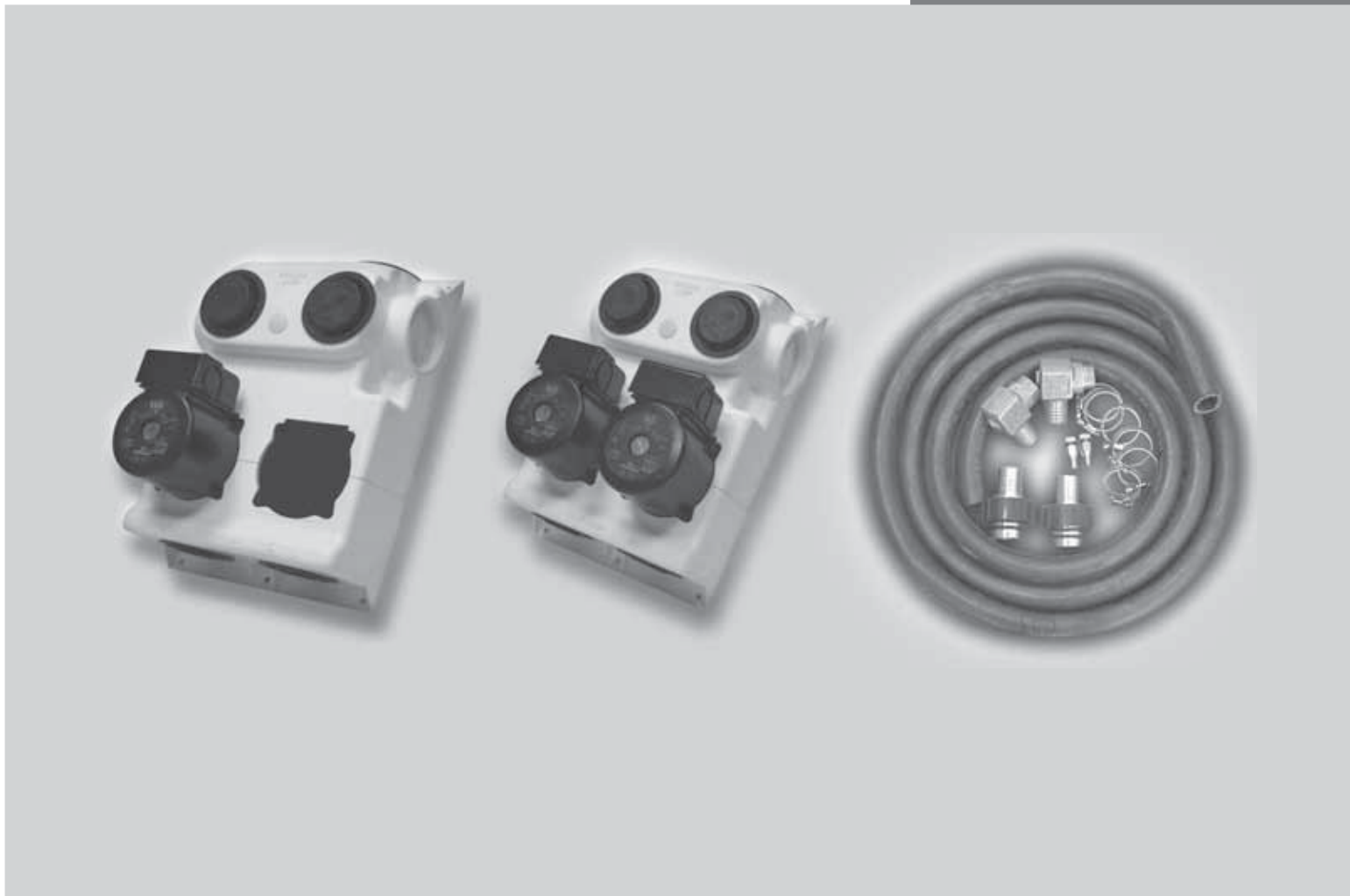


Installation and Maintenance Manual

Ground Loop Pumping Packages



6 720 220 254
Revised 05-11



BOSCH

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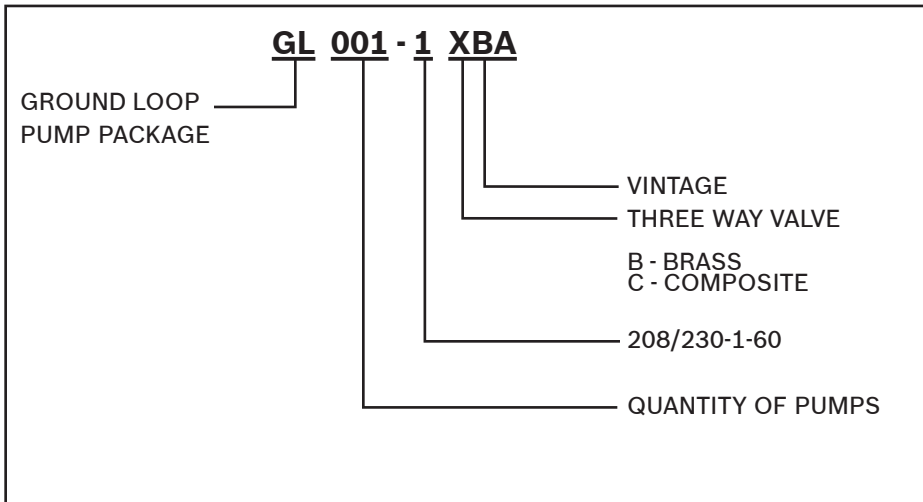
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MODEL NOMENCLATURE



FORWARD

The complete instruction manual should be read carefully before beginning installation. Follow the instructions precisely to insure proper operation of the system. The instructions are to be left with the homeowner for future reference if needed. All local, state and national codes supercede these instructions and must be strictly adhered.

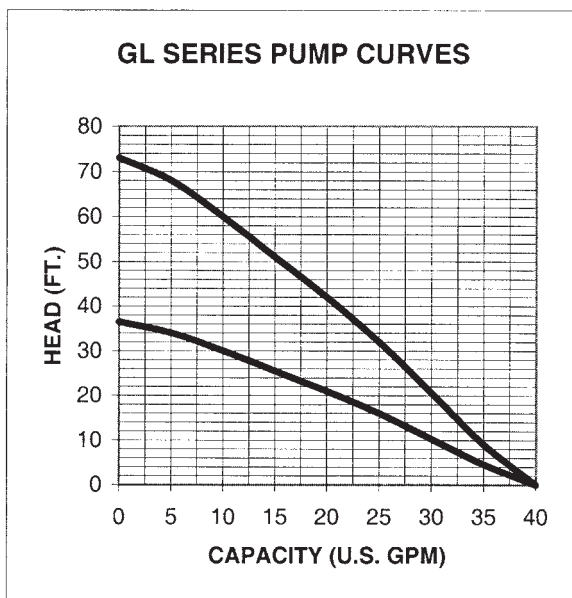
UNCRATING AND INSPECTION

Check for shipping damage, both visible and concealed if there exists any indication of damage immediately file a claim with the shipping company. You are the only one to file a claim regardless of why the damage was incurred or by whom. Remove the access cover and check all of the component parts to make sure they are properly secured before installing the unit. Parts broken loose from their secured position with resultant damage is considered damage during shipment.

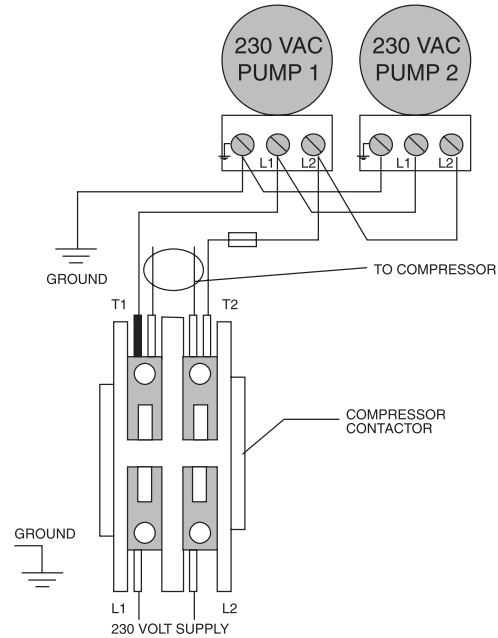
APPLICATION

The Ground Loop package adequately supplies the pumping power to circulate fluid requirements for most residential and light commercial earth coupled ground loop systems. See Figure 1 for pumping performance.

Figure 1 Pumping Performance



GRUNDFOS® UP 26-116F Pump Curve



MOUNTING AND INSTALLATION

Mounting of the Ground Loop package is accomplished by the use of (6) six 1/4 inch bolts in the package base. The package may be mounted on the unit opposite the return air opening or on a nearby wall. When installing the package on a unit, be certain not to drill into any components in the unit. When mounting the package on a wall, it is recommended not to exceed (10) ten feet in linear distance from the unit to the package. If more than (10) ten feet exists, excessive pressure drop could occur causing reduced flow rates having an adverse effect on system performance.



Package must be mounted with the pump shaft PARALLEL to the horizon. Failure to do so will cause premature failure of the thrust bearings.

GROUND LOOP PACKAGE PIPING CONNECTIONS

Connections from and to the unit are accomplished by utilizing the Ground Loop Connection kit. PVC pipe is not recommended for ground loop applications due to it's rigidity at low temperatures and it's pliability at high temperatures. Inside piping and connections must be insulated to prevent condensation water to damage. It is recommended to pressure check the system before proceeding with final insulation.

ELECTRICAL

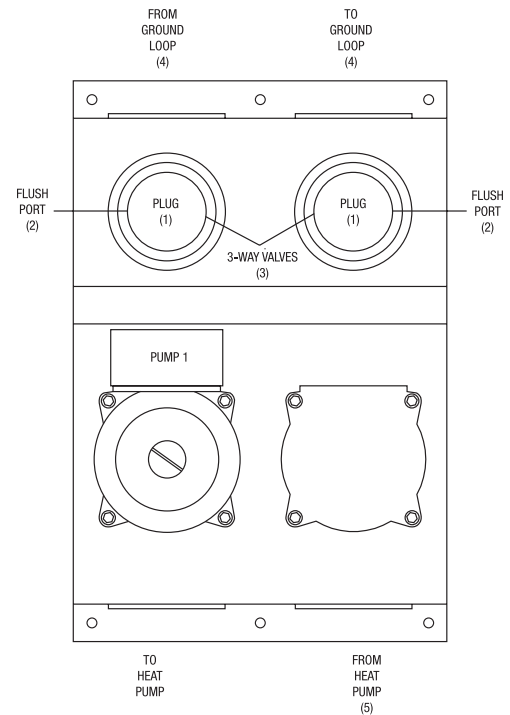
Electrical connection is accomplished in the field. The Ground Loop package pump motors are connected to the load side of the compressor contactor terminals thus allowing the pumps to run on demand of the unit. It is important that the pumps be appropriately fused and grounded. The N.E.C. prevails in wiring techniques. Please follow the wiring diagram for proper connection. Always check the pump motor nameplate for the correct voltage before connecting and start-up.

EARTH LOOP FLUSHING AND FILLING:

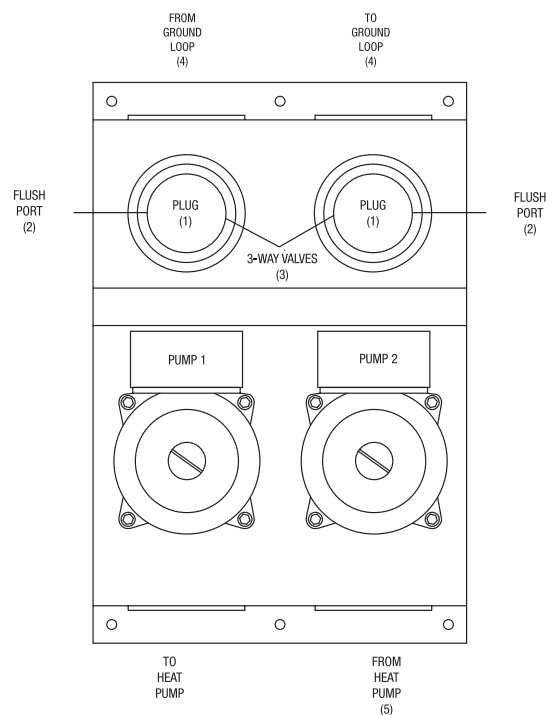
It is imperative that all air and foreign material are expelled from the earth coupled piping system before operation. This is accomplished by flushing the loop in both directions with a high volume of water at a high velocity at 2 ft/sec. Your distributor will have the required flush cart and associated equipment required for this operation. Please follow the steps outlined below for proper flushing procedures:

1. Remove countersunk plugs (1) located in flush port (2) of three-way flow control valves. (3) Hook up flush ports to flush cart, liquid must be present in supply lines at all times.
2. Position the flow control valves (3) so as to open the ports to the loop (4) and close the ports to the unit. (5)* Arrows located on the control valves indicate flow directions. When the center hub white line appears adjacent to the arrows, the flow path is established.
3. Flush the loop in both direction to insure that all air and foreign matter is eliminated. Allowing the water level to drop below the pump inlet line on the flush cart will allow air back into the loop. When air bubbles are no longer present in the return line, flow should be reversed. This procedure should be repeated several times until no air is present. If air is left in the loop, it will have an immediate effect on the units coaxial heat exchanger causing corrosion and any other associated ferrous metal components. It is absolutely imperative that the system is clean and completely free of air.
4. With the flush cart running, position the three-way valves so that the loop is now isolated. This will create a positive pressure on the loop and the flush cart may then be shut off. It is important to close the valve on the outlet side of the loop first to obtain this required positive pressure.

GL001



GL002



FLUSHING THE PUMP UNIT

1. With the three way valve now closed to the loop and open to the unit, repeat steps (3) and (4) as outlined above.
2. If the cart is not available due to the installation of the Ground Loop and pumping package prior to the units arrival, antifreeze may be utilized for flushing the unit. As previously mentioned, it is imperative that all air and foreign matter are absent from the unit.

ANTI-FREEZE

In areas where loop temperatures drop below a fixed minimum temperature per given unit, anti-freeze maybe required to prevent frost build-up and eventual freezing of the unit heat exchanger. It would be convenient to assign an arbitrary minimum allowable loop fluid temperature before frosting occurs, however; this is not the case. Freeze conditions are based on a number of variables such as fluid flow rates, fluid temperatures, equipment suction temperatures and corresponding saturated suction temperatures. These parameters vary with individual equipment design inherent with engineering design criteria. If unsure of actual operating conditions, to be safe, use anti-freeze if loop temperatures drop below 45°F.

Some commonly used anti-freezes are the Methanol and Glycols. You should first check with local authorities and the E.P.A. to determine which substances are appropriate and allowable for use in your area. Your distributor can also assist you in your anti-freeze selection (Please refer to Table 2).

ANTI-FREEZE CHARGING

1. The flush container should be filled with the proper amount of anti-freeze, to adequately protect the units heat exchanger (Please refer to Table 1).
2. Run the discharge line to a drain.
3. With the flow valves closed to the unit and open from the inlet valve flush port to the Ground Loop, start the flush pump.
4. Open the flush gradually introducing the required amount of anti-freeze.

5. Shut down the flush pump and disconnect from the pumping package. Install the threaded flush port caps into the flush ports using pliable pipe sealant. *Do not use PVC cement.
6. Take extreme care in handling Methanol that can be combustible. Forms of Glycol can be toxic if ingested.



Equipment warranties may be void if damage is caused by improper or negligent anti-freeze application.

Table 1 Appropriate Fluid Volume per 100' of Pipe

PIPE	SIZE	VOLUME (Gal/100'Pipe)
Copper	1"	4.1
Copper	1.25"	6.4
Copper	1.5"	9.2
Polybutylene	1" - CTS SDR 13.5	3.7
Polybutylene	1.25" - CTS SDR 13.5	5.6
Polybutylene	1.5" CTS - SDR 13.5	7.8
Polybutylene	2" - CTS SDR 13.5	13.4
Polyethylene	.75" - IPS SDR 11	2.8
Polyethylene	1" - IPS SDR 11	4.5
Polyethylene	1.25" - IPS SDR 11	7.8
Polyethylene	1.50" - IPS SDR 11	11.5
Polyethylene	2" - IPS SDR 11	18.0

Table 2 Anti-Freeze

Type	Minimum Temperature for Freeze			
	10°F	15°F	20°F	25°F
Protection				
Methanol	25%	21%	16%	10%
Propylene Glycol	26%	23%	19%	9%
Ethylene Glycol*	21%	18%	13%	8%
Calcium Chloride 95%**	1.5#	1.2#	1.0#	.6#
Calcium Chloride 78%**	1.8#	1.5#	1.2#	.7#
GS4	35%	30%	21%	13%

* All percentages are by volume (gal/gal), not weight

** All weights are pounds of Calcium Chloride required per gallon of water.

PRESSURE - TEMPERATURE PLUGS

P/T Plugs are provided with the ground loop connection kits as a means of measuring system fluid flow, pressure drop and temperature. The fluid flow (GPM) through the unit can be verified by measuring the pressure drop across the unit heat exchanger or condenser. Once the pressure drop is determined, then refer to the unit specification data sheet section labeled condenser water flow. This section provides flow rates with corresponding pressure drops.



EARTH LOOP PRESSURE:

A slightly positive system pressure 5 PSIG on suction of pump is required to operate the ground loop pumps. System pressures will fluctuate as the earth loop relaxes and fluid temperatures change. Typical Earth Loop pressures range from 5 to 40 PSIG. Some initial Ground Loop settling may occur on initial start up which may cause fluctuating pressures briefly. Pressures should stabilize after some initial run-time.

START-UP OF GROUND LOOP PUMPING PACKAGE

1. Check electrical power supply for proper voltage.
2. Check valves to make sure they are properly positioned. Ground loop and unit ports open, flush ports fully closed and capped.
3. Check and record unit pressure drop, ground loop pressure drop, and system flow rate.
4. Check and record heat pump performance utilizing engineering brochures and installation and start-up manuals.

TROUBLESHOOTING

Problem	Possible Cause	Checks and Corrections
Noisy	Defective pump	Replace
	Air in loop	Flush loop again
	Vibration	Check mounting
Pressure Loss	Leak	Repair
	Temperature change	Pressure should vary as temperature changes(10-30 psi)
	Pipe expansion	Plastic pipe relaxing
Unit trips out on low pressure	Low Flow/No Flow	See low flow/No flow
Water drips out	Condensate	Insulate piping
	Water leak	Tighten connections
Low Flow/ No Flow	No power	Check power supply
	Blown fuse	Replace fuse - check for cause
	Broken or loose wires	Replace or tighten wires
	Pump shaft stuck	Remove the indicator plug from the center of each circular pump and ensure that shaft is rotating
	Air Lock	Flush the loop to eliminate air
	Improperly sized pump	Add pump capacity
	Defective pump	Replace
	No positive pressure	Check for leaks; add fluid; flush loop in earth loop (need more than 2 psi)
	Viscous solution	Change type of anti-freeze
	Loop fluid freezing or frozen	Switch "T" Stat to air conditioning to see if flow improves at warmer temperature; add anti-freeze and measure freeze protection
	Kink in loop piping	Straighten or replace



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