready for operation.

Each unit employs a steel tank, providing years of trouble free service. All components used in the unit are of highest quality and meet or exceed all customer design specifications and American Society of Mechanical Engineers (A.S.M.E.) Code regulations.

Each Non-Electric Condensate Pump is accompanied by this Installation, Operation, and Maintenance Manual, a detailed Submittal sheet and C.A.D. drawing, as well as all documentation supplied by the manufacturer of each major component. If any of these documents are missing, contact either CEMLINE CORPORATION or your authorized sales representative.

Installation

Transporting and Unpacking the Unit

Each CEMLINE CORPORATION Non-Electric Condensate Pump is crated, as necessary, at the factory. The crating is designed to provide protection for the unit during transportation, and to provide a safe means by which to lift and move the unit with a fork lift or hand truck.

- ▼ The unit should only be lifted at the areas indicated on the crate, or by the lifting lugs provided. Improper lifting of the unit may result in damage to the unit.

Location Requirements

CEMLINE Non-Electric Condensate Pumps are designed for indoor use only and require at least two feet (2') of clearance around and above the unit, unless otherwise required by the design specifications. The unit should be located on a level surface (no more than one-half degree [$\frac{1}{2}^\circ$] of slope), capable of supporting the total weight of the unit when filled to capacity.

Once the unit has been set in place, the crating should be carefully removed.

Examining the Unit

After the unit has been set in place and uncrated, it should be carefully examined to assure that neither the main unit nor components have been damaged during shipping. If any evidence of damage is detected that could affect the safe operation of the unit, contact CEMLINE CORPORATION, or your authorized sales representative, to report the damage and to receive instructions on how to proceed.

After the unit and all components have been inspected for damage, it is suggested that all pressure and temperature components be checked to assure that they meet or exceed design specifications. This can be done by reviewing the design specifications (included with the unit) and the specification tags / plates attached to each component. If any discrepancy is found, contact CEMLINE CORPORATION, or your authorized sales representative, before proceeding with the installation.

Mounting the Unit

The unit should be mounted to the floor, following applicable architectural / local code requirements, or accepted standards for the specific installation site and for the Series purchased.

Note: Skid Packaged Series CCP units should be mounted to house keeping pads, providing a minimum of one inch (1") clearance between the floor and the unit.

In areas prone to seismic activity, it is recommended that the unit be mounted to the floor, according to recommended procedures for the site, to make the units less susceptible to seismic damage.

Familiarization with the Unit and Components

CEMLINE Non-Electric Condensate Pumps are designed to make installation a relatively simple procedure. After placing and mounting the unit, installation involves:

1. installing the gauge glass;
2. connecting the condensate source to the condensate inlet;
3. connecting the condensate outlet to the condensate return line;
4. connecting the pump exhaust / vent to the receiver / reservoir tank
5. connecting the energy source (steam, or pneumatic {air} to the unit);

Each unit is supplied with a Submittal sheet and C.A.D. drawing that indicates the location and specifications for each connection that must be made. In addition, the drawing will enable the installer(s) to determine the flow direction of both the condensate and energy source.

Installing the Gauge Glass

Each unit is supplied with a gauge glass shipped loose. The gauge glass needs to be installed before connecting the unit to the condensate inlet / outlet and the energy source (steam, or pneumatic {air}).

- ▼ Safety glasses and gloves should be worn at all times when working with or examining water glass and connections.
- ▼ Improper installation or maintenance of the gauge glass and connections can cause immediate or delayed breakage resulting in bodily injury and/or property damage.

All installation, operation, and maintenance procedures should be performed by experienced, trained, and certified personnel only. Personnel should be trained in correct piping procedures and methods, and should be experienced in working with steam or pneumatic (air) and hot condensate systems.

Do not operate without a safety shut-off system (e.g. safety ball check)

1. Confirm gauge glass and gauge glass valves match the conditions specified for the Non-Electric Condensate pump selected.

Take all necessary precautions to safeguard maintenance personnel.

2. Secure fittings firmly to preclude misalignment, which may result in harsh bending stresses, when packing nuts are tightened, in the glass.

Always utilize new packing before the tubular gauge glass installation, keep the seal areas and gland nuts gland (where applicable) free of harmful deposits and build ups.

Do not secure packing and gland nut beyond gauge manufacturer's standards.

3. Equip washers (metal) so nuts may be tightened without twisting the tube or packing.

Ensure tubular gauge glass, gland, nuts, packaging, etc are the proper parts prior to installation.

4. Provide ample (not too much) clearance between packing nuts, bearing washers, and glass.

5. Conserve glass length to allow for expansion.

Do not surpass manufacturer recommended working pressure or optimum gauge glass length.

6. Keep ample clearance between the gage glass and metal fittings. Glass on metal friction will limit expansion and cause cracks.

Keep the gauge glass exterior defended against abrupt temperature fluctuations, such as water spray, drafts, etc.

7. Expansion and Contraction is key to overall success of the system; therefore, do not over-tighten the packing nuts above the manufacturer's recommendation.

Isolate the gauge from the pressure vessel and open the drain vent before beginning any inspection of the glass or other fittings and adjusting the tie rods, packing nuts or glands.

8. In all instances, please rely on gauge manufacturer's recommendations as to what packing to utilize. Normally, conical rubber or cylindrical is acceptable for Low and Medium Pressure. High Temp/High Pressure applications may require special accommodations.

Operate only if gauge valve sets are furnished with safety ball check and drain vent.

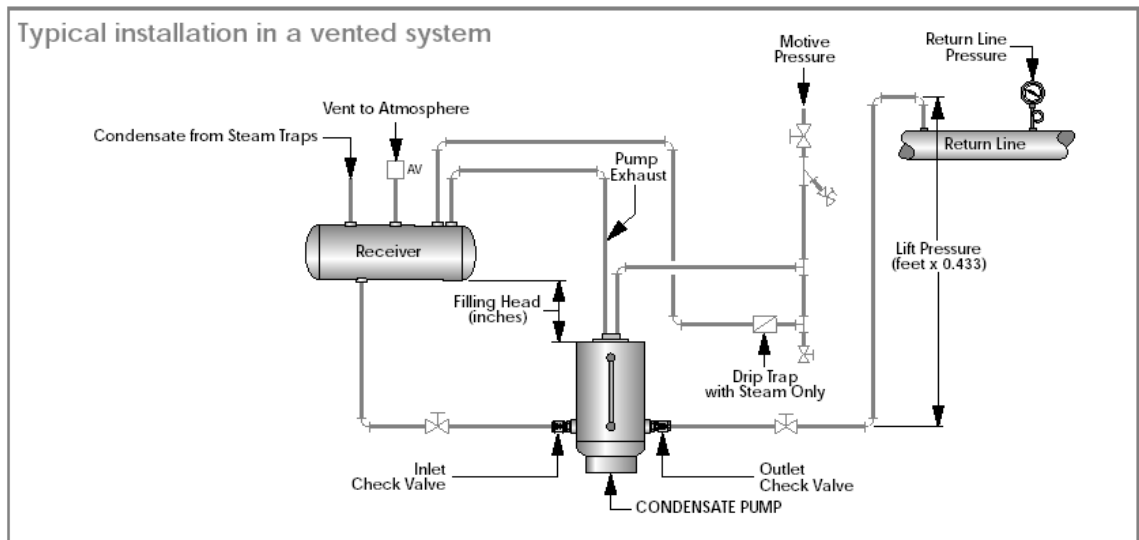
Connecting the Condensate Lines

Condensate Inlet / Outlet Lines

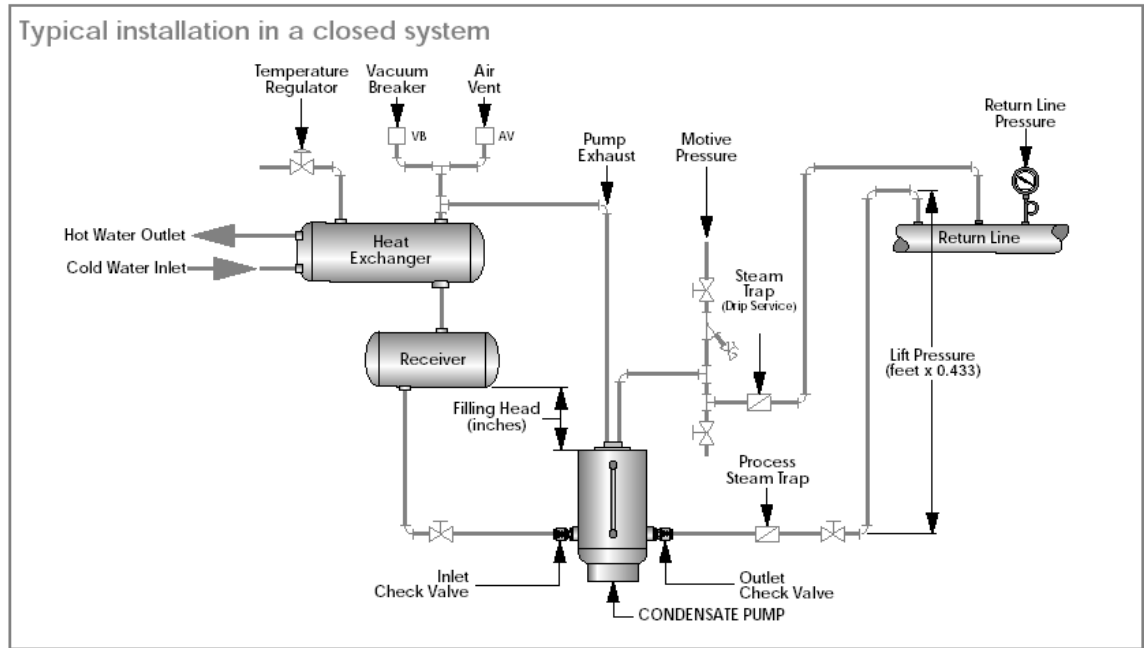
- ▼ Steam, pneumatic (air) or condensate present situations that can be *very dangerous* due to the fact they are under pressure and at very high temperatures. To avoid possible injury or death, use common sense and follow all accepted and recommended procedures when performing installation, operation, and maintenance procedures.

Cemline Non-Electric Condensate Pumps can be used in open or closed systems. In an open system, Cemline requires installing a vented receiver in a horizontal plane ahead of the Non-Electric Condensate Pump. The receiver should be sized adequately to handle the system return volume. The receiver should be mounted above the required filling head of the Cemline Non-Electric Condensate Pump. The receiver tank should also be capable of providing ample volume to allow for flash steam separation from the condensate. If a packaged system is supplied, a receiver tank is included on the skid.

Model Number	Recommended Filling Head (Inches)
V25CCP	12"
V18CCP	6"
H22CCP	12"
H240CCP	24"



In a closed system, Cemline requires installing a reservoir of sufficient volume to handle system returns during the condensate units discharge stroke. It is important to properly size the reservoir tank because system flooding is caused by inadequately sized receivers.



All system gravity return lines must be properly pitched downward to the inlet of the Cemline Non-Electric Condensate Unit.

The condensate inlet line should be connected to the unit at the condensate inlet check valve. The exact location of this inlet for the specific unit, as well as the condensate inlet pipe diameter and thread size, can be determined from the C.A.D. drawing supplied with the Submittal sheet.

The condensate outlet on the unit should be connected to the condensate discharge line. The exact location of the outlet for the specific unit, as well as the condensate outlet pipe diameter and thread size, can be determined from the C.A.D. drawings supplied with the submittal sheet.

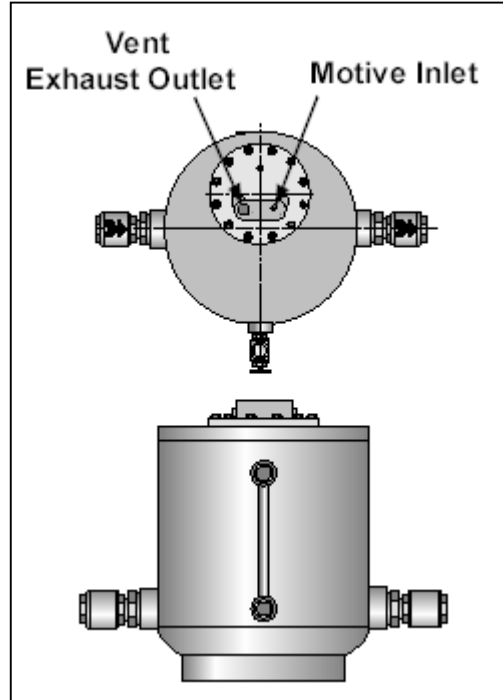
Manual shutoff valves should be installed upstream and downstream of the condensate pump to allow the unit to be isolated from the system. The condensate shutoff valves will prevent back flow of condensate if the line is disconnected.

Piping the Vent Line to the Receiver / Reservoir Tank

All CEMLINE Non-Electric Condensate Pumps require a receiver or reservoir tank.

In an open system, vent lines must be connected from the lid of the pump mechanism labeled 'vent' located on the top of the condensate pump to the receiver tank. To ensure consistent operation, the receiver tank has to be of suitable size to divide the flash steam and the condensate.

In a closed system, vent lines must be connected from the lid of the pump mechanism labeled 'vent' located on the top of the condensate pump to the reservoir tank. To run efficiently while the CEMLINE Non-Electric Condensate Pump stroke discharges, the reservoir tank has to be of suitable size to control system returns and eliminate the possibility of system flooding.



Connecting the Motive Energy Source (Steam, or Pneumatic {Air})

- ▼ Steam, or pneumatic (air) present situations that can be *very dangerous* because of the high temperatures and pressures. Use common sense and follow all accepted and recommended procedures when performing installation, operation, and maintenance procedures to avoid possible injury or death.

Assure that a manual shutoff valve is installed upstream in the steam, or pneumatic (air) (energy source), and that it is functioning properly. If any doubt exists concerning the integrity of the shutoff valve, replace the valve before attempting installation. All energy source valves should be closed and remain closed throughout the installation process.

Connect the energy source to the pressure connection located on the top of the pump mechanism located on the top of the condensate pump. The exact location of the motive force for the specific unit, as well as energy source pipe diameter and thread size, can be determined from the C.A.D. drawing supplied with the Submittal sheet.

Note: For all energy source piping connections, the use and / or type of joint compound or sealer on the joint should be determined by referring to local codes, accepted practices, or the requirements of the installing contractor.

Completing Installation

Installation of the CEMLINE Non-Electric Condensate Pump is now complete. All documentation supplied with the unit should be passed along to maintenance personnel for future reference.

Operation

After all installation procedures have been completed, and all condensate, and motive energy source joints have been double checked, the unit is ready for operation. As a precaution, it is strongly suggested that the following startup and shutdown procedures be followed.

Startup Procedures

1. Assure that all manual shutoff valves on the condensate and motive source (steam / pneumatic {air}) lines are closed.
2. Slowly open the manual shutoff valve on the vent (exhaust) line, checking to assure that there are no leaks at the valve or any joints.
3. Slowly open the shutoff valve on the motive energy (steam / pneumatic {air}) supply line.
4. Slowly open the shutoff valve on the condensate outlet line.
5. Slowly open the shutoff valve on the condensate inlet line.

Shutdown Procedures

1. Close all valves in the motive energy line (steam / pneumatic {air}).
2. Close the shutoff valve on the condensate inlet line.
3. Close the shutoff valve on the condensate outlet line.
4. Close the manual shutoff valve on the vent (exhaust) line.
8. After the system has cooled, drain the unit by opening the tank drain valve. If the tank is not draining and appears to be pulling a vacuum, open the manual shutoff valve on the vent (exhaust) line. This will prevent the formation of a vacuum and to the increase the drainage flow.
6. Proceed with the required maintenance or repairs.
7. After performing the required maintenance or repairs, return the unit to operation by following the startup procedure detailed on the top of this page (page 16).

Parts List

Replaceable Parts List

The following is a list of parts that are generally replaceable, by trained / certified personnel, on CEMLINE CORPORATION Non-Electric Condensate Pumps. The replaceable parts may vary, depending on the model and the particular design specifications to which the unit was constructed. If there are questions concerning the replaceable parts for the unit, refer to the original design specifications, or contact CEMLINE CORPORATION. Please have the unit's model and serial number available when contacting CEMLINE.

Replaceable Parts CEMLINE Series CCP Non-Electric Condensate Pumps

Note: Replaceable Parts may vary depending on design specifications of the unit.

Pump Mechanism
Gasket - Mechanism
Spring - Mechanism
Spring Kit
Check Valves - Inlet/Outlet
Gauge Glass
Mechanism Inlet Supply and Vent Valve Kit

Suggested Spare Parts

For One (1) Year of Duty

Because of the built-in quality and long life of CEMLINE Non-Electric Condensate Pumps, there are no spare parts suggested for stock during the first year of service.

For Five (5) Years of Duty

It is recommended that the user stock a replacement pump mechanism and gaskets for possible replacement during the first five (5) years of duty. If suggested maintenance procedures are performed, the pump mechanism should not need to be replaced during the first five (5) years of duty.

For the replacement pump mechanism, refer to the nameplate mounted on the jacket of the unit.

Ordering Information

All replacement parts for CEMLINE Series CCP Non-Electric Condensate Pumps from:

CEMLINE CORPORATION
P. O. Box 55
Cheswick, PA 15024

Phone: (800) 245-6268
Fax: (412) 274-5448
www.cemline.com

Note: Replacement parts can also be ordered through your authorized sales agent.

Please include the model and serial number of the unit for which the parts are being ordered. If ordering by phone, please have this information readily available.

Inspection

The following table summarizes the recommended time intervals for inspections of the non-electric condensate pump, components, inlet and outlet condensate lines, and motive energy source lines (steam, or pneumatic {air}).

Recommended Inspections

Time Interval

To Be Inspected	Per Manu. Specs.	Weekly	Monthly	Quarterly	Semi- Annually	Annually	Bi- Annually
Pump Mechanism						✓	
Inlet/Outlet Check Valves						✓	
Gauge Glass Assembly-						✓	

If any problems are detected during inspections, refer to either the Troubleshooting (page 20) or Maintenance (page 21) sections of this manual for specific actions and instructions.

Troubleshooting

The following table summarizes problems that may be encountered over the life of a CEMLINE CORPORATION Non-Electric Condensate Pumps, and the procedures to remedy those problems. The left-hand column lists the symptoms. The remaining columns are suggested possible cause and "remedies" that should be followed to identify and correct the problem.

Symptom	Possible Cause	Remedy
Pump does not fill	<ul style="list-style-type: none"> a. Back pressure within the receiver tank. b. Inadequate filling head. c. Inlet check valve is installed in the wrong direction. 	<ul style="list-style-type: none"> a. Check the vent, confirm it is open to the atmosphere. b. Check filling head and correct to the proper height. c. Confirm the check valve direction and systems return.
Pump fills, but does not initiate.	<ul style="list-style-type: none"> a. Float has lost its buoyancy. b. Motive steam or gas supply terminated. c. Motive force stop valve fouled. d. Inlet or outlet check-valve frozen. e. Discharge line/valve closed. f. Discharge check valve installed in wrong direction. g. Motive force inadequate to overcome discharge. h. Motive force inadequate to overcome back pressure 	<ul style="list-style-type: none"> a. Replace float. b. Determine cause of motive force termination. c. Inspect supply valve, clean if fouled or replace if damaged. d. Inspect outlet check valve, clean if fouled or replace if damaged. e. Open discharge line/valve. f. Verify direction of check valve and system returns. g. Check back pressure and adjust motive force pressure accordingly. h. Motive pressure recommended 10-15 psig greater than total back pressure.
Water and/or steam flow from exhaust vent.	<ul style="list-style-type: none"> a. Exhaust vent valve leaking. b. Float has lost its buoyancy. c. Outlet check-valve frozen. d. Motive force supply valve leaking. 	<ul style="list-style-type: none"> a. Inspect valve, replace if damaged or clean if fouled. b. Replace float. c. Replace check-valve. d. Inspect valve, replace if damaged or clean if fouled.
Receiver floods and overflows.	<ul style="list-style-type: none"> a. Inlet or outlet check-valve to pump frozen. b. Inlet strainer to pump fouled. c. Undersized unit. d. Inadequate filling head. e. Motive force inadequate compared to back pressure 	<ul style="list-style-type: none"> a. Inspect check valves, clean if fouled or replace. b. Clean strainer. c. Check equipment selection. If possible install larger size check valve(s). Review system for excessive cyclical loads. d. Check filling head and correct to proper height. e. Check motive and back pressures during operation and compare to related capacity.
Diminished Capacity	<ul style="list-style-type: none"> a. Inlet or outlet check-valve fouled or frozen. b. Reduced inlet head pressure. c. Reduced motive steam or gas pressure d. Increased down stream back pressure. 	<ul style="list-style-type: none"> a. Clean or replace check-valves. b. Inspect inlet piping. c. Inspect motive force pressure and/or PRV. d. Inspect down stream piping.

Maintenance

The information contained in this section will detail service and maintenance procedures for the inspection and replacement of the components of the CEMLINE Non-Electric Condensate Pump. Remember, this manual serves all four (4) Models of Non-Electric Condensate Pumps. Therefore, the maintenance procedures may be general in some instances. If there are any questions concerning maintenance procedures that are not clearly explained in this manual, contact CEMLINE CORPORATION. Be sure to have the model and serial numbers of the unit and heat exchanger coil available before making contact.

Note: *Many of the maintenance procedures detailed in this section will require the unit to be taken off-line before the procedure is performed; and put back on-line after the procedure is completed. It is recommended that the maintenance personnel performing these procedures review the startup and shutdown procedures, detailed on page 16 of this manual, before attempting any maintenance procedure.*

Any component(s) directly connected or linked to the component being replaced should carefully be examined before maintenance procedures are started. If any of the related components show signs of wear or improper operation, they should be considered for replacement at the same time.

Gauge Glass – Inspection and Replacement

- ▼ Steam, pneumatic {air}, or high temperature condensate present situations that can be **very dangerous** because of the high temperatures and pressures. To avoid possible injury or death, use common sense and follow all accepted and recommended procedures when performing installation, operation, and maintenance procedures.
 - ▼ Safety glasses and gloves should be worn at all times when working with or examining water glass and connections.
 - ▼ **Improper installation or maintenance of the gauge glass and connections can cause immediate or delayed breakage resulting in bodily injury and/or property damage.**
1. Follow Steps 1 through 7 of the shutdown procedure (page 16) to take the unit off-line before attempting any service on the gauge glass.
 2. Ensure daily observation of the gauge glass, maintain written observation results and conduct replacement as IOM recommends.
 - I. Do not recycle used tubular glasses, packing, or seals.

- II. Use scratch resistant commercial glass cleaners to keep the gauge glass clean.
 - III. Do not enter into contact (e.g. collide, scratch, or jostle) with the glass.
 - IV. In the event standard cleaners are not sufficient, diluted acids like Hydrochloric (muriatic) acid can be effective.
 - V. When using acids in a cleaning medium, control all hazardous cleaning materials in accordance with the respective safety standards.
 - VI. Do not clean glass while operating the unit. Do not remove gauge glass to clean.
 - VII. Abrasive materials such as metal scrapers or wire brushes should not be used to clean the glass.
 - VIII. To examine for surface weakness, a flash light beam from an angle at the gauge glass will uncover any scratch or corrosion.
 - IX. A gauge glass that does not respond to any recommended cleaning method and still appears dark and dingy should be replaced.
 - X. Do not use glass that is damaged (e.g. scraped and/or nicked). Flawed glass is a safety hazard.
3. Follow Steps 1 through 5 of the start up procedure (page 16) to put the unit on-line after servicing the gauge glass.

Check Valves - Inspection and Replacement

The stainless steel check valves should be inspected annually (1) year.

▼ Steam, pneumatic {air}, or high temperature condensate present situations that can be *very dangerous* because of the high temperatures and pressures. To avoid possible injury or death, use common sense and follow all accepted and recommended procedures when performing installation, operation, and maintenance procedures.

1. Follow Steps 1 through 7 of the shutdown procedure (page 16) to take the unit off-line before attempting to remove and inspect the pump mechanism.
2. Assure that the motive supply energy source (steam or pneumatic {air}) and the condensate have been shut off; that the tank has been completely drained; that the pressure has been bled from the pump, condensate and energy source systems; and that the condensate, all components, and surfaces have cooled.

- Carefully break the joints between the pump mechanism and motive supply energy source (steam or pneumatic {air}) and the pump mechanism and the vent.

Note: *It may be necessary to break the lines at a second location, and for the lines to be rotated to allow clearance for the inlet / outlet check valves to be removed from the tank. If it is necessary, care should be taken to insure that in-line components are not damaged.*

- ▼ There may still be residual steam or condensate in the pump tank. If sufficient time has not been allowed for cooling, this residual steam / condensate could present *a danger of injury*.
- Carefully break loose joints between the pump tank and the condensate inlet / outlet lines.
 - After all lines have been broken loose, remove them from the unit.
 - Carefully separate the condensate inlet / outlet check valves from the pump tank.
 - Examine the check valve(s) for scale buildup / debris and signs of leakage. If no leakage is detected, carefully clean the excess scale / debris from the check valve(s) and prepare the check valve(s) for installation. If leakage is detected through the check valve(s), either repair the leaking check valve(s) or replace the check valve(s).
 - Carefully reconnect the condensate inlet / outlet check valves to the pump tank. Follow recommendations contained in the manufacturer's documentation, local codes, or accepted contractor practices as to the use and / or type of joint compound or sealer at the connections.
 - Carefully reconnect the inlet / outlet condensate lines to the inlet / outlet check valves that have been reconnected to the pump tank. If these lines were broken at an additional location to allow for removal of the check valves, be sure to also tighten those connections. Follow recommendations contained in the manufacturer's documentation, local codes, or accepted contractor practices as to the use and / or type of joint compound or sealer at the connections.
 - Reconnect the energy source inlet and vent outlet lines to the top of the pump mechanism. If these lines were broken at an additional location to allow for removal of the check valves, be sure to also tighten those connections. Follow recommendations contained in the manufacturer's documentation, local codes, or accepted contractor practices as to the use and / or type of joint compound or sealer at the connections.
 - Follow the startup procedures (page 16) to put the unit back on-line. Carefully check all connections for any sign of leakage.

Pump Mechanism - Inspection and Replacement

The pump mechanism is the heart of CEMLINE Non-Electric Condensate Pumps. It should be removed and inspected annually.

▼ Steam, condensate, or pneumatic {air} present situations that can be **very dangerous** because of the high temperatures and pressures. To avoid possible injury or death, use common sense and follow all accepted and recommended procedures when performing installation, operation, and maintenance procedures.

1. Follow Steps 1 through 7 of the shutdown procedure (page 16) to take the unit off-line before attempting to remove and inspect the pump mechanism. Verify the pump is completely isolated from the system.
2. Assure that the motive supply energy source (steam or pneumatic {air}) and the condensate have been shut off; that the tank has been completely drained; that the pressure has been bled from the pump, condensate and energy source systems; and that the condensate, all components, and surfaces have cooled.
3. Carefully break the joints between the pump mechanism and motive supply energy source (steam or pneumatic {air}) and the pump mechanism and the vent.

Note: *It may be necessary to break the lines at a second location, and for the lines to be rotated to allow clearance for the pump mechanism to be removed from the tank. If it is necessary, care should be taken to insure that in-line components are not damaged.*

4. Carefully loosen the bolts that secure the pump mechanism cover to the pump and remove them from the unit.
5. Please note the orientation of the pump mechanism cover and carefully lift the pump cover and mechanism from the pump tank. Mark the mechanism and vessel to assure correct orientation for re-assembly.

▼ There may still be residual steam or condensate in the pump tank. If sufficient time has not been allowed for cooling, this residual steam / condensate could present **a danger of injury**.

6. Examine the pump mechanism for dirt / scale buildup and verify the float and mechanism move freely. If the mechanism moves freely, carefully clean the excess scale from the mechanism and prepare the mechanism for installation. If mechanism does not move freely or is damaged, replace the pump mechanism. The replacement mechanism is factory set, therefore no adjustment is necessary.
7. Remove the old gasket and completely clean the mating surfaces. Install the new gasket between the pump mechanism cover and the pump.

8. Carefully insert the pump mechanism into the pump tank. The pump mechanism should be installed so that the orientation of the axis point is closest to the wall of the pump tank thereby allowing the pump mechanism float to rise and fall freely within the tank. The pump mechanism should be in installed in the same position as it was before it was removed.
9. After assuring that the pump mechanism and the pump tank are correctly aligned, insert the cover bolts and proceed with the torque procedure detailed below.

Note: *Bolts used to secure the pump mechanism cover to the pump tank **CEMLINE Non-Electric Condensate Pumps** are rated as Grade 8. Grade 8 bolts are designated by six (6) slash marks on the head (/////).*

- a. Lubricate the bolt threads and the threaded openings on the pump tank with a suitable lubricant.
- b. Insert the bolts through the flange, and then start and finger tighten the bolts.
- c. Number all bolts so that torquing requirements can be followed.

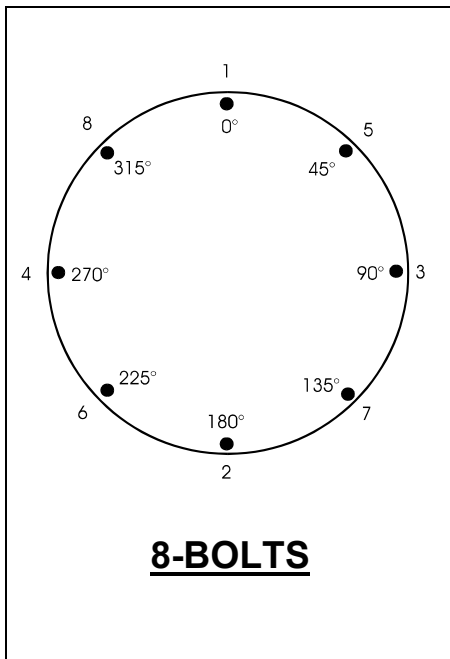
Note: *Below see the drawing depicting the typical flange configuration (number of bolts, location, tightening sequence, etc.) for **CEMLINE Non-Electric Condensate Pumps**.*

- d. Apply torque in twenty percent (20% [1/5]) steps of required final torque, loading all bolts at each step before proceeding to the next step. The following tables list ANSI approved target torques for both Grade 8 bolts.

**Garlock Bolt Torque Values
Grade 8 Bolts**

Number of Bolts	Size of Bolts (IN)	Grade 8 Target Torque (FT - LBS)
8	1/2"	61 (lubricated) 87 (unlubricated)

Bolt Torque Procedure



SEQUENTIAL ORDER

1 - 2
3 - 4
5 - 6
7 - 8

ROTATIONAL ORDER

1
5
3
7
2
6
4
8

- e. Tighten bolts in the applicable sequential order (0 - 180°, 90° - 270°, 45° - 225°, 135° - 315°, etc.) at each step until final target torque is reached (see applicable diagram contained in Appendix A).
 - f. Use rotational tightening until all bolts are stable at final torque level. Two (2) complete times around is usually required.
10. Reconnect the energy source inlet and vent outlet lines to the top of the pump mechanism. If these lines were broken at an additional location to allow for removal of the pump mechanism, be sure to also tighten those connections. Follow recommendations contained in the manufacturer's documentation, local codes, or accepted contractor practices as to the use and / or type of joint compound or sealer at the connections.
 11. Follow the startup procedures (page 16) to put the unit back on-line. Carefully check all connections for any sign of leakage.

Notes

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