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**Schreiber Engineering**  
**Division of Dova Tech, Ltd.**  
**12111 East Park Street, Cerritos CA 90703**  
**Phone (562) 926-3855 Fax (562) 926-0969**



# SCHREIBER ENGINEERING

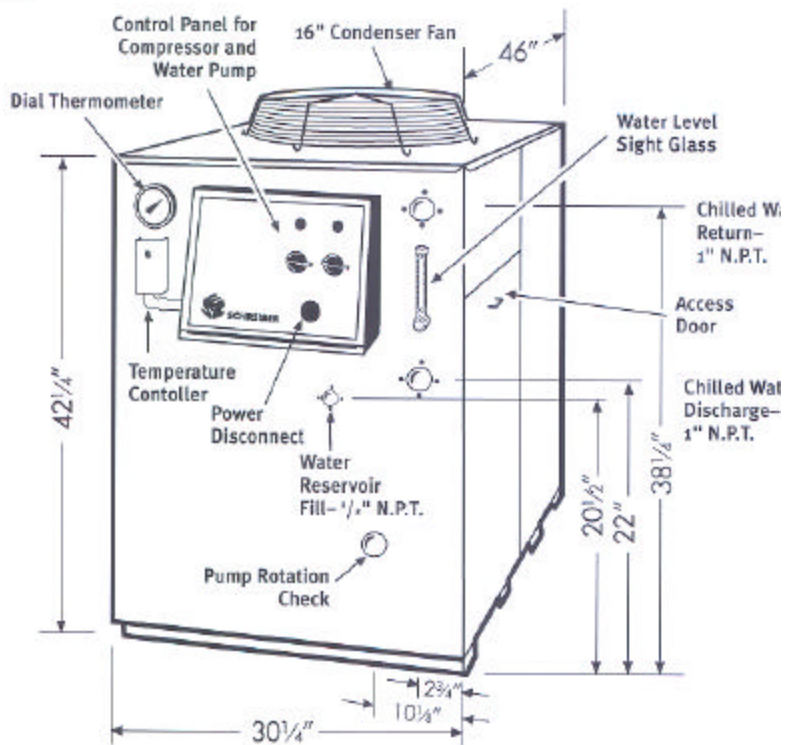
*The Finest Chiller Built in America.*

**200 AC AIR COOLED**

## Water Chiller—Specifications

Quality matters  
Trust the finest... for the long term.  
Made in America.

- ▶ Rated at the ARI Standard of 44° F chilled water at 95° F ambient
- ▶ ETL Tested and Approved 
- ▶ Large Stainless Steel Pump
- ▶ Contaminate Free System with all Non-Ferrous Components
- ▶ Highly Durable Powder Coated Finish
- ▶ Energy Savings Design Which Does Not Use Hot Gas Bypass



Cabinet Dimensions

Width 30-3/4" • Height 42-1/4" • Depth 46"

The 200 AC is rated to meet or exceed the "ARI"—American Refrigeration Institute's national standard of 44° F chilled water at 95° F ambient. The design and components of this chiller are built to deliver a long life of commercial duty application for process equipment. If you have any questions regarding load calculation, installation, service or parts, please call our Service Department: 562-926-3855

**CAUTION:** Do not overcharge this refrigeration system. The refrigeration sight glass is only an indicator of the charging system. The sight glass should never be filled when charging the system. The sight glass will always be fuzzy. Overcharging the system will damage the compressor.

MODEL NUMBER	200 AC
CAPACITY	2 Ton
BTU PER HOUR	24,000
FLUID RESERVOIR CAPACITY	45 gallons
WEIGHT	675 lbs.
VOLTAGE	230/3 — 460/3
AMPERAGE	18.0 — 9.0
FLUID CIRCULATING PUMP	1 H.P.
FLUID PUMP/GPM	30 @ 38.0 p.s.i.



**THE SCHREIBER WARRANTY—**  
Schreiber Engineering warrants the product described herein against defective material or workmanship for one year from the date of purchase. • If any part is found to be defective within the warranty period, Schreiber Engineering, or its authorized service agent, will replace, or at Schreiber's option, repair the part free of charge for materials and labor. • This warranty does not cover damage caused by misuse, accident, abuse, incorrect installation or operation. In addition, it does not cover damage occurring during transit, or damage caused by or resulting from repair or modifications carried out by anyone other than Schreiber Engineering or its Authorized Service Agent.

12111 E. Park Street  
Cerritos, CA 90703  
tel 562-926-3855  
fax 562-926-0969  
www.schreibereng.com



# WARNING



## ELECTRICAL HAZARDS

- 1) TURN OFF MAIN POWER DISCONNECT SWITCH ON THIS MACHINE BEFORE ATTEMPTING TO SERVICE THIS EQUIPMENT.
- 2) THIS MACHINE IS PORTABLE. DISCONNECT ALL POWER SOURCES BEFORE REMOVING CONTROL COVERS.
- 3) USER IS RESPONSIBLE FOR LOSS OF (OR FAILURE TO USE AND MAINTAIN) ANTI-HAZARD PROTECTIVE COVERS FOR ELECTRICAL EQUIPMENT AS FURNISHED BY THE MANUFACTURER OF THIS MACHINE.
- 4) SHOULD YOU FIND IT NECESSARY TO MAKE ANY REPAIRS TO THE REFRIGERATION, BECAUSE REPAIR CAN BE HAZARDOUS, READ THE UNIT MANUAL UNDER REFRIGERATION, OR CALL THE MANUFACTURER AND SELLER. PLEASE NOTE THE DANGER OF OVER CHARGING THE REFRIGERATION SYSTEM.

Failure to read and observe above precautionary warnings are serious offenses under Public Law 91-596. All employees are hereby notified that the employer (and owner of this equipment) under OSHA must take immediate disciplinary action up to and including dismissal for failure to read and comply with this notice.

To Comply With OSHA, All Warning Signs Must Not Be Removed From This  
Water Chilling Equipment

## WATER CHILLER STARTING CHECKLIST

### PROPER VOLTAGE

Check the voltage on the chiller to see that it matches your power supply.

### CRANK CASE HEATER

Power to the unit should be on for 3 hours prior to full usage to allow the crank case heater to heat the compressor. **PLEASE READ SECTION ON CRANK CASE HEATER ON PAGE 17.**

### MOTOR ROTATION

Make sure the fan motors and water pumps are running in the correct rotation. If the water pumps run for more than a short period in the wrong direction, the seal might back off the shaft. To test if the water pumps are rotating in the correct direction, turn the pump switch on and off quickly. The compressor switch is used to test the fan motors rotation.

The compressors to this unit always run in the correct rotation.

### SERVICE ACCESS PANEL

The service access panel must be in place when the unit is running. If it is not in place, the unit will cut off on the high-pressure limit switch, or be inefficient in its capacity. Also, it is dangerous to install panels while the unit is running.

PLEASE READ - IMPORTANT

### TEMPERATURE CONTROL

The temperature control and the dial thermometer is reading the discharge water temperature in Fahrenheit. All controls read in Fahrenheit.

## CONT. WATER CHILLER STARTING CHECKLIST

3

### ELECTRIC – POWER

A good test to make sure power is off to the unit is to turn on the water pump switch. If power is on, the light on this pump will be on. We recommend you take caution in all judgment about the power being on. The best test to find if the power is on is to use a voltmeter. Please Note: A single-phase condition can cause a pilot light to be out and still have voltage to the unit.

### TESTING STANDARDS

All components on the chiller meet UL's standards. The system is tested under 250 pounds of pressure. All motors have internal overload protection except where noted.

### ANTIFREEZE

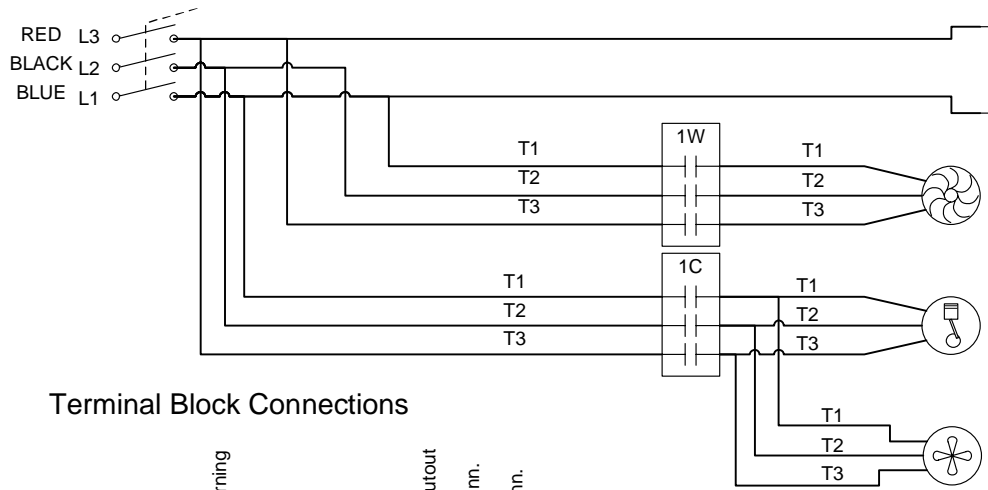
Keep the water tank filled at the proper level. Add antifreeze if you are going to operate the unit at 38<sup>0</sup> F or lower.

### DEIONIZED WATER

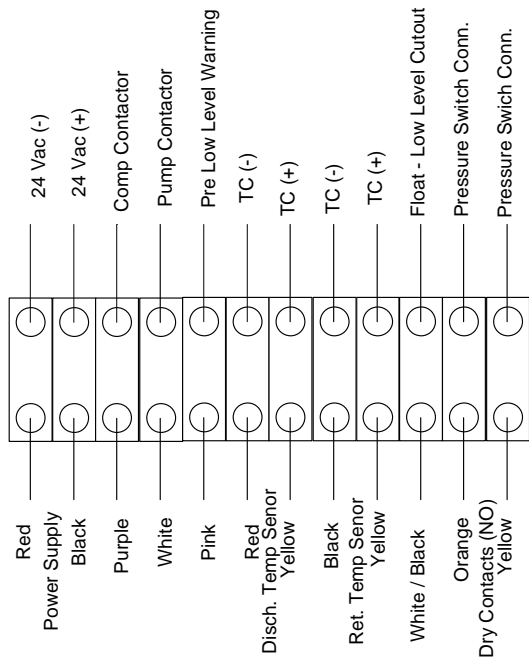
DO NOT USE DEIONIZED WATER IN THE TANK. Deionized water will cause damage to the copper evaporator.

### TANK FILL

Use the separate 1/2" line marked "tank fill" to fill the chiller. See number eight on the specification sheet for locations, page one.



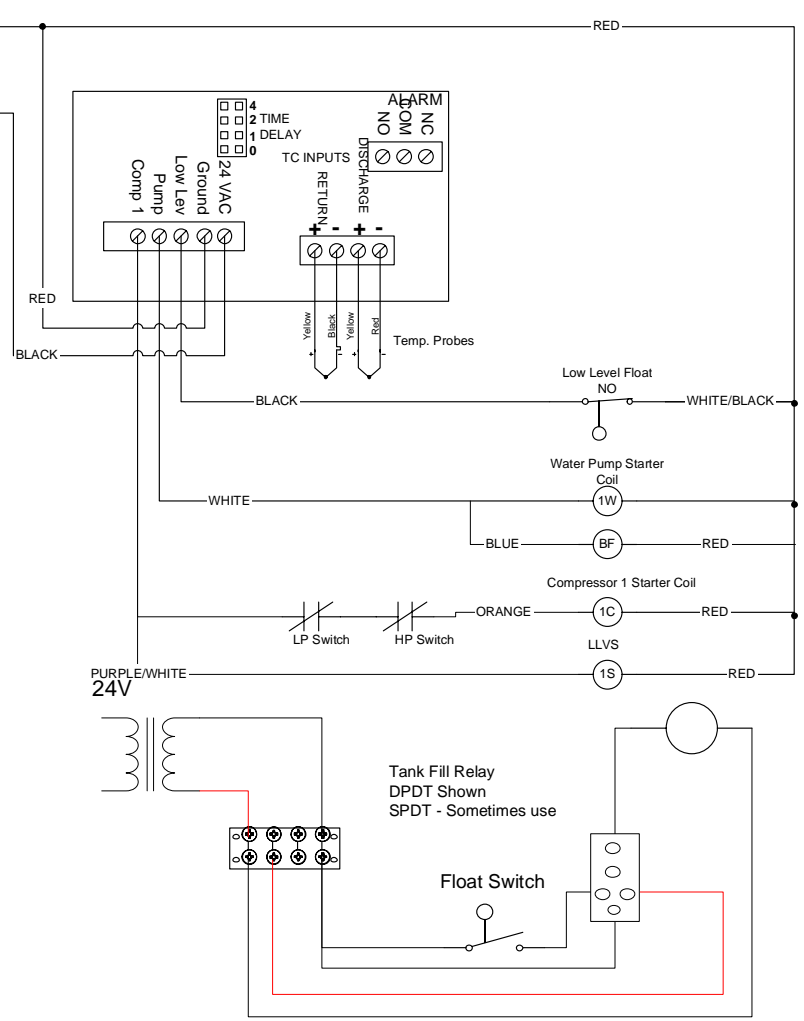
**Terminal Block Connections**



MYDOC/SCHREIBER/ELECTRICAL/  
NEW/ELECTRICAL/SINGLE STAGE/Single stage  
chiller\_BF\_Auto Tank fill

Note: Water cooled units  
are not equipped  
with FAN motors

LLSV - Liquid Line Solenoid Valve  
BF - Back Flow Kit Solenoid Valve



**Automatic Tank Fill**

<b>Models:</b> Single Stage	<b>Marks:</b>	<b>Options:</b>
<b>Voltage:</b> 230-460	<b>Phase:</b> 3	Auto Tank Fill
<b>Type:</b> Air Cooled/Water Cooled		Electronic Controls
<b>Notes:</b> All motors have internal overload protection unless otherwise shown On all connections: L1 - Blue, L2 - Black, L3 - Red		
Schreiber Engineering 12111 Park St. Cerritos, CA 90701		Back Flow kits
(562) 926-3853		
(562) 926-0969 Fax		

## SETTING SOLID STATE CONTROLS

Now a Standard Feature on:  
50,100,150,200,300,AND 400AC/WC Chillers

This unit has solid-state controls that regulate the temperature of the refrigeration system. After the unit is wired to the proper voltage, the temperature can be set.

### Setting the Temperature

Press and hold the button marked “**display set point**” as you turn the set point screw. The temperature shown on the **discharge temperature display** will indicate the temperature set point as you turn the set point screw. Press button marked “**display return**” and the screen will now show **return temperature**.

### Checking Temperature Set Points

To check the temperature set points, just press **display set point** for the compressor #1 set point, press **display return** for the compressor #2 set point,

Part Number: E128A



**SCHREIBER ENGINEERING**

*The Finest Chiller Built in America.*

# Electronic Control Panel

Standard Feature on:

50 • 100 • 150 • 200 • 300 • 400 Series Chillers



**TrueTon**  
Chiller Division



### Available in a Remote Version

Selecting the remote option allows you to place the chiller outdoors, or in a hard to reach indoor location, and then control the chiller from a more convenient location.

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fax 562-926-0969  
www.true-ton.com



## CHILLED WATER DISTRIBUTION PIPING

The chilled water distribution piping is an important factor in the performance of the water chiller. Proper piping will add to the LIFE of your chiller. This chiller is designed to be a containment free system. The chilled water piping should be the same. **NO BLACK IRON PIPE.**

1. If you are installing this water chiller to some existing chiller water lines (Black or galvanized) there is a good chance there will be rust in this system. If you cannot flush this system clean then it should not be used. A rust contaminated system will cause damage to the copper evaporator heat exchanger.
2. Should this be a new system and you are installing chilled water piping. We suggest using PVC piping if allowed. It is a poor conductor of heat, so you do not lose as much BTU capacity in the movement of the chilled water and there is no rusting.

Copper line will prevent any rusting but there is greater heat loss. You might want to insulate these lines.

3. Should the water chiller be installed next to your cooling load. We would suggest rubber hose. This would prevent any great heat loss. And there would also be no contamination.
4. If black pipe, galvanized, iron, and steel pipe are your piping of choice, you should be aware of the corrosiveness of these materials. Black Iron will damage the watering system.
5. Female connections to chiller are brass. If your connections to the chiller are anything other than, PVC, copper, or rubber hose you should consult with your local plumbing supplier about the use of dielectric pipe connections when dissimilar metals are used. If we can be of any assistance with this please call the manufacturer.
6. Keep in mind you should keep all chilled water lines full size. If your chiller has 1" NPT, then the chilled water lines should be no less.

## INSTALLATION INSTRUCTIONS

### Air or Water Cooled Chillers

1. When the chiller is received, check for any shipping damage. If any is found, a freight claim should be filed at once with the carrier.
2. This water chiller is designed with a contaminant free chilled water system, stainless steel reservoir, and all copper evaporator. Installed properly, it will give you years of trouble free service. Therefore, it is important that the chilled water piping system you are using to plumb this water chiller is also as contaminant free as possible. When you take this into consideration you will have a most efficient water cooling system

Should you need assistance to clean up an old chilled water system or to keep a new system clean, we suggest you contact your local water treatment company

3. Place the water chiller in an area that allows easy access to the service doors and control panel for routine maintenance and inspection. For the air-cooled unit, make sure it is in an area where there is good air circulation over the condenser inlet, **24" from any obstruction**. For the water-cooled unit, make sure it has a good water supply by keeping the piping to the condenser 1" in size. Restriction of air to the air-cooled condenser or water to the water-cooled unit will not only affect the efficiency of the unit, but will also cause damage to the refrigeration system. Note: Do not mix up the inlet and the outlet to the condenser on water-cooled units. Water cooled takes 3 gpm, per ton.
4. Make sure the ceiling above the fan discharge is over 12 feet to avoid recirculation of the condenser air, because recirculating condensed air can cause the unit to cut off on the high-pressure switch. If the ceiling is lower than 12 feet, a straight duct out of the ceiling should be installed in order to prevent the air from recirculating over the condenser.
5. Make up two chilled water lines, a discharge and a return line. The fitting on the chiller for these lines is 1" pipe coupling. IT SHOULD BE NOTED THAT THERE IS A 1/4" COPPER BY-PASS LINE BETWEEN THE WATER PUMP AND THE WATER TANK. This by-pass allows just enough water to circulate through the water system in order to prevent damage to the water pump in case the chilled water discharge is shut off. This small amount of water will not affect the efficiency of the unit.
6. Fill the chilled water tank through the hose bib, which is located on the chilled water return line. Fill the tank until it reaches the level as marked on the water sight glass. The water level should be kept within 1" of the marked level. **Do not fill the water tank with deionized water.**

7. Check the voltage on the chiller to see that it matches your supply. When applying power to the water pump (by turning the manual switch on), make sure all the switches on the control panel are in the "off" position. It is necessary to check the rotation of the water pump. The motors on all pumps have an internal overload protection.
8. Power to the unit should be on for 3 hours prior to full usage to allow the crank case heater to heat the compressor. **PLEASE READ SECTION ON CRANK CASE HEATER ON PAGE 18.**
9. The water pump manual switch controls the operation of the water pump. After checking the rotation of the water pump. PLEASE NOTE when the water pump is turning the proper rotation. The water pump switch must be on in order to check rotation of fan motor. The refrigeration system will not run unless the water pump switch is in the on position. Set the temperature controller to the desired temperature. If the temperature is set below 36<sup>0</sup> F, antifreeze must be added to the water supply tank. Use non-automotive antifreeze, which can be added through the overflow pipe. Never add more antifreeze than necessary, since it is a poor conductor of heat the cooling capacity of the chiller will be reduced.
10. With the temperature controller set, the compressor can be turned on by the manual switch. The refrigeration system is now running. It should be noted that there could be a two to three degree difference between the temperature control setting and the dial thermometer. Use the dial thermometer as a guide. Once set, the temperature controller will control the temperature of the water automatically.

## SPECIAL INSTRUCTIONS

### WATER PUMP

The water pump is controlled by the manual switch for off and on operations. The motor on this pump has a built-in overload protection, as do all the motors in our system.

### ELECTRICAL CONTROLS - Control Circuit 24 Volts

The control circuit for the refrigeration system has several controls wired in series. First are the high and low-pressure switches that are mounted in the control panel. The high-pressure switch will shut off the refrigeration system in the event the pressure is too high. High pressure can be caused by the condenser becoming restricted, by foreign material on the outside surface of the condenser, or if the fan motor is not running. If the high-pressure limit switch should cut out, there is a manual reset switch, which is located at the control panel on the right side. In order to reset this switch, the disconnect switch and the switch must be turned off and the control panel door must be open. If and when the high-pressure switch is off, check the "Trouble Shooting" chart for diagnosis.

The low-pressure switch will cut out at any time the pressure in the refrigeration system is below 25 psi. Low psi can be caused by a freeze up in the water tank, a leak in the refrigeration system, if the system is low on Freon (R-22), or if there is any sort of restriction in the system. If the switch cuts out, it will automatically reset. **Never try to adjust the high and low-pressure switches or by-pass them, or serious damage to the system will result.** Adjustment should only be made after the internal pressure of the refrigeration system has been read.

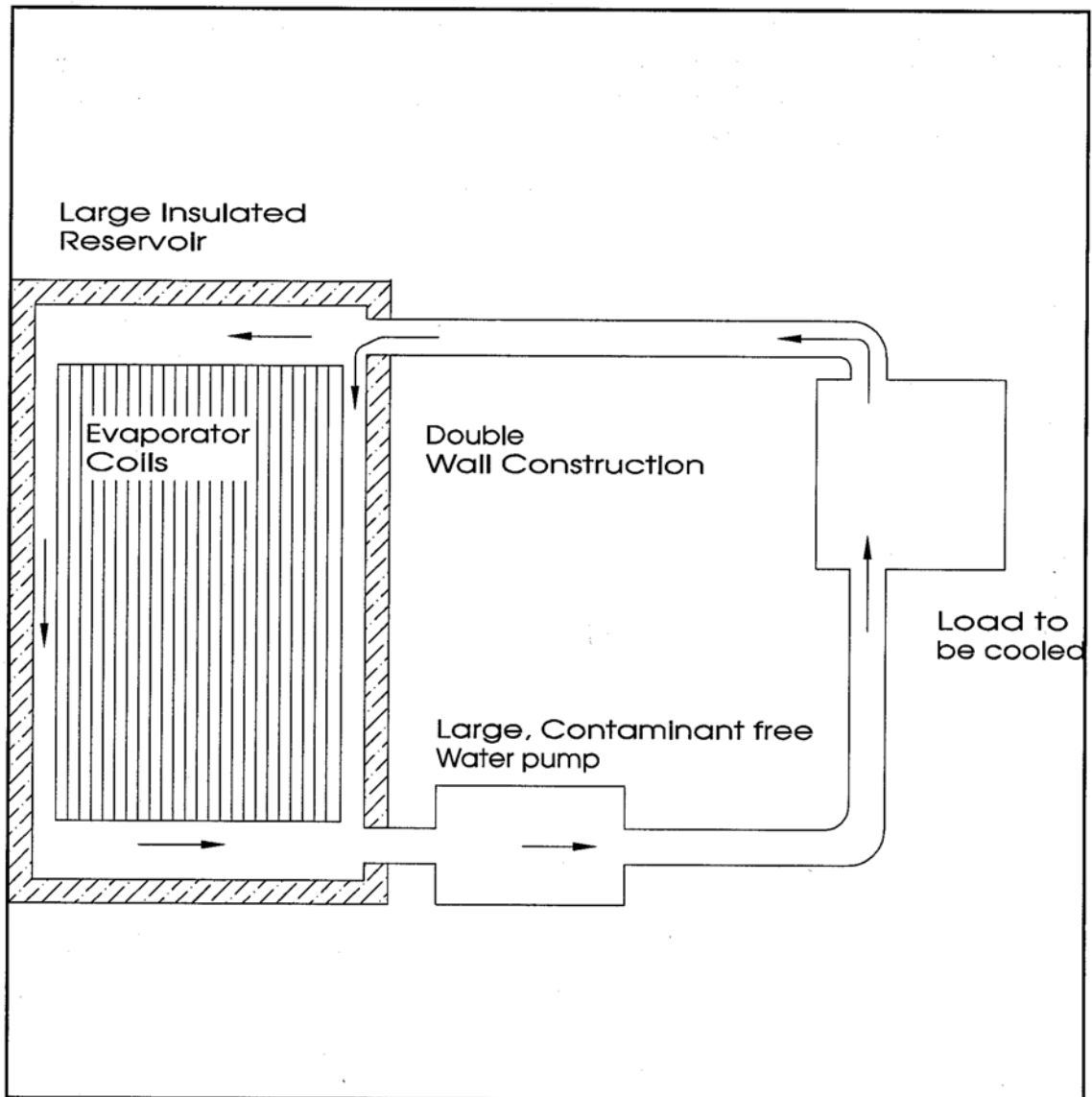
The second control of the circuit is the temperature controller. It controls the cycling of the refrigeration system. Once this control is set, it will control the cycling of the unit automatically. Do not set it below freezing unless the proper amount of antifreeze is put into the unit. Since antifreeze is a poor conductor of heat, never add more than necessary.

The third control on the circuit is the manual compressor switch. It is only used to turn the refrigeration system on or off.

The fourth part on the circuit is the overload protection on the compressor. It will open if the unit becomes low on refrigeration or if the improper voltage is used. This part of the circuit is an automatic reset.

## CHILLED WATER CIRCUIT

The chilled water is pumped from the chiller's water tank to the discharge outlet of the chiller. Then from the discharge outlet, the water travels to the object to be cooled, through the heat exchanger, and returns through the chiller's return line into the water tank. Be sure to keep all lines full size (1"). If the size of the lines is reduced, then the flow of water will be restricted, and thus resulting in improper chilling.



## **REFRIGERATION SYSTEM:**

The refrigeration system is a medium temperature system with a range from 35<sup>0</sup> F to 70<sup>0</sup> F. This is the most efficient range. If temperatures below or above this range are required, they should be discussed with our engineering department. The refrigeration system also includes a hermetically sealed refrigeration system and all parts, except the evaporator coil, are standard to the refrigeration industry. The evaporator coil is installed in a stainless steel tank and the tank on each unit has a large area. This large area allows better control of water temperature and causes the water flow not to be restricted, resulting in better water circulation. Any repairs to the refrigeration system should be done by a qualified refrigeration company. Schreiber Engineering will always have a service engineer available to answer any questions regarding chiller service.

This unit has a service valve on the suction and discharge line. The suction line has its valve on the suction line. The high pressure or discharge service line is on the receiver.

This unit is charged with R-22. **DO NOT OVERCHARGE** because this will cause damage to the compressor. The refrigeration sight glass is fuzzy until the unit reaches it's proper temperature.

## **MAINTAINING THE CHILLER:**

Very little maintenance is required on this unit. It might be necessary to clean out the heat exchanger located within the water tank, only depending on the condition of the water used in the chilled water circuit. It might also be necessary to blow out the condenser from time to time, depending on the environment of the installed unit. Finally, the water cooled condenser needs to be flushed out once in a while. The frequency of this process depends on the condition of the condenser's water supply.

## FAN MOTORS

### **SPECIFICATIONS:**

H.P. 1/2

VOLTAGE - 220/230/440 3 Phase

HZ-50-60

RPM - 1140

OVERLOAD - Automatic, Internal

FRAME - LA56

MTG - Rigid, Open Motor

CAT. NO. Leeson #115726

**ROTATION:** Motor runs clockwise (CW).

**FAN BLADE:** 18" x 23<sup>0</sup>

**SAFETY:** Avoid personal injury or equipment damage by disconnecting electrical power before working on the motor. Make sure the power is off when checking each phase.

### **MAINTENANCE:**

1. There are no lubrication points; therefore, no lubrication is necessary.
2. Make sure the blade runs in the correct rotation.
3. Clean the outside of the fan motor as necessary.

# Installation, Operation and Maintenance Instructions.

## Model NPE/NPE-F

### DESCRIPTION & SPECIFICATIONS:

The models NPE (close-coupled) and NPE-F (frame-mounted) are end suction, single stage centrifugal pumps for general liquid transfer service, booster applications, etc. Liquid-end construction is all AISI Type 304 stainless steel, stamped and welded. Impellers are fully enclosed, non-trimable to immediate diameters. Casings are fitted with a diffuser for efficiency and for negligible radial shaft loading.

Close-coupled units have NEMA 48J or 56J motors with C-face mounting and threaded shaft extension. Frame-mounted units can be coupled to motors through a spacer coupling, or belt driven.

### 1. Important

**1.1.** Inspect unit for damage. Report any damage to carrier/dealer immediately.

**1.2.** Electrical supply must be a separate branch circuit with fuses or circuit breakers, wire sizes, etc., per National and local electrical codes. Install an all-leg disconnect switch near pump.

#### CAUTION

Always disconnect electrical power when handling pump of controls.

**1.3.** Motors must be wired for proper voltage. Motor wiring diagram is on motor nameplate. Wire size must limit maximum voltage drop to 10% of nameplate voltage at motor terminals, or motor life and pump performance will be lowered.

**1.4.** Always use horsepower-rated switches, contactor and starters.

**1.5.** Motor Protection

**1.5.1.** Single-phase: Thermal protection for single-phase units is sometimes built in (check nameplate). If no built-in protection is provided, use a contactor with a proper overload. Fusing is permissible.

**1.5.2.** Three-phase: Provide three-leg protection with properly sized magnetic starter and thermal overloads.

**1.6.** Maximum Operating Limits:

Liquid Temperature: 212F (100C) with standard seal.  
250F (120C) with optional high temp seal.

Pressure: 75 PSI.

Starts Per Hour: 20, evenly distributed.

**1.7** Regular inspection and maintenance will increase service life. Base schedule on operating time. Refer to section 8.



### 2. Installation

**2.1.** General

**2.1.1.** Locate pump as near liquid source as possible (below level of liquid for automatic operation).

**2.1.2.** Protect from freezing or flooding.

**2.1.3.** Allow adequate space for servicing and ventilation.

**2.1.4.** All piping must be supported independently of the pump, and must "line-up" naturally.

#### CAUTION

Never draw piping into place by forcing the pump suction and discharge connections.

**2.1.5.** Avoid unnecessary fittings. Select sizes to keep friction losses to a minimum.

**2.2.** Close-Coupled Units:

**2.2.1.** Units may be installed horizontally, inclined or vertically.

#### CAUTION

Do not install with motor below pump. Any leakage or condensation will affect the motor.

**2.2.2.** Foundation must be flat and substantial to eliminate strain when tightening bolts. Use rubber mounts to minimize noise and vibration.

**2.2.3.** Tighten motor hold-down bolts before connecting piping to pump.

**2.3.** Frame-Mounted Units:

**2.3.1.** Bedplate must be grouted to a foundation with solid footing. Refer to Fig. 1.

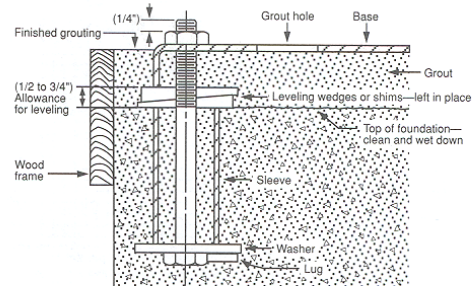


Figure 1

IM013R01



**2.3.2.** Place unit in position on wedges located at four points (two below approximate center of driver and two below approximate center of pump). Adjust wedges to level unit. Level or plumb suction and discharge flanges.

**2.3.3.** Make sure bedplate is not distorted and final coupling alignment can be made within the limits of movement of motor and by shimming, if necessary.

**2.3.4.** Tighten foundation bolts finger tight and build dam around foundation. Pour grout under bedplate making sure the areas under pump and motor feet are solid. Allow grout to harden 48 hours before fully tightening foundation bolts.

**2.3.5.** Tighten pump and motor hold-down bolts before connecting the piping to pump.

### 3. Suction Piping:

**3.1.** Low static suction lift and short, direct, suction piping is desired. For suction lift over 10 feet and liquid temperatures over 120 F, consult pump performance curve for Net Positive Suction Head Required.

**3.2.** Suction pipe must be as large as the suction connection of the pump. Smaller size will degrade performance.

**3.3.** If larger pipe is required, and eccentric pipe reducer (with straight side up) must be installed at the pump.

**3.4.** Installation with pump below source of supply:

**3.4.1.** Install full flow isolation valve in piping for inspection and maintenance.

#### CAUTION

Do not use suction isolation valve to throttle pump.

**3.5.** Installation with pump above source of supply:

**3.5.1.** Avoid air pockets. No part of piping should be higher than pump suction connection. Slope piping upward from liquid source.

**3.5.2.** All joints must be airtight.

**3.5.3.** Foot valve to be used only if necessary for priming, or to hold prime on intermittent service.

**3.5.4.** Suction strainer open area must be at least triple the pipe area.

**3.6.** Size of the inlet from liquid source and minimum submergence over inlet, must be sufficient to prevent air from entering pump through vortexing. See figs. 2-5.

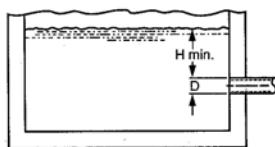


Figure 2

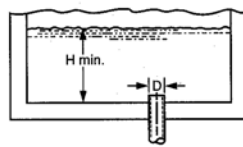


Figure 3

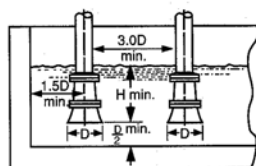


Figure 4

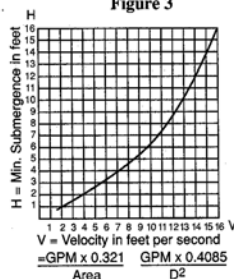


Figure 5

### 4. Discharge Piping:

**4.1.** Arrangement must include a check valve located between a gate valve and the pump. The gate valve is for regulation of capacity, or for inspection of the pump or check valve.

**4.2.** If an increaser is required, place between check valve and pump.

**4.3.** Use 3-4 wraps of Teflon tape to seal threaded connections.

### 5. Motor-To-Pump Shaft Alignment:

**5.1.** Close-coupled Units:

5.1.1. No field alignment necessary.

**5.2.** Frame-Mounted Units:

5.2.1. Even though the pump-motor unit may have a factory alignment, this could be disturbed in transit and must be checked prior to running.

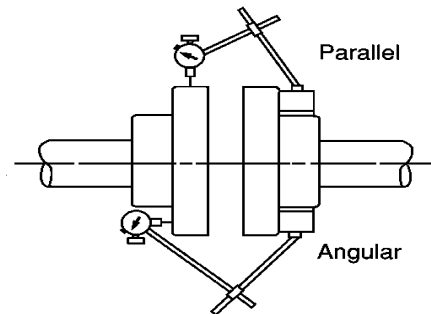


Figure 6

**5.2.2.** Tighten all hold-down bolts before checking the alignment.

**5.2.3.** If re-alignment is necessary, always move the motor. Shim is required.

**5.2.4.** Parallel misalignment – shafts with axis parallel but not concentric. Place a dial indicator on one hub and rotate this hub 360° while taking readings on the outside diameter of the other hub. Parallel alignment occurs when Total indicator reading is .005", or less.

**5.2.5.** Angular misalignment – shafts with axis parallel but not concentric. Place dial indicator on one hub and rotate this hub 360° while taking readings on the face of the other hub. Angular alignment is achieved when Total Indicator Reading is .005", or less.

**5.2.6.** Final alignment is achieved when parallel and angular requirements are satisfied with motor hold-down bolts tight.

#### CAUTION

Always recheck both alignments after making any adjustment.

### 6. Rotation:

**6.1.** Correct rotation is right-hand (clockwise when viewed from the motor end). Switch power on and off quickly. Observe shaft rotation. To change rotation:

- 6.1.1. Single-phase motor: Non-reversible.
- 6.1.2. Three-phase motor: Interchange any two power supply leads.

## 7. Operation:

7.1. Before starting, pump must be primed (free of air and suction pipe full of liquid) and discharge valve partially open.

### CAUTION

**Pumped liquid provides lubrication. If pump is run dry, rotating parts will seize and mechanical seal will be damaged. Do not operate at or near zero flow. Energy imparted to the liquid is converted into heat. Liquid may flash to vapor. Rotating parts require liquid to prevent scoring or seizing.**

7.2. Make complete check after unit is run under operating conditions and temperature has stabilized. Check for expansion of piping. On frame-mounted units coupling alignment may have changed due to the temperature differential between pump and motor. Recheck alignment.

## 8. Maintenance:

8.1. Close-coupled Unit. Ball bearings are located in and are part of the motor. They are permanently lubricated. No greasing required.

8.2. Frame-Mounted Units:

8.2.1. Bearing frame should be re-greased every 2,000 hours or three month interval, whichever occurs first. Use a #2 sodium or lithium based grease. Fill until grease comes out of relief fittings, or lip seals, then wipe off excess.

8.2.2. Follow motor and coupling manufacturers' lubrication instructions.

8.2.3. Alignment must be rechecked after any maintenance work involving and disturbance of the unit.

## 9. Disassembly:

Complete disassembly of the product will be described. Proceed only as far as required to perform the maintenance work needed.

9.1. Turn off Power.

9.2. Drain system. Flush if necessary.

9.3. Close-Coupled Units: Remove motor hold-down bolts. Frame-Mounted Units: Remove coupling, spacer, coupling, spacer, coupling guard and frame hold-down bolts.

9.4. Disassembly of Liquid End:

9.4.1. Remove casing bolts (370).

9.4.2. Remove back pull-out assembly from casing (100).

9.4.3. Remove impeller locknut (304).

### CAUTION

**Do not insert screwdriver between impeller vanes to prevent rotation of close-coupled units. Remove cap at opposite end of motor. A screwdriver slot or a pair of flats will be exposed. Using them will prevent impeller damage.**

9.4.4. Remove impeller (101) by turning counter-clockwise when looking at the front of the pump. Protect hand with rag or glove.

### CAUTION

**Failure to remove impeller in a counter-clockwise direction may damage threading on the impeller, shaft or both.**

9.4.5. With two pry bars 180° apart and inserted between the seal housing (184) and the motor adapter (108), carefully separated the two parts. The mechanical seal rotary unit (383) should come off the shaft with the seal housing.

9.4.6. Push out the mechanical seal stationary seat from the motor side of the seal housing.

9.5. Disassembly of Bearing Frame:

9.5.1. Remove bearing cover (109).

9.5.2. Remove shaft assembly from frame (228).

9.5.3. Remove lip seals (138 & 139) from bearing frame and bearing cover if worn and are being replaced.

9.5.4. Use bearing puller or arbor press to remove all ball bearing. (112 & 168).

## 10. Reassembly:

10.1. All parts should be cleaned before assembly.

10.2. Refer to parts list to identify required replacement items. Specify pump index or catalog number when ordering parts.

10.3. Reassembly is the reverse of disassembly.

10.4. Observe the following when reassembling the bearing frame:

10.4.1. Replace lip seals if worn or damaged.

10.4.2. Replace ball bearings if loose, rough or noisy when rotated.

10.4.3. Check shaft for runout. Maximum permissible is .002" T.I.P.

10.5. Observe the following when reassembling the liquid-end:

10.5.1. All mechanical seal components must be in good condition or leakage may result. Replacement of complete seal assembly, whenever seal has been removed, is a good standard practice.

10.5.2. Inspect casing O-ring (513) and replace if damaged. This o-ring may be lubricated with petroleum jelly to ease assembly.

10.5.3. Inspect guidevane O-ring (349) and replace if worn.

### CAUTION

**Do not lubricate guidevane O-ring (349). Insure it is not pinched by the impeller on reassembly.**

10.6. Check reassembled unit for binding. Correct as required.

10.7. Tighten casing bolts in a star pattern to prevent O-ring binding.

**11. Trouble Shooting Chart:**

**Motor Not Running:**

(See causes 1 – 6)

**Little or No Liquid Delivered:**

(See causes 7 – 17)

**Power Consumption Too High:**

(See causes 4, 17 - 19, 22)

**Excessive Noise and Vibration:**

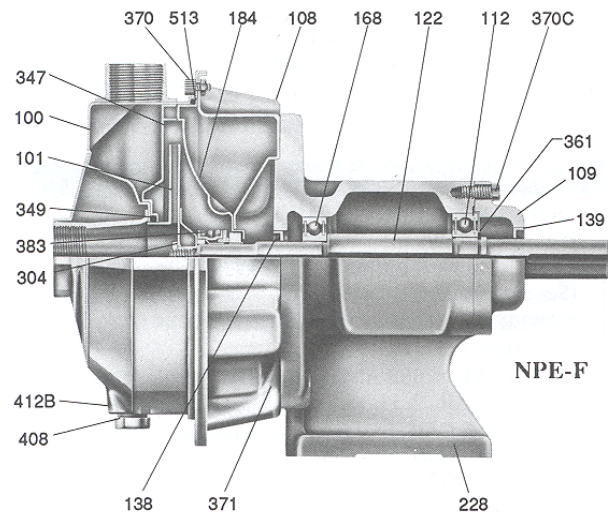
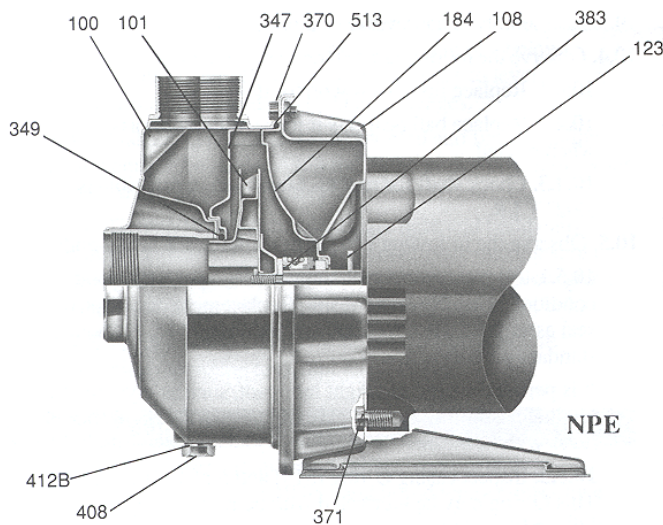
(See causes 4, 6, 9, 13, 15, 16, 18, 20 – 22)

**Probable Cause:**

- 1) Tripped thermal protector.
- 2) Open circuit breaker.
- 3) Blown fuse.
- 4) Rotating parts binding.
- 5) Motor wired improperly.
- 6) Defective motor.
- 7) Not primed.
- 8) Discharge plugged or valve closed.
- 9) Incorrect Rotation
- 10) Foot valve too small, suction not submerged, inlet screen plugged.
- 11) Low voltage.
- 12) Phase loss (3-phase only).
- 13) Air or gasses in liquid.
- 14) System head too high.
- 15) NPSHA too low:  
Suction lift too high or suction losses excessive.  
Check with vacuum gauge.
- 16) Impeller worn or plugged.
- 17) Incorrect impeller diameter.
- 18) Head too low causing excessive flow rate.
- 19) Viscosity or specific gravity too high.
- 20) Worn bearings.
- 21) Pump or piping loose.
- 22) Pump and motor misaligned.

Liquid End Components		
Item No.	Description	Materials
100	Casing	AISI 304 Stainless Steel
101	Impeller	
184	Seal Housing	
304	Impeller Locknut	
347	Guidevane	
349	O-ring, Guidevane	Buna-N
370	Socket Hd. Screws, Casing	AISI 304 S.S.
383	Mechanical Seal	**see chart
408	Drain & vent Plug, Casing	AISI 304 S.S.
412B	O-ring, Drain & Vent Pug	Buna-N
513	O-ring, Casing	Buna-N
Power End Components		
108	Adapter	AISI 304 S.S.
109	Bearing Cover	Cast Iron
112	Ball Bearing (Outboard)	Steel
122	Shaft	AISI 303 S.S.
138	Lip Seal (Inboard)	Buna/Steel
139	Lip Seal (Outboard)	Buna/Steel
168	Ball Bearing (Inboard)	Steel
228	Bearing Frame	Cast Iron
361	Snap Ring	Steel
370C	Hex. Hd. Cap Screw, Brg. Cvr.	Plated Steel
371	Hex. Hd. Cap Screw, Adapter	Plated Steel

**Mechanical Seals – Item 383						
Part No.	Service	Rotary	Stationary	Elastomer	Metal Parts	Crane Type
10K46	Standard	Carbon	Ceramic	Buna	18-8 S.S.	21
10K18	Option-High Temp.		Ni-Resist	EPR		
10K24	Option-Chemical Duty		Ceramic	Viton		
10K55	Option-High Temp.		Tungsten			
10K29	Option-Severe Duty		Silicon Carbon	Buna		



## WARNING

Overcharging a refrigeration or air conditioning system can be dangerous.

\*\*\*\*

If a system refrigerant overcharge is sufficient to immerse the major parts of the motor and compressor in liquid refrigerant, a situation has been created which, when followed by unusual circumstances can lead to compressor housing seam separation or rupture.

The sequence of circumstances which can lead to compressor housing seam separation or rupture may occur in the following manner:

- (a) The system overcharge immerses the compressor motor, piston, connecting rods, cylinder, etc., in liquid refrigerant, thereby effectively forming a hydraulic block preventing the compressor from starting. This condition is known as locked rotor.
- (b) Electric current continues to flow through the compressor motor windings that become, in effect, electric resistance heaters. The heat produced begins to vaporize the excessive refrigerant liquid overcharge, causing a rapid increase in system pressure.
- (c) If the system compressor protective devices fail for any reason prior to or during this locked rotor heating cycle, or cycles, liquid refrigerant may be vaporized sufficiently fast enough to raise the pressure within the system to extremes far in excess of the housing or weld seam design limits.
- (d) In some instances where the amount of refrigerant overcharge is critical in proportion to the system internal volume, the pressure reached can cause a compressor housing seam separation or rupture, which can be hazardous.

The remedy to eliminate this exceedingly rare but potential hazard is to use correct refrigerant charging amounts and techniques.

Tecumseh Products Company urges that all individuals responsible for training, teaching, or advising installation mechanics and service personnel, must emphasize proper charging techniques and strict adherence to limiting refrigerant charge amounts to those specifically recommended by the manufacturer of the refrigeration, air conditioning, or heat pump system.

## SERVICE BULLETIN

### HERMETIC COMPRESSOR ELECTRICAL TERMINAL VENTING CAN BE DANGEROUS

\*\*\*\*

When the insulating material, which supports a hermetic compressor electrical terminal, suddenly disintegrates due to physical abuse or as a result of an electrical short between the terminal and the compressor housing, the terminal may be expelled, venting the vaporous and liquid contents of the compressor housing and system.

If the hermetic compressor terminal PROTECTIVE COVER is not properly in place with its weatherproofing gasket (if required) and bale strap fastening device secured, there is a remote possibility if a terminal vents, that the vaporous and liquid discharge can be ignited, spouting flames several feet, causing potentially severe or fatal injury to anyone in its path.

The discharge from a venting terminal can be ignited external to the compressor if the terminal PROTECTIVE COVER is not properly in place and if the discharge impinges on a sufficient heat source such as, but not limited to, an open flame, electric heater, or an electrical spark.

Ignition of the discharge can also occur at the venting terminal or inside the motor-compressor enclosure, if there is sufficient contaminant air present in the system and an electrical arc occurs as the terminal vents.

Ignition cannot occur at the venting terminal without the presence of contaminant air, and cannot occur externally from the venting terminal without the presence of an external ignition source.

It is, therefore, essential that any air in a refrigeration, air conditioning, or heat pump system be completely removed when the system is manufactured - when the system is installed - and whenever the system is field processed as a result of field service. Field service includes, but is not limited to, leak repairs or compressor replacement.

Eliminating air within the system prevents ignition at, or in, the hermetic compressor if a terminal should vent, thereby reducing the hazard potential.

To reduce the possibility of external ignition, all open flame, electrical power, and other heat sources should be extinguished or turned off prior to servicing a system.

Before using a soldering or welding torch to remove or repair tubing, make sure all the system refrigerant charge has safely been released.

A venting terminal presents no danger to servicing personnel or anyone else in the vicinity if the compressor terminal PROTECTIVE COVER is properly in place as shown on Tecumseh Products Company drawings and diagrams using the parts as shown on Tecumseh Products Company bills of material.

Hermetic compressors can be properly serviced without unnecessarily removing the terminal PROTECTIVE COVER by adhering to the following service procedures:

1. If the branch circuit, short circuit, and ground fault protective device, i.e., fuse or circuit breaker, is open, this is a strong indication that an electrical problem exists and must be found and corrected.

The circuit protective device rating must first be checked as required by the National Electrical Code, and its maximum rating should coincide with that marked on the equipment nameplate and/or on the unit wiring diagram and/or instructions. This breaker or fuse rating should be as low as practical. A rule of thumb is 175% times the motor-compressor RLA (FLA on older units) as shown on the unit nameplate.

It is acceptable to first replace the fuse or reset the circuit breaker ONE TIME to determine if it was just a nuisance opening. WARNING! The terminal PROTECTIVE COVER must be securely in place.

2. If the fuse or circuit breaker again opens, DO NOT continue to replace or reset, as the equipment obviously has an electrical problem. CAUTION! Continual resetting may cause the terminal to vent.
3. DISCONNECT all power to the unit, making sure all power legs are open.
4. Without removing the terminal PROTECTIVE COVER, disconnect the three leads going to the compressor terminals at the nearest point to the compressor, and identify them as Common (C), Start (S), and Run (R). Identification can generally be made through the unit wiring diagram. DO NOT disconnect at the compressor terminals at this time.
5. With a Megger, Hi-Potential Ground Tester, or other suitable instruments which puts out a voltage between 300 and 1500 volts, check for a ground separately between each of the three C, S, & R leads and ground (such as an unpainted tube on the compressor). Do not use a low voltage output instrument such as a volt-ohmmeter or other such continuity instruments, as these will not detect a low level fault (ground).
6. If a ground is indicated, then carefully remove the compressor terminal PROTECTIVE COVER and inspect for loose leads or insulation breaks in the lead wires.
7. If #6 indicates no visible problem, carefully remove the leads at the compressor terminals. CAUTION: Damage can occur to the glass embedded terminals at this point if the leads are not properly removed, which can result in the terminal venting and hot oil discharging. No ignition, however, can occur if all power is disconnected and no external ignition source is present.

8. Repeat #5 testing, carefully checking for ground, directly between each compressor terminal (C, S, & R) and ground.
9. If once again a ground is indicated, proceed to properly replace the compressor, as it has failed and cannot be repaired.
10. It is important to note that a volt-ohmmeter may be used only to check the resistance and/or continuity of the motor windings. This may be done as follows:
  - (a) For internal overload protected motor-compressor, the overload is located between the common terminal of the compressor and the common motor lead inside the compressor. If the resistance reading between Common and Start or Common and Run is open (infinity) and the resistance reading between Start and Run indicates winding Resistance Values in the Tecumseh Hermetic Compressor Service Data Book, then the internal protector is open and time must be allowed for it to reset. Any Common and Start, Common and Run, and Start and Run resistance reading must be within the values shown in Tecumseh Hermetic Compressor Service Data Book. Three phase internal overloads open all three phases. Therefore, allow time for reset.
  - (b) For external overload protected motor-compressors, the continuity of the overload may be checked. The resistance of all winding may also be checked, i.e., C-S, C-R, and S-R.
  - (c) Any lack of continuity (other than test indicating an open internal protector) or improper resistance, indicates a faulty or damaged motor and the compressor must be properly replaced, as it has failed and cannot be repaired.

If the above indicates no problem with the compressor, then carefully reconnect the leads to the proper compressor terminals (C, S, & R), correctly replace the terminal PROTECTIVE COVER, gasket (if required), and the bale strap.

Then proceed to conduct similar ground and continuity test from the three lead connection points which you previously disconnected, forward toward the incoming power connections, to find the electrical problem. DO NOT reset the ground fault protective device until you have located and corrected the problem. Refer to the Unit Wiring Diagram and Service Manual for the proper procedure and wiring checkout.

The text of step-by-step procedures uses language and symbols, which refer to the electrical supply as single phase. Three-phase equipment should be given equally cautious consideration when service is necessary.

Again, we want to stress that it is essential that WHENEVER ELECTRIC POWER is applied to the motor-compressor, the terminal PROTECTIVE COVER must be properly in place.

Servicing refrigeration and air conditioning systems can be dangerous, and extreme caution in all respects should be exercised by the personnel servicing such equipment. The precautions discussed in this bulletin deal only with those dangers associated with VENTING TERMINALS.

## **CRANK CASE HEATERS**

This unit has a CRANK CASE HEATER on the compressor. It is important to the life of this compressor that you follow the instructions. This low wattage heater protects the compressor when it is idle by producing just enough heat to keep the Freon from accumulating in the compressor. Under certain specific conditions this heater will prevent the compressor from slugging causing damage to its internal parts.

These Heaters are wired at our factory in such away that allows the heater to be on any time the disconnect switch on the chiller is on. When you want to turn the water pump or refrigeration compressor off, you must only use the manual switches on the electrical enclosure as marked. When you use the disconnect to turn the unit off you kill the power to the crank case heaters. ONLY use the disconnect to turn off power if you are going to work on the electrical system.

### *AN IMPORTANT FACTOR - READ*

## **SPECIAL INSTRUCTIONS FOR CRANK CASE HEATER**

When the unit is first received, the power to the chiller should be on for 3 hours. That means you must at this time have the unit disconnect on. The manual water pump and refrigeration switches should be off. This will allow the refrigeration compressor to warm up, driving out the freon (R22) that had migrated to the compressor.

This start up time is necessary if you have all the power off for 12 hours or more. Then you must allow this same warm up time. It is okay to turn the unit off by the manual switch only and not the main power. Then you do not need to be concern about a warm up time.

The crank case heater is HIGH VOLTAGE. But it is only very low wattage. Caution should be taken when working on the crank case heater to make sure the POWER is off.

Any question call for more details Schreiber Engineering Corporation 562-926-3855.



## MAINTENANCE INFORMATION

1. There are no lubrication points on the chiller. All motors have permanent lubrication in the bearings.
2. The water that is used in the chilled water circuit has no special requirements, except that deionized water cannot be used. The water should be clean and some type of water conditioner can be used. Nothing should be used in the chilled water circuit that could damage the all copper Heat Exchanger. THIS INCLUDES THE USE OF DEIONIZED WATER.
3. The air cooled condenser should be cleaned on a regular basis, depending on the environment the chiller is installed in.
4. The water level should be maintained as close to the level as marked on the water sight glass. You cannot damage the refrigeration system by the water being at a low level, it will only effect the efficiency of the unit.
5. Caution: The compressor receivers and water pump could be hot enough to injure one touching these components.
6. The dial thermometer is reading the temperature of the discharge chilled water.
7. Please note: This is a hermetically sealed compressor. There are no necessary maintenance requirements. Please read the service bulletins before making any repairs.

## SPECIAL NOTICE

To clean the condenser, it is necessary to remove the access panel and pulling it out at the bottom. When this panel is removed, you can brush away all the foreign matter. You must always put this access panel back in place or the unit could cut out on high head pressure. CAUTION: The fins on this condenser coil can be bent very easily. If you use another type of brush make sure it is soft enough to not damage the condenser. You can also blow out the with compressed air.

## MAINTENANCE INFORMATION Part II

### NOTICE OF EXPANSION VALVE

This is a standard Alco Expansion Valve, Model #TLCE (size) HW. These valves come from the factory pre-set. For the proper super heat, do not try to adjust the super heat on this valve unless you call the factory service department. This Alco valve is one of the most reliable parts. If this valve needs to be changed out, do it without losing the R-22 charge. To do this, turn the receiver off at the liquid line to the expansion valve. Then pump the system down until there is two or three pounds of gauge pressure. Remove the power element and install the replacement power element, open the receivers liquid line valve. **TEST FOR LEAKS** and restart the unit. Remember; call the factory before you do any work on the expansion valve.

## TROUBLE SHOOTING – PART 1

SYMPTOM	DIAGNOSIS	REMEDY
Compressor won't run	Check Power supply Electrical circuit  Check Line load voltage Temperature control Compressor overload Low pressure switch High pressure switch Manual switch Compressor All control circuit	Correct circuit breaker Repair or replace bad circuit  Correct voltage condition Repair or replace Replace Repair or replace Repair or replace Replace Replace Repair
Compressor runs No refrigeration	Refrigerant leak Stuck expansion valve	Repair leak and recharge Replace expansion valve
High pressure trips	Condenser motor Air over condenser restricted Service panel not in place	Repair or replace motor Clean condenser Install service panel
Low pressure switch Cutting out	Defective expansion Refrigerant leak	Replace expansion valve Repair leak
Temperature too high	Dial thermometer Temperature controller Water pump off	Re-adjust or replace Replace Check controls circuit
Temperature too cold	Temperature controller Dial thermometer Water pump	Repair or replace Out of adjustment Not circulating water

## TROUBLE SHOOTING - PART II

### REFRIGERATION SYSTEM INTERNAL PRESSURE USING REFRIGERANT R-22

- \* High Pressure Switch: Manual Reset - Cut out at 425 P.S.I.
- \* Low Pressure Switch: Automatic Reset - Cut out at 25 P.S.I.

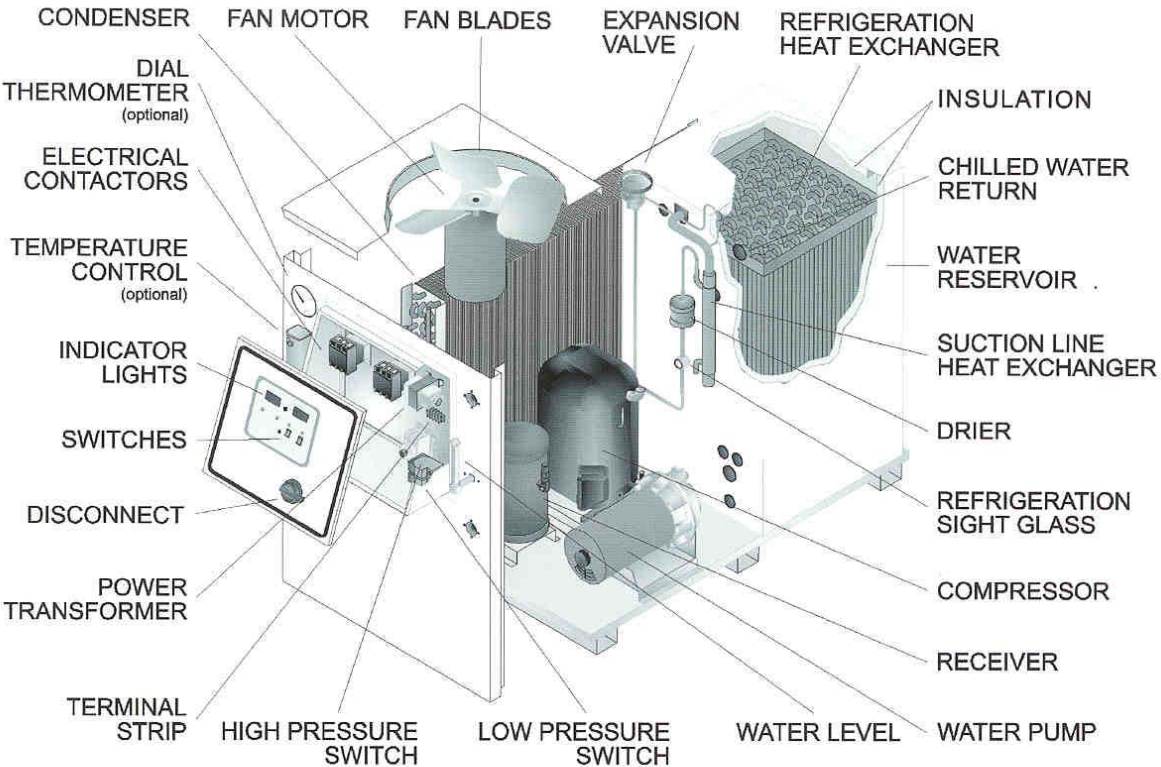
### WORKING REFRIGERANT PRESSURES R-22

- \* High Pressure: 185 to 325 P.S.I.
- \* Low Pressure: 45 to 70 P.S.I.

#### **\*\*\*NOTE\*\*\***

These pressures are under normal ambient temperatures and chilled water temperatures.

# CHILLER PARTS IDENTIFICATION



## PARTS LIST

200AC/WC - 460/3 or 230/3

If this unit has special feature(s) installed, see appendix for part number(s).

Part Number	Description	460/3	230/3	Qty.
<b>Refrigeration</b>				
R105	Compressor – 220/3 – 3 HP		✓	1
R106	Compressor – 440/3 – 3 HP	✓		1
R122	Condenser – Air Cooled	✓	✓	1
R122-W	Condenser – Water Cooled	✓	✓	1
R131	Receiver 1-3 Ton	✓	✓	1
R140-2	Expansion Valve – 2 HW	✓	✓	1
R141-1	Expansion Valve Flange	✓	✓	1
R146-1	Refrigeration Sight Glass	✓	✓	1
R152	Refrigeration Drier – 3/8"	✓	✓	1
R164	Evaporator (All Copper)	✓	✓	1
R180	Suction Line Heat Exchanger	✓	✓	1
R182	High Pressure Switch	✓	✓	1
R183	Low Pressure Switch	✓	✓	1
<b>Electrical</b>				
E101	Disconnect 80 Amp	✓	✓	1
E101-H	Disconnect Handle Only	✓	✓	1
E101-S	Disconnect Shaft Only	✓	✓	1
E103	Contactors – 30 Amps	✓	✓	2
E104	4 Point Terminal Block	✓	✓	1
E112	Transformer – 220/3		✓	1
E113	Transformer – 440/3	✓		1
E115	Grounding Screw	✓	✓	1
E122	Off / On Switch	✓	✓	2
E124-3	Pilot Light Bulb – 24v	✓	✓	2
E126	Pilot Light Assembly	✓	✓	2
E128A	Solid State control Board Half thru 4 Ton	✓	✓	1
E128P-D	Discharge Probe & Wire	✓	✓	14 ft
E128P-R	Return Probe & Wire	✓	✓	14 ft
E132	Thermostat	✓	✓	1
E134	Dial Thermometer	✓	✓	1
E145	Fan Motor – ½ HP	✓	✓	1
E148	Fan Blade – 18"	✓	✓	1
E153-20	Fan Guard for 18" Blade	✓	✓	1
<b>Plumbing</b>				
P122-S	1 HP Stainless Steel Water Pump	✓	✓	1
P145-2S	Seal & "O" Ring Kit for Water Pump	✓	✓	1
P149-WSGA	Water Sight Glass Assembly	✓	✓	1
P151-WSG	Water Sight Glass Only	✓	✓	1

## **Schreiber Limited Warranty**

Schreiber warrants the product described herein against defective material or workmanship for one year from the date of purchase.

If any part is found to be defective within the warranty period, Schreiber, or its authorized service agent, will replace, or at Schreiber's options, repair the part free of charge for materials and labor.

This warranty does not cover damage caused by misuse, accident, abuse, incorrect installation or operation. In addition, it does not cover damage occurring during transit, or damage caused by or resulting from repair or modifications carried out by anyone other than Schreiber or its Authorized Service Agent.

(562) 926-3855