

CONAIR

FRANKLIN

Part of The Conair Group
CS-3A, CS-5A
Coldstream Chiller
With Standard Control
Instruction Manual

NOTE

WHEN CONTACTING THE FACTORY ABOUT YOUR COLDSTREAM CHILLER,
PLEASE GIVE THE FOLLOWING INFORMATION:

1. MODEL NUMBER
2. SERIAL NUMBER
3. DATE OF MANUFACTURE

CAUTION

BEFORE TURNING UNIT ON . . .

1. MAKE SURE CHILLER IS CONNECTED TO FUSED DISCONNECT AT PROPER VOLTAGE AND IS EARTH GROUNDED IN ACCORDANCE WITH NEC AND APPLICABLE LOCAL CODES.
2. MAKE ALL ELECTRICAL CONNECTIONS IN ACCORDANCE WITH THE NEC AND APPLICABLE LOCAL CODES.
3. MAKE SURE WATER CONNECTIONS ARE MADE USING HOSES WITH ADEQUATE PRESSURE RATING FOR 150 PSI.
4. MAKE SURE ALL MANUAL VALVES IN SYSTEM ARE OPEN.
5. DO NOT TAMPER WITH THE ADJUSTMENTS OF THE SAFETY DEVICES.
6. KEEP ALL COVERS ON AT ALL TIMES TO AVOID THE RISK OF ELECTRICAL SHOCK AND COMING IN CONTACT WITH HOT PARTS.
7. ONLY A QUALIFIED ELECTRICIAN SHOULD SERVICE THE ELECTRICAL COMPONENTS.
8. ONLY A QUALIFIED REFRIGERATION TECHNICIAN SHOULD SERVICE THE REFRIGERATION EQUIPMENT.
9. CONSULT OPERATING MANUAL FOR DETAILED INSTRUCTIONS.

SPECIFICATIONS:

Model Type:	CS-3A	CS-5A
Cooling Capacity @50°F. Chilled Water	3.25 Tons	4.74 Tons
Pump Capacity (Standard): (Hi-Pressure):	20GPM @ 40PSI 12.0GPM @ 75PSI	20GPM @ 40PSI 15.4GPM @ 75PSI
Maximum Pump Pressure (Standard): (Hi-Pressure):	45 PSI 75 PSI	45 PSI 75 PSI
Pump Motor:	1 HP (Standard) 1-1/2, 2, 3 HP (Opt) 1-1/2 HP Hi-Pressure (Optional)	1 HP (Standard) 1-1/2, 2, 3 HP (Opt) 3 HP Hi-Pressure (Optional)
Compressor Nominal Rating:	3.5 HP	5.0 HP
Reservoir Tank Capacity:	5 Gallons	5 Gallons
Fan Rating:	3800 CFM @ 0.3"WG S.P.	4700 CFM @ 0.7"WG S.P.
Fan Motor:	3/4 HP	1-1/2 HP
Minimum Operating Temperature: (Water only)	40°F.	40°F.
Minimum Operating Temperature: (Water/glycol mixture)	20°F.	20°F.
Refrigerant Type and Charge:	R22 11 lbs.	R22 13 lbs.
Voltage:	208-230/3/60 or 460/3/60	208-230/3/60 or 460/3/60
Connections:		
To Process:	1" NPT	1" NPT
From Process:	1" NPT	1" NPT
Water Makeup (Optional)	1/2" NPT	1/2" NPT
Temperature Controller:	Microcomputer (PC Board Assembly)	Microcomputer (PC Board Assembly)
Dimensions:		
Length:	49-1/4" (1250 mm)	49-1/4" (1250 mm)
Width:	24-3/4" (630 mm)	24-3/4" (630 mm)
Height:	72" (1830 mm)	72" (1830 mm)
Weight:	680 lbs.	750 lbs.

PUMP	CS - 3A				CS - 5A			
	208V	230V	460V	575V	208V	230V	460V	575V
1 HP	22.4	21.7	10.9	8.8	31.1	30.2	14.0	11.4
1-1/2 HP	24.1	23.3	11.7	9.5	32.8	31.8	14.8	12.1
2 HP	25.9	24.9	12.5	10.1	34.6	33.4	15.6	12.7
3 HP	29.0	27.7	13.9	11.3	37.7	36.2	17.0	13.9

DESCRIPTION

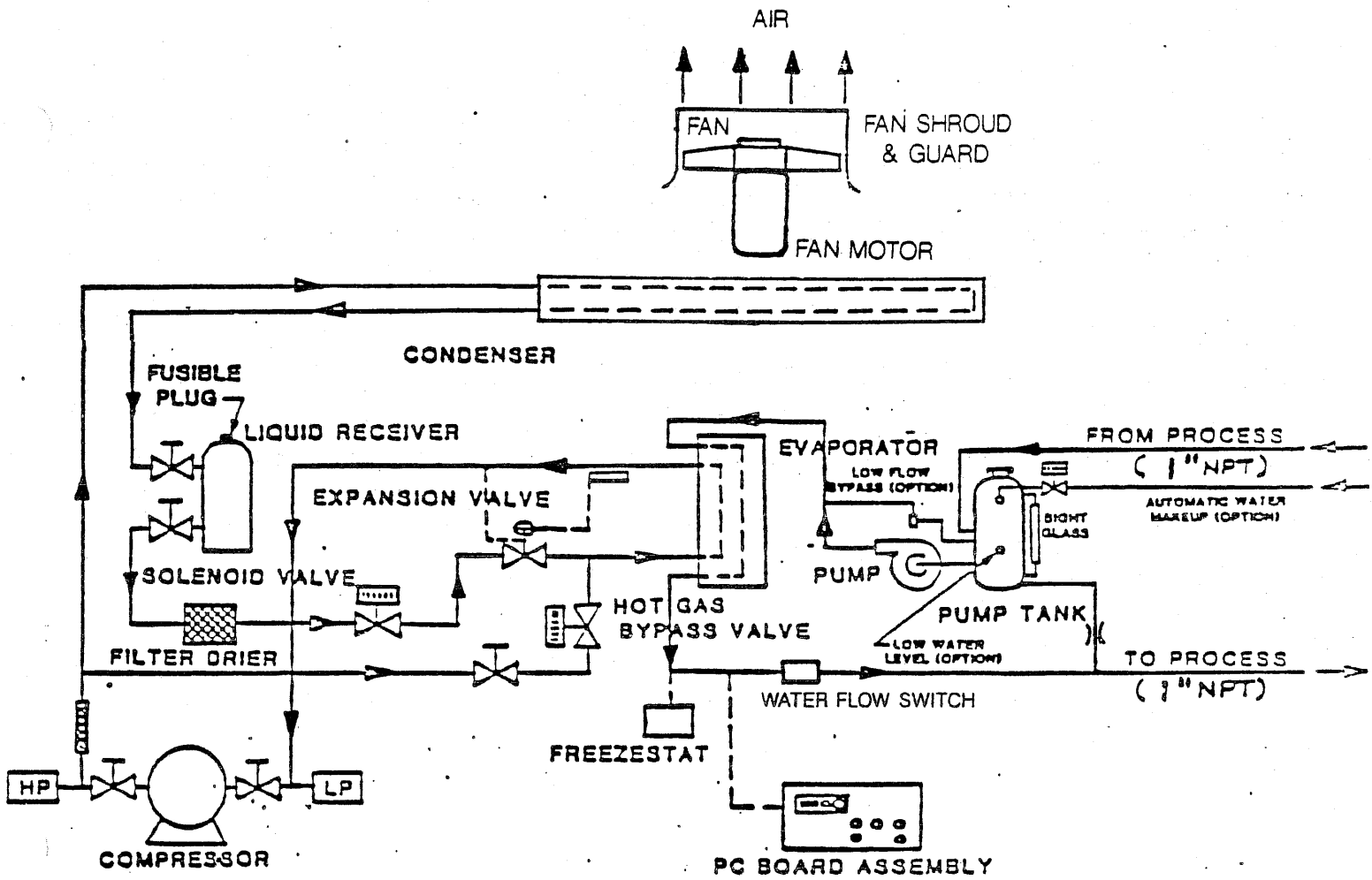
- 1.1 The chiller is a completely self-contained unit designed to provide chilled water at a constant temperature under varying load conditions.
- 1.2 The various components that the unit is built up from are all matched for size relative to each other and form two independent but related systems, i.e. refrigeration and water circuit.
(See Figure 1)
- 1.3 The water system is fitted with a pump that is matched to the cooling capacity of the unit to give a maximum temperature rise across the process of approximately 8-10 degrees F. under design flow conditions.
- 1.4 An expansion and make-up tank is incorporated in the circuit for making up the losses of fluid due to leakage etc. and to allow for volumetric changes that take place due to changes in temperature. The tank is specifically useful when an antifreeze solution is being used for low temperature applications when, the fluid added to make up for losses can be pre-mixed to the correct strength solution. The tank is fitted with a sight glass and filler cap which provides pressure relief and vacuum break.
- 1.5 An electrical interlock is fitted to the water pump to insure water flow through the evaporator before the refrigeration system can be operated.
- 1.6 A small by-pass connection is fitted in the water circuit between the outlet and return connections of the chiller. This gives flow through the system during "closed valve" conditions external to the chiller and allows the refrigeration system to be balanced accordingly.
- 1.7 The cooling effect is created by circulating refrigerant around a sealed refrigeration system where heat is extracted from the chilled system and transferred into the ambient air by means of the condenser.
- 1.8 The recirculation is created by a compressor which pumps the gas that has extracted heat from the water into a condenser where the gas is cooled by air or water which condenses it into a liquid state. The condensation occurs because the gas is at high pressure as created by the compressor.
- 1.9 The liquid refrigeration passes from the condenser to a liquid receiver, through a filter/drier which will remove any dirt or water that may be present, through a moisture indicator which provides a sight glass to view the refrigerant, and then on to the expansion valve via an isolating solenoid valve which closes the system when the compressor is switched off.

.10 The expansion valve is a temperature controlled modulating valve which senses the temperature of the refrigerant as it leaves the evaporator and opens or closes relevant to this temperature to maintain it at a constant value. This temperature is determined by the water temperature and the efficiency point at which the evaporator is operating relevant to the water flow rate.

1.11 As the high pressure refrigerant is metered through the expansion valve into the evaporator, it is exposed to low pressure conditions which allow it to vaporize. The process of vaporization causes the refrigerant gas to absorb large quantities of heat energy from the surroundings.

Efficient heat exchange within the evaporator is insured by insulating the outside and by maintaining a fast and turbulent water flow through the inside.

1.12 The refrigerant then enters the compressor in a dry gas state and is pumped back to the condenser at a high pressure and a high temperature.



CHILLER REFRIGERATION AND WATER PIPING SCHEMATIC
 . FIGURE 1

- 1.14 The expansion valve cannot automatically cover the complete range of temperatures and varying load conditions that exist under normal operating load conditions and a secondary control system is employed to cater for these variables. This system consists of the operation of a hot gas solenoid valve and the switching off of the compressor.
- 1.15 When the temperature of the water leaving the chiller is above the set point, the unit will operate under 100% cooling capacity conditions. When the temperature falls to the set point a solenoid valve will open to allow hot gas to pass from the compressor directly into the evaporator, by passing the condenser. This will have the effect of reducing the cooling capacity of the chiller by approximately 50%.
- 1.16 If the load on the chiller is below this condition the temperature of the water will continue to fall until it reaches a second preset set point, when the compressor will be switched off.
- The water will continue to circulate and absorb heat but the compressor will remain off until the temperature of the water rises above the indicated set point again. The compressor will then switch on and the above cycle will repeat itself to maintain the water temperature at that required.
- 1.17 Thus for all operating conditions between 0 and 100% of the cooling capacity of the chiller, the delivery water temperature can be automatically controlled at any value selected on the temperature control instrument.

1.18 There are several safety devices fitted to the chiller and their functions are as follows:

1.18.1 High Pressure Switch

This is a safety interlock to check the operation and efficiency of the condenser. It will stop the unit and give an alarm signal if the condenser becomes dirty or if the cooling flow (air or water) becomes restricted.

1.18.2 Low Pressure Switch

This is a safety interlock which will switch off the chiller in the event of a loss of gas, blocked filter or frozen evaporator.

1.18.3 Refrigerant Pressure Relief Device

A fusible plug is fitted to the liquid receiver as an ultimate safety against overpressure conditions being created within the refrigerant circuit.

1.18.4 Freezestat

This thermostat is fitted into the water circuit at the outlet of the evaporator and will switch off the compressor should the water temperature fall below 40°F. when using water only. If an antifreeze solution is being used, this thermostat can be adjusted down to a minimum of 20°F. See the curve for freezing conditions relative to antifreeze percentage for correct setting relative to mixture.

1.18.5 Compressor Thermostat

This device senses the temperature of the motor windings and will switch off the compressor if for any reason the windings become overheated.

1.18.6 Motor Overload

All motors in the unit are protected by current sensing overloads and will switch off that motor and other related parts of the unit, if an overload condition occurs.

18.7 Water Flow Switch

This switch is fitted to the outlet of the evaporator to sense that water is flowing through the evaporator and that the pump is not air locked. Without this switch in its operated condition, the compressor cannot be switched on.

3. Unpacking

- 3.1 Examine the packing for any signs of damage, ingress of water, etc.
- 3.2 Remove unit from packing and further inspect for any transit damage.
- 3.3 Report any defect immediately to the carrier and to Conair in writing.

4. INSTALLATION

4.1 Locate the unit as near as practical to the process insuring that there is a 3 foot clearance on all sides for servicing requirements and for adequate air flow to the air-cooled condenser.

4.2 The unit must be protected from rainfall and direct sunlight if located outside. It will operate satisfactorily in ambient temperature conditions to a maximum of approximately 120°F.

NOTE: If the unit is to be used in low ambient temperature conditions, precautions must be taken to prevent freezing within the unit during periods when the unit is switched off.

4.3 Exhaust air from the air-cooled condenser may be ducted into the factory or storage areas to make use of the heat rejected. Any ductwork should have an area of not less than the area of the fan outlet (preferably increased by 50% to 100%), not to have any sharp bends or restrictions to air flow and generally not to be more than 30 foot long.

4.4 Connect the control box to a fused disconnect with sufficient capacity to handle the maximum amps stamped on the nameplate. Use fuses of a size as specified in the NEC and applicable local codes. Ground the chiller to an earth ground in accordance with the NEC and applicable local codes.

4.5 Fit isolating valves to the process connections and connect water lines.

NOTE: For maximum efficiency, the inter-connecting pipes should not be less than the pipe sizes as on the chiller and should preferably be insulated.

4.6 Use hoses with pressure ratings adequate for operation at 150 psi.

4.7 Fill the expansion tank to the top of the sight glass with water or water/glycol mixture as required.

NOTE: On units fitted with automatic water make-up connect and turn on water supply to the machine. The tank will automatically fill up to the correct level.

4.8 Briefly switch on the pump and check its rotation against the arrow of its casing. If incorrect, change over two of the phases of the main supply; not individual motor connections as all motors have previously been checked relative to each other.

4.9 The unit should now be left with the main isolator on for 24 hours to allow the crankcase heater to vaporize any refrigerant that may have migrated into the compressor.

NOTE: This is only necessary if the chiller has not been run for 12 hours or more.

- 4.9 The power supply should be left on at all times except when carrying out electrical maintenance to enable the unit to be ready for immediate operation.
- 4.10 Run the pump to circulate water through the process and its interconnecting pipework, ensuring that the water level in the tank remains within the sight glass.

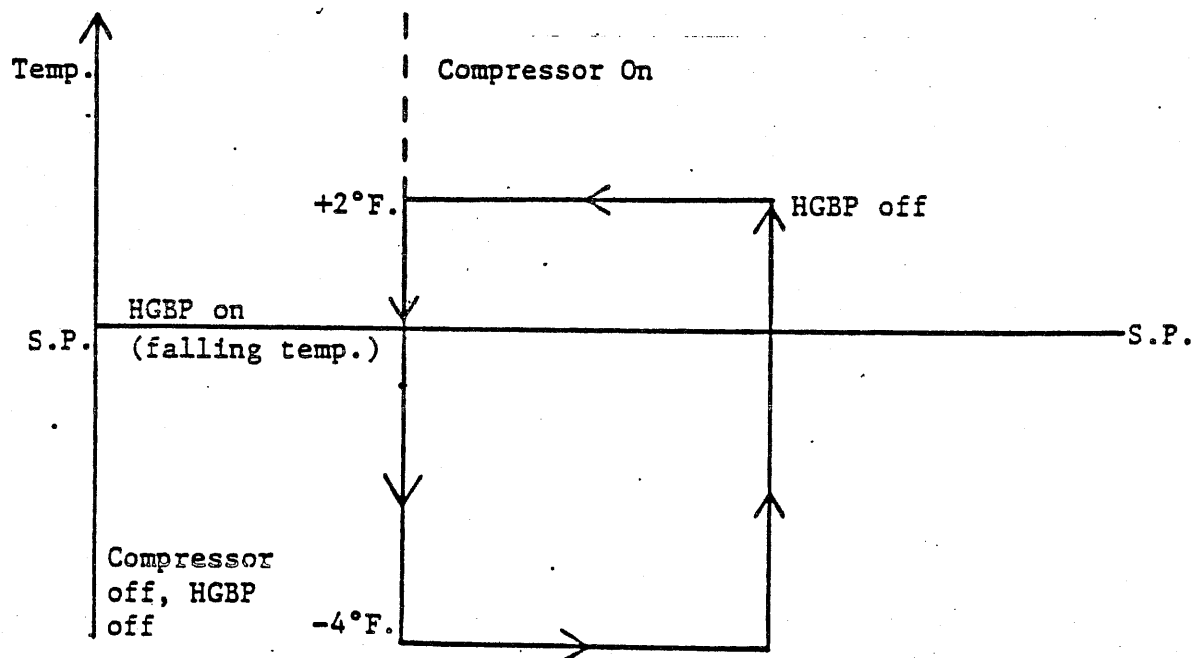
5. Operation

- 5.1 Operation of the chiller is simply a matter of selecting the required temperature of the water or water/glycol mixture best suited to the application.
- 5.2 Switch on the fused disconnect and the "power on" light will come on.
- 5.3 Depress the "Push to Read" button and turn the setpoint to the desired operating temperature.
- 5.4 Release the "Push to Read" button and a continuous digital read-out of the "to process" temperature is displayed.
- 5.5 Press the "Pump Start" button. The button will light and the pump will start. Ensure that there is correct circulation through the process.
- 5.6 Press the "Compressor On" button. This will start the refrigeration system.
- 5.7 The unit is now ready for operation and will now recirculate water at the temperature required - See Temperature Control Method.
- 5.8 Should a change in the water temperature be required, all that is necessary is to change the setpoint temperature.
- 5.9 When switching the unit off, first switch off the compressor and allow the water to continue flowing for 2 minutes, then switch off the unit.

NOTE: Leave the power supply main "On".

6. Chiller Temperature Control Method

Typically, the water temperature at startup is above the setpoint. If so, the compressor is energized immediately to begin the cooling process. The result should be a water temperature approaching setpoint. In order to slow the cooling trend, a hot, gas bypass valve is energized when the temperature of the water is equal to the setpoint. This should serve to add some heat to the water. If the temperature rises two degrees above setpoint, the hot gas bypass is de-energized allowing cooling to take place once more. This should be the expected control profile; however if the hot gas bypass usage fails to turn around the cooling trend, both the compressor and the hot gas bypass are de-energized when the water reaches four degrees below setpoint. The mechanical specification of the compressor requires that it remain off a reasonable amount of time after being de-energized. This is accomplished through a software two minute time delay. The below logic is reflected in software release referred to as "Chiller D". Setpoint range is 20°F. to 60°F.



7. Maintenance

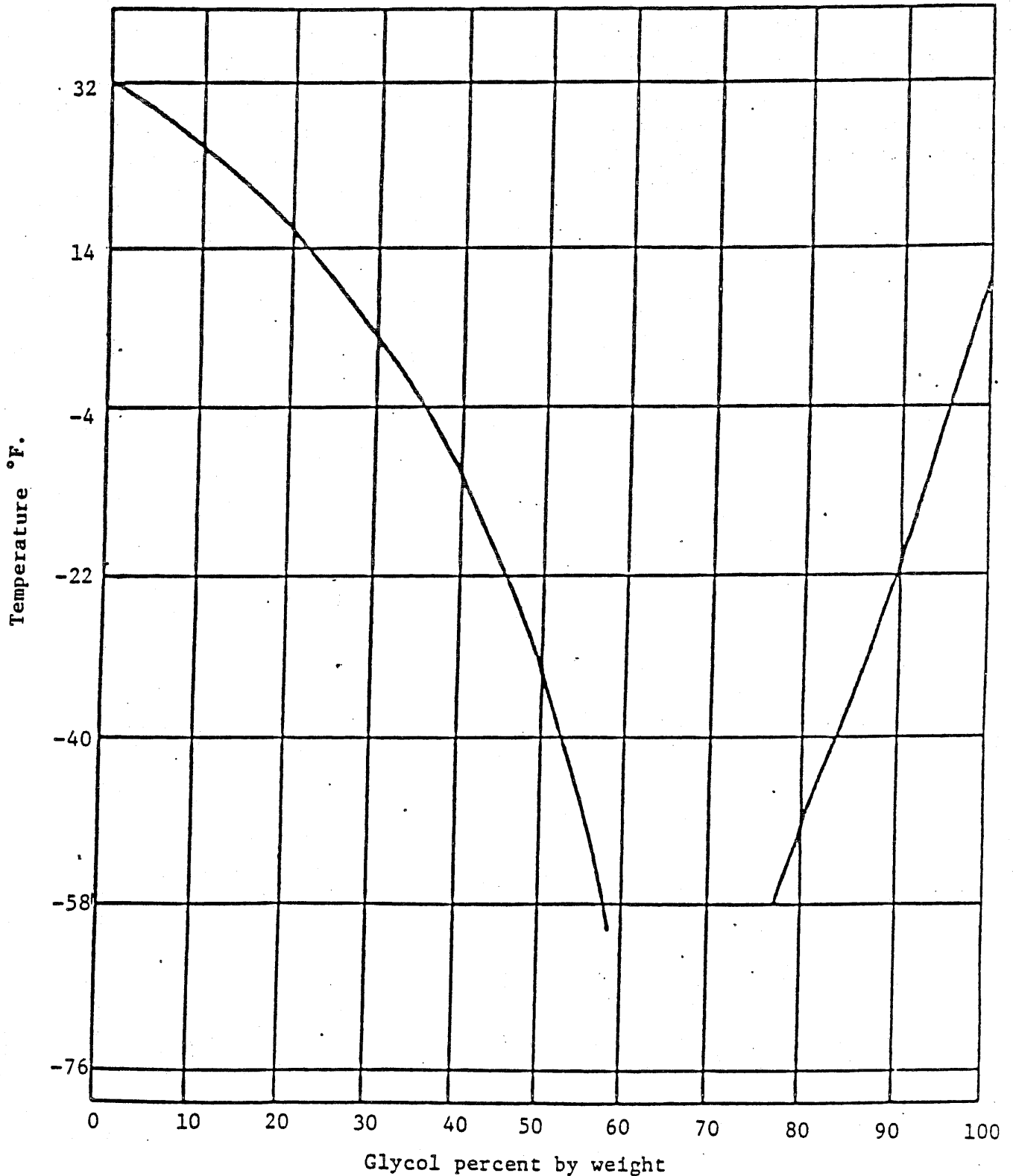
- 7.1 Routine maintenance on this unit is basically ensuring that the unit is kept clean, dry and filled with water or water/glycol.
- 7.2 Periodically isolate the electrical supply, remove covers and blow any dust off all components including those in the electrical cabinet using a dry compressed air line.
- 7.3 It is advised to have the unit checked over annually by a qualified refrigeration engineer to ensure correct operation of the refrigeration system.
- 7.4 On air cooled units, once a week brush any fluff and dirt from the exposed air condenser face and blow through the air condenser over its total surface with a compressed air line.

FREEZING POINTS OF ETHYLENE GLYCOL SOLUTIONS

Note: - Antifreeze must be used for operation below 40°F.

- For operation at 20°F., solution should be minimum 25%.

- Strength of anti-freeze should be selected at 10°F. lower than minimum operating temperature.



8. TROUBLESHOOTING

8.1 General

8.1.1 This section is intended to simplify the tracing of faults within the unit.

8.1.2 Error Messages - There are five error messages which flash on and off on the digital display alternating with the temperature reading:

a. ERR 1 - The Mold-Cool PC Board has a control range of 20 degrees F. to 60 degrees F. If the setpoint is set for a temperature outside of this range, ERR 1 will be displayed. The error message will disappear as soon as the setpoint is readjusted back within the control range.

b. ERR 2 - If the actual temperature rises 5 degrees F. above setpoint after having reached setpoint, ERR 2 will be displayed. The error message will disappear and the actual temperature will again be displayed when the temperature is brought down to within 10 degrees F. of setpoint. ERR 2 will not be displayed on start-up.

c. ERR 3 - If the actual temperature drops 5 degrees F. below setpoint after having reached setpoint, ERR 3 will be displayed. The error message will again be displayed when the temperature rises to within 10 degrees F. of setpoint. ERR 3 will not be displayed on start-up.

d. ERR 4 - If the temperature sensor (thermister probe) is faulty, ERR 4 will be displayed. The thermister probe will have to be replaced before the Coldstream Chiller can be placed back in operation.

e. Four Dots - If four dots appear at the top of the display, it means the microcomputer has detected a fault on the PC Board. Under these conditions, the Coldstream Chiller may or may not continue to operate. If the Coldstream Chiller continues to run, replace the PC Board as soon as possible. If the Coldstream Chiller shuts down, the PC Board has to be replaced before it can be placed back in operation.

8.1.3 The Coldstream Chiller has the following built-in alarms and troubleshooting aids:

Fault Light - This is a neon light located immediately below the POWER ON/OFF light. The FAULT light indicates an alarm condition and it will light under any one of the following conditions:

a. Evaporator Freezeup - Indicates possible freezing conditions in the evaporator.

b. Low Water Flow - Insufficient water flow through the evaporator.

c. High Refrigerant Pressure - Excessive refrigerant pressure in the condenser.

d. Low Refrigerant Pressure - Insufficient refrigerant pressure into the compressor.

e. Pump or Fan Motor Overload - Excessive current draw by pump or fan motor.

f. Low Water Level - Insufficient water level in the reservoir tank.

8.1.4 To trace the fault refer to the following to identify the principal symptoms and trace through the secondary and following symptoms until the problem can be rectified.

8.2 No Circulation

8.2.1 Pump Running

Check water level in tank - if low, add water as required or check water supply if automatic water makeup option is fitted. Check ball valve.

- if correct, suspect blockage in system or in air bleed pipes causing air lock in pump.
- a blockage in the system could be caused by the formation of ice in the evaporator if the temperature is set too low or if there is insufficient antifreeze in the water.
- alternatively, there could be foreign matter blocking the inlet to the evaporator.

8.2.2 Pump Stopped

- Mechanical fault, i.e. pump seized or impeller loose in pump.
- Electrical fault - motor overload tripped.
- Water level low on unit fitted with water low alarm option.

8.3 Refrigeration Not Effective

8.3.1 Compressor will not start

- Insufficient water flow/pressure.
- Water temperature below setpoint.
- Fault condition - check high and low pressure refrigeration switches. Press switch reset buttons.
- Fan not running - check overload.

- Compressor overload tripped, reset and check current on each phase.
 - Defective computer board
- 8.3.2 Chiller not cooling water sufficiently.
- Chiller overloaded - check heat relative to chiller capacity.
 - Hot gas by-pass valve permanently open, if mechanically stuck open, call refrigeration engineer.
 - Condenser requires cleaning.
 - Loss of refrigerant.
 - Fan fault - loose fan or faulty motor.
- 8.4 Pressure Switch Tripped
- 8.4.1 High pressure switch tripped
- Condenser dirty, require cleaning.
 - Fan fault - loose fan or faulty motor.
 - High ambient temperature.
- 8.4.2 Low pressure switch tripped
- Loss of refrigerant, leak in the system, a refrigeration engineer will have to locate repair and recharge machine.
 - Blocked filter/drier.
9. Options
- 9.1 Water low
- 9.1.1 This system employs a float switch mounted in the expansion/make-up tank which operates a relay as an interlock.
- This insures that there is sufficient water or water/antifreeze mixture in the tank before the unit can be started. It allows sufficient volume to be pumped out of the tank for normal circumstances without switching the unit off.
- 9.1.2 If the fluid level falls below the float switch, the pump will switch off and an audible horn will sound to indicate that more fluid requires to be added into the tank to bring the level above the float switch again.
- 9.2 Automatic Water Make-Up
- 9.2.1 Machines fitted with this option have water supply connected to them at the back of the unit which supplies water through a ball valve fitted into the expansion/make-up tank.
- 9.2.2 The expansion/make-up tank is also fitted with a float switch. It performs the same functions as described in Section 9.1.1

and 9.1.2.

9.3 Audible Horn

9.3.1 This option gives an audible alarm when any fault condition occurs within the unit. This incorporates any refrigerant fault, motor overload or water level low condition. The audible horn can be silenced from the control panel until the fault is rectified.

9.4 Low Flow Bypass Valve

9.4.1 This option provides a water system pressure relief valve to bypass the process water back to the pump tank during "closed valve" conditions.

CALL TOLL-FREE FOR CONAIR REPLACEMENT PARTS*

WATS line 800-458-1960* is your direct line to the Conair Parts Department. (* Pennsylvania customers must call through (814) 437-6861 and ask for Parts Department). Help in identifying the parts you need is available through that department. Service connected calls should be made to (814) 437-6861.

CONAIR GUARANTEE

Conair guarantees the machinery and equipment described herein for a period of one year from date of shipment against defects in material and workmanship, under the normal use and service for which it was recommended; except filters, flexible material conveying hose, and liners for valves in material lines. Conair's guarantee is limited to repairing or replacing, at our option, the part or parts determined by us to be defective after examination of the part or parts. The customer assumes the cost of transportation of the part or parts to and from the factory. **THERE ARE NO WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, OTHER THAN AS EXPRESSED HEREIN.** No liability for any special, indirect, or consequential damages of any nature is assumed by or shall be imposed on Conair based on its undertakings herein.

CONAIR SERVICE COMMITMENT

Conair equipment is built to give long, reliable, efficient service if it is installed, operated and maintained properly. Occasionally, you may require help from Conair's Service Department in making minor field corrections or in correcting operating malfunctions.

During normal business hours there is a Conair Service Man available by phone to discuss any service problem you may have: Call (814) 437-6861.

Before calling, check the Troubleshooting Guide in this instruction book to see if corrective action is described. If not, try to determine which part of a normal cycle is not operating properly. Note the model number and serial number of the unit and keep this instruction book handy for reference during the call.

If you need a Conair Serviceman, He'll be there fast! We know you need prompt attention. Most service calls are made within a few days from the request, often, because Conair has several factory-based servicemen in the field every week, you will get attention even faster. During your call to the Service Department it will

be determined if a visit is needed at your plant. You will be asked to give us a purchase order number to cover the cost of a service call if the problem is not covered by the equipment Warranty or Performance Guarantee. Calls made to cover such warranty or guarantee items are made at Conair's expense. The Service Department will detail current service costs, if any.

He stays until the job is done! Conair Servicemen are instructed to stay at your plant until you're satisfied that the difficulty has been corrected or your personnel know what to do should correction depend upon receipt of replacement parts. We know that good service often helps sell the next Conair units you buy . . . so we do everything we can to make it the best service in the industry.

We'll help train your people too! Conair will be pleased to quote, and arrange for, instruction sessions in your plant on the operation and maintenance of your Conair Equipment. Such training sessions may be arranged through the Service Department. (814) 437-6861

CONAIR PERFORMANCE WARRANTY

Conair warrants that this equipment will perform at, or above, the capacities as stated in specific quotations covering the equipment or as detailed in engineering and sales literature as long as the equipment is applied, installed, operated and maintained in the recommended manner as outlined in either a quotation or in literature.

Should performance not meet claimed levels, Conair, at its option, will:

1. Make an inspection of the equipment by a qualified representative and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless poor performance is due to misapplication, improper installation, maintenance or operation), or . . .
2. Replace the original equipment with other Conair equipment which will meet original performance claims at no extra cost to the customer, or . . .
3. Refund the invoiced cost of the equipment. Credit is subject to prior notice by the customer at which time a Return Goods Number will be issued by Conair's Service Department. Returned equipment must be well crated. Returns must be prepaid.

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Coldstream Chiller
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3. DATE OF MANUFACTURE

CAUTION

BEFORE TURNING UNIT ON . . .

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2. MAKE ALL ELECTRICAL CONNECTIONS IN ACCORDANCE WITH THE NEC AND APPLICABLE LOCAL CODES.
3. MAKE SURE WATER CONNECTIONS ARE MADE USING HOSES WITH ADEQUATE PRESSURE RATING FOR 150 PSI.
4. MAKE SURE ALL MANUAL VALVES IN SYSTEM ARE OPEN.
5. DO NOT TAMPER WITH THE ADJUSTMENTS OF THE SAFETY DEVICES.
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SPECIFICATIONS:

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Pump Capacity (Standard): (Hi-Pressure):	20GPM @ 40PSI 12.0GPM @ 75PSI	20GPM @ 40PSI 15.4GPM @ 75PSI
Maximum Pump Pressure (Standard): (Hi-Pressure):	45 PSI 75 PSI	45 PSI 75 PSI
Pump Motor:	1 HP (Standard) 1-1/2,2,3 HP (Opt) 1-1/2 HP Hi-Pressure (Opt)	1 HP (Standard) 1-1/2,2,3 HP (Opt) 3 HP Hi-Pressure (Opt)
Compressor Nominal Rating:	3.5 HP	5.0 HP
Reservoir Tank Capacity:	5 Gallons	5 Gallons
Condenser Cooling Water Required:	12 GPM	15 GPM
Minimum Operating Temperature: (Water only)	40°F.	40°F.
Minimum Operating Temperature: (Water/glycol mixture)	20°F.	20°F.
Refrigerant Type and Charge:	R22 10 lbs.	R22 12 lbs.
Voltage:	208-230/3/60 or 460/3/60	208-230/3/60 or 460/3/60
Connections:		
To Process:	1" NPT	1" NPT
From Process:	1" NPT	1" NPT
Condenser Water Inlet:	3/4" NPT	1" NPT
Condenser Water Outlet:	3/4" NPT	1" NPT
Water Makeup (Optional):	1/2" NPT	1/2" NPT
Temperature Controller:	Microcomputer (PC Board Assembly)	Microcomputer (PC Board Assembly)
Dimensions:		
Length:	49-1/4" (1250 mm)	49-1/4" (1250 mm)
Width:	24-3/4" (630 mm)	24-3/4" (630 mm)
Height:	43" (1090 mm)	43" (1090 mm)
Weight:	600 lbs.	650 lbs.

Pump	CS - 3W				CS - 5W			
	208 V	230 V	460 V	575 V	208 V	230 V	460 V	575 V
1 HP	19.3	18.9	9.5	7.7	25.4	25.0	11.4	9.3
1-1/2 HP	21.0	20.5	10.3	8.4	27.1	26.6	12.2	10.0
2 HP	22.8	22.1	11.1	9.0	28.9	28.2	13.0	10.6
3 HP	25.9	24.9	12.5	10.2	32.0	31.0	14.4	11.8

i. Description

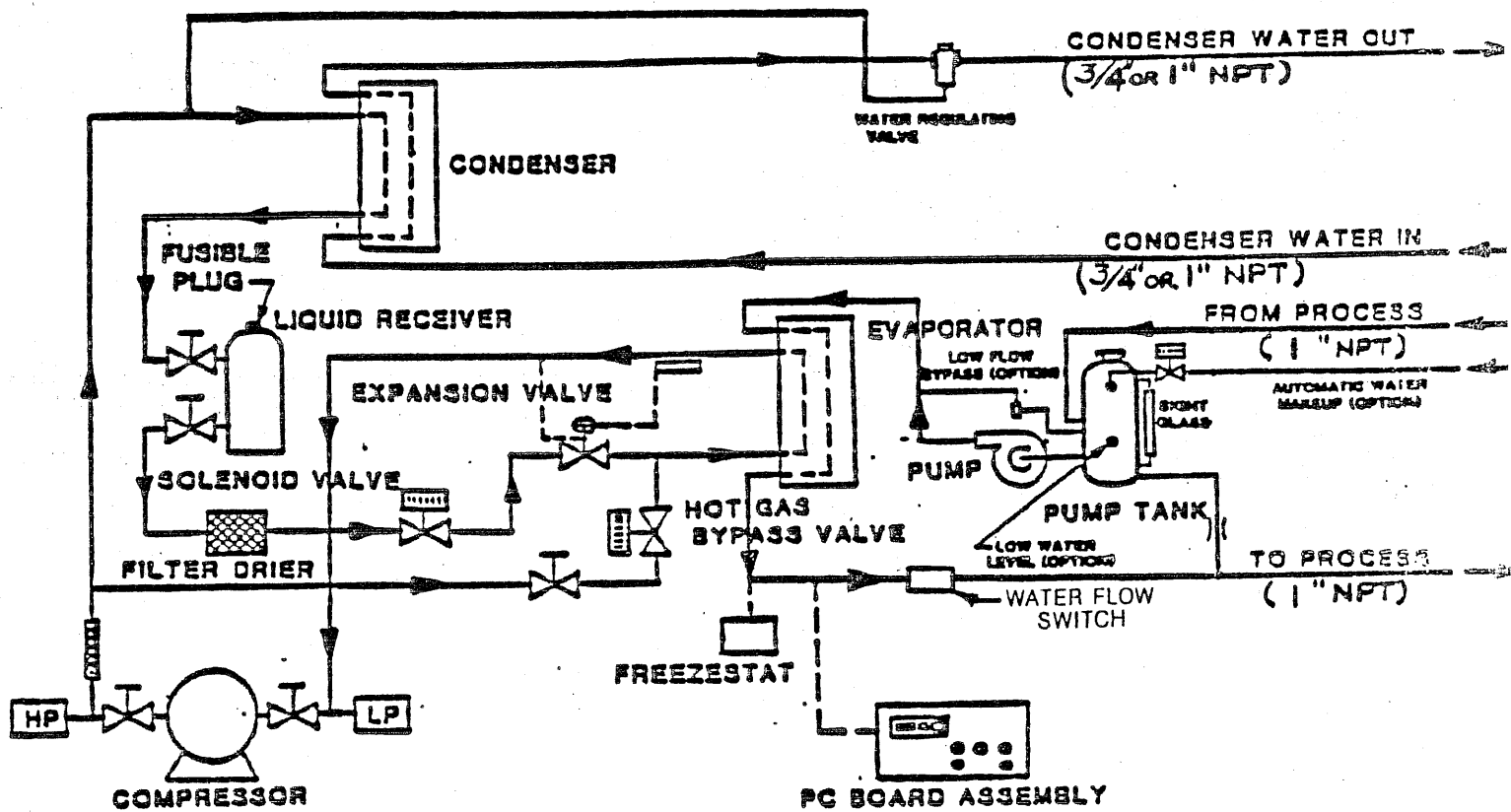
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- 1.5 An electrical interlock is fitted to the water pump to insure water flow through the evaporator before the refrigeration system can be operated.
- 1.6 A small by-pass connection is fitted in the water circuit between the outlet and pump tank of the chiller. This gives flow through the system during "closed valve" conditions external to the chiller and allows the refrigeration system to be balanced accordingly.
- 1.7 The cooling effect is created by circulating refrigerant around a sealed refrigeration system where heat is extracted from the chilled system and transferred into the water by means of the condenser.
- 1.8 The recirculation is created by a compressor which pumps the gas that has extracted heat from the water into a condenser where the gas is cooled by air or water which condenses it into a liquid state. The condensation occurs because the gas is at high pressure as created by the compressor.
- 1.9 The liquid refrigeration passes from the condenser to a liquid receiver, through a filter/drier which will remove any dirt or water that may be present, through a moisture indicator which provides a sight glass to view the refrigerant, and then on to the expansion valve via an isolating solenoid valve which closes the system when the compressor is switched off.

1.10 The expansion valve is a temperature controlled modulating valve which senses the temperature of the refrigerant as it leaves the evaporator and opens or closes relevant to this temperature to maintain it at a constant value. This temperature is determined by the water temperature and the efficiency point at which the evaporator is operating relevant to the water flow rate.

1.11 As the high pressure liquid refrigerant is metered through the expansion valve into the evaporator, it is exposed to low pressure conditions which allows it to vaporize. The process of vaporization causes the refrigerant gas to absorb large quantities of heat energy from the surroundings.

Efficient heat exchange within the evaporator is insured by insulating the outside and by maintaining a fast and turbulent water flow through the inside.

1.12 The refrigerant then enters the compressor in a dry gas state and is pumped back to the condenser at a high pressure and a high temperature.



CHILLER REFRIGERATION AND WATER PIPING SCHEMATIC

FIGURE 1

1.14 The expansion valve cannot automatically cover the complete range of temperatures and varying load conditions that exist under normal operating load conditions and a secondary control system is employed to cater for these variables. This system consists of the operation of a hot gas solenoid valve and the switching off of the compressor.

1.15 When the temperature of the water leaving the chiller is above the set point, the unit will operate under 100% cooling capacity conditions. When the temperature falls to the set point a solenoid valve will open to allow hot gas to pass from the compressor directly into the evaporator, by passing the condenser. This will have the effect of reducing the cooling capacity of the chiller by approximately 50%.

1.16 If the load on the chiller is below this condition the temperature of the water will continue to fall until it reaches a second preset set point, when the compressor will be switched off.

The water will continue to circulate and absorb heat but the compressor will remain off until the temperature of the water rises above the indicated set point again. The compressor will then switch on and the above cycle will repeat itself to maintain the water temperature at that required.

1.17 Thus for all operating conditions between 0 and 100% of the cooling capacity of the chiller, the delivery water temperature can be automatically controlled at any value selected on the temperature control instrument.

1.18 There are several safety devices fitted to the chiller and their functions are as follows:

1.18.1 High Pressure Switch

This is a safety interlock to check the operation and efficiency of the condenser. It will stop the unit and give an alarm signal if the condenser becomes dirty or if the cooling flow (air or water) becomes restricted.

1.18.2 Low Pressure Switch

This is a safety interlock which will switch off the chiller in the event of a loss of gas, blocked filter or frozen evaporator.

1.18.3 Refrigerant Pressure Relief Device

A fusible plug is fitted to the liquid receiver as an ultimate safety against overpressure conditions being created within the refrigerant circuit.

1.18.4 Freezestat

This thermostat is fitted into the water circuit at the outlet of the evaporator and will switch off the compressor should the water temperature fall below 40°F. when using water only. If an antifreeze solution is being used, this thermostat can be adjusted down to a minimum of 20°F. See the curve for freezing conditions relative to antifreeze percentage for correct setting relative to mixture.

1.18.5 Compressor Thermostat

This device senses the temperature of the motor windings and will switch off the compressor if for any reason the windings become overheated.

1.18.6 Motor Overload

All motors in the unit are protected by current sensing overloads and will switch off that motor and other related parts of the unit, if an overload condition occurs.

1.18.7 Water Flow Switch

This switch is fitted to the outlet of the evaporator to sense that water is flowing through the evaporator and that the pump is not air locked. Without this switch in its operated condition, the compressor cannot be switched on.

1.18.8 Water Regulating Valve

The water regulating valve is installed in the condenser water outlet line to regulate the amount of condensing water required based on the process system load.

3. Unpacking

- 3.1 Examine the packing for any signs of damage, ingress of water, etc.
- 3.2 Remove unit from packing and further inspect for any transit damage.
- 3.3 Report any defect immediately to the carrier and to Conair in writing.

4. INSTALLATION

4.1 Locate the unit as near as practical to the process ensuring that there is a 3 ft. clearance on all sides for servicing requirements.

4.2 The unit must be protected from rainfall and direct sunlight if located outside. It will operate satisfactorily in ambient temperature conditions to a maximum of approximately 120°F.

Note: If the unit is to be used in low ambient temperature conditions, precautions must be taken to prevent freezing within the unit during periods when the unit is switched off.

4.3 Connect the control box to a fused disconnect with sufficient capacity to handle the maximum amps stamped on the nameplate. Use fuses of a size as specified in the NEC and applicable local codes. Ground the chiller to an earth ground in accordance with the NEC and applicable local codes.

4.4 Fit isolating valves to the process connections and connect water lines.

Note: For maximum efficiency the inter-connecting pipes should not be less than the pipe sizes as on the chiller and should be preferably be insulated.

4.5 Use hoses with pressure ratings adequate for operation at 150 psi.

4.6 Fill the expansion tank to the top of the sight glass with water or water/glycol mixture as required.

Note: On units fitted with automatic water make-up connect and turn on water supply to the machine. The tank will automatically fill up to the correct level.

4.7 Briefly switch on the pump and check its rotation against the arrow of its casing. If incorrect change over two of the phases of the mains supply - not individual motor connections as all motors have previously been checked relative to each other.

4.8 The unit should now be left with the main isolator on for 24 hours to allow the crankcase heater to vaporize any refrigerant that may have migrated into the compressor.

Note: This is only necessary if the chiller has not been run for 12 hours or more.

4.9 The power supply should be left on at all times except when carrying out electrical maintenance to enable the unit to be ready for immediate operation.

4.10 Run the pump to circulate water through the process and its interconnecting pipework, ensuring that the water level in the tank remains within the sight glass.

5. Operation

5.1 Operation of the chiller is simply a matter of selecting the required temperature of the water or water/glycol mixture best suited to the application.

5.2 Switch on the fused disconnect and the "power on" light will come on.

5.3 Depress the "Push to Read" button and turn the setpoint to the desired operating temperature.

5.4 Release the "Push to Read" button and a continuous digital read-out of the "to process" temperature is displayed.

5.5 Press the "Pump Start" button. The button will light and the pump will start. Ensure that there is correct circulation through the process.

5.6 Press the "Compressor On" button. This will start the refrigeration system.

5.7 The unit is now ready for operation and will now recirculate water at the temperature required - See Temperature Control Method.

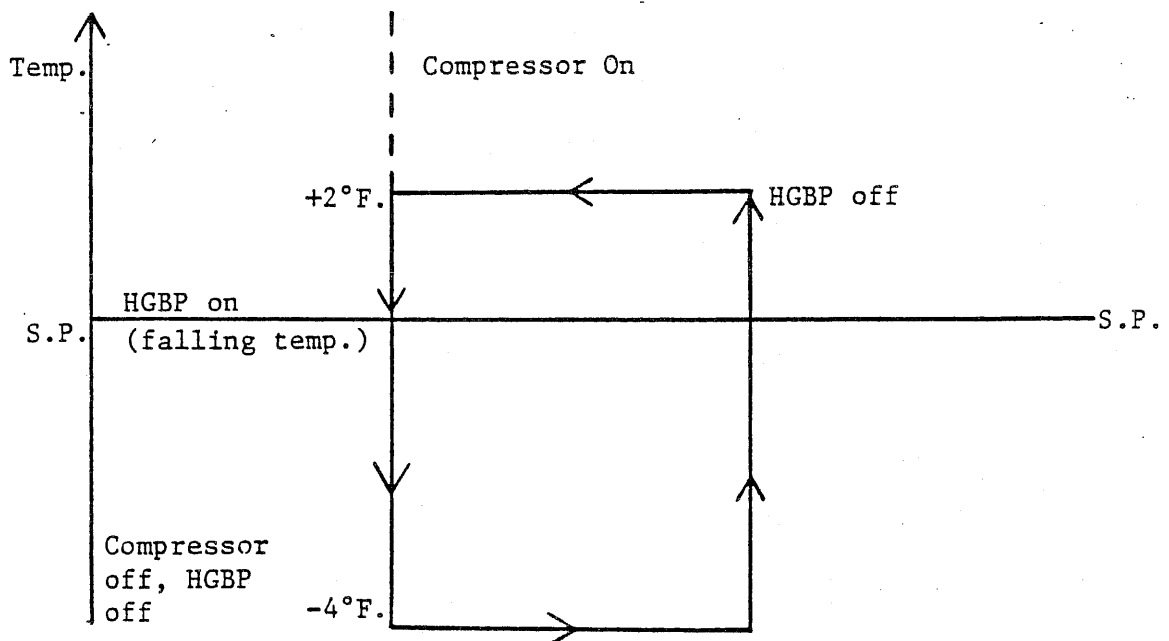
5.8 Should a change in the water temperature be required, all that is necessary is to change the setpoint temperature.

5.9 When switching the unit off, first switch off the compressor and allow the water to continue flowing for 2 minutes, then switch off the unit.

NOTE: Leave the power supply main "On".

6. Chiller Temperature Control Method

Typically, the water temperature at startup is above the setpoint. If so, the compressor is energized immediately to begin the cooling process. The result should be a water temperature approaching setpoint. In order to slow the cooling trend, a hot, gas bypass valve is energized when the temperature of the water is equal to the setpoint. This should serve to add some heat to the water. If the temperature rises two degrees above setpoint, the hot gas bypass is de-energized allowing cooling to take place once more. This should be the expected control profile; however if the hot gas bypass usage fails to turn around the cooling trend, both the compressor and the hot gas bypass are de-energized when the water reaches four degrees below setpoint. The mechanical specification of the compressor requires that it remain off a reasonable amount of time after being de-energized. This is accomplished through a software two minute time delay. The below logic is reflected in software release referred to as "Chiller D". Setpoint range is 20°F. to 60°F.

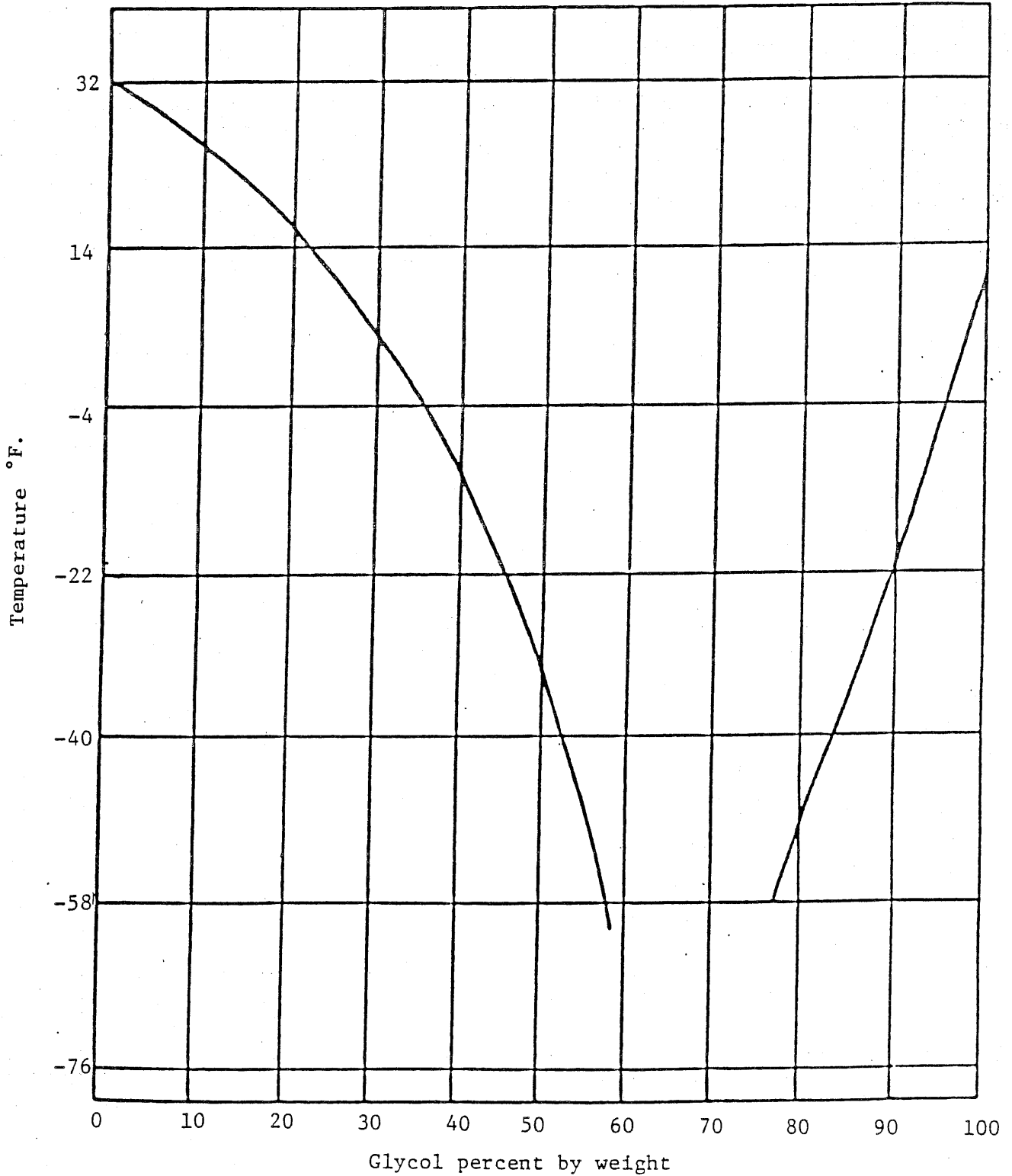


7. Maintenance

- 7.1 Routine maintenance on this unit is basically ensuring that the unit is kept clean, dry and filled with water or water/glycol.
- 7.2 Periodically isolate the electrical supply, remove covers and blow any dust off all components including those in the electrical cabinet using a dry compressed air line.
- 7.3 It is advised to have the unit checked over annually by a qualified Refrigeration Engineer to ensure correct operation of the refrigeration system.

FREEZING POINTS OF ETHYLENE GLYCOL SOLUTIONS

- Note: - Antifreeze must be used for operation below 40°F.
- For operation at 20°F., solution should be minimum 25%.
 - Strength of anti-freeze should be selected at 10°F. lower than minimum operating temperature.



TROUBLESHOOTING

8.1 General

8.1.1 This section is intended to simplify the tracing of faults within the unit.

8.1.2 The Coldstream Chiller has the following built-in alarms and troubleshooting aids:

8.1.2.1 Fault Light - This is a neon light located immediately below the POWER ON/OFF light. The FAULT light indicates an alarm condition and it will light under any one of the following conditions:

a. Evaporator Freezeup - Indicates possible freezing conditions in the evaporator.

b. Low Water Flow - Insufficient water flow through the evaporator.

c. High Refrigerant Pressure - Excessive refrigerant pressure in the condenser.

d. Low Refrigerant Pressure - Insufficient refrigerant pressure into the compressor.

e. Pump Motor Overload - Excessive current draw by pump motor.

f. Low Water Level - Insufficient water level in the reservoir tank.

8.1.2.2 Error Messages - There are five error messages which flash on and off on the digital display alternating with the temperature reading:

a. ERR 1 - The Mold-Cool PC Board has a control range of 20 degrees F. to 60 degrees F. If the setpoint is set for a temperature outside of this range, ERR 1 will be displayed. The error message will disappear as soon as the setpoint is re-adjusted back within the control range.

b. ERR 2 - If the actual temperature rises 5 degrees F. above setpoint after having reached setpoint, ERR 2 will be displayed. The error message will disappear and the actual temperature will again be displayed when the temperature is brought down to within 10 degrees F. of setpoint. ERR 2 will not be displayed on start-up.

c. ERR 3 - If the actual temperature drops 5 degrees F. below setpoint after having reached setpoint, ERR 3 will be displayed. The error message will disappear and the actual temperature will again be displayed when the temperature rises to within 10 degrees F. of setpoint. ERR 3 will not be displayed on start-up.

d. ERR 4 - If the temperature sensor (thermister probe) is faulty, ERR 4 will be displayed. The thermister probe will have to be replaced before the Coldstream Chiller can be placed back in operation.

e. Four Dots - If four dots appear at the top of the display it means the microprocessor has detected a fault on the PC Board. Under these conditions, the Coldstream Chiller may or may not continue to operate. If the Coldstream Chiller continues to run, replace the PC board as soon as possible. If the Coldstream Chiller shuts down, the PC Board has to be replaced before it can be placed back in operation.

8.1.3 To trace the fault, refer to the following to identify the principal symptoms and trace through the secondary and following symptoms until the problem can be rectified.

8.2 No Water Circulation

8.2.1 Pump Running

Check water level in tank - if low, add water as required or check water supply if automatic water makeup option is fitted. Check ball valve.

- If correct, suspect blockage in system or in air bleed pipes causing air lock in pump.
- a blockage in the system could be caused by the formation of ice in the evaporator if the temperature is set too low or if there is insufficient antifreeze in the water.
- alternatively, there could be foreign matter blocking the inlet to the evaporator.

8.2.2 Pump Stopped

- Mechanical fault, i.e. pump seized or impeller loose in pump.
- Electrical fault - motor overload tripped.
- Water level low on unit fitted with water low alarm option.

8.3 Refrigeration Not Effective

- 8.3.1 Compressor will not start
- Insufficient water flow/pressure.
 - Water temperature below set-point.
 - Fault condition - check high and low pressure refrigeration switches. Press switch reset buttons.
 - Compressor overload tripped, reset and check current on each phase.
 - Defective computer board.
- 8.3.2 Chiller not cooling water sufficiently.
- Chiller overloaded - check heat relative to chiller capacity.
 - Hot gas by-pass valve permanently open, if mechanically stuck open, call Refrigeration Engineer.
 - Condenser requires clearing.
 - Loss of refrigerant.

8.4 Pressure Switch Tripped

- 8.4.1 High pressure switch tripped.
- Condenser dirty, requires cleaning.
 - High ambient temperature.
- 8.4.2 Low pressure switch tripped.
- Loss of refrigerant, leak in the system, a Refrigeration Engineer will have to locate repair and recharge machine.
 - Blocked filter/drier.

9. Options

9.1 Water Low

- 9.1.1 This system employs a float switch mounted in the expansion/make-up tank which operates a relay as an interlock.

This ensures that there is sufficient water or water/antifreeze mixture in the tank before the unit can be started. It allows sufficient volume to be pumped out of the tank for normal circumstances without switching the unit off.

- 9.1.2 If the fluid level falls below the float switch, the pump will switch off and an audible horn will sound to indicate that more fluid requires to be added into the tank to bring the level above the float switch again.

7.2 Automatic Water Make-Up

- 9.2.1 Machines fitted with this option have water supply connected to them at the back of the unit which supplies water through a ball valve fitted into the expansion/make-up tank.
- 9.2.2 The expansion/make-up tank is also fitted with a float switch. It performs the same functions as described in section 9.1.1 and 9.1.2.

9.3 Audible Horn

- 9.3.1 This option gives an audible alarm when any fault condition occurs within the unit. This incorporates any refrigerant fault, motor overload or water level low condition. The audible horn can be silenced from the control panel until the fault is rectified.

9.4 Low Flow Bypass Valve

- 9.4.1 This option provides a water system pressure relief valve to bypass the process water back to the pump tank during "closed valve" conditions.

CALL TOLL-FREE FOR CONAIR REPLACEMENT PARTS*

WATS line 800-458-1960* is your direct line to the Conair Parts Department. (*Pennsylvania customers must call through (814) 437-6861 and ask for Parts Department). Help in identifying the parts you need is available through that department. Service connected calls should be made to (814) 437-6861.

CONAIR GUARANTEE

Conair guarantees the machinery and equipment described herein for a period of one year from date of shipment against defects in material and workmanship, under the normal use and service for which it was recommended; except filters, flexible material conveying hose, liners for valves in material lines, water pump seals and drive belts. Conair's guarantee is limited to repairing or replacing, at our option, the part or parts determined by us to be defective after examination of the part or parts. The customer assumes the cost of transportation of the part or parts to and from the factory. THERE ARE NO WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, OTHER THAN AS EXPRESSED HEREIN. No liability for any special, indirect, or consequential damages of any nature is assumed by or shall be imposed on Conair based on its undertakings herein.

CONAIR SERVICE COMMITMENT

Conair equipment is built to give long, reliable, efficient service if it is installed, operated and maintained properly. Occasionally, you may require help from Conair's Service Department in making minor field corrections or in correcting operating malfunctions.

During normal business hours there is a Conair Service Man available by phone to discuss any service problem you may have: Call (814) 437-6861.

Before calling, check the Troubleshooting Guide in this instruction book to see if corrective action is described. If not, try to determine which part of a normal cycle is not operating properly. Note the model number and serial number of the unit and keep this instruction book handy for reference during the call.

If you need a Conair Serviceman, He'll be there fast! We know you need prompt attention. Most service calls are made within a few days from the request, often, because Conair has several factory-based servicemen in the field every week, you will get attention even faster. During your call to the Service Department it will

be determined if a visit is needed at your plant. You will be asked to give us a purchase order number to cover the cost of a service call if the problem is not covered by the equipment Warranty or Performance Guarantee. Calls made to cover such warranty or guarantee items are made at Conair's expense. The Service Department will detail current service costs, if any.

He stays until the job is done! Conair Servicemen are instructed to stay at your plant until you're satisfied that the difficulty has been corrected or your personnel know what to do should correction depend upon receipt of replacement parts. We know that good service often helps sell the next Conair units you buy . . . so we do everything we can to make it the best service in the industry.

We'll help train your people too! Conair will be pleased to quote, and arrange for, instruction sessions in your plant on the operation and maintenance of your Conair Equipment. Such training sessions may be arranged through the Service Department. (814) 437-6861

CONAIR PERFORMANCE WARRANTY

Conair warrants that this equipment will perform at, or above, the capacities as stated in specific quotations covering the equipment or as detailed in engineering and sales literature as long as the equipment is applied, installed, operated and maintained in the recommended manner as outlined in either a quotation or in literature.

Should performance not meet claimed levels, Conair, at its option, will:

1. Make an inspection of the equipment by a qualified representative and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless poor performance is due to misapplication, improper installation, maintenance or operation), or . . .
2. Replace the original equipment with other Conair equipment which will meet original performance claims at no extra cost to the customer, or . . .
3. Refund the invoiced cost of the equipment. Credit is subject to prior notice by the customer at which time a Return Goods Number will be issued by Conair's Service Department. Returned equipment must be well crated. Returns must be prepaid.