

## Instruction Manual

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### 1. Introduction

Your **PORTABLE CHILLING SYSTEM** has been carefully assembled and engineered to give trouble free service with a minimum of maintenance.

Your unit is self-protecting by a series of safety controls integrated in the control system. These have been timely set to obtain both adequate protection and optimum efficiency from your unit.

Water temperature is controlled by adjusting the thermostat. Since this is sensing from the chiller vessel inlets it should be set approximately **10° F. above desired leaving water temperature**. However, **ON NO ACCOUNT** must the leaving water temperature be **LOWER THAN 45° F.** unless a glycol solution is used and adjustments are made to the controls by a qualified refrigeration serviceman.

Other than the thermostat, adjustment of controls and valves by unqualified personnel is done at a very severe risk of permanent damage to the unit loss of efficiency and **BROKEN WARRANTY AGREEMENT**.

Before you start to install your unit, we urge you to carefully read through and digest this literature to familiarize yourself with its contents.

**TO PREVENT PERSONAL INJURY AND/OR DAMAGE TO THE EQUIPMENT, THIS MANUAL SHOULD BE USED FOR REFERENCE ONLY. ANY SERVICE SHOULD BE PERFORMED BY LICENSED SERVICE PERSONNEL QUALIFIED IN THEIR RESPECTIVE FIELDS.**

### 2. Un-Crating and Checking Unit For Damage

2.10 Remove packaging material and examine unit for shipping damages. The CONSIGNEE is responsible for making claims to the transportation agent and any damage should be reported immediately.

2.20 When moving the units it can be rolled into Position. However, if it is necessary to lift the unit, this should be done by the bottom frame only. If you must use lifting cables or chains, be careful not to damage components controls or pipes.

### 3. Locating Your Unit

3.1.0 It is recommended that the unit be as close as possible to the process machinery.

3.2.0 The unit must be located inside a building that is heated during the winter months (minimum room temperature 50° F.).

3.3.0 Unit should be located on a flat level floor.

3.4.0 Since the unit is portable, clearance for service is not critical as the unit can be rolled away from obstructions for access to panels.

3.5.0 During operation, the air cooled unit must have adequate clearance around the condenser inlet for air movement and condenser outlet for hot air discharge.

### 4. Installation

4.1.0 You have now determined the desired location of the unit. The chiller comes with casters and can be rolled into position. If it is necessary to lift the unit this should be done by the bottom frame only. If you must use lifting cables or chains, be careful not to damage components, controls or pipes.

4.2.0 Check to ensure that power supply agrees with nameplate. Supply voltage must be within plus or minus 10 percent.

4.3.0 Power should be supplied through a fused disconnect.

4.4.0 Check power source for voltage unbalance.

## 5. Fill Tank

5.1.0 DO NOT connect city water supply line directly to reservoir, it has not been designed to withstand pressure. Reservoir is vented to atmosphere, do not change or obstruct vent line during installation. On systems with process piping above reservoir, a stand pipe should be installed on vent line and fill line to a level above the highest point in the system.

5.2.0 A plastic liquid level gauge has been installed on the tank to view water level.

## 6. Process Connections

6.1.0 ALL units are equipped with two chilled water connections.

(A) Water to process (from evaporator coils)

(B) Water from process ( to reservoir)

It is important that all external connections be full size to minimize pressure losses.

6.2.0 If the unit is not supplied with shut-off valves, these should be supplied by the customer.

6.3.0 To operate efficiently, the chiller vessel must be kept clean. It is strongly recommended that water treatment additives be included in the chilled water system. Failure through a plugged or contaminated chiller vessel is not covered by our warranty.

### **6.4.0. Condenser piping (water cooled units)**

The condenser is supplied with one water-in connection and one water-out connection. Piping into the condenser must be minimum connection size and pressure at the condenser a minimum of 40 PSIG

Piping from condenser must be minimum connection size up to 100 ft. run. If run exceeds 100 ft. contact 1st Choice Portable Chillers or your local representative.

If main water lines to and from the condenser are used to feed other equipment it is advisable to install shut-off valves at both water in and out lines, adjacent to the condenser, so the condenser can be isolated for service purposes if required without cutting off water supply to other equipment.

6.4.2 To operate efficiently the condenser must be kept clean. It is strongly recommended that water treatment additives to control calcium and magnesium scale, algae and fungi, together with regulated bleed-off, be included in the condenser water system. The additives should also contain chemical corrosion inhibitors. Unit failure through plugged or contaminated condensers is not covered our warranty.

## 7. Pre-Start-Up

7.1.0 **DO NOT** switch unit on. Make a complete visual check of unit for possible damage sustained during installation.

7.2.0 **WITH POWER OFF** Check all terminal screws in control panel, making sure they are tight.

**7.3.0 Fill reservoir through fill pipe. Replace fill cap after filling (use our fill cap, it has a vent hole to protect the tank from expansion and contraction).**

7.4.0 A minimum of eight (8) hours before start-up and with chiller switch in "off" position, turn on the supply disconnect. This allows the compressor crankcase heater to evaporate the refrigerant in the crankcase oil.

7.5.0 A process heat load must be available to the chiller for start-up.

## 8. Start-Up Sequence ACP Series Chillers

8.1.0 Mains power (3 phase to unit) must be on twenty-four (24) hours before the chiller has to run. The chiller on/off switch is to be left in the off position. This allows the compressor crankcase heater to boil off any liquid refrigerant in the oil preventing damage to the compressor.

8.2.0 Filling the tank: **DO NOT CONNECT CITY WATER LINE or HOSE DIRECTLY TO THE TANK.** Our tank is vented to the atmosphere and is not designed to withstand any water pressure. Pressurizing the tank is dangerous and will damage tank.

8.2.1 Fill the tank with a hose until the water level can be seen in the clear plastic fill tube. Shut off the water supply and start the pump (**see item 3 for correct pump rotation**). As the water is circulated and fills the process equipment the water level

- will fall. Keep topping up the tank until the water level is constant.
- 8.2.2 It is also recommended that a water/glycol mix be used even if you are operating the chiller at 50° F. (10° C). At 50° F. leaving water temperature a 30% solution should be used.
  - 8.3.3 This will protect the chiller vessel in event the unit is operated below 32° F. and will also prevent scaling in water channels and steel pipes.
  - 8.3.0 Check rotation of the chiller pump, there is an arrow on the pump for correct rotation. **This must be set correctly.**
  - 8.4.0 Set temperature on controller to process temperature desired. **NOT BELOW 45° F. WITHOUT A WATER/GLYCOL SOLUTION.**
  - 8.5.0 To operate with a water/glycol solution see the chart in service manual for the proper mixture at a desired process temperature. Glycol percentage is determined by subtracting 15° F. (8.3° C.) from the desired operating temperature.

IE:	<b>CHILLER OPERATING TEMPS</b>	<b>MINIMUM % ETHYLENE GLYCOL</b>
	40° F	30%
	35° F	30%
	30° F	30%
	25° F	30%

- 8.6.0 **DO NOT RESTRICT THE CHILLED WATER FLOW**, if the chiller connection is 1" and your process is 1/2" a by-pass line must be installed. The by-pass should be sized to ensure that the combined size of the process pipe and by-pass add up to the same diameter as the chiller line out.
- 8.6.1 The by-pass should be connected from the process line out back to the return line to the tank, and a valve should be installed to properly adjust the by-pass flow.
- 8.6.2 If the by-pass is not installed the flow of water through the chiller vessel is reduced and can freeze causing sever damage to the chiller vessel and voiding warranty.
- 8.6.3 If you are installing a line out to the plant and connecting to multiple machines it is recommended that the bypass be installed at the furthest point from the chiller.
- 8.7.0 Check the level of the fluid in the holding tank after chiller has been operating a few minutes, the level will fall due to filling of the process equipment, lines and as air is vented through the tank fill. Top up as needed.

**Adjusting Temperature Controller Set Points**

The setting of the temperature controller is important and they will use this part most often for changing the operating temperature.

- 8.8.0 Recommended settings switches and differentials for **Ranco** two (2) switch temperature controller used on single compressor chiller units. Models ACP-3, 5, 7.5, 10 and 15.

Cut in compressor 1 (set point & switch 1)	-50° F
Differential (switch 1)	-5° F
Hot-gas compressor 1 (switch 2)	-55° F
Differential (switch 2)	-2° F

- 8.9.0 Recommended settings switches and differentials for Honeywell four (4) switch temperature controller used on dual compressor chiller units. Models **ACP-10D, 15D, 20D, 25D and 30D.**

Cut in compressor 1 (set point & switch 1)	-53° F
Differential (switch 1)	-2° F
Hot-gas compressor 1 (switch 2)	-55° F
Differential (switch 2)	-1° F
Cut in compressor 2 (switch 3)	-56° F
Differential (switch 3)	-2° F
Hot-gas compressor 2 (switch 4)	-58° F
Differential (switch 4)	-1° F

- 8.9.1 When set point is adjusted (moving switch 1 only) all other switch settings and differentials follow the new set point without adjusting them.

**9. Trouble Shooting Chart**

**NOTE:** All repairs to the unit should be done by qualified service personnel. (i.e., for refrigeration, a licensed refrigeration mechanic, for electrical, a licensed electrician etc.) For mechanical repairs please call our main company telephone number which is monitored 24 hours, seven days a week.

Safety controls are set for water Operation (45° F. L.W.T.). For lower operating temperatures glycol must be used and controls must be reset by qualified personnel.

- 9.1.0 Symptom: Unit Will Not Start
- 9.2.0 Symptom: Compressor Hums But Does Not Start
- 9.3.0 Symptom: Shuts Off On High Pressure Indoor Air Cooled

- 9.3.6 Symptom: Shuts Off On High Pressure Remote Outdoor Air Cooled
- 9.3.11 Symptom: Shuts Off On High Pressure Water Cooled
- 9.4.0 Symptom: Shuts Off On Low Pressure Air and Water Cooled:
- 9.5.0 Symptom: Compressor Shuts Off On Internal Protector
- 9.6.0 Symptom: Shuts Off On Freeze Thermostat
- 9.7.0 Symptom: Low Or No Water Flow
- 9.8.0 Symptom: Cooling Capacity Inadequate

## 10. Operating Lights

- POWER ON: This light must be on for the chiller to operate. Indicates main three phase power disconnect is "on" and that you have 24 VAC control voltage.
- FLOW: This light must be on for the chiller to operated. Indicates the flow switch is closed and you have water flow.
- COMP. 1 RUN: Indicates when compressor # 1 is operating.
- HOT GAS: Indicates when the hot gas capacity control valve is operating reducing capacity on # 1 circuit.
- FREEZESTAT: Indicates when the freezestat has tripped due to unsafe low water temperature leaving # 1 chiller vessel.
- COMP. 2 RUN: Indicates when compressor # 2 is operating.
- HOT GAS: Indicates when the hot gas capacity control valve is operating reducing capacity on circuit # 2.
- FREEZESTAT: Indicates when the freezestat has tripped due to unsafe low water temperature leaving # 2 chiller vessel.

## 11. Operation Instructions

- 11.1.0 The fused disconnect to your unit should be on a minimum of eight (8) hours before unit is started; this is to allow the crankcase heater to evaporate any refrigerant in the oil. It is advisable to leave the disconnect on at all times except for extended shut-downs.
- 11.2.0 On a water cooled unit, cooling tower pump(s) must be turned on.
- 11.3.0 Set thermostat to desired temperature. This must not be set lower than 50° F. unless sufficient glycol has been added to prevent freezing. (See 8.4.0 for mixture). Thermostat senses return water, the leaving water is 10° F lower.
- 11.4.0 Turn chiller switch to "ON".
- 11.5.0 Allow unit to run for ten minutes and check the refrigerant sight glass. Sight glass should be clear and center button green. If there are bubbles in the liquid line sight glass, allow the unit to run but call a qualified refrigeration serviceman in as soon as possible. If the button in the sight glass is bright yellow shut unit down immediately and call in a qualified serviceman. This procedure must be done when the unit is started up or a minimum of once a month.
- 11.6.0 Check crankcase oil by observing oil compressor. Oil should be halfway up the sight glass do not consider foam on the top of oil. This procedure must be done when the unit is started up or a minimum of once a month
- 11.7.0 Observe the unit for short cycling compressor starting up and stopping frequently. Unit must not be allowed to run for a extended period on short cycle conditions. Call 1st Choice Portable Chillers for control adjustments.
- 11.8.0 Observe unit for abnormal vibrations and abnormal noises from the compressor and piping.
- 11.9.0 Check and clean condenser inlet air filters. This should be done as required depending on plant air conditions. DO NOT run the unit without a filter as a plugged condenser is not covered under our warranty agreement.  
When shutting down unit, turn chiller switch to "OFF". Leave disconnect ON except for long periods of shut down time.
- 11.11.0 Controls and valves must not be tampered with, it is only necessary to adjust the thermostat as required.
- 11.12.0 Failure through plugged contaminated or corroded chiller vessel is not covered by warranty.

## 12. Maintenance

- 12.1.0 The pumps and machine connections should be checked regularly for leaks.
- 12.2.0 Check glycol solution concentration regularly.
- 12.3.0 Pump motors should be checked regularly for plugged air inlets, leading to overheating.
- 12.4.0 Pump and fan bearings should be checked for noise and lubrication. Lubricate bearing only as often as manufacturer specifies.
- 12.5.0 Chiller and tower tank water should be clean. Tank may have to be drained periodically to replace system water and clean debris from tank. Dirty water can cause excessive plugging of heat exchangers and pump seal wear.

## 13. Recommended For Multi-Machine Connections

Diagram

## 14. Component Descriptions

**WARRANTY:** 1st CHOICE PORTABLE CHILLERS offers the **most comprehensive warranty** in the industry! We warrant our equipment to be free from defects in material and workmanship under normal use starting from date of shipment as follows:

**SUPPORT:** 3 YEAR compressor replacement warranty.  
2 YEAR parts warranty on the balance of the unit.  
Start-up assistance and ongoing technical support is just a phone call away using our toll free number: 877 - 513 - 8310

**CAPACITY:** Hot gas by-pass reduces capacity to 50% on single compressor units and compressor cycling and hot-gas  
**CONTROL** reduces capacity to 25% on dual compressor units.  
**FREEZE** We use both a water flow switch and a freeze thermostat in the evaporator out line.  
**PROTECTION:**

**CONDENSER:** Air cooled: Copper tube with aluminum fins, rated for 400 psi. Water cooled: stainless steel brazed plate, coaxial tube-in-tube or shell and tube.  
Non-rusting galvanized steel and plastic.

**WATER**

**FITTINGS:**

**REFRIGERATION:** We use Alco or Sporlan for thermal expansion valve, liquid line and hot gas solenoids, liquid line sight glass and filter dryer.