GEH-6374A
(Supersedes GEH-6374)

GE Industrial Systems

Innovation Series™ LCI Liquid Cooling System

These instructions do not purport to cover all details or variations in equipment, nor to provide every possible contingency to be met during installation, operation, and maintenance. If further information is desired or if particular problems arise that are not covered sufficiently for the purchaser's purpose, the matter should be referred to GE Industrial Systems.

Safety Symbol Legend

Warning

Indicates a procedure, practice, condition, or statement that, if not strictly observed, could result in personal injury or death.

Caution

Indicates a procedure or condition that, if not strictly observed, could result in damage to or destruction of equipment.

Note Indicates an essential or important procedure, practice, condition, or statement.

Section	Page

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Introduction

These instructions describe the liquid cooling system used in the Innovation Series™ Load Commutated Inverter (LCI) only (does *not* include Static Starter applications).

The drive uses a liquid cooling system to transfer heat from heat producing devices (such as SCRs and high wattage resistors) to a heat exchanger.

The liquid cooling system is a closed-loop system with a covered reservoir for makeup coolant (see Figures 1 and 2). Coolant circulates from the pump discharge, to the heat exchanger, to the power conversion bridges, and returns to the pump. A portion of the coolant bypasses to a deionizer system to maintain the coolant resistivity.

The liquid cooling system has the following features:

- Self-venting, closed-loop cooling system using a water and propylene glycol mixture
- Full-capacity coolant circulation pump
- Redundant circulation pumps with automatic changeover and isolation valves for maintenance
- Full capacity heat exchanger, either remote liquid-to-liquid or liquid-to-air with cooling blower and optional redundant heat exchanger blowers with automatic changeover
- Purity alarm monitor with digital resistance and temperature display and contacts for alarm and trip
- Translucent coolant storage reservoir with cover and contacts for overflow alarm, low-level alarm and low-level trip
- Deionizer system with isolation valve for maintenance
- Differential pressure switch across bridge
- Temperature switches
- Drain valves
- Temperature-regulating valve

Coolant Circulating System

Isolation valves allow the pumps to be changed online without draining the system.

Redundant pumps circulate the coolant. The differential pressure switch and interlocking pump motor starters provide automatic transfer to the backup pump at 7 pounds per square inch (psi). Normal differential pressure is 15 to 40 psi.

The coolant circulating system is self-venting. During normal operation, it does not require air venting or purging. The outlet side of the power conversion bridge contains a manual vent.

The storage reservoir is at atmospheric pressure and determines the inlet pressure to the circulating pumps. Make sure that the pumps are not run dry. While charging the system, cycle the pumps as the system fills.

The reservoir is low-density polyethylene with a screw cap. Keep the reservoir covered to prevent unnecessary contamination of the system and coolant evaporation or spillage. Ventilation to the atmosphere is through a vent in the top of the reservoir.

The liquid-to-air heat exchanger option includes redundant cooling blowers. A coolant temperature switch and interlocking blower motor starters provide automatic transfer to the backup blower.

A liquid-to-liquid heat exchanger for remote mounting can be supplied as an option. This option does not use cooling blowers.

Caution

The heat exchanger is usually mounted at the same elevation as the drive. If the heat exchanger is mounted above the drive, coolant draining back into the system from the heat exchanger can overfill the reservoir if the pump is shutdown. Place the reservoir vent at an elevation above the highest point in the closed loop cooling system to prevent spillage if the pump is shutdown.

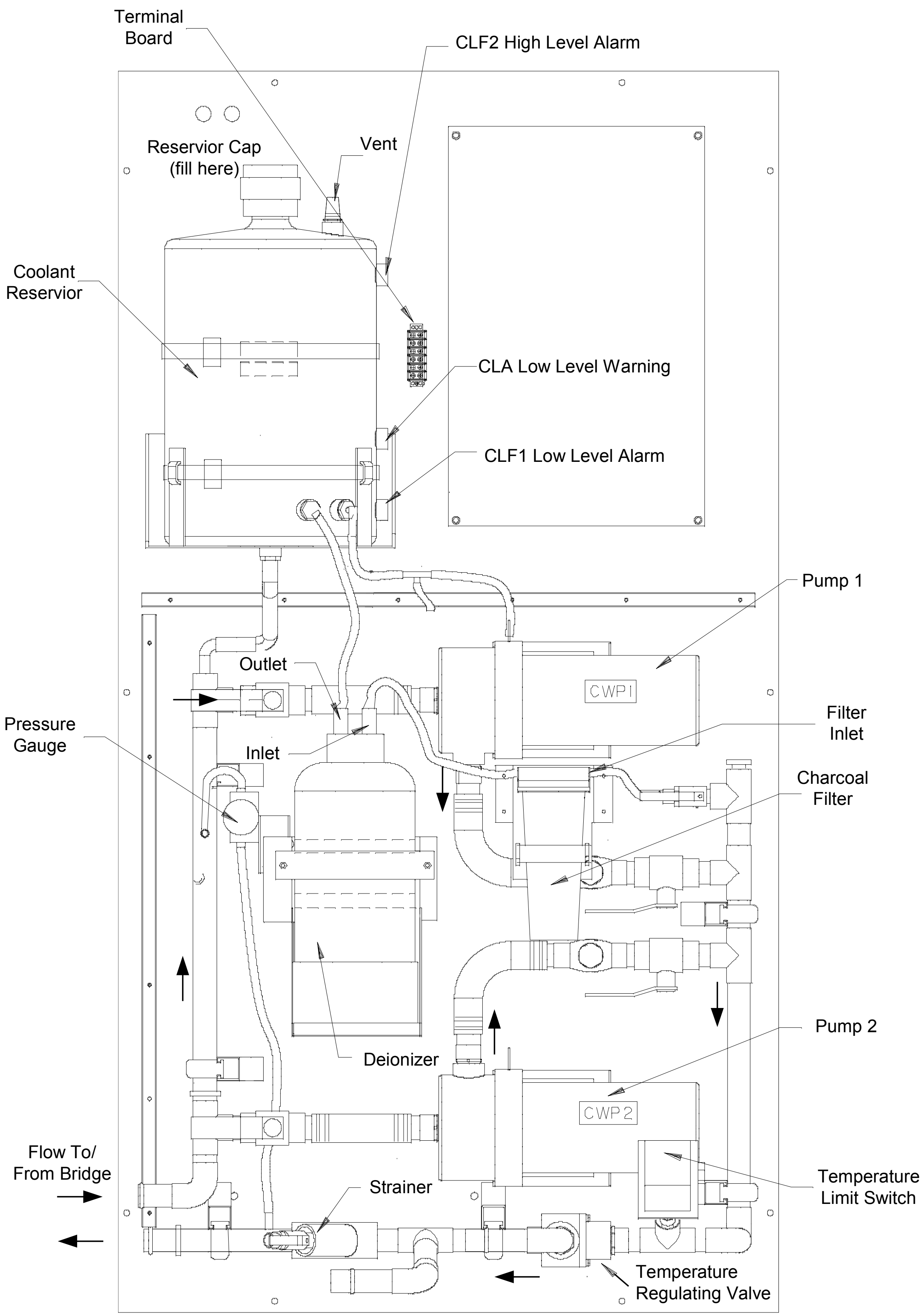

Figure 1. Liquid Cooling System for Innovation Series LCI

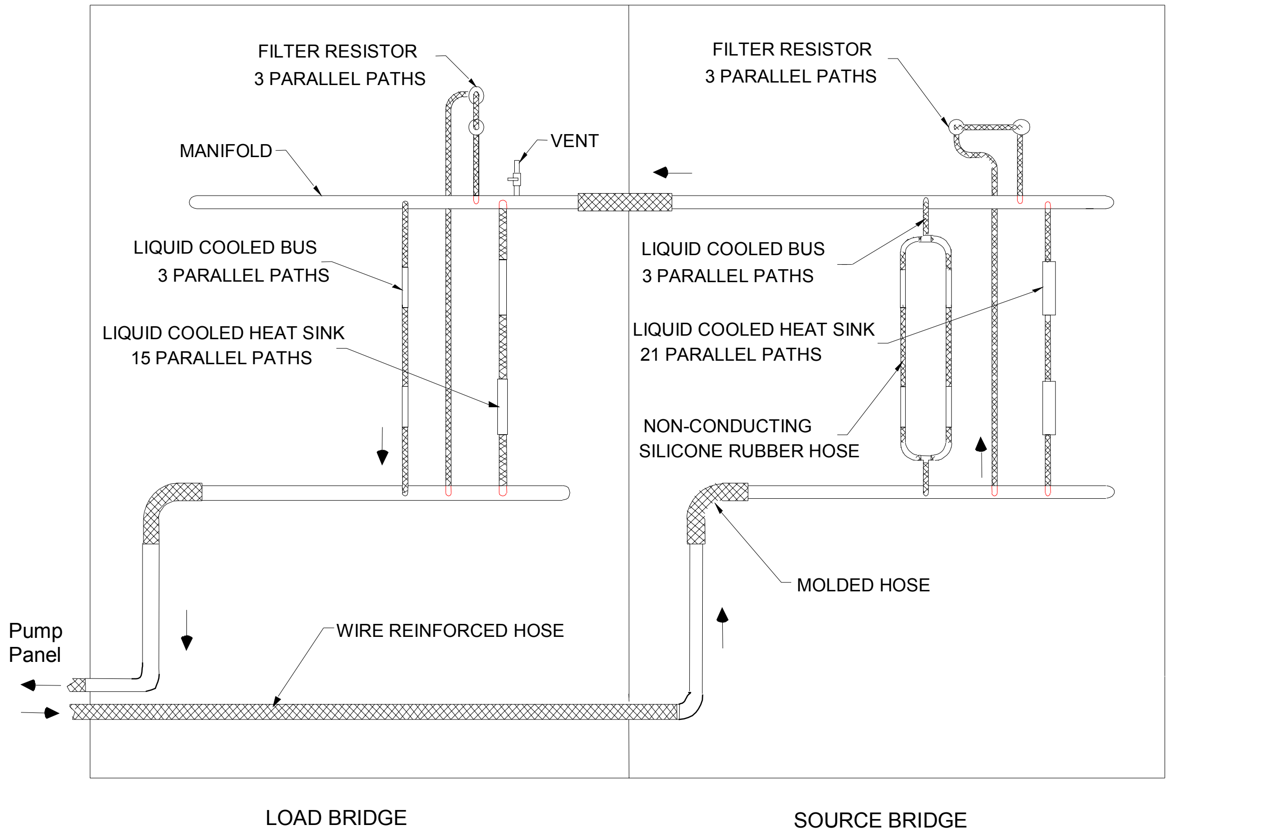

Figure 2. LCI Bridge Line Up, Rear View, Cooling Diagram (12/6 version)

The reservoir levels are:

Full:	38 liters (10 gallons)
Low low level alarm:	5 liters (1.4 gallons)
Low level alarm:	19 liters (5 gallons)
High level alarm:	46 liters (12 gallons)

Insulating hoses are used between the grounded cooling manifolds and the heatsinks, which are at drive line voltage potential. Insulating hoses are also used between heatsinks that are at different potentials.

See Routine Maintenance section, Table 2 for recommended spare parts.

The insulating system must be maintained. This requires using exact replacement hoses having at least 100 megohm per inch of resistance as confirmed by a 1000 V dc megger. Use exact replacement hose clamps.

Large diameter hose used to interconnect between panels and hose used in the pump panel can be conducting (wire-reinforced) or fabric-reinforced EDPM or Neoprene. Silicone rubber hose is also used in the pump panel.

Coolant Temperature and Condensation Control

A temperature-regulating valve within the pump panel controls the coolant temperature within the bridge to a minimum of 65 °F (18 °C) while the pump is running. The valve keeps the bridge temperature above the ambient dew point, which prevents condensation from forming within the bridge. Above 95 °F (35 °C) the temperature of the coolant being delivered by the heat exchanger limits the maximum temperature in the bridge.

Temperature alarm and fault messages are given at the following temperatures:

Temperature alarm: 68 °C (155 °F)
Temperature fault: 77 °C (170 °F)

A valve that will not fully close could allow condensation to form resulting in arcing faults in the bridge. A valve that will not fully open could cause the bridge to overheat and trip on the over temperature fault. Under certain operating conditions it is possible to determine if your temperature-regulating valve has failed. Refer to Table 1 and Figure 3.

Note If the temperature-regulating valve fails, the manifold assembly, which the valve is located in, must be replaced with an assembly containing a new valve. The part number for this manifold is 173C9237ABG1.

Table 1. Failure Indications for Temperature-Regulating Valve

Coolant Temperature from Heat Exchanger (Figure 3, section A)	Coolant Temperature from Internal Bridge (Figure 3, section B)		
	<65 °F	**65 °F – 95 °F**	**>95 °F**
< 65 °F	Failed	Unknown	Failed
< 95 °F	Failed	Unknown	Failed
> 95 °F	Failed	Unknown	Unknown

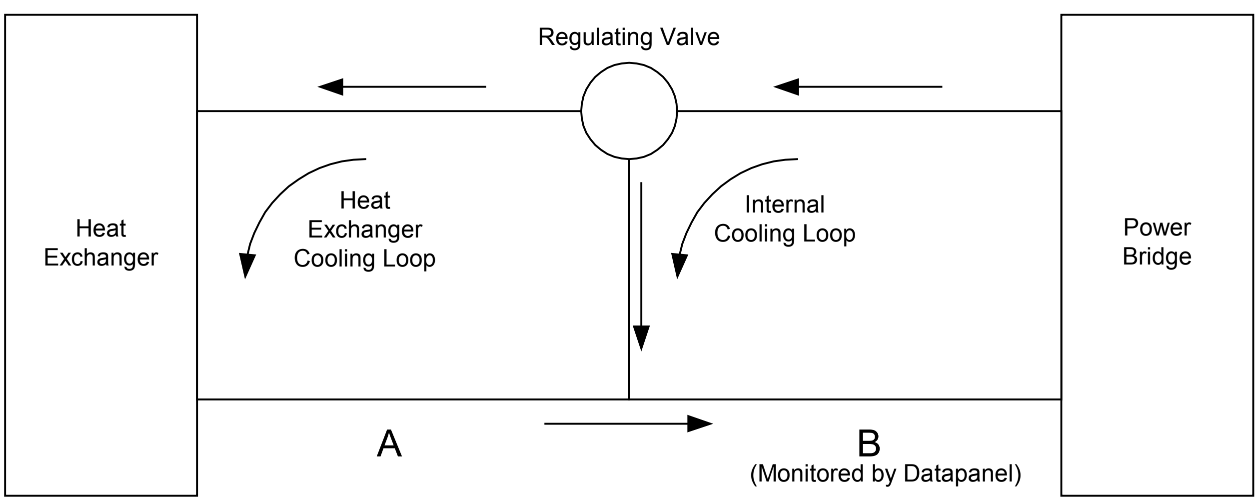

Figure 3. Coolant Circulation

Datapanel and OC2000 Indications and Operation

Under normal conditions, the liquid cooling system operates without human intervention. Cooling system status can be determined through the Datapanel™ user interface and/or through a remote OC2000 cooling system display.

Note The blower references on the screens illustrated in Figure 4 and Figure 5 apply to the liquid-to-air heat exchanger option. A system that uses a liquid-to-liquid heat exchanger has no blowers and BLWR references on the menus should be ignored.

Datapanel Data Displays

Access the Datapanel's **COOLANT** menu from the top level menu by pressing the F2 (PUMP) function key. The COOLANT menu resembles Figure 4. The COOLANT menu displays cooling system conditions. The example in Figure 4 displays that the temperature, resistivity, pressure, and coolant level are within design limits (OK). The fields are as follows:

TEMP displays the messages ALARM, when the temperature begins to rise above its optimum level, and FAULT, if the temperature exceeds the design limits. If the FAULT message displays, the LCI bridge shuts down.

RESIS refers to the electrical resistivity of the coolant. It can display one of three messages: OK, ALARM, or FAULT. The deionizer, when properly operating, keeps the conductivity of the cooling solution low, and its resistivity high. If the resistivity falls below a preset value (the FAULT case), the software shuts down the LCI bridge.

PRESS can be either OK or LOW.

LEVEL can display four different messages: OK, LOW ALARM, LOW FAULT, and HIGH FAULT. It is controlled by three sensors in the reservoir (see Figure 2).

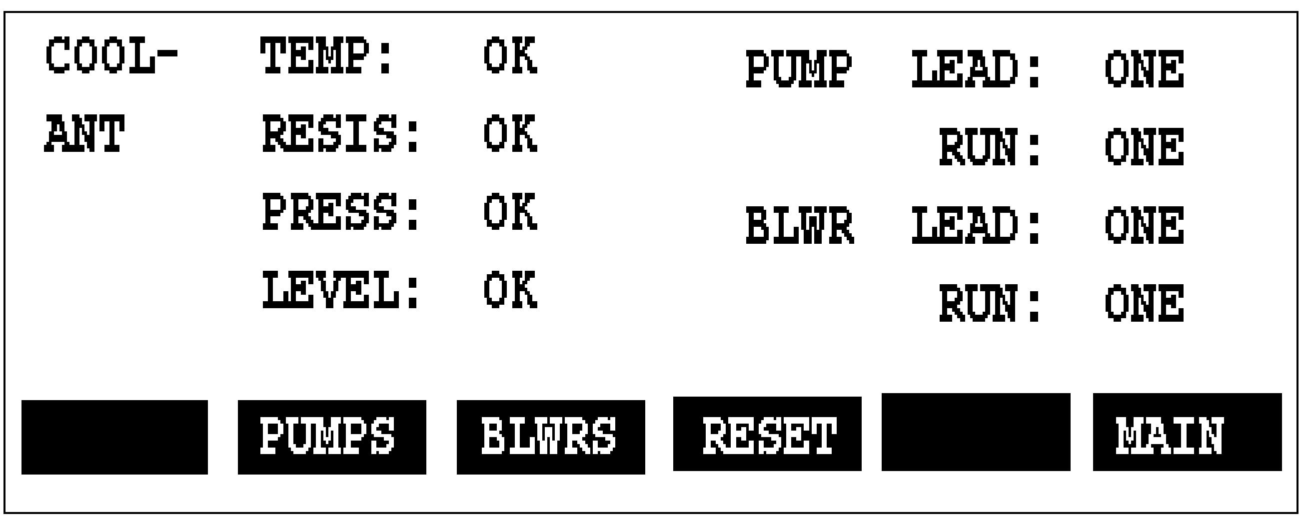

Figure 4. Datapanel Coolant System Menu

Datapanel Control Selections

Datapanel control selections are as follows:

ON/OFF displays the operating status of the system (either ON or OFF) in large type on the left side of the screen. To turn pumps or blowers on and off, use the ON/OFF/AUTO switches in the pump panel.

PUMP SLECT selects which of the two coolant circulation pumps runs (press the F2 key to select). The assigned pump (ONE or TWO) is listed in the PUMP LEAD field. The control software automatically switches to the other pump if coolant pressure drops. As long as the selected pump maintains the necessary pressure, the RUN field is the same as the PUMP LEAD field.

If the selected LEAD pump fails to maintain pressure, the RUN field lists which pump is actually running. Since this field is linked to sensors on the pumps, it reflects the actual status. It can display three values: ONE, TWO, or NONE. The NONE message is displayed if pumps ONE and TWO both fail, or if both pumps are switched off in the pump panel.

Note It is good practice to alternate the lead pump (one or two) at regular intervals to ensure that the bridge has reliable backup cooling capacity and to even the wear on the pumps.

Attention

The blower references below apply to the liquid-to-air heat exchanger option only (the second blower is optional). A system that uses a liquid-to-liquid heat exchanger has no blowers and the blower status messages in Figures 4 and 5 should be ignored.

BLOWR SLECT selects which of the two blowers for the liquid-to-air heat exchanger is running (press the F3 key to select). The assigned blower (ONE or TWO) is listed in the BLWR LEAD field. The control software automatically turns on both blowers if the coolant temperature rises beyond design limits. Both blowers stay on until coolant temperature is OK and F4 RESET key is pressed. As long as the selected blower keeps the radiators cool, the RUN field is the same as the BLWR LEAD field.

If the selected LEAD blower fails to maintain temperature within limits, the RUN field shows that BOTH blowers are running. Since this field is linked to sensors on the blowers, it reflects the actual status. It can display four states: ONE, TWO, BOTH, or NONE. This last message is displayed.

Note It is good practice to alternate the pump on duty at regular intervals to ensure that the bridge has reliable backup cooling capacity.

The RESET button also clears the low coolant alarm.

RESET triggers the RESET sequence of actions (press the F4 key to select). If the low pressure (or high temperature) condition that caused the system to go to the backup pump (or both blowers) has cleared, pressing this key places the lead pump (or blower) into service again.

BACK closes the coolant system menu and returns to the top level menu (press the F6 key to select).

OC2000 Control Selections

A remote OC2000 can be used for the PUMP and BLOWER select functions from the Cooling System menu (see Figure 5). Additional coolant system information will still be shown on the Datapanel display. OC2000 control selections are as follows:

PUMP SELECT selects which of the two coolant circulation pumps runs (press the PUMP 1 SELECT or PUMP 2 SELECT key). The assigned pump (1 or 2) is indicated by the PUMP 1 SELECT LED or PUMP 2 SELECT LED. The actual running pump is indicated by the corresponding PUMP 1 RUN LED or PUMP 2 RUN LED. The control software automatically switches to the other pump if coolant pressure drops or the selected pump shuts down.

The backup pump will continue to run until the condition that caused the system to switch to the backup pump is cleared and the RESET key is pressed.

Note The selected pump will continue to run as long as it maintains the necessary pressure. It is a good practice to alternate the lead pump (one or two) at regular intervals to ensure that the bridge has reliable backup cooling capacity and to even the wear on the pumps.

BLOWER SELECT selects which of the two blowers runs (press the BLOWER 1 SELECT or BLOWER 2 SELECT key). The assigned blower (1 or 2) is indicated by the BLOWER 1 SELECT LED or BLOWER 2 SELECT LED. The actual running blower is indicated by the corresponding BLOWER 1 RUN LED or BLOWER 2 RUN LED. The control software automatically turns on both blowers if the coolant temperature rises beyond designated limits. Both blowers will stay on until coolant temperature is OK and the RESET key is pressed.

Note The selected blower will continue to run as long as it maintains the correct coolant temperature. It is a good practice to alternate the lead blower (one or two) at regular intervals to ensure that the bridge has reliable backup cooling capacity and to even the wear on the blowers.

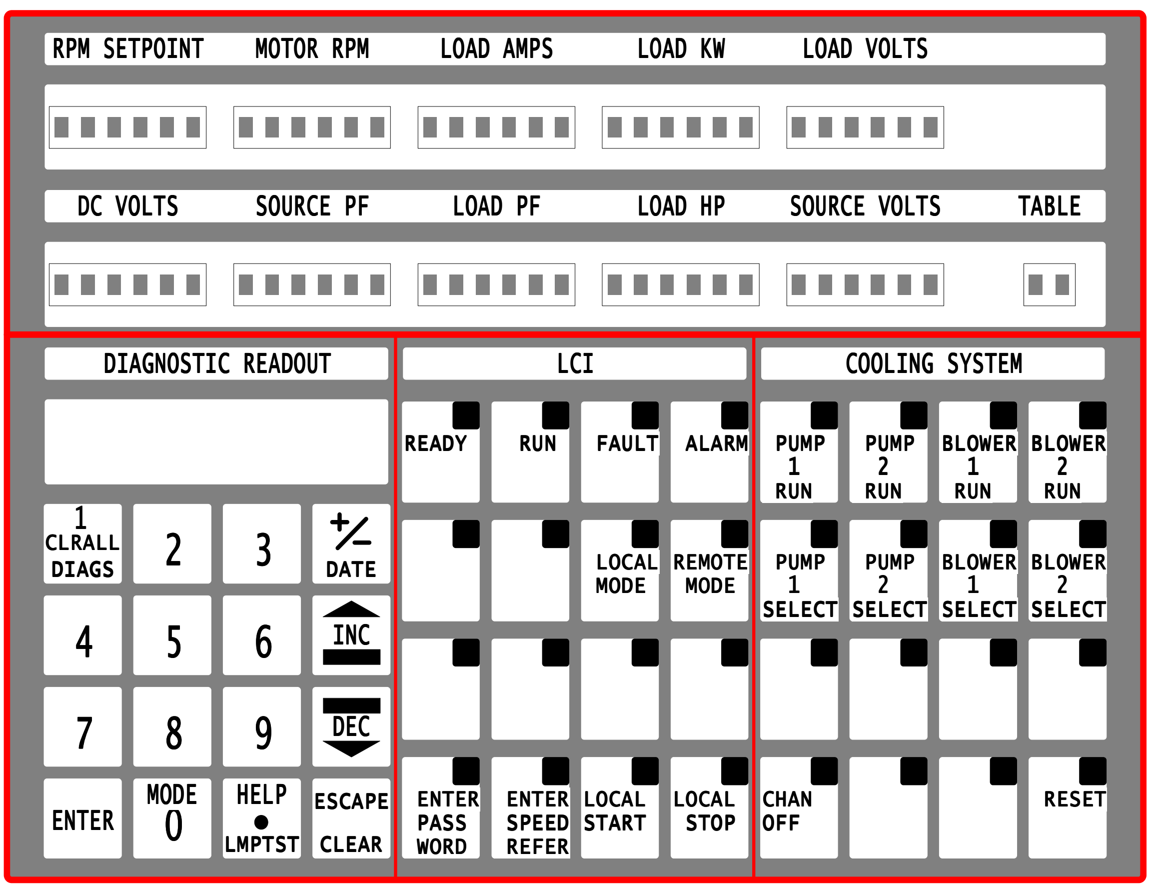

Figure 5. OC2000 Cooling System Display

Heat Exchanger Installation

Overview

When an external heat exchanger is provided, either water-water or water-air, mounting and plumbing at the site will be required. The LCI cooling system requires ultra-high purity water in order to function correctly. Water purity will be compromised by any contaminates which make their way into the heat exchange cooling loop. For this reason it is very important that the recommendations in this section concerning exchanger installation, materials used, and cleaning be followed. Failure to follow these guidelines can result in startup delays, frequent deionizer replacement, and extensive damage to the LCI.

Caution

Contamination introduced into the system from the heat exchanger cooling loop can settle throughout the bridge and be impossible to remove.

Plumbing on the customer's side of a water-water exchanger should conform to the customer's specifications not this guide.

Prevention is the only way to keep contamination from negatively affecting LCI performance for years to come. These guidelines apply to piping between the heat exchanger and the LCI pump panel.

Materials

Suitable material for piping and fittings include Type K or L copper tube, copper-base alloys, stainless steel, or schedule 80 CPVC. To avoid rust contamination, do not use steel or cast iron pipe or fittings. There is no restriction on the type of flux, solder, or glue that can be used, however, keep flux to a minimum to avoid excessive contamination.

Cleaning

Clean all metal pipe and fittings before assembly by wiping their interior with a non-residue solvent such as Xylol (Xylene) to remove oil, solder flux, and any other debris.

Note Do not attempt to clean CPVC piping with Xylol. Instead, use soap and then rinse thoroughly with water.

Flushing

Complete the entire installation with the exception of the final connections to the LCI pump panel. Blow out any remaining dust or construction debris from the entire heat exchanger loop with compressed air before making the final connections to the LCI pump panel.

Stress Relief

Rubber hose and rubber vibration isolators are not required, but can be used if the manufacturer confirms its compatibility with water and propylene glycol. Use accepted alignment, strain relief, and expansion practices to prevent stressing system components.

Allowable Pressure Drop

To keep pressure drop within the acceptable limit, make sure that field-installed piping complies with the length restrictions as follows:

Maximum total length:	75 ft for 1.5-in nominal diameter 200 ft for 2-in nominal diameter
Elbows:	Count as 2 ft each
Ball valves:	Count as 7 ft each

Heat Exchanger Elevation

The heat exchanger is normally mounted with its base at or below the elevation of the drive.

It can be mounted higher than the drive, including on the roof above the drive. The limitation is the reservoir vent must be above the elevation of the highest point in the cooling system. The objective is to avoid spillage from the vent in the event of an extended shut down or venting at some other location.

An alternate approach is to route the reservoir vent to an auxiliary reservoir to accommodate the heat exchanger and external plumbing located above the reservoir vent.

The elevation should be kept to a minimum. In no case can the top of the heat exchanger or any other piping be higher than 26 feet above the base of the drive (about 20 feet above the reservoir).

Note Heat exchanger performance is reduced above 5000 feet altitude and requires a special design.

Drain-Back Provision

Caution

The heat exchanger is usually mounted at the same elevation as the drive. If the heat exchanger is mounted above the drive, coolant draining back into the system from the heat exchanger can overfill the reservoir upon shutdown.

Provide for drain-back of coolant from the heat exchanger by:

- Extending the reservoir vent to an elevation above the heat exchanger

  or

- Using an auxiliary reservoir to hold the additional volume

Using an auxiliary reservoir requires calculating the total volume of drain-back from the heat exchanger and piping located above the top of the reservoir. Coolant volume for the type K copper piping connecting the system to the heat exchanger is as follows:

Volume	Diameter
0.089 gal/ft	1½-inch
0.156 gal/ft	2-inch

The dimensions for the various heat exchangers used with this system are defined in GE drawing 323A1318AA. The volumes for the standard redundant-blower heat exchangers are shown on the heat exchanger's nameplate. Use the nameplate volume when calculating any drain-back volumes.

General Mechanical Provisions

Observe the following guidelines when installing piping:

- Use drip loops to prevent water on the pipe exterior from entering the equipment.
- Provide drain and vent valves at all low and high points to facilitate filling and draining.

Liquid-to-Air Heat Exchanger Option

Observe the following guidelines when installing this optional heat exchanger:

- Do not obstruct heat exchanger airflow. (Care must be taken to prevent the cooling fins from becoming obstructed with foreign material.)
- Do not locate the equipment so that it intakes hot air exhausted from some other equipment.
- Provide at least 1½ fan diameters of clearance to the heat exchanger inlet and exhaust it away from walls that might cause the air to re-enter.
- Locate the blower above any anticipated snow level.

Liquid-to-Liquid Exchanger Option

If a remotely mounted Robertshaw temperature regulating valve is used, install it as shown in GE drawing 238B4861, Sheet 2 for liquid-to-liquid heat exchangers.

Note This valve is not supplied by GE. It must be furnished by the user and picked to operate within the cooling system requirements and meet the environmental conditions of the site location. Its function is to limit coolant requirements and to possibly reduce/eliminate manifold sweating during temperature and humidity extremes.

The use of a thermowell is recommended so that the coolant does not have to be drained if the sensing bulb has to be removed.

The dimensions shown (238B4861 sheet 2) for the sensing bulb are for the thermowell supplied with the valve. The sensing bulb can be installed in any position from vertical to horizontal. If the bulb is installed away from vertical, the arrow and/or UP markings on the positioning disk must point UP. The top (threaded end) should be approximately the same elevation as the valve actuator. Do not install the sensing bulb below horizontal or with the threaded end below the bulb.

Coolant Mixture

The drive's *normal* operating environment temperature ranges from 0 to 40 °C (32 to 104 °F). The coolant is a water and propylene glycol mixture that prevents freezing with lower ambient temperatures.

The system should initially be charged with a mixture of distilled, de-mineralized, or deionized water and pure propylene glycol. Makeup coolant (coolant added to adjust the coolant concentration) must be a similar mixture to maintain the desired freeze protection. Depending upon the coolant quality and cleanliness of the heat exchanger installation, initial charging of the system can require up to 24 hours for the coolant resistivity to exceed the alarm level. Distilled water (100%) may be used if there is *no* chance of freezing.

Caution

For freeze protection, use only pure propylene glycol without additives. Do not use automotive antifreeze or any type of corrosion inhibitors since this contaminates the deionizer.

Use propylene glycol from GE Industrial Systems (GE stock number 278A2175FUP1) or Propylene Glycol USP/FCC from Fisher Scientific Company.

Propylene Glycol Concentration

Caution

Too much propylene glycol in the mixture reduces cooling system performance. Be sure to keep it at the minimum percentage required for freeze protection. The heat dissipation system is fully rated up to a maximum of 52% propylene glycol.

The concentration of propylene glycol can be selected for as much as 8 °C (15 °F) above the minimum anticipated temperature since slushing occurs before the coolant freezes solid.

Typical concentrations of propylene glycol in water with some slushing between the two listed temperatures are:

30% –13 to –22 °C (8 to –7 °F)

40% –21 to –29 °C (–6 to –21 °F)

52% –35 to –43 °C (–31 to –46 °F)

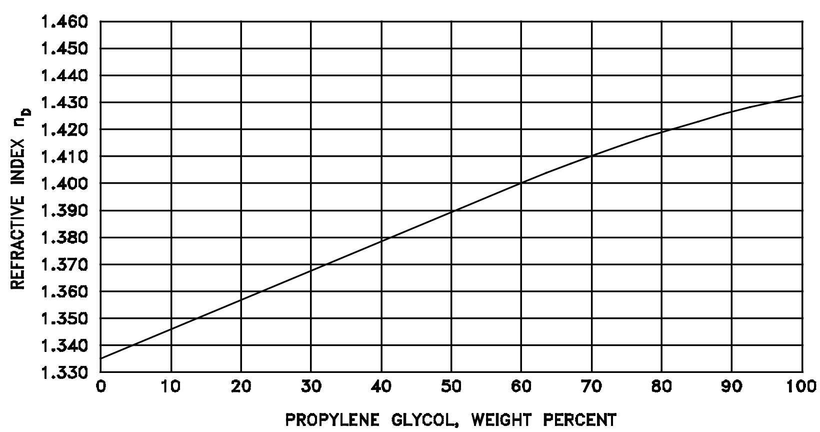

Figure 6. Refractive Indices for Aqueous Propylene Glycol Solution at 77 °F (25 °C)

Maintaining Coolant Concentration

Water evaporation increases the propylene glycol concentration over time. To keep coolant freeze protection within the desired range, periodically check the propylene glycol concentration by doing the following:

The American Optical model 7181 refractometer, for example, is portable, requires only a few drops of fluid for testing, and needs no adjustment for fluid temperature.

1. Use a **refractometer** to determine the refractive index of the coolant.
2. Use the curve of Figure 6 to determine the existing propylene glycol concentration.
3. Add either distilled water or propylene glycol as appropriate.
4. Check the concentration again to make sure it is within the correct temperature parameters.

Note Adding a large quantity of makeup coolant can cause a momentary drop in coolant electrical resistance and trigger an alarm. Unless extreme contamination has occurred, the deionizer soon restores nominal resistance. A brief drop in coolant resistance does not harm system operation.

Startup Procedure

Warning **This equipment contains a potential hazard of electrical shock or burn. Only those who are adequately trained and thoroughly familiar with the equipment and the instructions should install, operate, or maintain this equipment.**

➢ To startup the coolant system using the Datapanel

1. Before filling the cooling system, jog the pump motor and check rotation by noting the motor blower rotation direction.

Caution **Incorrect rotation can cause the pump impeller to unscrew on the pump shaft and jam against the pump housing.**

Do not run the pump dry for more than a few seconds or seal damage can result.

2. Make sure that the carbon filter and deionizer are in place in the deionizer loop.
3. Make sure that all external piping connections have been made and tested for leaks.
4. Fill the reservoir to the full mark with a deionized or distilled water and propylene glycol mixture in the correct proportion for freeze protection, as determined from Figure 6.
5. Turn all valves to the ON position.
6. The temperature modulating valve has a manual override to force coolant to the heat exchanger if the valve fails or if the ambient temperature is below 27 °C (80 °F). Switch the modulating valve to **manual**.
7. Cycle the primary pump on to purge air from the system.

Caution **Do not empty the reservoir and risk running the pump dry.**

8. Stop the pump and refill the reservoir. Record the volume of coolant required to fill the system for future reference.

Note When the pump is stopped, the reservoir level can rise as coolant flows back from components above the reservoir. Do not fill the reservoir past the *full* mark.

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9. Repeat the fill and pump cycle until all air is purged from the system and the reservoir level is stabilized.
10. Air is vented from the pump and deionizer to the reservoir. The bridge and heat exchanger can have additional manual or continuous vents to the reservoir. Open these vents to speed purging air, but be careful to avoid losing coolant and contaminating electric circuits.
11. Slowly close and open the outlet valve on the primary pump. The differential pressure switch is factory set for 7 psig (48 kPa). Verify that the backup pump comes online before the outlet valve is completely closed.
12. The system should automatically engage the alternate pump when the LEAD pump stops. Check to make sure that this process works in both directions, as follows:
    a. Turn off the primary pump using its Pump Starter switch and read the Datapanel to confirm that an automatic transfer is made to the backup pump. Then turn the primary pump back on and pushing the RESET button. Read the Datapanel to confirm that the backup pump is still the LEAD pump.
    b. Turn off the secondary pump using its Pump Starter switch and read the Datapanel to confirm that an automatic transfer is made to the primary pump. Then turn the secondary pump back on and push the RESET button. Read the Datapanel to confirm that the primary pump is still the LEAD pump.
13. Check the system's lead/lag pump controls as follows:
    a. Verify pump transfer by pressing the F2 PUMP SELECT key to switch the PUMP LEAD from #1 pump to #2 pump and back to #1 pump.
    b. With the #1 pump selected as PUMP LEAD, verify automatic transfer to the #2 pump by slowly closing the outlet valve on the #1 pump as in step 12.
    c. Transfer PUMP LEAD status back to #1 pump by pressing the F2 PUMP SELECT key.
    d. Turn off the #1 pump using its Pump Starter switch and read the Datapanel to confirm that an automatic transfer is made to the backup pump.
    e. Repeat the automatic transfer test, starting with step b and the #2 pump selected.
14. If the system has lead/lag blower controls (only in systems that use liquid-to-air heat exchangers), check them as follows:
    a. Verify blower transfer by switching from #1 blower to #2 and back to #1 blower.
    b. With the selector switch set for #1 blower, verify automatic transfer to the #2 pump by opening the breaker on #1 blower.
    c. Repeat the automatic transfer test, starting with step b and the selector set for #2 blower.

Note The overtemperature switch is factory set to alarm at 68 °C (155 °F) and fault at 77 °C (170 °F). It should not require adjustment.

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15. Check all fittings and hose connections for leaks.
16. Verify the water to propylene glycol mixture.
17. Return the temperature-regulating valve to **automatic**.

Routine Maintenance

Maintaining the Liquid Cooling System

Periodically is defined as one month.

Periodically check the following items to make sure the liquid cooling system is properly maintained:

- Check the propylene glycol concentration and replenish the coolant, as necessary.
- Keep the cooling system free from contamination.
- Keep the reservoir covered.
- Clean the strainers.
- Check the coolant resistivity. The life of the carbon filter and deionizer depends upon the operating temperatures and quality of makeup coolant. If possible, they should be replaced before the coolant reaches the 1-megohm/centimeter alarm level.

Caution

The deionizer tank should be refurbished by an authorized service center or replaced with the recommended spare part. Severe damage to the equipment can result.

- Check all hose connections for leaks. Repair any coolant leaks promptly. The recommended repair procedure on the 3/8 in bridge coolant hoses is to re-terminate the hose using two stepless ear clamps of the type originally supplied with the drive (see Table 2). Cut off the portion of the hose under the old clamps before making a new connection.

Note Do not use an adjustable, radiator type clamp on the 3/8 in bridge hose. This type of clamp is sharp and not perfectly round.

- Check the radiator on liquid-to-air heat exchangers. Remove any paper or debris blocking the radiator.
- Check bridge clamp pressure (source bridge and load bridge)

Table 2. Recommended Spare Parts

Description	Part Number	Quantity
Blue Hose	278A2175PUP1	50*
Black Hose Clamp	278A2175RYP1	12
Clear Hose Clamp	305A6482P4	8
Blue Hose Clamp	305A6482P5	24
Filter Wrench	278A2175VNP4	1
Pincer Hose Clamp Tool	305A6482P2	1

*1 = 1 foot (50 = 50 feet)

Removal and Replacement Procedures

Carbon Filter and Deionizer Cartridge Replacement

Note When a carbon filter is supplied, replace the carbon filter and deionizer cartridge as a pair.

➢ **To replace the deionizer cartridge**

1. Close ball valve on supply 3/8 in supply line to the deionizer cartridge and carbon filter pair.
2. Detach input and output 3/8 in lines from the low spillage couplings (see Figure 7). These couplings are hand operated, and mounted in a position to prevent the reversal of the input and output lines.
3. Remove the 3/8 in nuts on the clamp, and then remove the clamp.
4. Lift out the expended deionizer cartridge.
5. Put in the new deionizer cartridge.

Note All deionizers, regardless of the external cartridge configuration, use the same mixed bed resin: Ionic NM-60/SG manufactured by Sybron Chemicals Inc., Birmingham, NJ 08011 USA. You may contact a local supplier for a new or refurbished deionizer or purchase from GE Industrial Systems or the following supplier: (GE part number 323A2419)

Water Chemistry Inc.
3404 Aerial Way Drive
Roanoke, VA 24018
Phone: (540) 989-0400

6. Attach input and output 3/8 in lines to the couplings.
7. Replace the clamp, and the 3/8 in nuts that hold it in place.
8. Replace the activated charcoal filter.

Filter Replacement (If Supplied)

➢ **To replace the filter**

1. Replace the deionizer cartridge.
2. Unscrew the filter housing (see Figure 7).
3. Replace expended filter element with new AMETEK EPM-10 cartridge by contacting:

   AMETEK
   Plymouth Products Inc.
   502 Indiana Avenue, PO Box 1047
   Sheboygan, WI 53082-1047

   www.plymouthwater.com
   Phone: 1 (800) 222-7558
   Fax: (920) 457-6652

4. Open the ball valve on 3/8 in supply line to the deionizer cartridge and filter pair.

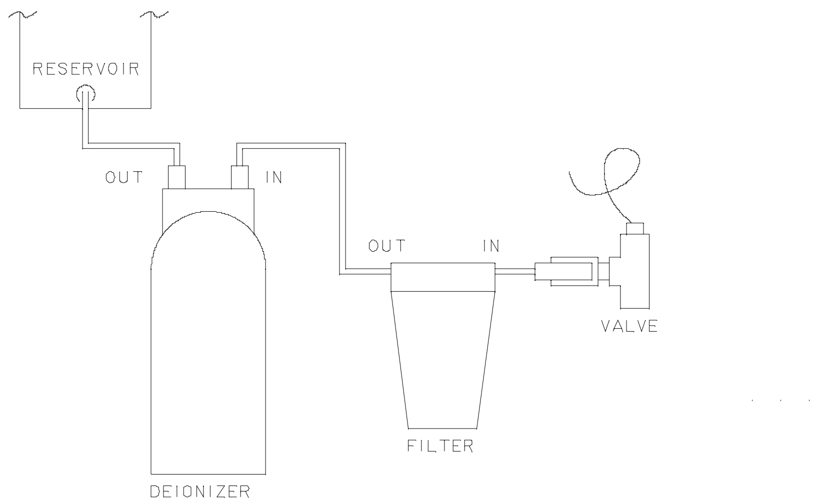

Figure 7. Typical Deionizer Cartridge Flow and Filter

Strainer Cleaning

Open the drain valve on the strainer unit (see Figure 8). Debris that has lodged against the strainer is then flushed out.

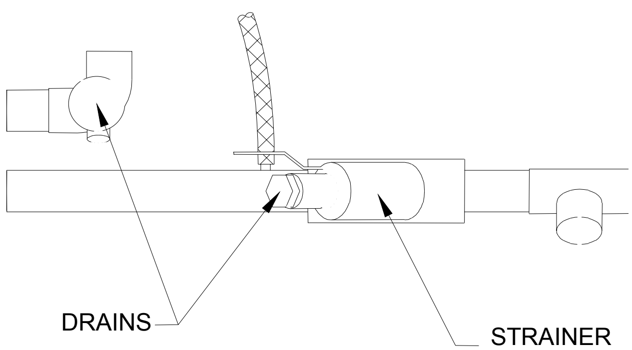

Figure 8. Strainer

Coolant Pump Replacement

This equipment contains a potential hazard of electric shock or burn. Only adequately trained persons who are thoroughly familiar with the equipment and the instructions should install or maintain this equipment.

➢ To Remove Coolant Pump

1. Get an assistant to help with the replacement (two persons are needed).
2. Turn off and lock out the start-up switch that supplies 460 V ac power to the subject pump.
3. Open electrical hookup box at pump motor (see Figure 9).
4. Check power at pump to make sure it is off.

5. Disconnect all wires.
6. Turn off supply and discharge valves for pump.
7. Remove the supply and discharge hoses.
8. For the **top pump only**:
   a. Clamp the pump vent hose leading to the reservoir shut using the pinch-off tool
   b. Disconnect hose from pump
9. While someone else holds the failed pump and motor assembly, unfasten the 1/2 in hex head bolts that secure the bracket to the cabinet. (The bolt attaches to cage nuts on the other side of the cabinet wall.)

Note Some models of the pump panel require GE part number 323A5715AHP7 3-hp pumps to be reconfigured for top pump replacement. These pumps are shipped in a configuration that matches the bottom pump. The following procedure details how to rotate the discharge for top pump replacement in these models.

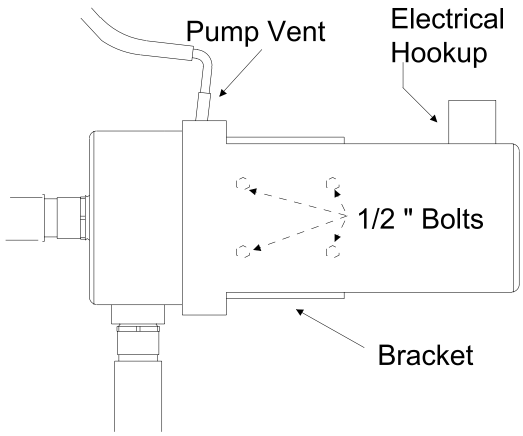

Figure 9. Pump and Motor Assembly

➢ To rotate discharge connection on 323A5715AHP7 pumps for top pump replacement only (required in certain pump panels)

1. Stand the replacement pump on end with the impeller end up.
2. Remove the casing bolts with a 6 mm Allen wrench and carefully lift off the casing.
3. Examine the o-ring casing seal for any damage and ensure that the o-ring is in position on the motor adapter and that the sealing surfaces are free from dirt or debris.

Warning **Impeller surfaces are sharp. Keep o-ring and hands away to avoid damage or injury.**

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4. Rotate the casing 180° and carefully position it over the adapter.
5. Reinstall the casing bolts and torque them to 5 – 6 ft lbs with a 6 mm Allen wrench. (Torque these bolts in a *star* pattern or sequence.)

➢ **To install new coolant pump**

1. While someone else holds the replacement pump and motor assembly in place, fasten the 1/2 in hex head bolts that secure the bracket to the cabinet.
2. For the top pump only, connect and unclamp the pump vent hose leading to the reservoir.
3. Attach the hoses.
4. Turn on all valves nearest pump.
5. Reconnect all wires at the electrical hookup box.
6. Turn on the 460 V ac supply power.
7. Check all connections for leaks.

Long-Term Storage

➢ **To prepare the coolant system for drive shutdown periods of six months or longer**

1. Drain the system of all coolant.
2. Close the valves to isolate the pumps, then blow out all lines with compressed air.
3. Drain all components, such as the pump.
4. Clean all strainers.
5. Cap all open lines.

Warranty Terms

Product **warranty information**, including warranty period and parts and service coverage is defined at the time of sale. This information is included with customer documentation, but can also be obtained from the nearest GE sales office or GE sales representative, if needed.

Note Standard warranty is 18 months from shipment or 12 months from when power is first applied, whichever comes first.

Parts still under **warranty** may be obtained directly from the factory. Refer to the section *How to Get Help*.

Renewal Parts (spares or those not under warranty) should be ordered by contacting the nearest GE Sales or Service Office. Be sure to include the following when ordering any warranty or renewal parts:

- Complete part number and description
- Drive serial number
- Drive Material List number

Time Limitations and Warranty

The above times and conditions apply to shipping and storage duration of up to one year. Longer times can require additional treatment.

Note It is important that the specifications defined in this publication be followed at all times. Failure to do so voids the equipment warranty.

How to Get Help

If help is needed beyond the instructions provided in the documentation, contact GE as follows:

GE Industrial Systems
Product Service Engineering
1501 Roanoke Blvd.
Salem, VA 24153-6492 USA

"+" indicates the international access code required when calling from outside of the USA.

Phone: + 1 800 533 5885 (United States, Canada, Mexico)
+ 1 540 378 3280 (International)

Fax: + 1 540 387 8606 (All)

Notes

GE Industrial Systems

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