

INSTALLATION MANUAL

Thank you for purchasing a Chillking Chiller Systems, Inc. water chiller. Please know that your water chiller was designed and manufactured using the finest in materials and craftsmanship. Each and every employee at Chillking takes a personal interest in your order to make sure that you receive a quality product that will give you the performance and durability you expect. We also pledge to you, when you purchase our chillers, you get our service and employee commitment with it.

We encourage you to read this entire installation and maintenance manual before attempting to install the chiller. If you encounter any problems or have questions, please call us immediately. Our staff is on hand to assist you during the hours of 8:00 a.m. to 5:00 p.m. (Central Time) Monday through Friday. Our technical staff number is: (512) 303-1529.

BASIC WARRANTY

Chillking Chiller Systems, Inc. Warrants to the original purchaser-user that products manufactured by Chillking Chiller Systems, Inc. shall be free from defects in material and workmanship under normal use and service for a period of twelve months from date of start-up by a Chillking-approved technician. There is an additional two year limited compressor Warranty. There is an additional six month limited Warranty on water pump(s).

The obligation of Chillking Chiller Systems, Inc. under this Warranty is limited to Chillking Chiller Systems, Inc. repairing or replacing free of cost to the purchaser-user, F.O.B. factory, and part(s) that in the judgment of Chillking Chiller Systems, Inc. show evidence of defect, provided upon factory authorization, be returned, prepaid, to the factory for inspection and judgment. Under this Warranty, Chillking Chiller Systems, Inc. assumes no responsibility for the expense of labor or materials necessary to remove a defective part(s) or install repaired or new part(s).

This Warranty is issued only to the original purchaser-user and is not transferable. This Warranty applies to only units installed within the United States of America, its territories or possessions and Canada. This Warranty is in lieu of all other Warranties expressed or implied. Chillking Chiller Systems, Inc. neither assumes nor authorizes any other person to assume any liabilities not herein stated.

Chillking Chiller Systems, Inc. shall not be liable for any damages or delays occurring in transit, for any delays in performance caused by any contingency beyond its control including war, government restrictions or restraints, strikes, short or reduced supply of raw materials, fire, flood or other acts of God, nor for damage or loss of products, production, refrigerant, property, loss of income or profit due to manufacturing of said unit.

IN WARRANTY REPLACEMENT PARTS

Should replacement part(s) be required, they may be obtained by calling the factory direct. When requesting In Warranty replacement part(s), it is necessary to furnish the equipment model and serial number, part(s) description and shipping information. Upon determination that the part(s) is in Warranty, a Return Authorization will be issued. Return Authorizations are valid for thirty days from issuance. After thirty days or expiration of a Return Authorization, return part(s) will no longer be accepted.

NOTE: For chillers over 30 tons, please read "LARGE CHILLERS ADDENDUM", page 11

I. RECEIVING AND INSPECTION

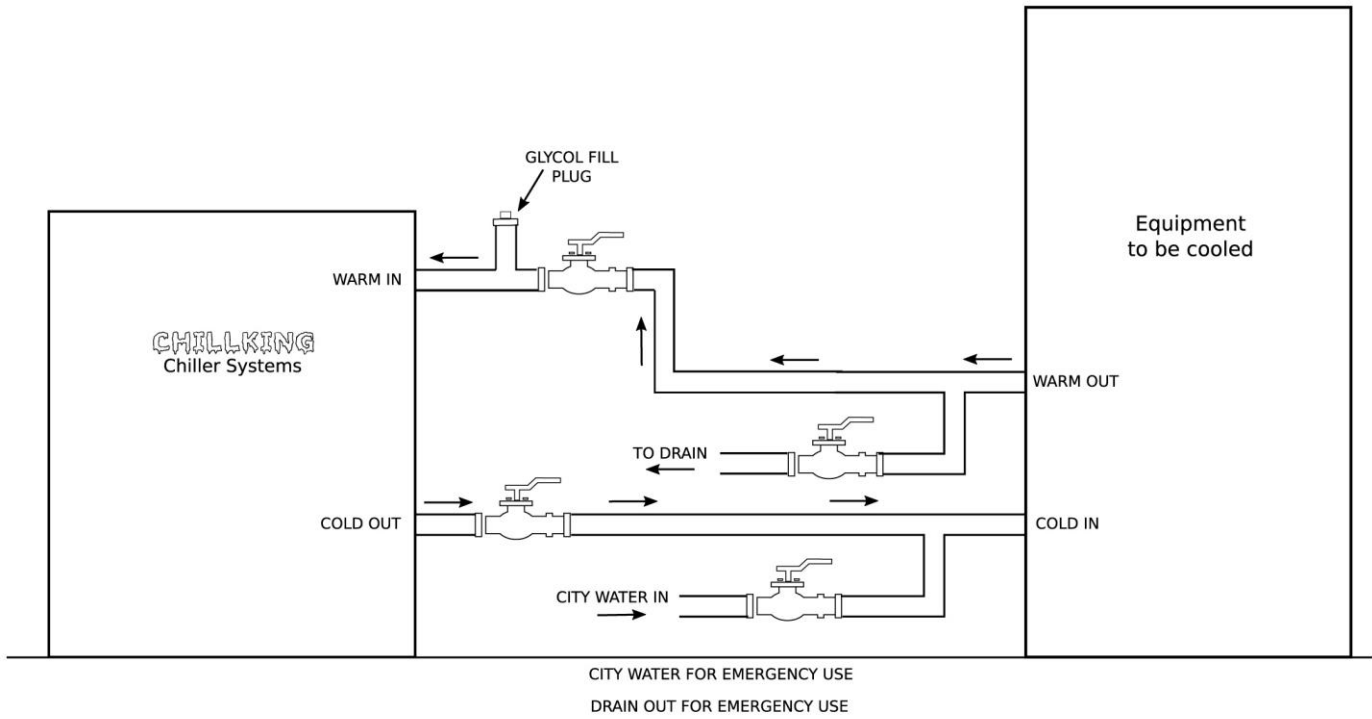
- a) Immediately upon receiving shipment, equipment should be inspected for evidence of any Visible Damage received in transit. If Visible Damage is evident, a dated photo documenting the damage should be taken if possible. A claim should be made, without delay, to the transportation company and a representative of Chillking Chiller Systems, Inc. should be notified. Should Concealed Damage be discovered after the unit is uncrated/unpackaged, the same procedure should be followed in documenting and reporting the damage and filing a claim with the transportation company.
- b) Acceptance of shipping documents should be done by making sure the delivering Bill of Lading matches the original Purchase Order and that model number(s) and voltage rating(s) are correct. If the shipping documents are not correct, contact a representative of Chillking Chiller Systems, Inc. immediately.

II. RIGGING

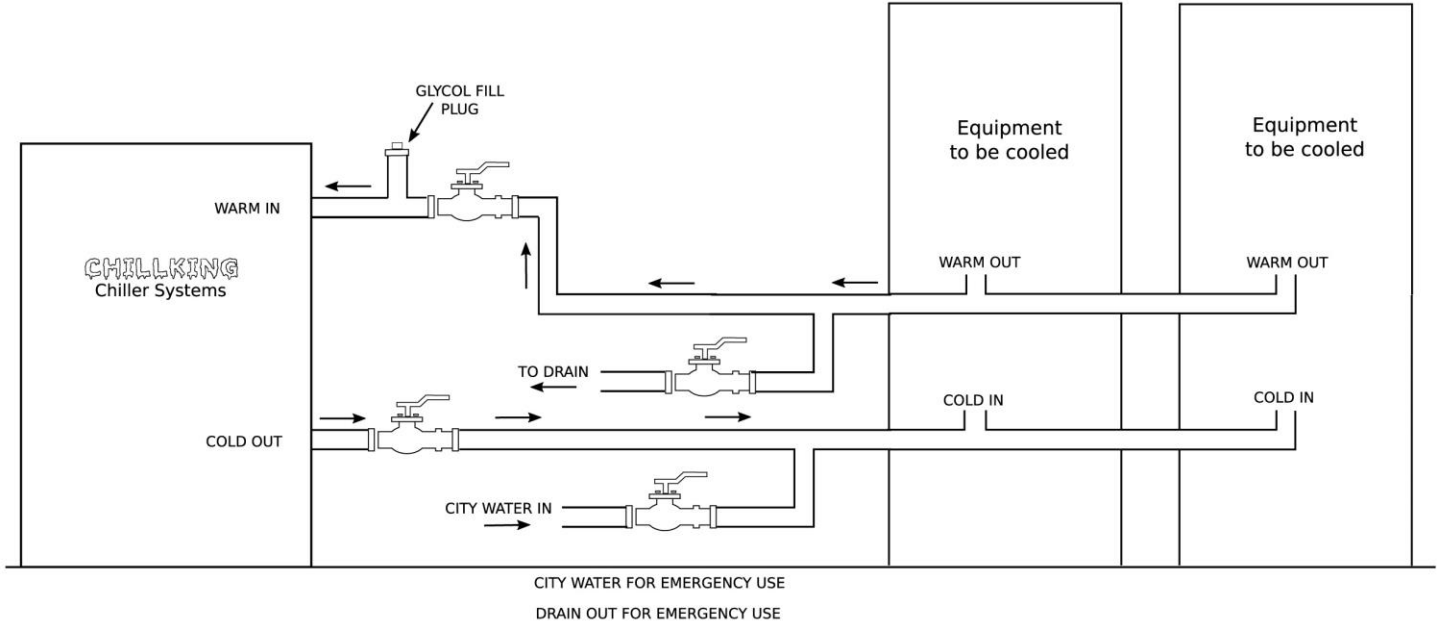
- a) Proper rigging procedures should be followed at all times making certain that the load is evenly distributed and lifted in a level configuration. When applicable, lifting mounts are provided. When lifting mounts are not provided or available, approved rigging/lifting straps should be used. Safety should always be followed through the entire rigging process.

III. LOCATION & MOUNTING

- a) Air-cooled water chillers should be located outdoors in an area with unrestricted fresh air for efficient operation of the condenser coils. Adequate area (approx. 1 unit width) must be provided around the water chiller to insure for unrestricted air flow and service availability. Two units side by side should have a minimum of one and a half unit width between them.
- b) Care should be taken to prevent air from other sources from entering the condenser coils if the air is at an elevated temperature.
- c) Air-cooled water chillers should not be mounted under low structural overhands which can cause interference with condenser air discharge and condenser air recirculation.
- d) Equipment must be mounted on smooth, hard and level surface.
- e) The mounting surface should be rigid with provisions to prevent noise transmission to surrounding areas.
- f) Basic water chiller connection to a single or multiple equipment diagram is illustrated in Figure #1. This illustration may be used as a guide for mounting location and piping layout.
- g) Vertical units must be secured to a level surface using the brackets already secured to the chiller.



BASIC SINGLE HOOK UP TO WATER CHILLER



BASIC MULTIPLE HOOK UP TO WATER CHILLER

Figure 1

IV. PIPING

- a) Included in the installation packet found inside of the electrical panel of the chiller is the appropriate mechanical drawing for your water chiller. The drawing shows the location and size of the water (in) and water (out) piping connections as well as the vent pipe connection. If you cannot locate the mechanical drawing in your installation packet, please contact the factory before proceeding with the piping installation.
- b) All piping must be in accordance with applicable local and state codes.
- c) Use of dissimilar metals in the piping installation is not recommended. Doing so will cause electrolysis between the metals resulting in corrosion.
- d) Provisions must be made to prevent freezing if local ambient temperatures dictate. Installing a (T) connection at the water (in) pipe connection with an 8" extension tube and a male plug will allow for the chiller to be charged with Propylene Glycol anti-freeze. The plug is left in place during normal operation. Please refer to the anti-freeze charging chart included in the manual for the proper protection for local ambient temperatures.
- e) A vent stack should be connected to the vent pipe connection. The stack should be at a length equal to or higher than the process location to prevent overflow when the system is shut down.
- f) In some cases it will be necessary to place a check valve on the "out" pipe and a solenoid valve on the return "in" pipe to prevent liquid from returning and overflowing the tank if/when the unit is powered down.
- g) Please refer to the illustration in Figure #1 for the correct method of connecting to the city water supply for filling the system with water.
- h) AUTO-FILL VALVE: When the Auto-fill Valve option is ordered, it is supplied separately and will need to be field connected at the return water or city water supply. See Figure #2 for correct installation. Provisions must be made to keep the valve from freezing in cold weather. It is strongly suggested that the valve be connected to the water supply in a heated environment.
- i) A 24 volt valve used for the autofill is connected with two wires labeled "auto-fill" inside the cabinet control panel and provides power to the valve when the float switch is activated.

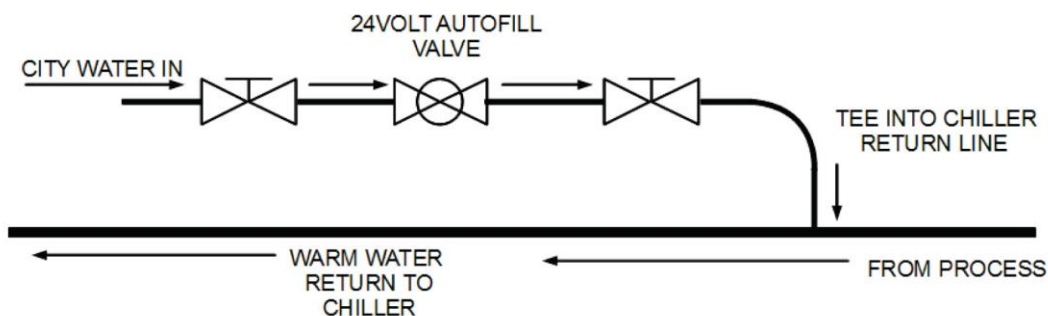


Figure 2

V. SPLIT SYSTEM REFRIGERATION PIPING

- Refrigeration piping for split systems should be designed and installed by a licensed refrigeration technician in accordance with practices outlined in ARI or ASHRE piping guide. See Figure #3 line size guide.
- When refrigeration piping is completed, a thorough leak test should be performed before line evacuation. Do not exceed 150psig test pressure on low side of system.
- When refrigerant piping is complete and leak tested, the equipment is ready to evacuate. Do not use the compressor to evacuate the system. A quality vacuum pump capable of 350 micron vacuum is necessary for adequate and dependable system vacuum. Moisture in the refrigeration system can cause corrosion, expansion valve freeze-up and compressor oil sludge.
- Attach the vacuum pump to both high and low side of system through compressor service valves and evacuate to 350 microns. All service, hand valves and solenoids must be open during evacuation. It is suggested that the vacuum pump be run for a period of time after vacuum has been reached.

		Unit size (tons)	Liquid line size(in.)				Suction line size(in.)			
			2	3	4	5	2	3	4	5
equivalent length(ft.)	0-24		1/4	3/8	3/8	3/8	5/8	3/4	7/8	7/8
	25-49		3/8	3/8	3/8	3/8	3/4	7/8	1 1/8	1 1/8
	50-79		3/8	3/8	3/8	3/8	3/4	1 1/8	1 1/8	1 1/8

		Unit size (tons)	Liquid line size(in.)					Suction line size(in.)				
			7.5	10.0	12.5	15.0	20.0	7.5	10	12.5	15	20
equivalent length(ft.)	1 to 15		1/2	5/8	5/8	5/8	7/8	1 1/8	1 3/8	1 3/8	1 5/8	1 5/8
	16 to 50		1/2	5/8	5/8	5/8	7/8	1 1/8	1 3/8	1 5/8	1 5/8	1 5/8
	51 to 100		1/2	5/8	5/8	3/4	7/8	1 3/8	1 3/8	1 5/8	1 5/8	2 1/8
	101 to 150		1/2	5/8	5/8	3/4	7/8	1 3/8	1 5/8	2 1/8	2 1/8	2 1/8

Figure 3

VI. WIRING

- Included in the installation packet found in the electrical panel of your chiller is the appropriate electrical schematic for your water chiller. The wiring schematic should be examined and thoroughly understood before field wiring connections are made. If you cannot find the electrical schematic, please contact the factory before proceeding with the installation wiring.
- DISCONNECT THE POWER SOURCE BEFORE PERFORMING ELECTRICAL INSTALLATION.
- All local and state codes must be strictly adhered to and good electrical practices should be followed.

- d) Power wiring must be adequately sized for the minimum ampacity shown on the chiller nameplate. A power disconnect should be installed and located adjacent to the chiller for both safety and service purposes.
- e) The power supply should be checked to be certain that the supply voltage agrees with the chiller nameplate. Serious damage to the compressor and motors can occur if improper voltage is applied.
- f) Use copper conductors ONLY.
- g) The control transformer located in the control access panel must be wired for the proper incoming voltage. Although Chillking wires the transformer to accommodate testing in the factory, it is important that the incoming voltage be checked to match the transformer. Transformer output voltage is 24 volts.
- h) CAUTION: IF the water chiller is supplied with three phase scroll compressor(s) they MUST be checked for proper rotation after electrical connections are made. IMPROPER ROTATION WILL RESULT IN COMPRESSOR FAILURE. Refer to the START-UP instructions for the proper procedure to check rotation.

Figure #4 illustrates a typical electrical panel with connection points.



Figure 4

VII. START-UP PROCEDURE

- a) CAUTION: The chiller should never be run without system charged with water. Doing so will result in water pump failure.
- b) To charge the system with water, open the city water supply valve and fill at a slow rate. When water comes out the vent opening, the evaporator tank is full. Shut off the city water supply valve. Open all valves to the process and start the chiller and run for about 15 seconds to fill all lines and process equipment. Turn off the chiller and open the city water supply valve again and fill at a slow rate until water again comes out of the vent opening. Shut off the city water supply valve. The system is fully charged with water and ready for normal operation.
- c) Connect refrigeration gauges to the refrigeration circuits and check for proper compressor rotation. To perform this procedure, turn chiller switch OFF and turn on the main power supply to the chiller at the disconnect panel. Now turn ON the chiller switch. The control thermostat will indicate the current water temperature in the evaporator tank. The temperature controller is preset at the factory at 65F. If the water temperature in the evaporator tank is too low to activate the compressor, please refer to the temperature control instructions included in the installation packet found in the electrical panel to lower the temperature setting.

- d) If the compressor is noisy and the pressures are almost equal when the system is running; the compressor is operating in the wrong direction and must be corrected immediately. Turn off the chiller and change the compressor rotation.
- e) To change the compressor rotation, TURN OFF MAIN POWER DISCONNECT to the chiller. Interchange any two of the power supply wires. Turn ON the main power at the disconnect and retest for correct compressor rotation.

VIII. MAINTENANCE

- a) The entire system should be checked periodically. Typically a six month schedule is recommended. Use only the services of a qualified refrigeration mechanic if repairs or service is required other than general maintenance.
- b) Air-cooled condenser units--the inlet air side of the condenser must be kept clean and free of dirt, dust and debris. TURN OFF POWER AT THE DISCONNECT and using a garden hose or similar-type water hose with spray nozzle, spray water through to inlet side of the condenser to wash away any material blocking air flow. DO NOT use a high pressure sprayer as damage to the condenser fins will occur.
- c) Check the water level in the system by following the fill procedure listed in the START-UP section VII, paragraph (b). If the system is charged with Glycol, check the solution percentage level.
- d) Check all electrical connections for possible loose or corroded terminals.

IX. SYSTEM SHUT DOWN

- a) Equipment which will not be required to operate for an extended period of time should be secured by storing the refrigeration charge in the receiver or condenser. Water-cooled condenser chillers will require the condenser to be drained to prevent freezing if stored in conditions where the ambient temperature is below 32F.
- b) Drain all water or water/glycol solution from the evaporator tank, lines and water pump.
- c) Inspect the complete system for worn or faulty components and repair if necessary.

X. SYSTEM RESTART AFTER SHUT DOWN

- a) A thorough leak test should be performed.
- b) The condenser coils should be checked for dirt and debris and cleaned if required.
- c) Refill the water system and purge all air from water lines by following the procedure in the START-UP Section VII, paragraph (b).
- d) With refrigeration gauges, check the system for the correct refrigeration charge and the system operation and balance.

XI. TROUBLESHOOTING

The troubleshooting chart lists some of the more common issues that might occur during the operation of your chiller system. If you have a problem that cannot be resolved by the troubleshooting chart, please contact us for help during our normal business hours: 8:00 a.m. to 5:00 p.m. (Central Time) Monday through Friday.

Chillking Chiller Systems, Inc.
P.O. Box 1696
Bastrop, TX 78602
(512) 303-1529

Compressor will not run:

IF:	THEN:
Main switch open. Circuit breakers open.	Close switch.
Thermal overloads tripped or fuses blown.	Overloads are auto-reset. Check unit closely when unit comes back on. Check condenser for dirt and debris.
Defective contactor or coil.	Repair or replace.
System shut down by safety devices.	Determine type and cause of shut down and correct it before resetting safety switch.
No cooling required.	None. Check water temperature reading and set point on the temperature setting.
Motor electrical trouble.	Check motor for open contacts, short circuit or burnout.
Loose wiring.	Check all wire junctions. Tighten all terminal screws.

Compressor noisy or vibrating:

IF:	THEN:
Improper rotation (scroll compressors).	Refer to the start-up procedure (Section VII) for instructions for proper procedure to check rotation.
Flooding of refrigerant into crankcase.	Check setting of expansion valve.
Worn compressor.	Replace.

High discharge pressure:

IF:	THEN:
Condenser water (water-cooled) insufficient or temperature is too high.	Readjust the water regulating valve. Investigate ways to increase the water supply.
Fouled condenser tubes (water-cooled). Dirty tube and fin surface (air-cooled).	Clean.
Discharge shut off valve partially closed.	Open valve.
Dirty condenser coil.	Clean coil.
Condenser fan not operating.	Repair/replace fan.

Discharge pressure:

IF:	THEN:
Faulty condenser temperature regulation.	Check condenser control operation.
Suction shut-off valve partially closed.	Open valve.
Insufficient refrigerant in the system.	Check for leaks. Repair and add refrigerant charge.

Low suction pressure:

IF:	THEN:
Lack of refrigerant.	Check for leaks. Repair and add refrigerant charge.
Evaporator dirty.	Clean.
Clogged liquid line filter/dryer.	Replace cartridges.
Clogged suction line or compressor suction gas filters.	Replace filter.
Expansion valve malfunctioning.	Check and reset for proper superheat. Replace if needed.
Condenser temperature too low.	Check means for regulating condensing temperature.
Compressor will not unload.	See corrective steps for failure of compressor unloading (below).
Insufficient water flow.	Adjust gpm rate.

Compressor will not unload or load up:

IF:	THEN:
Defective capacity control.	Replace.
Unloader mechanism defective.	Replace.
Faulty thermostat stage or broken capillary tube.	Replace.
Stages not set for application.	Reset thermostat settings for application.

Compressor loading -- Unloading intervals too short:

IF:	THEN:
Erratic water thermostat readings.	Replace.
Insufficient water flow.	Adjust gpm.
Low refrigerant.	Check for leaks. Add refrigerant.

Compressor loses oil:

IF:	THEN:
Lack of refrigerant.	Check for leaks and repair. Add refrigerant charge.
Excessive compression ring blow-by.	Replace compressor.

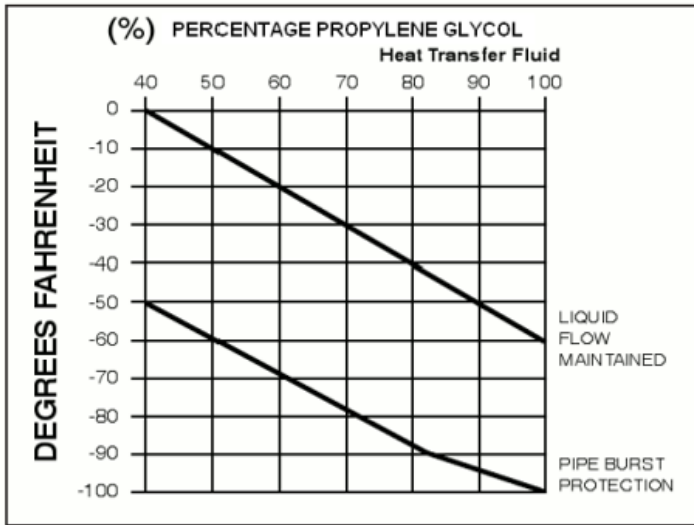
Motor overload relays or circuit breakers open:

IF:	THEN:
Low voltage during high load conditions.	Check supply voltage for excessive line drop.
Defective or grounded wiring in motor or power circuits.	Replace compressor.
Loose power wiring.	Check all connections and tighten.
Power line fault causing unbalanced voltage.	Check supply voltage. Notify power company. Do not start until fault corrected.
High ambient temperature around the overload relay.	Provide ventilation to reduce heat.
Failure of second starter to pull in on part-winding start system.	Repair or replace starter or time delay mechanism.

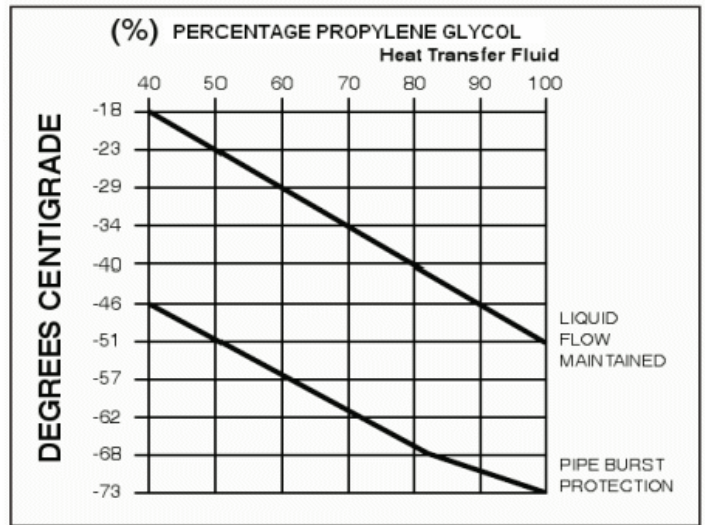
Compressor thermal protector switch open:

IF:	THEN:
Operating beyond design conditions.	Add facilities so that conditions are within allowable limits.

FAHRENHEIT CHART



CENTIGRADE CHART



LARGE CHILLERS ADDENDUM

FOR CHILLERS LARGER THAN 30 TONS

I. USE OF CRANE/FORK LIFTS

When lifting the large Chilling Chillers it is important to first check the weight of the EMPTY chiller. Check the capacity of your crane, boom truck, or lifting equipment to ensure your equipment has the capacity to lift the chiller into position. If installing on a roof top, it is important to place wooden beams in several locations across the width of the chiller.

The beams should be intersecting the width in several locations. On chillers larger than 30 tons, 4" x 6" x 144" beams should be used to spread the weight of the chiller across the roof trusses. Chillers 30 tons and smaller should use a minimum of 3 beams 4" x 4" x 96" in size. All beams should either be pressure treated or of a type of wood that is resistant to rotting. Beams should be located at each end of the chiller beneath the chiller frame, a minimum of 3 beams should support 30 tons and smaller. A minimum of four beams should support over 30 ton chillers.

There are lift points at the corner of Chilling Vertical chillers. They are locations to loop the lift strap through or to hook chains. On horizontal chillers, the straps should run through the frame's fork lift guides in the chiller frame. Cardboard or a fabric material should be placed between the chain or straps where the straps or chain rubs when pulled tight by the lift or crane. This prevents rubbing the paint from the chiller condensers.

II. GLYCOL FILLER PORTS

Please refer to Figure 1, page 3

The first step in plumbing the chiller should be installing the (port) location to fill the chiller with glycol and water. This port is also used to check the % of glycol in the system. The port is to be plumbed the same size as the lines providing coolant to equipment. The port consists of a "T" that points upward and is 90 degrees of the horizon. Then, a fitting that is either male threads or female threads is installed into the portion of the "T" that is upward facing. If using 1.5" pipe a 1.5" threaded plug or threaded cap is used to seal and close the port. Use Teflon tape on the threads to ease the removal when access is needed.

We recommend no smaller than a 1.5" port for filling with glycol or water. This access port is critical in easing the job of maintenance. Every six months the glycol level and percentage should be checked. Chillers that have a water auto-refill should have the percentage of glycol checked every three months. This test will indicate if there is a leak in the system or equipment.

When the chiller is used for food prep or any type of gardening, we highly recommend propylene glycol (PG). There are organic PGs available in the market. Most are made from corn byproducts. Although organic propylene glycols are slightly more expensive, the benefits outweigh the costs in the opinion of Chilling management. Never use Ethylene Glycol (EG) in a food environment or when crops can be exposed. EG is poisonous to most living things including animals.

III. DRAINING THE CHILLER

It is best to operate the pump when draining the chiller. The chiller does have a drain port on the reservoir inside the chiller; however, the chiller can be quickly emptied by using the pump. If draining for the winter, it is important to drain the pump heads also, especially when glycol has not been used. The pump does have 1/4" ports every ninety degrees of the pump housing wet end. These ports can be used to slow drain the chiller.

IV. PUMP STORAGE

When Chilling drains and stores pumps we always put a small amount of glycol in the pump head. A stored water pump should be rotated once a month. Although the shaft is round, rotating the pump once a month helps keep seals tight and without what is called "flat spots". Any spot that develops from long term contact between the pump shaft and pump seal is considered a flat spot.