INSTALLATION

GO SERIES

AND MAINTENANCE MANUAL

TABLE OF CONTENTS

MODEL NOMENCLATURE

GO 048 -1 VT C - F L T

SERIES:
GO-GEO MISER

NOMINAL CAPACITY:

VOLTAGE DESIGNATION:
1 - 208/1/60 & 230/1/60
3 - 208/3/60 & 230/3/60 (SINGLE STEP ONLY)

CABINET CONFIGURATION:
VT - VERTICAL
HZ - HORIZONTAL
CF - COUNTERFLOW

HEAT EXCHANGER MATERIAL:
C - COPPER
N - CUPRO-NICKEL

WATER CONNECTION LOCATION
F - FRONT

RETURN AIR LOCATION:
L - LEFT
R - RIGHT
B - BACK
F - FRONT

SUPPLY AIR LOCATION:
T - TOP (VT ONLY)
E - END BLOW (HZ ONLY)
B - BOTTOM (CF ONLY)

INITIAL INSPECTION:

Be certain to inspect all cartons or crates on each unit as received at the job site before signing the freight bill. Verify that all items have been received and that there are no visible damages; note any shortages or damages on all copies of the freight bill. In the event of damage or shortage, remember that the purchaser is responsible for filing the necessary claims with the carrier. Concealed damages not discovered until after removing the units from the packaging must be reported to the carrier within 15 days of receipt.

GENERAL DESCRIPTION:

The GO Water-to-Air Heat Pumps provide the best combination of performance and efficiency available. Safety devices are built into each unit to provide the maximum system protection possible when properly installed and maintained.

The GO Water-to-Air Heat Pumps are Underwriters Laboratories (UL) and (cUL) listed for safety. The water-to-Air Heat Pumps are designed to operate with entering fluid temperature between 25°F to 75°F in the heating mode and between 50°F to 110°F in the cooling mode.

NOTE: 50°F Min. EWT for well water applications with sufficient water flow to prevent freezing. Antifreeze solution is required for all closed loop applications. Cooling Tower/Boiler and Earth Coupled (Geo Thermal) applications should have sufficient antifreeze solution to protect against extreme conditions and equipment failure. Frozen water coils are not covered under warranty.

NOTE: This product should not be used for temporarily heating/cooling during construction. Doing so may effect the units warranty.

MOVING AND STORAGE:

If the equipment is not needed for immediate installation upon its arrival at the job site, it should be left in its shipping carton and stored in a clean, dry area. Units must only be stored or moved in the normal upright position as indicated by the "UP" arrows on each carton at all times. If unit stacking is required, stack units as follows: Vertical units less than 6 tons, no more than two high. Horizontal units less than 6 tons, no more than three high. "Do not stack units larger than 6 tons."

SAFETY CONSIDERATIONS:

Installation and servicing of this equipment can be hazardous due to system pressure and electrical components. Only trained and qualified personnel should install, repair, or service the equipment. Untrained personnel can perform basic functions of maintenance such as cleaning coils and replacing filters.

WARNING: Before performing service or maintenance operations on the system, turn off main power to the unit. Electrical shock could cause personal injury or death.

When working on equipment, always observe precautions described in the literature, tags, and labels attached to the unit. Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing, and place a fire extinguisher close to the work area.

LOCATION:

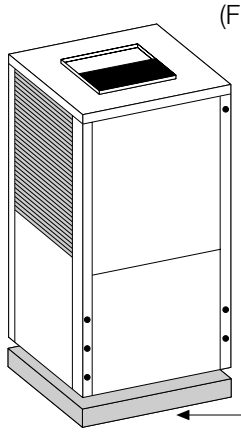
Locate the unit in an indoor area that allows easy removal of the filter and access panels, and has enough room for service personnel to perform maintenance or repair. Provide sufficient room to make fluid, electrical, and duct connection(s). If the unit is located in a confined space such as a closet, provisions must be made for return air to freely enter the space. On horizontal units, allow adequate room below the unit for a condensate drain trap and do not locate the unit above supply piping. These units are not approved for outdoor installation; therefore, they must be installed inside the structure being conditioned. Do not locate in areas that are subject to freezing.

INSTALLATION:

NOTE: Remove all shipping blocks under blower housing. Loosen compressor mounting bolts.

MOUNTING VERTICAL UNITS:

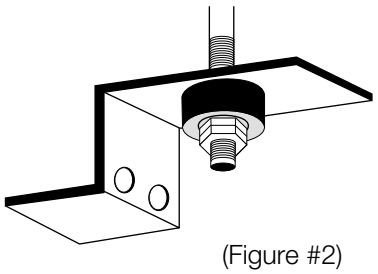
(Figure #1)



Vertical units up to five tons are available in left, right, front, or rear air return configurations. Vertical units should be mounted level on a vibration absorbing pad slightly larger than the base to minimize vibration transmission to the building structure. It is not necessary to anchor the unit to the floor. (See Figure #1). Vertical units larger than five tons should be vibration isolated according to the design engineers specifications.

MOUNTING HORIZONTAL UNITS:

While horizontal units may be installed on any level surface strong enough to hold their weight, they are typically suspended above a ceiling by threaded rods. The rods are usually attached to the unit corners by hanger bracket kits (P/N 930-004, 006). (See Figure #2). The rods must be securely anchored to the ceiling. Refer to the hanging bracket assembly and installation instructions for details. Models GO 042 and up require six brackets (930-006).(See unit horizontal detail drawing). Horizontal units installed above the ceiling must conform to all local codes. An auxiliary drain pan if required by code, should be at least four inches larger than the bottom of the heat



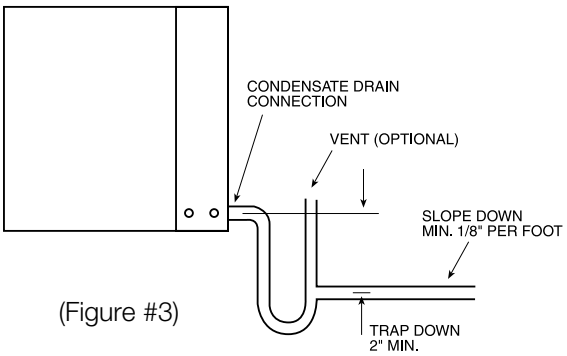
(Figure #2)

pump. Plumbing connected to the heat pump must not come in direct contact with joists, trusses, walls, etc..

Some applications require an attic floor installation of the horizontal unit. In this case the unit should be set in a full size secondary drain pan on top of a vibration absorbing mesh. The secondary drain pan prevents possible condensate overflow or water leakage damage to the ceiling. The secondary drain pan is usually placed on a plywood base isolated from the ceiling joists by additional layers of vibration absorbing mesh. In both cases, a 3/4" drain connected to this secondary pan should be run to an eave at a location that will be noticeable. If the unit is located in a crawl space, the bottom of the unit must be at least 4" above grade to prevent flooding of the electrical parts due to heavy rains.

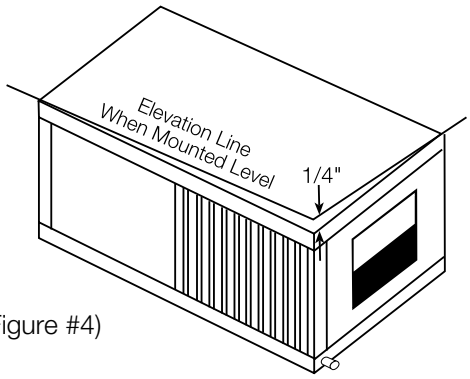
CONDENSATE DRAIN:

NOTE: If equipped with float style condensate overflow switch, final adjustment must be made in the field.



(Figure #3)

All GO Units are equipped with a condensate overflow sensor/switch. A drain line must be connected to the heat pump and pitched away from the unit a minimum of 1/8" per foot to allow the condensate to flow away from the unit.
This connection must be in conformance with local plumbing codes. A trap must be installed in the condensate line to insure free condensate flow. (Heat Pumps are not internally trapped). A vertical air vent is sometimes required to avoid air pockets. (See Figure #3). The length of the trap depends on the amount of positive or negative pressure on the drain pan. A second trap must not be included.



(Figure #4)

The horizontal unit should be pitched approximately 1/4" towards the drain in both directions, to facilitate condensate removal. (See Figure #4)

DUCT SYSTEM:

A supply air outlet collar and return air duct flange are provided on all units to facilitate duct connections. Refer to the FHP individual data specification sheet for physical dimensions of the collar and flange.

A flexible connector is recommended for supply and return air duct connections on metal duct systems. All metal ducting should be insulated with a minimum of one inch duct insulation to avoid heat loss or gain and prevent condensate forming during the cooling operation. Application of the unit to uninsulated duct work is not recommended as the unit's performance will be adversely affected. Do not connect discharge ducts directly to the blower outlet. The factory provided air filter must be removed when using a filter back return air grill.The factory filter should be left in place on a free return system.

If the unit will be installed in a new installation which includes new duct work, the installation should be designed using current ASHRAE procedures for duct sizing. If the unit is to be connected to existing ductwork, a check should be made to assure that the duct system has the capacity to handle the air required for the unit application. If the duct system is too small, larger ductwork should be installed. Check for existing leaks and repair.

The duct system and all diffusers should be sized to handle the designed air flow quietly. To maximize sound attenuation of the unit blower, the supply and return air plenums should be insulated. There should be no direct straight air path thru the return air grille into the heat pump. The return air inlet to the heat pump must have at least one 90 degree turn away from the space return air grille. If air noise or excessive air flow are a problem, the blower speed can be changed to a lower speed to reduce air flow. (Refer to ICM motor interface board section in this manual and Figure #7)

PIPING:

Supply and return piping must be as large as the unit connections on the heat pump (larger on long runs). Never use flexible hoses of a smaller inside diameter than that of the fluid connections on the unit. GT Units are supplied with either a copper or optional cupro-nickel condenser. Copper is adequate for ground water that is not high in mineral content. Should your well driller express concern regarding the quality of the well water available or should any known hazards exist in your area, we recommend proper testing to assure the well water quality is suitable for use with water source equipment. In conditions anticipating moderate scale formation or in brackish water a cupro-nickel heat exchanger is recommended.

Both the supply and discharge water lines will sweat if subjects to low water temperature. These lines should be insulated to prevent damage from condensation.

All manual flow valves used in the system must be ball valves. Globe and gate valves must not be used due to high pressure drop and poor throttling characteristics. Never exceed the recommended water flow rates.

Serious damage or erosion of the water to refrigerant heat exchanger could occur.

Always check carefully for water leaks and repair appropriately. Units are equipped with female pipe thread fittings. Consult the specification sheets for sizes. Teflon tape sealer should be used when connecting water piping connections to the units to insure against leaks and possible heat exchanger fouling. Do not overtighten the connections. Flexible hoses should be used between the unit and the rigid system to avoid possible vibration. Ball valves should be installed in the supply and return lines for unit isolation and unit water flow balancing.

ELECTRICAL:

(Refer to electrical component box layout, Figure #5)

Field wiring must comply with local and national electric codes. Power to the unit must be within the operating voltage range indicated on the unit nameplate. or on the performance data sheet. On three phase units (single steps units only) phases must be balanced within 2%.

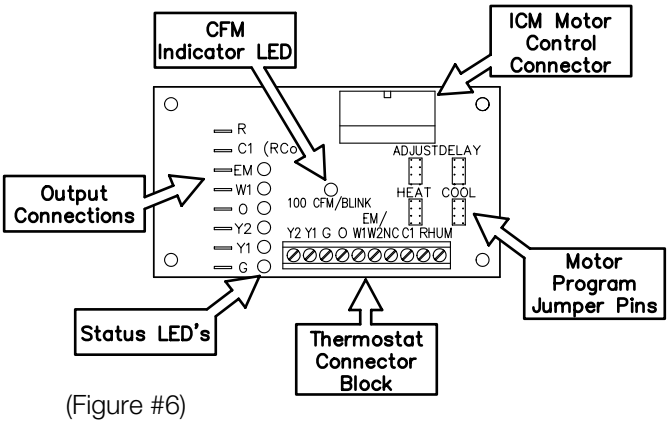
CAUTION: Operation of unit on improper line voltage or with excessive phase imbalance will be hazardous to the unit, constitutes abuse and may void the warranty.

Properly sized fuses or HACR circuit breakers must be installed for branch circuit protection. See unit nameplate for maximum fuse or breaker size.

The unit is provided with a concentric knock-out in the front left corner post for attaching common trade sizes of conduit, route power supply wiring through this opening. Always connect the ground lead to the grounding lug provided in the control box and power leads to the power supply terminal block as indicated on the wiring diagram and Figure #5.

NOTE: Units supplied with internal electric heat require two (2) separate power supplies: one for the unit compressor and one for the electric heater elements, blower motor and control circuit. Refer to the ELECTRIC HEATER PACKAGE OPTION section and Figure #8 and #9 for wiring instructions, minimum circuit ampacities and maximum fuse/breaker sizing.

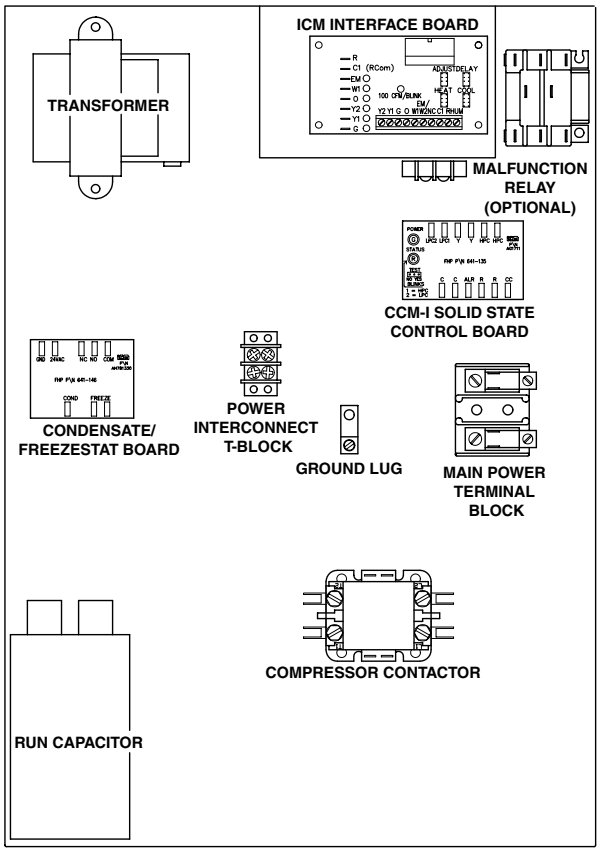
ICM INTERFACE BOARD:



(Figure #6)

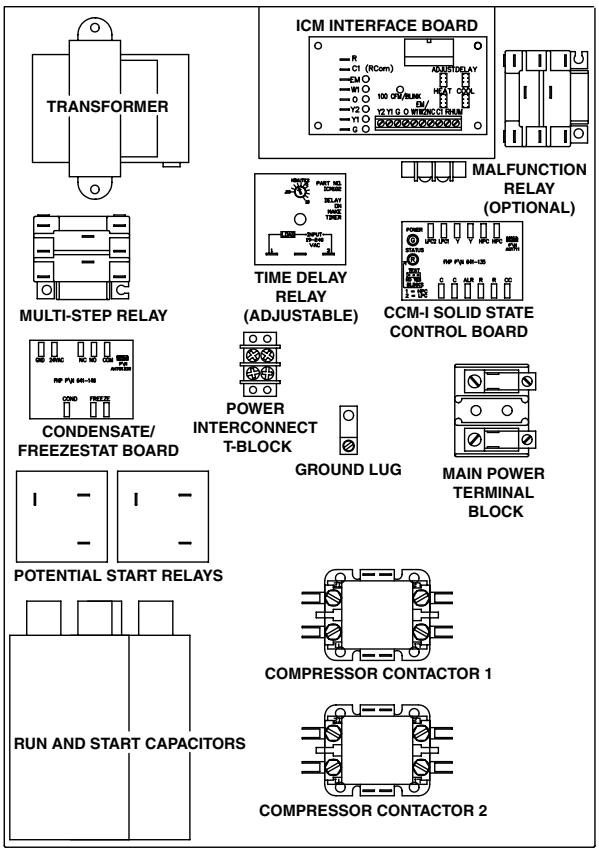
THERMOSTAT CONNECTIONS:

Thermostat wiring is connected to the 10 pin screw type terminal block on the lower center portion of the ICM Interface Board. In addition to providing a connecting



Single Step

(Figure #5)
Electrical Box Component Layout



Multi Step

point for thermostat wiring, the interface board also translates thermostat inputs into control commands for the variable speed programmable ICM-2 DC fan motor and displays an LED indication of operating status. The thermostat connections and their functions are as follows:

Y2	Second Stage Compressor Operation
Y1	First Stage Compressor Operation
G	Fan
O	Reversing Valve (energized in cooling)
W1	Auxiliary Electric Heat (runs in conjunction with compressor)
EM/W2	Emergency Heat (electric heat only)
NC	Transformer 24 VAC Common (extra connection)
C1	Transformer 24 VAC Common (primary connection)
R	Transformer 24 VAC Hot
HUM	Dehumidification Mode (not used in GO Series)

If the Geo-Miser unit is being connected to a thermostat with a malfunction light, this connection is made at the unit lockout relay.

NOTE:: If the thermostat is provided with a malfunction light powered off of the common (C) side of the transformer (such as FHP's part # 641-068), the unit must be provided with a malfunction relay (FHP option # 660-006) to properly energize the light. The relay coil will be wired across the (ALR) and (C) contacts on the unit's CCM board and the relay's normally open contacts across (ALR) and the malfunction light connection on the thermostat. If the thermostat is provided with a malfunction light powered off of the hot (R) side of the transformer (such as FHP part#641-060), then the thermostat malfunction light connection should be connected directly to the (ALR) contact on the unit's CCM board.

MOTOR PROFILE AIR FLOW TABLE

MODEL	FAN ONLY	LOW STEP	HIGH STEP AIRFLOW	AUX. HEAT	EMERGENCY HEAT	COOL HEAT DELAY	ADJUST
GO024	550	–	800	900	900	B	NORM
GO030	700	–	1000	900	900	A	NORM
GO036	850	–	1200	1150	1150	A	NORM
GO042	1000	–	1400	2000	2000	D	NORM
GO048	1050	1100	1600	2000	2000	C	NORM
GO060	1100	1400	2000	2000	2000	B	NORM
GO072	1600	1600	2200	2200	2200	A	NORM

(Figure #7)

To the left of the thermostat connection block are a row of 2 red and 4 green LED's. These LED's indicate the operating status of the unit. They are labeled as follows:

EM	(red)	Emergency Heat On
W1	(red)	Auxiliary Heat On
O	(green)	Reversing Valve Energized, unit is in cooling mode
Y2	(green)	Second Stage Compressor On
Y1	(green)	First Stage Compressor On
G	(green)	Fan On

Just above the connector block is a single red LED labeled CFM that will blink intermittently when the unit is running and may flicker when the unit is off. This LED indicates the air delivery of the blower at any given time. Each blink of the LED represent 100 CFM of air delivery so if the LED blinks 12 times, pauses, blinks 12 times, etc. the blower is delivering 1200 CFM. Refer to Figure #7 for factory programmed air delivery settings for the GO Series.

To the right of the thermostat connection block is a green LED labeled dehumidify. This feature is not utilized on the GO Series.

Just above and to the right of the thermostat connection block are four sets of jumper pins labeled ADJ, DELAY, HEAT and COOL. The ADJ set of pins are labeled NORM, (+), (-) and TEST. GO units will all be set on the NORM position from the factory, however, airflow can be increased (+) or decreased (-) by 15% from the pre-programmed setting by relocating the jumper in this section. The TEST position is used to verify proper motor operation. If a motor problem is suspected, move the ADJ jumper to the TEST position and energize G on the thermostat connection block. If the motor ramps up to 100% power, then the motor itself is functioning normally. Always remember to replace the jumper to NORM, (+) or (-) after testing and reset the unit thermostat to restore normal operation.

NOTE: Do not set the ADJ jumper to the (-) setting when electric heaters are installed. Doing so may cause the heaters to cycle on their thermal overload switches, potentially shortening the life of the switches.

The other three sets of jumper pins are used to select the proper program in the ICM motor for the unit. Refer to Figure #7 for the proper jumper placement.

NOTE: Always disconnect power before changing jumper positions on the interface board and reset the unit afterward.

To the left of the red and green status LED's is a row of 1/4" male quick connects. These are used to pass thermostat inputs on to the rest of the control circuit. Remember to always turn off unit power at the circuit breaker before attaching or disconnecting any wiring from these connections to avoid accidental short circuits that can damage unit control components.

SAFETY DEVICES AND THE LOCKOUT CIRCUIT:

Each Go Series unit is factory provided with a high pressure switch, low pressure switch and a condensate overflow switch. These switches are all normally closed, opening on a fault condition. If either the high pressure switch or the condensate overflow switch open, the unit compressors will shut down immediately. Note that the blower motor and electric heaters will remain active. The low pressure switch is deactivated for 90 seconds after compressor start-up by the low pressure bypass timer. This prevents nuisance low pressure lockouts during cold

start-ups in the heating mode. After the 90 second period has elapsed, if the low pressure switch opens, the unit compressors will shut down.

After the first shut down, the unit will restart once the switch(es) close and the anti short cycle timer has timed out. If a safety switch opens again the unit will lock out and must be manually reset.

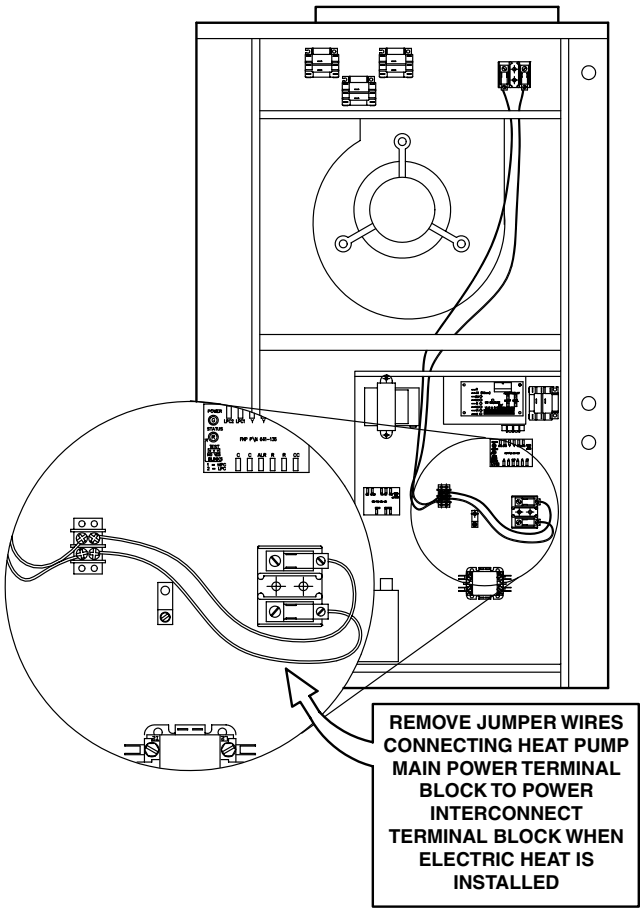
A lockout can be reset by turning the unit thermostat off and then back on or by shutting off unit power at the circuit breaker.

ELECTRIC HEATER PACKAGE OPTION:

Factory or field installed internal electric heater packages are available for all Geo-Miser series units. Two power supplies are required when heater packages are utilized. The power supply for the heater package (located in the electric heater package control box) provides power for the heater elements, the blower motor and the control circuit for the unit. The power supply for the unit provides power for the compressor(s). This allows the electric heaters to continue to operate along with the blower motor in the case of unit compressor and/or compressor power supply failure.

When field installing a heater package, always remember to remove the factory wired jumpers between the unit power supply terminal block and the power interconnect terminal block (see Figure #8). Failure to do so will cause damage to the power supply circuit breakers and the unit.

(Figure #8)



(Figure #9)

	GEO -MISER MODEL	HEATER MODEL	KW	HEATER AMPS		CIRCUIT	MCA		MAX FUSE		AWG MIN
				208V	240V		208V	240V	208V	240V	
❍	GO024, 030	HP050-1XS	4.8	17.3	20.0	L1/L2	27.1	30.4	30	30	8
❍	GO036	HP050-1XM	4.8	17.3	20.0	L1/L2	27.1	30.4	30	30	8
❍	GO024, 030	HP075-1XS	7.2	23.6	30.0	L1/L2	34.9	42.9	40	45	8
❍	GO036	HP075-1XM	7.2	23.6	30.0	L1/L2	34.9	42.9	40	45	8
❍	GO024, 030	HP100-1XS	9.6	34.7	40.0	L1/L2	48.8	55.4	50	60	6
❍	GO036	HP100-1XM	9.6	34.7	40.0	L1/L2	48.85	55.4	50	60	6
❍	GO042, 048, 060, 072	HP100-1XL	9.6	34.7	40.0	L1/L2	52.2	5.8	60	60	6
❍	GO036	HP150-1XM	14.4	52.0	60.0	TOTAL	73.9	83.8	80	90	4
		HP150-1XM	14.4	34.7	40.0	L1/L2	48.8	55.4	60	60	6
				17.3	20.0	L3/L4	21.7	25.0	25	25	10
❍	GO042, 048, 060, 072	HP150-1XL	14.4	52.0	60.0	TOTAL	73.9	83.8	80	90	4
		HP150-1XL	14.4	34.7	40.0	L1/L2	52.2	58.8	60	60	6
				17.3	20.0	L3/L4	21.7	25.0	25	25	10
❍	GO048, 060, 072	HP200-1XL	19.2	69.3	80.0	TOTAL	92.2	105.4	100	110	2
		HP200-1XL	19.2	34.7	40.0	L1/L2	48.8	55.4	50	60	6
				34.7	40.0	L3/L4	43.4	50.0	45	50	6

All heaters rated single phase 60hz, and include unit fan load. All fuses type “D” time delay or HACR type breaker or HRC FORM 1 Wire size based on 60 deg. C copper conductors.

Each Geo-Miser model has a number of heater sizes available. Refer to Figure #9 for heater package compatibility with specific Geo-Miser units, model nomenclature and electrical data.

SEQUENCE OF OPERATION-SINGLE STEP UNITS
(Figure #14)

COOLING MODE:

Energizing the "O" terminal energizes the unit reversing valve in the cooling mode. The fan motor starts when the "G" terminal is energized. Note that the fan motor will take 30 seconds to ramp up to operating speed and will run at 70% of the cooling rated air flow as long as there is no call for compressor or heater operation.

When "Y2" in the unit ("Y" or "Y1" on the thermostat) is energized the compressor starts and the unit is now cooling. Solenoid valves or loop pumps are brought on in conjunction with the compressor.
When the thermostat is satisfied, the compressor shuts down and the fan ramps down. If the "G" terminal is still energized (fan operation is on "continuous" at the thermostat) the fan will ramp down to 70% of cooling air flow in 30 seconds. If the "G" terminal is de-energized with "Y2" then the fan ramps down to off in 30 seconds.

HEATING MODE:

Heating operation follows the same sequence as cooling only without the "O" terminal. During heating operation if the thermostat calls for auxiliary heat ("W1"), the fan ramps up to auxiliary heat air flow immediately and the electric heaters are energized (if installed) along with the compressor. Note that if the unit compressor locks out for any reason at this time, the electric heaters will continue to function normally.
Emergency heat (W2/EM) energizes the emergency heat relay in the heater control box, bringing on all of the heating elements at once. The fan immediately ramps up to full electric heat air flow.
As in cooling, once the thermostat is satisfied, the fan will ramp back down over a period of 30 seconds.

SEQUENCE OF OPERATION-MULTI-STEP UNITS:
(Figure #15 Wire Schematic)

COOLING MODE:

Energizing the "O" terminal energizes the unit reversing valve in the cooling mode. The fan motor starts when the "G" terminal is energized. Note that the fan motor will take 30 seconds to ramp up to operating speed and will run at 70% of the cooling rated air flow as long as there is no call for compressor or heater operation.

When the thermostat calls for first stage cooling (Y1) the loop pump or solenoid valve is energized and the 40% (lead) compressor starts. The fan ramps up to first stage cooling air flow in 30 seconds.

When the thermostat calls for second stage cooling (Y2) the multi-step relay is energized along with the 60% compressor contactor. This shuts down the 40% compressor and starts the 60% (lag) compressor. The fan ramps up to full cooling air flow.

At this point the time delay relay starts timing out. Once the time period set on the TDR elapses, the 40% compressor restarts for full 100% capacity. Depending on the application this time delay relay can be set for 0.1 to 8 minutes. If the thermostat can be satisfied prior to the set time delay, then the 40% compressor will not restart, allowing the unit to satisfy the space temperature at a much higher efficiency than if both compressors were running. This is the secret of multi-step operation, allowing the unit to run at up to 3 stages of compressor operation with a 2 stage thermostat.

In addition to controlling the multi-step logic, the multi-step relay also holds the unit in full cooling until the thermostat is completely satisfied. This prevents compressor short-cycling and satisfies the space more quickly.

Once the thermostat is satisfied, the compressor(s) shut down and the fan ramps down to either fan only mode or off over a span of 30 seconds.

Note that a fault condition initiating a lockout will de-energize both compressors.

HEATING MODE:

The first two stages of heating (Y1 & Y2) operate in the same manner as cooling, but with the reversing valve de-energized. On a call for auxiliary heat (W1), the fan ramps up to auxiliary heat air flow immediately and the electric heater package is energized along with the compressor(s). As the thermostat is satisfied, the heaters will shut off as soon as W1 is de-energized, but both compressors will remain on until the thermostat is completely satisfied. Note that if the unit compressor(s) lock out for any reason at this time, the electric heaters will continue to function normally.

Once the thermostat is satisfied, the compressor(s) shut down and the fan ramps down either fan only mode or off over a span of 30 seconds. If emergency heat (W2/EM) is called for, the fan will ramp up to emergency heat air flow immediately and the heater package will energize in emergency heat mode, all heater elements coming on. On shut down the fan will ramp down over a period of 30 seconds.

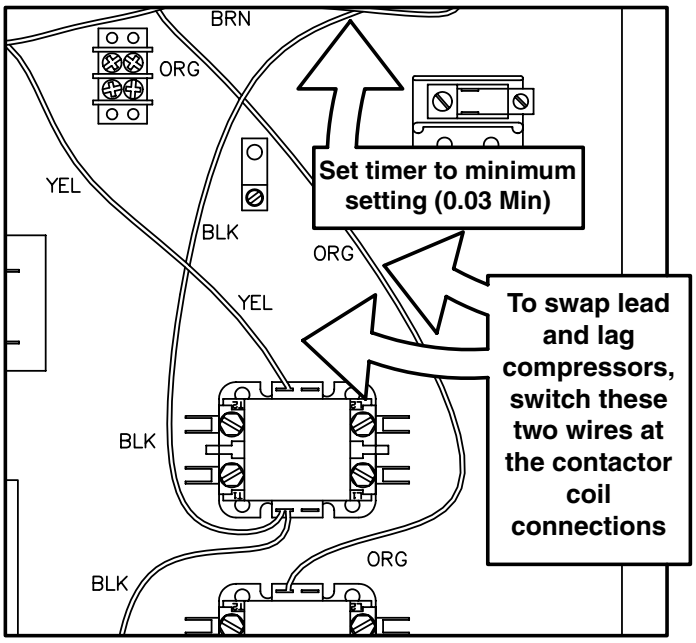
ALTERNATE SEQUENCE OF OPERATION-MULTI-STEP UNIT WITH 60% COMPRESSOR AS LEAD:
(Figure #10, #16)

Multi-step units can be field converted from the factory sequence of operation with the 40% compressor running in 1st stage and the 60% compressor then both compressors running in 2nd stage to an alternate sequence with th e 60% compressor running in 1st stage and both in 2nd stage. This sequence would give more capacity (but at slightly lower efficiency) in 1st stage and a lower sensible to total ratio in 1st stage. This sequence might make sense in areas of high humidity or where a little extra 1st stage capacity would allow the unit to run predominantly on 1st stage for a higher overall operating efficiency.

To convert the unit the installer needs to switch the

compressor contractor coil wires from CC1 to CC2 and vice versa. Additionally the installer should set the time delay relay to its minimum setting of 0.1 minutes to prevent extended periods of the 40% compressor running alone with full air flow. It is recommended that if the sequence of operation is altered in this manner that the installer replace the unit wiring diagram with the one shown in Figure #18 to avoid confusion in the future.

The sequence of operation for this unit would basically be the same as for a factory wired multi-step unit but with the 60% compressor running in 1st stage and the 40% compressor starting in 2nd followed immediately by the 60% compressor for full capacity.



(Figure #10)

WELL WATER SYSTEMS:
(Figure #11)

In well water applications water pressure must always be maintained in the heat exchanger. This can be accomplished with either control valve or a bladder type expansion tank. When using a single water well to supply both domestic water and the heat pump care must be taken to insure that the well can provide sufficient flow for both. In well water applications a slow closing solenoid valve must be used to prevent water hammer.

Solenoid valves should be connected across Y1 and C1 on the interface board for multi-step units and Y2 and C1 for single step units. Make sure that the VA draw of the valve does not exceed the contact rating of the thermostat.

INSTALLATION OF PRESSURE REGULATING VALVES:

Pressure regulating valves are used to increase or decrease water flow through the heat pump in response to refrigerant pressure. In some cases more water may be required in heating than in cooling, or vice versa. With the Geo-Miser heat pumps these valves are not required. However, if installed, a pair of valves are required for proper operation, one valve for cooling (direct acting) and another valve for heating (indirect acting). A refrigerant tap is provided in the refrigerant line located between the reversing valve and the water-to-refrigerant heat exchanger for proper monitoring of the refrigerant pressures.
The discharge water from the heat pump is not contaminated in any manner and can be disposed of in various ways depending on local building codes (i.e. discharge well, dry well, storm sewer, drain field, stream or pond, etc.) Most local codes forbid the use of a sanitary sewer for disposal. Consult your local building and zoning department to insure compliance in your area.

COOLING TOWER/BOILER SYSTEMS:
(Figure #12)

The cooling tower and boiler water loop temperature is usually maintained between 50˚ F to 100 ˚ F to assure adequate cooling and heating performance.

In the cooling mode, heat is rejected from the FHP unit into the water loop. A cooling tower provides evaporative cooling to the loop water thus maintaining a constant supply temperature to the unit. When utilizing open cooling towers, chemical water treatment is mandatory to ensure the water is free from corrosive elements. A secondary heat exchanger (plate frame) between the unit and the open cooling tower may also be used. It is imperative that all air be eliminated from the closed loop side of the heat exchanger to insure against fouling.

In the heating mode, heat is absorbed from the water loop. A boiler can be utilized to maintain the loop at the desired temperature.

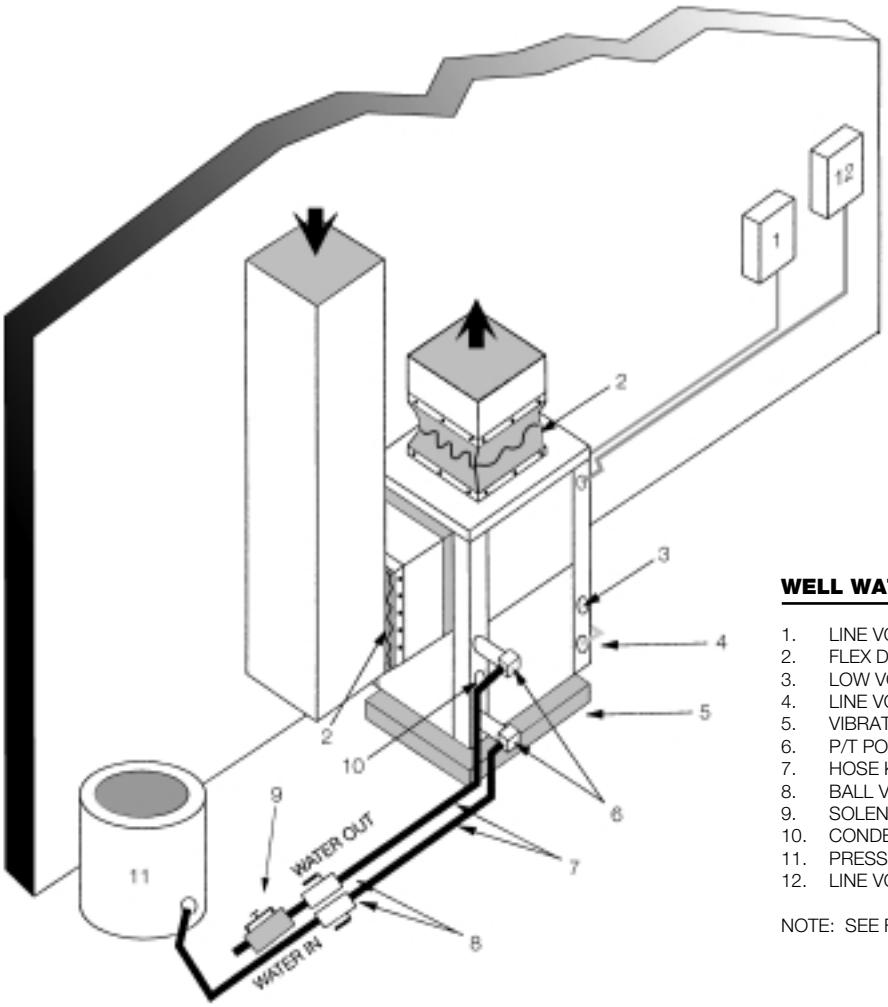
CAUTION: Water piping exposed to extreme low ambient temperatures is subject to freezing.

Consult the specification sheets for piping sizes. Teflon tape sealer should be used when connecting to the unit to insure against leaks and possible heat exchanger fouling. Do not overtighten the connections. Flexible hoses should be used between the unit and the rigid system to avoid possible vibration. Ball valves should be installed in the supply and return lines for unit isolation and unit water flow balancing. Pressure/temperature ports are recommended in both supply and return lines for system flow balancing. Water flow can be accurately set by measuring the water-to-refrigerant heat exchangers water side pressure drop. See specification sheets for water flow vs. pressure drop information.

Before final connection to the unit, the supply and return hose kit must be connected together and the system flushed to remove dirt, piping chips and other foreign material. Failure to do so may cause poor unit performance, heat exchanger damage and will void the unit warranty.

EARTH COUPLED SYSTEMS:
(Figure #13)

Closed loop and pond applications require specialized design knowledge.No attempt at these installations should be made unless the dealer has received specialized training. Utilizing FHP's Ground Loop



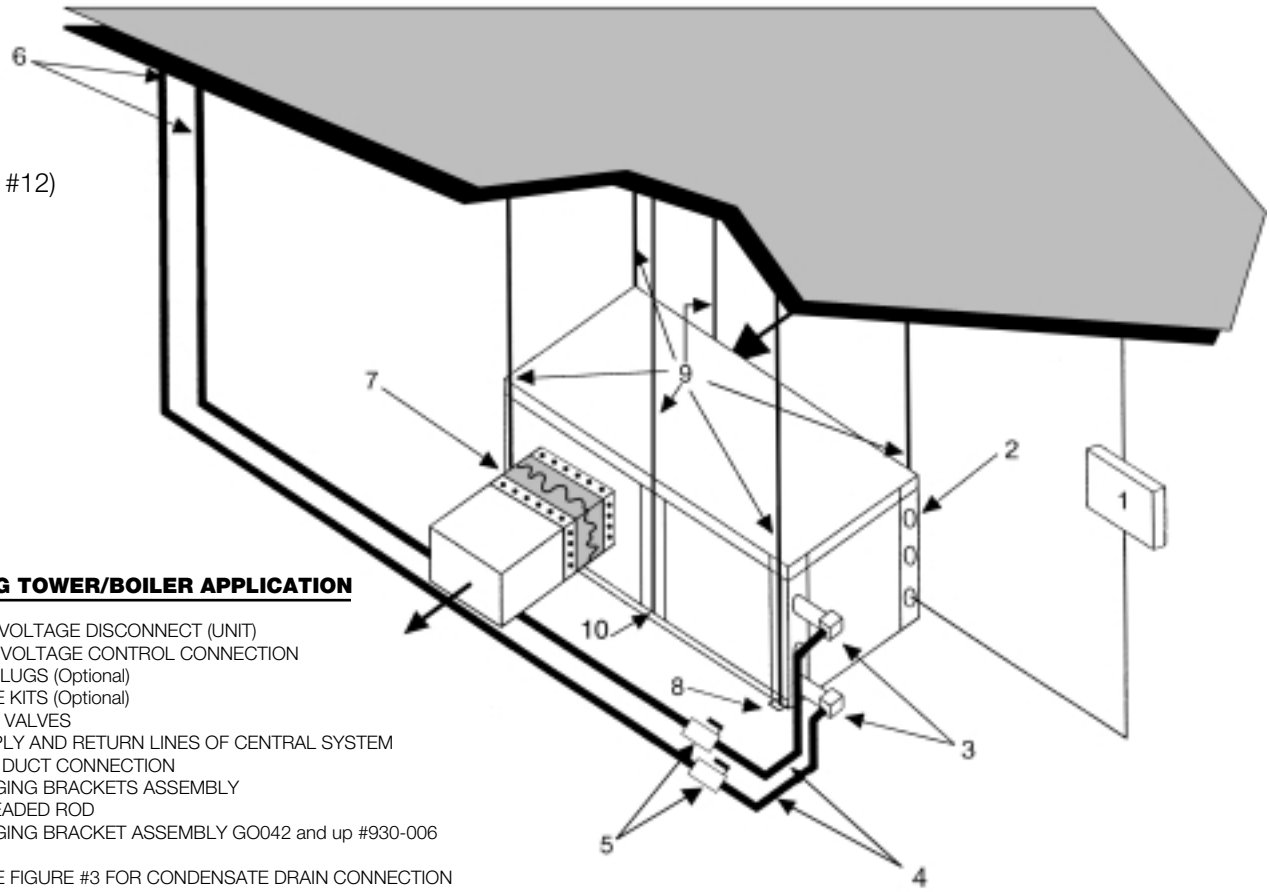
(Figure #11)

WELL WATER APPLICATIONS (50°F EWT MIN.)

1. LINE VOLTAGE DISCONNECT (UNIT)
2. FLEX DUCT CONNECTION
3. LOW VOLTAGE CONTROL CONNECTION
4. LINE VOLTAGE CONNECTION
5. VIBRATION PAD
6. P/T PORTS
7. HOSE KITS (Optional)
8. BALL VALVES
9. SOLENOID VALVE SLOW CLOSING
10. CONDENSATE DRAIN CONNECTION
11. PRESSURE TANK (Optional)
12. LINE VOLTAGE DISCONNECT (ELECTRIC HEATER)

NOTE: SEE FIGURE #3 FOR CONDENSATE DRAIN CONNECTION

(Figure #12)

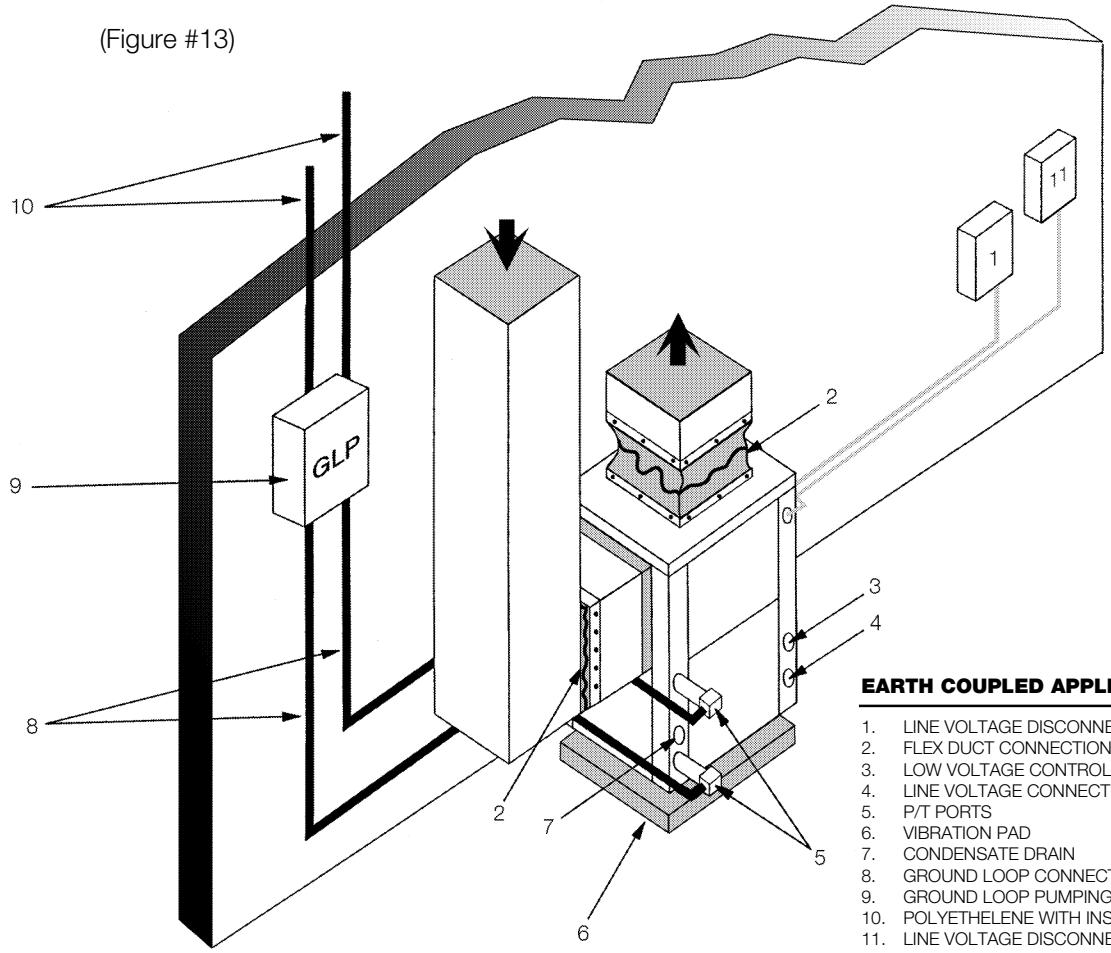


COOLING TOWER/BOILER APPLICATION

1. LINE VOLTAGE DISCONNECT (UNIT)
2. LOW VOLTAGE CONTROL CONNECTION
3. P/T PLUGS (Optional)
4. HOSE KITS (Optional)
5. BALL VALVES
6. SUPPLY AND RETURN LINES OF CENTRAL SYSTEM
7. FLEX DUCT CONNECTION
8. HANGING BRACKETS ASSEMBLY
9. THREADED ROD
10. HANGING BRACKET ASSEMBLY GO042 and up #930-006

NOTE: SEE FIGURE #3 FOR CONDENSATE DRAIN CONNECTION

(Figure #13)



EARTH COUPLED APPLICATION

1. LINE VOLTAGE DISCONNECT (UNIT)
2. FLEX DUCT CONNECTION
3. LOW VOLTAGE CONTROL CONNECTION
4. LINE VOLTAGE CONNECTION (UNIT)
5. P/T PORTS
6. VIBRATION PAD
7. CONDENSATE DRAIN
8. GROUND LOOP CONNECTION KIT (550-016, 017)
9. GROUND LOOP PUMPING PACKAGE (GL001-1 or 002-1)
10. POLYETHELENE WITH INSULATION
11. LINE VOLTAGE DISCONNECT (ELECTRIC HEATER)

NOTE: SEE FIGURE #3 FOR CONDENSATE DRAIN CONNECTION

Pumping Package (GLP), makes the installation easy. Anti-freeze solutions are utilized when low evaporating conditions are expected to occur. Refer to the GLP installation manuals for more specific instructions.

SYSTEM CHECKOUT:

- After completing the installation, and before energizing the unit, the following system checks should be made:
- Verify that the supply voltage to the heat pump is in accordance with the nameplate ratings.
- Make sure that all electrical connections are tight and secure.
- Check the electrical fusing and wiring for the correct size.
- Verify that the low voltage wiring between the thermostat and the unit is correct.
- Verify that the water piping is complete and correct.
- Check that the water flow is correct, and adjust if necessary.
- Check the blower for free rotation, and that it is secured to the shaft.
- Verify that vibration isolation has been provided.
- Unit is serviceable. Be certain that all access panels are secured in place.

UNIT START-UP:

1. Set the thermostat to the highest setting.
2. Set the thermostat system switch to "COOL", and the fan switch to the "AUTO" position. The reversing valve solenoid should energize. The compressor and fan should not run.
3. Reduce the thermostat setting approximately 5 degrees below the room temperature.
4. Verify the heat pump is operating in the cooling mode.
5. Turn the thermostat system switch to the "OFF" position. The unit should stop running and the reversing valve should deenergize.
6. Leave the unit off for approximately (5) minutes to allow for system equalization.
7. Turn the thermostat to the lowest setting.
8. Set the thermostat switch to "HEAT".
9. Increase the thermostat setting approximately 5 degrees above the room temperature.
10. Verify the heat pump is operating in the heating mode.
11. Set the thermostat to maintain the desired space temperature.
12. Check for vibrations, leaks, etc...
13. Instruct the home owner on the unit and thermostat operation.

MAINTENANCE:

1. Filter changes or cleanings are required at regular intervals. The time period between filter changes will depend upon type of environment the equipment is used in. In a single family home, that is not under construction, changing or cleaning the filter every 60 days is sufficient. In other applications such as motels, where daily vacuuming produces a large amount of lint, filter changes may be need to be as frequent as biweekly.

WARNING: Equipment should never be used during construction due to likelihood of wall board dust accumulation in the air coil of the equipment which permanently affects the performance and may shorten the life of the equipment.

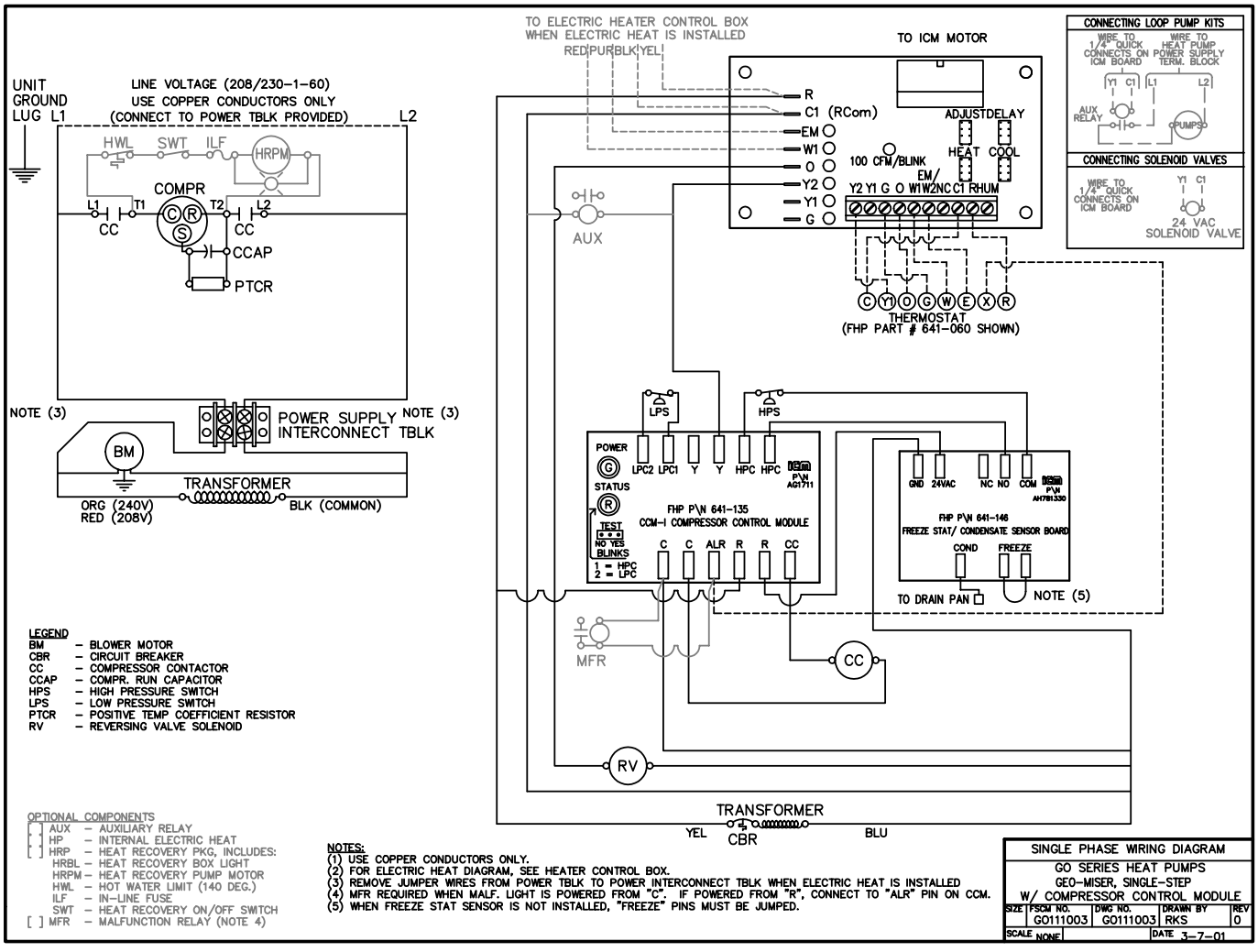
2. A bi-yearly "checkup" is recommended by a licensed refrigeration mechanic. Recording the performance measurements of volts, amps, and water temperature differences (both heating and cooling) is recommended. This data should be compared to the information on the unit's data plate and the data taken at the original startup of the equipment.

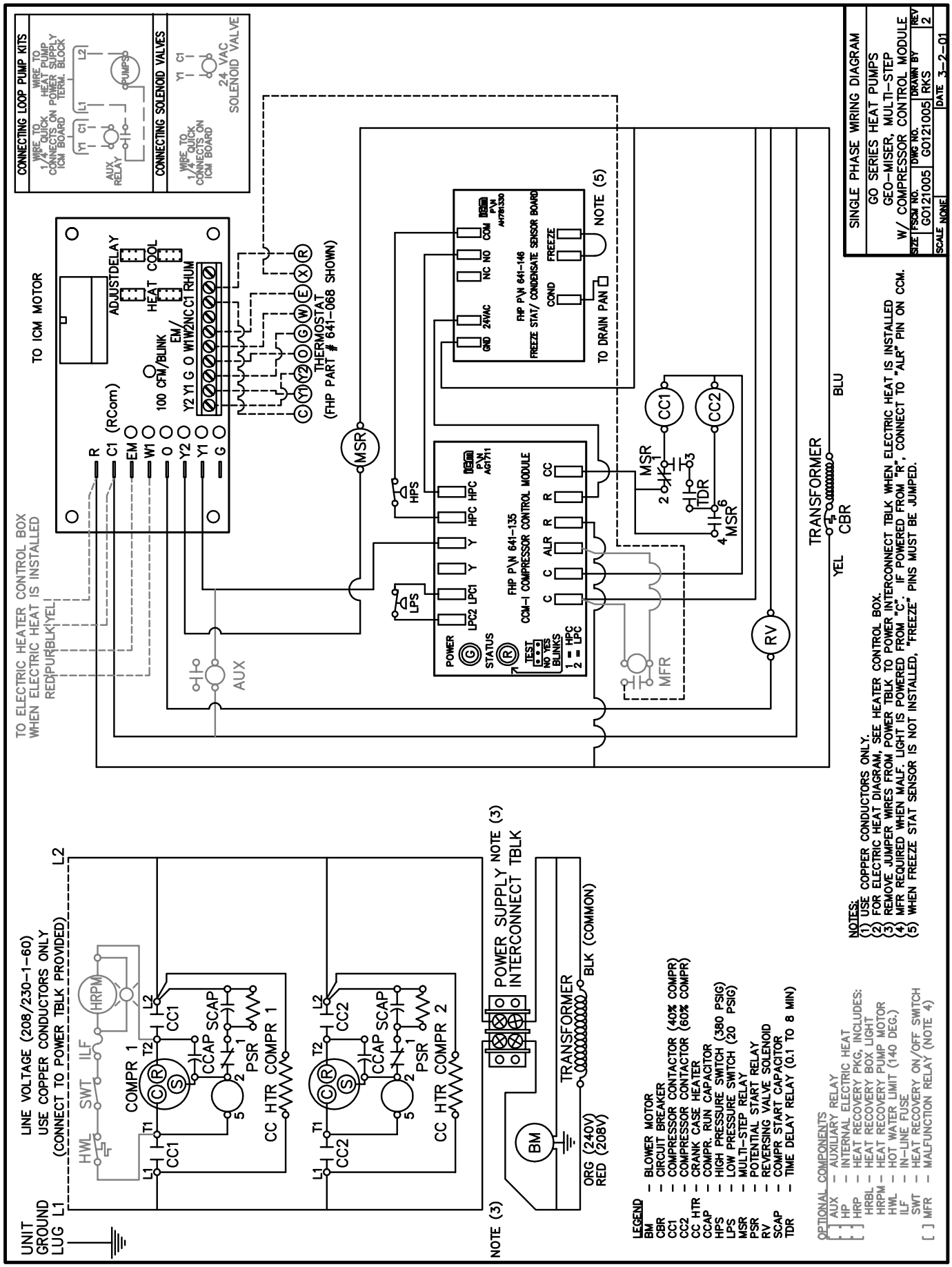
3. Lubrication of the blower motor is not required, however may be performed on some motors to extend motor life. Use SAE-20 non-detergent electric motor oil.

4. The condensate drain should be checked biannually by cleaning and flushing to insure proper drainage.

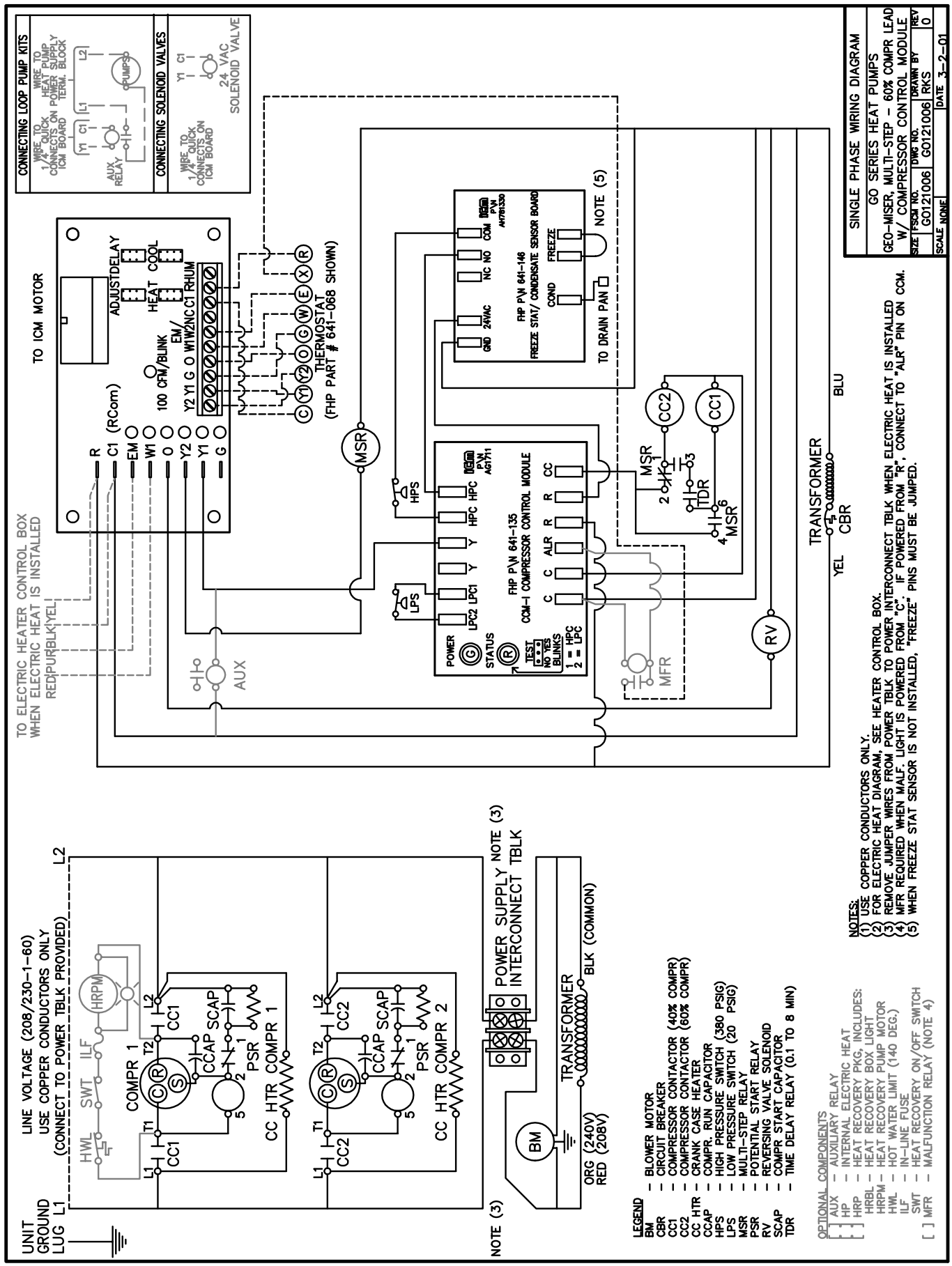
5. Periodic lockouts almost always are caused by air or water flow problems. The lockout (shutdown) of the unit is a normal protective measure in the design of the equipment. If continual lockouts occur call a mechanic immediately and have them check for: water flow problems, water temperature problems, air flow problems or air temperature problems. Use of the pressure and temperature charts for the unit may be required to properly determine the cause.

(Figure #14)




CONNECTING LOOP PUMP KITS
WIRE TO 1/4" QUICK CONNECTS ON ICM BOARD
WIRE TO HEAT PUMP POWER SUPPLY TERM. BLOCK
AUX RELAY
PUMP
CONNECTING SOLENOID VALVES
WIRE TO 1/4" QUICK CONNECTS ON ICM BOARD
Y1 C1
24 VAC SOLENOID VALVE
TO ICM MOTOR
ADJUST
DELAY
HEAT COOL
100 CFM/BLINK
EM/
Y2 Y1 G O W1 W2 NC C1 R HUM
R
C1 (RCom)
EM
W1
O
Y2
Y1
G
THERMOSTAT
(FHP PART # 641-068 SHOWN)
C Y2 Y1 G O W1 W2 E X R
MSR
HPS
LPS
TO ELECTRIC HEATER CONTROL BOX
WHEN ELECTRIC HEAT IS INSTALLED
RED PUR BLK YEL
AUX
POWER
STATUS
TEST
NO YES
BLINKS
1 = HPC
2 = LPC
LPC2 LPC1 Y HPC HPC
FHP P\N 641-135
COM-I COMPRESSOR CONTROL MODULE
C C ALR R R CC
FHP P\N 641-146
FREEZE STAT/ CONDENSATE SENSOR BOARD
GND 24VAC
NC NO COM
COND FREEZE
TO DRAIN PAN
NOTE (5)
MSR
TDR
CC1
CC2
MFR
RV
TRANSFORMER
YEL CBR
BLU
SINGLE PHASE WIRING DIAGRAM
GO SERIES HEAT PUMPS
GEO-MISER, MULTI-STEP
W/ COMPRESSOR CONTROL MODULE
SIZE FSCM NO. DWG NO. DRAWN BY REV
GO121005 GO121005 RKS 2
SCALE NONE DATE 3-2-01
LINE VOLTAGE (208/230-1-60)
USE COPPER CONDUCTORS ONLY
(CONNECT TO POWER TBLK PROVIDED)
L2
HWL SWT ILF HRPM
COMPR 1
T1 T2
CC1
CCAP SCAP
PSR
CC HTR COMPR 1
COMPR 2
CC2
POWER SUPPLY NOTE (3)
INTERCONNECT TBLK
TRANSFORMER
BLK (COMMON)
ORG (240V)
RED (208V)
BM
NOTE (3)
UNIT GROUND LUG L1
NOTES:
(1) USE COPPER CONDUCTORS ONLY.
(2) FOR ELECTRIC HEAT DIAGRAM, SEE HEATER CONTROL BOX.
(3) REMOVE JUMPER WIRES FROM POWER TBLK TO POWER INTERCONNECT TBLK WHEN ELECTRIC HEAT IS INSTALLED
(4) MFR REQUIRED WHEN MALF. LIGHT IS POWERED FROM "C". IF POWERED FROM "R", CONNECT TO "ALR" PIN ON CCM.
(5) WHEN FREEZE STAT SENSOR IS NOT INSTALLED, "FREEZE" PINS MUST BE JUMPED.
LEGEND
BM - BLOWER MOTOR
CBR - CIRCUIT BREAKER
CC1 - COMPRESSOR CONTACTOR (40% COMPR)
CC2 - COMPRESSOR CONTACTOR (60% COMPR)
CC HTR - CRANK CASE HEATER
CCAP - COMPR. RUN CAPACITOR
HPS - HIGH PRESSURE SWITCH (380 PSIG)
LPS - LOW PRESSURE SWITCH (20 PSIG)
MSR - MULTI-STEP RELAY
PSR - POTENTIAL START RELAY
RV - REVERSING VALVE SOLENOID
SCAP - COMPR START CAPACITOR
TDR - TIME DELAY RELAY (0.1 TO 8 MIN)
OPTIONAL COMPONENTS
[ ] AUX - AUXILIARY RELAY
[ ] HP - INTERNAL ELECTRIC HEAT
[ ] HRP - HEAT RECOVERY PKG, INCLUDES:
HRBL - HEAT RECOVERY BOX LIGHT
HRPM - HEAT RECOVERY PUMP MOTOR
HWL - HOT WATER LIMIT (140 DEG.)
ILF - IN-LINE FUSE
SWT - HEAT RECOVERY ON/OFF SWITCH
[ ] MFR - MALFUNCTION RELAY (NOTE 4)

(Figure #15)


SINGLE PHASE WIRING DIAGRAM
GO SERIES HEAT PUMPS
GEO-MISER, MULTI-STEP - 60% COMPR LEAD
W/ COMPRESSOR CONTROL MODULE
SIZE | FSCM NO. | DWG NO. | REV
G0121006 | G0121006 | 0
SCALE NONE | DRAWN BY RKS | DATE 3-2-01
CONNECTING LOOP PUMP KITS
CONNECTING SOLENOID VALVES
TO ICM MOTOR
TO ELECTRIC HEATER CONTROL BOX WHEN ELECTRIC HEAT IS INSTALLED
THERMOSTAT (FHP PART # 641-068 SHOWN)
FHP P\N 641-135 COM-I COMPRESSOR CONTROL MODULE
FHP P\N 641-146 FREEZE STAT/ CONDENSATE SENSOR BOARD
TO DRAIN PAN
NOTE (5)
TRANSFORMER
LINE VOLTAGE (208/230-1-60)
USE COPPER CONDUCTORS ONLY
(CONNECT TO POWER TBLK PROVIDED)
UNIT GROUND LUG L1
L2
COMPR 1
COMPR 2
CC HTR COMPR 1
CC HTR COMPR 2
POWER SUPPLY NOTE (3)
INTERCONNECT TBLK
NOTE (3)
LEGEND
BM - BLOWER MOTOR
CBR - CIRCUIT BREAKER
CC1 - COMPRESSOR CONTACTOR (40% COMPR)
CC2 - COMPRESSOR CONTACTOR (60% COMPR)
CC HTR - CRANK CASE HEATER
CCAP - COMPR. RUN CAPACITOR
HPS - HIGH PRESSURE SWITCH (380 PSIG)
LPS - LOW PRESSURE SWITCH (20 PSIG)
MSR - MULTI-STEP RELAY
PSR - POTENTIAL START RELAY
RV - REVERSING VALVE SOLENOID
SCAP - COMPR START CAPACITOR
TDR - TIME DELAY RELAY (0.1 TO 8 MIN)
OPTIONAL COMPONENTS
[ ] AUX - AUXILIARY RELAY
[ ] HP - INTERNAL ELECTRIC HEAT
[ ] HRP - HEAT RECOVERY PKG. INCLUDES:
HRBL - HEAT RECOVERY BOX LIGHT
HRPM - HEAT RECOVERY PUMP MOTOR
HWL - HOT WATER LIMIT (140 DEG.)
ILF - IN-LINE FUSE
SWT - HEAT RECOVERY ON/OFF SWITCH
[ ] MFR - MALFUNCTION RELAY (NOTE 4)
NOTES:
(1) USE COPPER CONDUCTORS ONLY.
(2) FOR ELECTRIC HEAT DIAGRAM, SEE HEATER CONTROL BOX.
(3) REMOVE JUMPER WIRES FROM; POWER TBLK TO POWER INTERCONNECT TBLK WHEN ELECTRIC HEAT IS INSTALLED
(4) MFR REQUIRED WHEN MALF. LIGHT IS POWERED FROM "C". IF POWERED FROM "R", CONNECT TO "ALR" PIN ON CCM.
(5) WHEN FREEZE STAT SENSOR IS NOT INSTALLED, "FREEZE" PINS MUST BE JUMPED.

(Figure #16)

TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
ENTIRE UNIT DOES NOT RUN	Power supply off	Apply power, close disconnect.
	Blown fuse	Replace fuse or reset circuit breaker. Check for correct fuses.
	Broken or loose wires	Replace or tighten the wires.
	Voltage supply low	If voltage is below minimum voltage specified on unit data plate, contact local power company.
	Thermostat	Set the fan to "ON", the fan should run. Set thermostat to "COOL" and lowest temperature setting, the unit should run in the cooling mode (reversing valve energized). Set unit to "HEAT" and the highest temperature setting, the unit should run in the heating mode. If neither the blower or compressor run in all three cases, the thermostat could be miswired or faulty.To ensure miswired or faulty thermostat verify 24 volts is available on the condensing section low voltage terminal strip between "R" and "C", "Y" and "C", and "O" and "C". If the blower does not operate, verify 24 volts between terminals "G" and "C" in the air handler. Replace the thermostat if defective.
BLOWER OPERATES BUT COMPRESSOR DOES NOT	Thermostat	Check setting, calibration, and wiring.
	Wiring	Check for loose or broken wires at compressor, capacitor, or contactor.
	Safety controls	Check CCM board red default L.E.D. for Blink Code
	Compressor overload open	If the compressor is cool and the overload will not reset, replace compressor.
	Compressor motor grounded	Internal winding grounded to the compressor shell. Replace compressor. If compressor burnout, install suction filter dryer.
	Compressor windings open	After compressor has cooled, check continuity of the compressor windings. If the windings are open, replace the compressor.
UNIT OFF ON HIGH PRESSURE CONTROL	Discharge pressure too high	In "COOLING" mode: Lack of or inadequate water flow. Entering water temperature too warm. Scaled or plugged condenser.
	Refrigerant charge	The unit is overcharged with refrigerant. Reclaim refrigerant, evacuate and recharge with factory recommended charge.
	High pressure	Check for defective or improperly calibrated high pressure switch.
UNIT OFF ON LOW PRESSURE CONTROL	Suction pressure too low	In "COOLING" mode: Lack of or inadequate air flow. Entering air temperature too cold. Blower inoperative, clogged filter, or restrictions in ductwork. In "HEATING" mode: Lack of or inadequate water flow. Entering water temperature too cold. Scaled or plugged condenser.
	Refrigerant charge	The unit is low on refrigerant. Check for refrigerant leak, repair, evacuate and recharge with factory recommended charge.
	Low pressure switch	Check for defective or improperly calibrated low pressure switch.
UNIT SHORT CYCLES	Unit oversized	Recalculate heating and or cooling loads.
	Thermostat	Thermostat installed near a supply air grill, relocate thermostat. Readjust heat anticipator.
	Wiring and controls	Loose connections in the wiring or a defective compressor contactor.
INSUFFICIENT COOLING OR HEATING	Unit undersized	Recalculate heating and or cooling loads. If excessive, possibly adding insulation and shading will rectify the problem.
	Loss of conditioned air by leaks	Check for leaks in duct work or introduction of ambient air through doors or windows.
	Airflow	Lack of adequate air flow or improper distribution of air. Replace dirty filter.
	Refrigerant charge	Low on refrigerant charge causing inefficient operation.
	Compressor	Check for defective compressor. If discharge is too low and suction pressure is too high, compressor is not pumping properly. Replace compressor.
	Reversing valve	Defective reversing valve creating bypass of refrigerant from discharge to suction side of compressor. Replace reversing valve.
	Operating pressures	Compare unit operating pressures to the pressure / temperature chart for the unit.
	TXV	Check TXV for possible restriction or defect. Replace if necessary.
	Moisture, noncondensables	The refrigerant system may be contaminated with moisture or noncondensables. Reclaim refrigerant, evacuate and recharge with factory recommended charge. Note: a liquid line dryer may be required.

UNIT CHECK-OUT SHEET

Customer Data

Customer Name _____ Date _____
Address _____
_____
Phone _____ Unit Number _____

Unit Nameplate Data

Unit Make _____
Model Number _____ Serial Number _____
R-22 Charge (oz) _____
Compressor: RLA_____ LRA _____
Blower Motor: FLA (or NPA) _____ HP _____
Mximum Fuse Size (Amps) _____
Minimum Circuit Ampacity (Amps) _____

Operating Conditions

	Cooling Mode	Heating Mode
Entering / Leaving Air Temp	_____/_____	_____/_____
Entering Air Measured at:	_____	_____
Leaving Air Measured at:	_____	_____
Entering / Leaving Fluid Temp	_____/_____	_____/_____
Fluid Flow (gpm)	_____	_____
Fluid Side Pressure Drop	_____	_____
Suction / Discharge Pressure (psig)	_____/_____	_____/_____
Suction / Discharge Temp	_____/_____	_____/_____
Suction Superheat	_____	_____
Entering TXV / Cap Tube Temp	_____	_____
Liquid Subcooling	_____	_____
Compressor Volts / Amps	_____/_____	_____/_____
Blower Motor Volts / Amps	_____/_____	_____/_____

Auxiliary Heat

Unit Make _____
Model Number _____ Serial Number _____
Max Fuse Size (Amps) _____
Volts / Amps_____/_____
Entering Air Temperature _____
Leaving Air Temperature_____

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Phone: (954) 776-5471 • Fax: (800) 776-5529 • http://www.fhp-mfg.com

FHP MANUFACTURING

"GO" models

Operating Pressures & Temperatures

GENERAL: There are many variables (airflow, air temperatures) in an air conditioning system that will affect operating refrigerant pressures and temperatures. The chart below shows approximate conditions and is based on air flow at the rated SCFM, entering air at 80˚ FDB, 67˚ FWB in cooling, 70˚ FBD in heating. (+) Heating data with 40˚F EFT and lower is based on the use of an anti-freeze solution having a freezing point 20˚F lower than the minimum expected entering temperature.

			OPERATING DATA							
			COOLING				HEATING (+)			
MODEL	ENTERING WATER TEMP, ˚F	WATER FLOW GPM	SUCT. PRESS., PSIG	DISCH. PRESS., PSIG	WATER TEMP RISE. ˚F	AIR TEMP DROP˚ FDB	SUCT. PRESS., PSIG	DSICH PRESS., PSIG	WATER TEMP DROP ˚F	AIR TEMP RISE ˚FDB
GO024	30˚	3.0					39-43	159-195	7-8	15-22
		6.0					41-46	165-201	4-5	16-23
	40˚	3.0	75-83	131-145	21-24	23-31	46-51	169-206	8-9	17-25
		6.0	74-82	115-127	12-13	25-33	50-55	174-213	4-5	18-27
	50˚	3.0	76-84	151-167	21-23	22-30	55-60	180-220	9-11	20-29
		6.0	75-83	132-146	12-13	24-33	59-65	186-227	5-6	21-31
	60˚	3.0	79-88	173-191	21-23	21-28	64-71	187-229	10-13	23-33
		6.0	79-87	150-166	12-13	23-31	69-76	193-236	6-7	24-35
	70˚	3.0	81-89	200-221	20-22	20-27	74-82	201-245	13-15	26-38
		6.0	80-88	174-192	11-12	22-29	80-88	207-253	7-8	27-40
	80˚	3.0	83-91	233-257	19-21	19-26	83-92	209-256	14-17	28-41
		6.0	82-90	203-224	11-12	21-28	89-98	216-264	7-9	30-44
	90˚	3.0	84-93	264-292	18-20	19-25	92-102	220-269	16-19	30-45
		6.0	83-92	230-254	10-11	20-27	99-109	227-277	8-10	32-48
	100˚	3.0	86-95	299-331	17-19	18-24				
		6.0	85-93	261-288	10-11	19-26				
GO030	30˚	4.0					39-43	159-195	7-8	15-23
		7.0					41-45	163-200	4-5	16-24
	40˚	4.0	73-81	124-137	19-21	22-29	47-52	169-206	8-9	18-26
		7.0	73-80	112-124	12-13	23-31	49-54	173-211	5-6	19-28
	50˚	4.0	74-82	143-158	19-21	21-29	55-61	180-220	9-11	21-31
		7.0	73-81	129-142	12-13	23-31	58-64	184-225	6-7	22-32
	60˚	4.0	77-85	161-178	19-21	20-27	66-73	189-231	10-13	24-35
		7.0	76-84	146-161	12-13	21-29	70-77	194-237	6-8	25-37
	70˚	4.0	78-86	186-206	18-20	19-26	76-85	203-248	12-15	27-39
		7.0	77-85	168-186	11-12	20-28	81-89	207-253	8-9	28-42
	80˚	4.0	80-88	217-240	17-19	19-25	86-95	211-258	14-17	29-43
		7.0	79-87	196-217	11-12	20-27	90-100	216-264	9-11	31-46
	90˚	4.0	81-90	246-272	16-18	18-24	95-105	222-271	15-19	32-47
		7.0	80-89	223-246	10-11	19-26	100-111	227-278	10-12	34-49
	100˚	4.0	83-91	279-309	16-18	17-23				
		7.0	82-90	252-279	10-11	18-25				
GO036	30˚	5.0					39-43	159-194	7-8	15-23
		9.0					41-46	163-199	4-5	16-24
	40˚	5.0	78-86	133-147	19-21	22-30	47-52	168-205	7-9	18-26
		9.0	77-85	119-132	12-13	24-32	50-55	172-211	4-5	19-28
	50˚	5.0	79-87	153-169	19-21	22-29	56-61	179-219	9-11	21-31
		9.0	78-86	137-152	11-13	23-31	59-65	184-225	5-6	22-32
	60˚	5.0	80-89	173-191	18-20	20-27	66-73	188-230	10-12	24-35
		9.0	80-88	155-171	11-12	21-29	70-77	193-236	6-7	25-37
	70˚	5.0	82-90	200-221	17-19	19-26	76-85	202-246	12-14	27-40
		9.0	81-89	179-198	11-12	20-28	81-89	207-253	7-8	28-42
	80˚	5.0	84-92	233-257	17-18	19-25	86-95	210-257	13-16	29-43
		9.0	83-92	209-231	10-11	20-27	91-100	216-264	8-9	31-46
	90˚	5.0	85-94	264-292	16-18	18-24	95-105	221-270	14-18	32-47
		9.0	84-93	237-262	10-11	19-26	101-111	226-277	9-10	34-49
	100˚	5.0	87-96	299-331	15-17	17-23				
		9.0	86-95	269-297	9-10	18-25				

"GO" models

Operating Pressures & Temperatures

GENERAL: There are many variables (airflow, air temperatures) in an air conditioning system that will affect operating refrigerant pressures and temperatures. The chart below shows approximate conditions and is based on air flow at the rated SCFM, entering air at 80˚ FDB, 67˚ FWB in cooling, 70˚ FBD in heating. (+) Heating data with 40˚F EFT and lower is based on the use of an anti-freeze solution having a freezing point 20˚F lower than the minimum expected entering temperature.

			OPERATING DATA							
			COOLING				HEATING (+)			
MODEL	ENTERING WATER TEMP, ˚F	WATER FLOW GPM	SUCT. PRESS., PSIG	DISCH. PRESS., PSIG	WATER TEMP RISE. ˚F	AIR TEMP DROP˚ FDB	SUCT. PRESS., PSIG	DSICH PRESS., PSIG	WATER TEMP DROP ˚F	AIR TEMP RISE ˚FDB
GO042	30˚	5.0					39-43	159-195	7-8	15-23
		10.0					41-45	165-201	4-5	16-24
	40˚	5.0	73-81	124-137	19-21	22-29	47-52	169-206	8-9	18-26
		10.0	73-80	112-124	12-13	23-31	49-54	174-213	4-5	19-28
	50˚	5.0	74-82	143-158	19-21	21-29	55-61	180-220	9-11	21-31
		10.0	73-81	129-142	12-13	23-31	58-64	186-227	5-6	22-32
	60˚	5.0	77-85	161-178	19-21	20-27	66-73	187-229	10-13	24-35
		10.0	76-84	146-161	12-13	21-29	70-77	193-236	6-7	25-37
	70˚	5.0	78-86	186-206	18-20	19-26	76-85	201-245	13-15	27-39
		10.0	77-85	168-186	11-12	20-28	81-89	207-253	7-8	28-42
	80˚	5.0	80-88	217-240	17-19	19-25	86-95	209-256	14-17	29-43
		10.0	79-87	196-217	11-12	20-27	90-100	216-264	7-9	31-46
	90˚	5.0	81-90	246-272	16-18	18-24	95-105	220-269	16-19	32-47
		10.0	80-89	223-246	10-11	19-26	100-111	227-277	8-10	34-49
	100˚	5.0	83-91	279-309	16-18	17-23				
		10.0	82-90	252-279	10-11	18-25				
GO048 40% COMP. 1000 CFM	30˚	3.0					41-49	140-150	5-9	12-14
		6.0					47-53	150-160	2-5	12-15
	40˚	3.0	80-89	105-126	20-23	18-22	52-58	148-157	7-11	13-18
		6.0	73-82	100-110	9-13	19-23	57-63	150-160	3-6	13-17
	50˚	3.0	83-93	125-135	20-22	18-21	60-65	155-165	8-12	14-19
		6.0	75-85	110-120	8-12	18-21	65-70	160-170	4-6	15-20
	60˚	3.0	85-95	148-163	19-21	18-20	67-78	160-171	9-13	16-20
		6.0	80-90	130-140	8-12	18-21	72-80	162-173	5-7	17-21
	70˚	3.0	87-97	170-190	18-20	17-20	75-80	165-175	10-14	18-20
		6.0	85-95	150-160	8-12	18-21	80-85	168-180	5-8	19-22
	80˚	3.0	90-101	196-217	17-19	15-18	83-89	170-181	10-16	19-22
		6.0	88-98	170-180	8-12	16-19	91-104	175-191	5-9	21-24
	90˚	3.0	92-103	224-245	16-19	14-17	92-101	180-207	11-18	20-24
		6.0	90-99	175-185	7-11	15-18	112-123	186-215	6-9	23-28
	100˚	3.0	93-105	243-267	14-17	13-17				
		6.0	92-101	180-190	5-9	14-18				
GO048 BOTH COMP. 1600 CFM	30˚	6.0					35-45	160-170	6-10	15-20
		12.0					40-50	165-175	3-6	18-22
	40˚	6.0	68-77	130-140	19-23	21-25	45-55	170-180	7-11	19-23
		12.0	68-79	110-120	9-13	21-26	50-60	175-185	3-7	21-25
	50˚	6.0	70-80	145-155	18-22	20-24	50-60	180-190	8-12	22-26
		12.0	70-80	125-135	8-12	20-25	55-65	185-195	4-8	22-27
	60˚	6.0	72-82	175-185	18-22	19-23	62-71	183-203	10-14	24-28
		12.0	73-83	150-160	8-12	20-24	65-75	199-208	5-9	25-31
	70˚	6.0	75-85	205-215	18-22	18-22	73-83	205-215	12-17	27-33
		12.0	75-85	175-185	8-12	19-23	75-85	210-220	6-10	29-35
	80˚	6.0	77-87	225-235	18-22	18-21	84-95	216-228	14-18	30-36
		12.0	78-88	200-210	8-12	18-22	86-97	221-233	7-11	32-39
	90˚	6.0	79-89	240-255	18-21	18-20	96-108	227-234	15-20	34-44
		12.0	80-90	225-240	8-11	18-21	98-110	235-241	8-12	36-46
	100˚	6.0	83-93	265-295	17-20	17-20				
		12.0	84-94	250-280	7-11	18-20				

FHP MANUFACTURING

"GO" models

Operating Pressures & Temperatures

GENERAL: There are many variables (airflow, air temperatures) in an air conditioning system that will affect operating refrigerant pressures and temperatures. The chart below shows approximate conditions and is based on air flow at the rated SCFM, entering air at 80° FDB, 67° FWB in cooling, 70° FBD in heating. (+) Heating data with 40°F EFT and lower is based on the use of an anti-freeze solution having a freezing point 20°F lower than the minimum expected entering temperature.

			OPERATING DATA							
			COOLING				HEATING (+)			
MODEL	ENTERING WATER TEMP, °F	WATER FLOW GPM	SUCT. PRESS., PSIG	DISCH. PRESS., PSIG	WATER TEMP RISE. °F	AIR TEMP DROP° FDB	SUCT. PRESS., PSIG	DSICH PRESS., PSIG	WATER TEMP DROP °F	AIR TEMP RISE °FDB
GO060 40% COMP. 1400 CFM	30°	5.0					42-52	148-158	4-6	8-11
		8.0					45-55	150-160	2-4	9-12
	40°	5.0	78-89	105-115	13-18	18-23	52-63	161-171	5-7	10-14
		8.0	77-87	100-110	9-13	19-24	55-65	155-165	2-5	11-15
	50°	5.0	80-90	125-135	12-17	17-22	65-75	165-175	5-8	14-19
		8.0	79-89	120-130	9-13	19-23	68-78	170-181	2-6	15-21
	60°	5.0	83-94	145-155	12-16	17-21	75-85	172-183	5-10	17-22
		8.0	82-93	140-150	9-12	18-22	77-87	176-187	3-6	18-23
	70°	5.0	86-97	165-175	11-16	16-21	84-94	179-190	8-12	20-24
		8.0	85-95	160-170	8-12	17-21	86-96	181-193	3-7	21-24
	80°	5.0	88-99	190-200	11-15	15-20	93-104	184-210	9-13	22-27
		8.0	86-97	185-195	7-10	17-21	99-109	186-213	4-8	23-28
	90°	5.0	90-100	213-225	10-15	14-19	103-113	188-230	10-14	24-30
		8.0	89-98	208-220	7-9	16-20	112-124	191-233	5-8	25-32
	100°	5.0	92-102	236-250	10-14	14-19				
		8.0	91-100	228-240	6-8	15-20				
GO060 BOTH COMP. 2000 CFM	30°	8.0					35-45	175-185	5-8	18-22
		14.0					40-50	180-185	3-6	19-23
	40°	8.0	69-80	151-162	18-23	23-27	45-55	185-195	5-8	20-24
		14.0	69-79	142-152	10-14	23-28	45-55	190-200	3-6	21-26
	50°	8.0	70-81	155-165	18-22	22-25	55-65	195-205	8-12	24-28
		14.0	70-80	145-155	9-13	22-26	56-67	200-210	4-7	25-30
	60°	8.0	72-83	185-195	17-21	21-24	65-75	203-223	9-14	27-32
		14.0	71-82	170-180	8-13	21-25	67-78	212-223	5-9	28-33
	70°	8.0	74-85	215-225	16-21	20-23	75-85	220-230	11-15	30-35
		14.0	73-84	195-205	8-12	20-24	77-88	225-235	6-10	30-36
	80°	8.0	75-85	235-245	16-20	17-22	84-94	226-257	12-16	31-39
		14.0	74-84	215-225	8-12	18-23	88-98	232-263	6-11	32-42
	90°	8.0	77-86	259-292	15-20	17-21	94-102	232-283	13-17	33-43
		14.0	76-87	239-272	8-11	17-23	98-107	237-289	7-12	34-47
	100°	8.0	80-88	281-312	15-19	16-20				
		14.0	79-88	263-298	7-10	16-22				

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Operating Pressures & Temperatures

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			OPERATING DATA							
			COOLING				HEATING (+)			
MODEL	ENTERING WATER TEMP, °F	WATER FLOW GPM	SUCT. PRESS., PSIG	DISCH. PRESS., PSIG	WATER TEMP RISE. °F	AIR TEMP DROP° FDB	SUCT. PRESS., PSIG	DSICH PRESS., PSIG	WATER TEMP DROP °F	AIR TEMP RISE °FDB
GO072 40% COMP. 1600 CFM	30°	7.0					42-52	145-155	4-6	8-11
		10.0					45-55	150-160	2-5	11-15
	40°	7.0	74-84	108-123	14-18	20-25	55-65	155-165	4-8	12-14
		10.0	73-83	98-118	9-13	21-26	55-65	160-170	3-6	14-18
	50°	7.0	75-85	125-135	13-18	19-24	65-75	165-175	4-8	16-20
		10.0	75-85	120-130	8-12	20-25	65-75	165-175	3-6	17-21
	60°	7.0	80-90	148-157	13-17	18-23	75-85	175-185	6-10	17-22
		10.0	80-90	140-150	8-12	19-24	77-87	177-187	3-6	18-23
	70°	7.0	85-95	170-180	13-17	18-22	85-95	180-190	8-11	22-26
		10.0	85-95	160-170	8-12	19-23	85-95	185-195	6-10	23-27
	80°	7.0	86-96	196-216	12-17	16-20	92-102	185-195	9-13	23-28
		10.0	85-95	180-190	7-11	17-21	97-107	187-202	7-11	24-29
	90°	7.0	87-97	221-251	12-16	15-20	101-112	195-225	9-13	24-30
		10.0	86-95	194-210	7-11	16-21	110-115	192-230	7-11	25-31
	100°	7.0	88-97	235-261	11-15	15-19				
		10.0	87-96	208-230	6-10	16-20				
GO072 BOTH COMP. 2200 CFM	30°	10.0					35-45	170-180	4-8	17-21
		16.0					35-45	170-180	3-7	18-22
	40°	10.0	68-78	140-155	18-22	22-26	40-50	180-190	5-8	20-24
		16.0	68-77	135-150	10-14	22-26	45-55	185-195	4-7	21-25
	50°	10.0	70-80	145-155	17-20	21-25	50-60	190-200	8-12	24-27
		16.0	70-80	130-140	11-15	21-25	50-60	195-205	5-8	25-28
	60°	10.0	72-83	180-195	17-21	21-24	60-70	208-228	9-14	25-30
		16.0	71-82	170-185	7-13	21-24	60-70	212-223	5-9	27-32
	70°	10.0	70-80	195-205	16-20	20-24	65-75	210-220	8-12	28-32
		16.0	70-85	180-190	10-14	20-24	65-75	215-225	5-8	29-33
	80°	10.0	75-85	210-220	17-20	19-22	75-85	225-255	12-14	29-33
		16.0	75-85	195-205	8-12	19-22	75-85	230-260	5-15	30-33
	90°	10.0	77-87	235-285	16-20	17-21	95-105	235-285	13-16	33-43
		16.0	76-86	235-270	8-11	17-21	95-105	240-290	7-11	34-45
	100°	10.0	80-90	280-310	15-19	16-20				
		16.0	80-91	270-300	7-10	16-21				


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