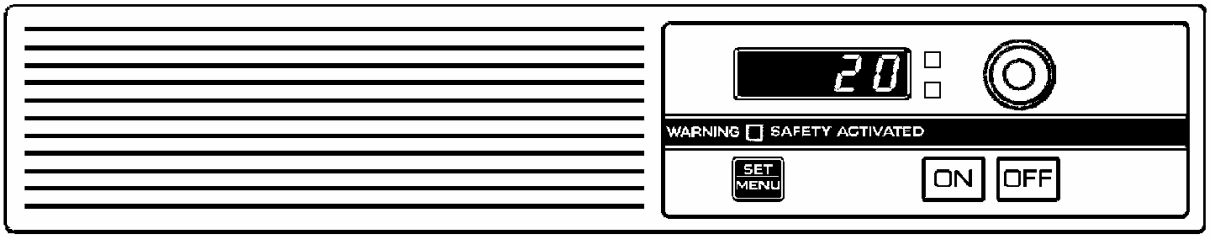


Operators Manual

DuraChill™

DCA 500 and DCW 500 Chillers

DCA 750 and DCW 750 Chillers

DCA 1000 and DCW 1000 Chillers

DCA 1300 and DCW 1300 Chillers

DCA 1500 and DCW 1500 Chillers

110-262 Rev. A
ECN 1894
9/17/03

Table of Contents

This symbol marks chapters and sections of this instruction manual which are particularly relevant to safety. When attached to the unit, this symbol draws attention to the relevant section of the instruction manual.

This symbol indicates that hazardous voltages may be present.

Read all instructions pertaining to safety, set-up, and operation.
Proper operation is the users' responsibility.

Section 1 – Safety and Warranty Information

1.1 Safety

It is the user's responsibility to read and understand all instructions and safety precautions included in this manual prior to installing or operating this equipment. Contact our Customer Service Department with any questions regarding the operation of this chiller or the information contained in this manual.

	Installation, operation, or maintenance of this equipment should be performed in strict accordance with the instructions outlined in this manual. Failure to follow those instructions may increase the risk of personal injury, damage the equipment, and/or void the warranty.
	Exercise care when unloading, loading, rigging, or moving this equipment.
	All warning labels should be carefully observed. Never remove or obstruct a warning label.
	Make sure that ventilation is adequate when welding or brazing around this equipment. Protect adjacent materials from flames or sparks. Keep an approved fire extinguisher close at hand.
	Always operate this equipment within the stated design specifications.
	Be sure to remove power from the equipment, reclaim the refrigeration charge, and relieve any residual pressure before cutting into the refrigeration system.
	Do not attempt to operate leaking or damaged equipment.
	Service should only be performed by fully qualified personnel.
	Follow all applicable electrical and safety codes when connecting power to this equipment.

	Do not attempt to override the power interlock switch or any other safety features on this equipment.

	Always remove power from the equipment prior to performing any service or maintenance.

	Do not move the equipment without first disconnecting power.

	Make sure the equipment's main power switch is in the OFF position before connecting or disconnecting power.

Additional Precautions

Do not attempt to operate this equipment without an appropriate cooling fluid in the reservoir.

Always empty to the fluid reservoir before moving the unit.

1.2 Warranty

Thank you for purchasing this chiller. We are confident it will serve you for a long time. Our warranty to you is as follows:

The manufacturer agrees to correct for the original user of this product, either by repair, or at the manufacturer's election, by replacement, any defect that develops after delivery of this product within the period as stated on the warranty card. In the event of replacement, the replacement unit will be warranted for 90 days or warranted for the remainder of the original unit's parts or labor warranty period, whichever is longer.

If this product requires service, contact the manufacturer/supplier's office for instructions. When return of the product is necessary, a return authorization number will be assigned and the product should be shipped, (transportation charges pre-paid), to the indicated service center. To insure prompt handling, the return authorization number should be placed on the outside of the package and a detailed explanation of the defect enclosed with the item.

This warranty shall not apply if the defect or malfunction was caused by accident, neglect, unreasonable use, improper service, or other causes not arising out of defects in material or workmanship. There are no warranties, expressed or implied, including, but not limited to, those of merchantability or fitness for a particular purpose which extends beyond the description and period set forth herein.

The manufacturer's sole obligation under this warranty is limited to the repair or replacement of a defective product and shall not, in any event, be liable for any incidental or consequential damages of any kind resulting from use or possession of this product. Some states do not allow: (A) limitations on how long an implied warranty lasts; or (B) the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights. You may have other rights that vary from state to state.

1.3 Unpacking

Your chiller is shipped in a special container. Retain the container and all packing materials until the unit is completely assembled and working properly. Set up and run the unit immediately to confirm proper operation. Beyond one week, your unit may be warranty repaired, but not replaced. If the unit is damaged or does not operate properly, contact the transportation company, file a damage claim and contact the company where your unit was purchased immediately.

Section 2 – Introduction

2.1 General Description

The PolyScience DuraChill line of industrial chillers offers exceptional performance, reliability, and operational simplicity. Available in both air and water cooled models, these robust self-contained chillers are engineered to provide accurate temperature control in a wide range of process cooling applications.

These powerful chillers can be configured with a wide variety of standard and optional features, including:

Standard

- Process temperatures from 32° to 86°F (0° to 30°C)
- Ambient temperatures from 60° to 95°F (16° to 35°C)
- ±2°F (±1.11°C) temperature stability
- High efficiency vertical air exhaust (DCA units only)
- Accurate microprocessor control with LED temperature readout
- Remote On/Off capability
- RS232 interface for remote control and datalogging
- Over/under temperature process fluid alarms
- Copeland Scroll compressor
- Stainless steel centrifugal pump
- Integral pump and compressor protection
- Choice of air- or water-cooled operation
- Locking casters
- NEMA 12 style electrical enclosure with door-mounted power disconnect

Optional

- Extended process temperatures (-15° to 85°C / 5° to 185°F)
- Extended ambient temperatures (60° to 104°F / 16° to 40°C)
- Higher output centrifugal or turbine pump
- RS485 serial output
- Tank fluid level indicator
- Remote temperature probe
- Remote control panel
- Stainless steel reservoir
- High/low water pressure cutouts
- Power phase monitor
- Digital flow rate readout
- Automatic water make-up valve
- DI water compatible process piping
- Remote condenser
- Recirculation pump
- Process water side-stream filter
- Rail or foot mounting
- Audible and visual alarm indicators
- Variable speed fan
- Heaters
- Process shutoff valves
- Soft start fan motor

- Low tank level indicator/alarm
- Full flow bypass valve
- Alternate heat transfer fluids

An application data sheet showing how your chiller is equipped is included with the documentation that accompanied this manual.

2.2 Component Identification

Your DuraChill Model 500 or 750 Chiller consists of three basic sub-systems:

- Control system
- Fluid circulation system
- Cooling system

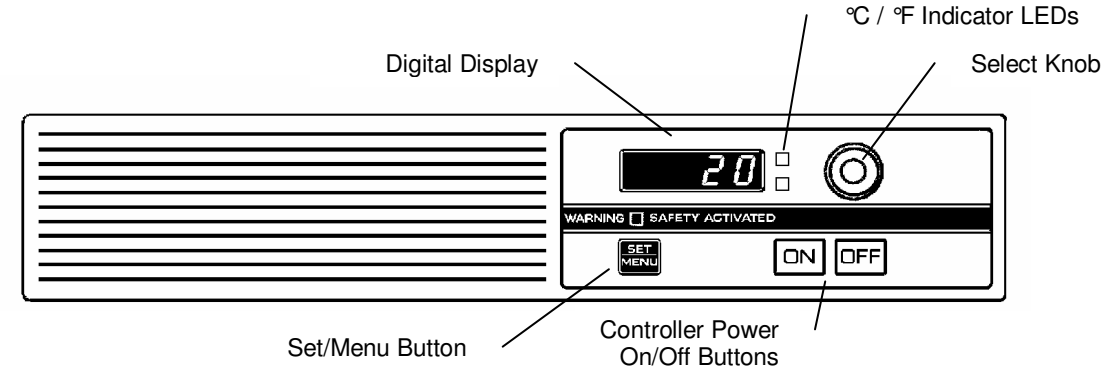
This section describes these sub-systems in detail and includes information on the available options. Please note that your chiller may or may not be equipped with all the components discussed.

See Sections A.1 and A.2.

2.2.1 Control System

This system controls and monitors Chiller operation. It consists of a microprocessor-based controller linked to the various sensors, gauges, valves, switches, and signal input/output connections on the unit.

Control Panel — Temperature set point, temperature units, and other operating parameters are set via the Control Panel. Operating information is displayed on a local LED readout. A remote Control Panel is available as an option.



Power Switch / Disconnect — The main power switch is located on the front door of the unit. This switch also functions as a power disconnect when access to the unit's electrical components and terminal blocks is required; the access door cannot be opened until the Power Switch / Disconnect is placed in the Off position.

Temperature Probe — An internal RTD is used to measure fluid temperature downstream of the pump. Its reading is displayed on the Control Panel LED. A Remote Temperature Control Probe is available as an option.

Pressure Gauge — Measures fluid pressure at the outlet of the Chiller. This gauge is located on the rear of the unit.

Reservoir Float Switch (optional) — Measures liquid level in the unit's reservoir. If the level drops too low, activates an alarm. On units with the automatic water makeup option, the low liquid level signal opens a solenoid on the water makeup inlet until the proper liquid level is restored.

Flow Switch — Monitors process fluid flow. If the flow rate is less than 30% of the Chiller's nominal flow rate, power to the pump, condenser, and fan is removed and an alarm message displayed on the Control Panel LED.

Condenser System Solenoid Valves — Control coolant fluid to the condenser.

Refrigerant Pressure Switches — These switches automatically disconnect power from the condenser system in the event that refrigerant pressure is outside factory set high/low values. The Low Pressure Switch is set to cutout at 15 PSI. The High Pressure Switch is set to cutout at 375 PSI on air-cooled units and at 290 PSI on water-cooled units.

Note: If refrigerant pressure reaches 350 PSI (DCW models) or 400 PSI (DCA models) , a pressure relief valve opens.

Refrigerant Temperature Switch — These switches automatically disconnect power from the condenser system in the event that refrigerant temperature becomes too high. It is factory set to cutout at 200°-210°F.

Fan Cycling Switch — Air-cooled units only. This switch controls fan operation. The fan is turned On when the compressor discharge pressure reaches 250 PSI; it is turned Off when the discharge pressure drops below 170 PSI.

Variable Speed Fan Control — Air-cooled units only. Adjusts the fan speed to varying heat loads to maintain a constant compressor discharge pressure.

Serial Output — For remote computer control. RS232 output standard; RS485 output optional.

2.2.2 Fluid Circulation System

This system governs the circulation of fluid through the unit.

Reservoir Tank — This 16 gallon polyethylene tank is used to maintain stable temperature control and an adequate reserve of fluid for the system. It may be equipped with an optional float switch that monitors fluid level and activates an alarm or opens the automatic water makeup solenoid valve is the level drops too low. A stainless steel reservoir tank is available as an option.

Tank Sight Glass or Level Indicator — This optional indicator serves as a convenient means of checking the liquid level within the Reservoir Tank.

Automatic Water Makeup System — This optional system consists of a Pressure Reducing Valve and Solenoid Valve connected to a water makeup line. It is used to automatically maintain fluid in the Reservoir Tank at adequate levels. The customer is responsible for installing an appropriate back flow prevention system on the inlet to this system.

Process Pump — This 1 HP stainless steel centrifugal pump is used to pump fluid from the Reservoir Tank through the Evaporator and back to process. Optional centrifugal and turbine pumps are available for applications requiring higher pressures or flow rates.

Process Water Recirculation Pump — An optional pump installed for special applications.

Strainer — Traps debris which could potentially clog the Evaporator.

Evaporator — Serves as the heat exchanger between the refrigeration and fluid flow system. Used to cool fluid before it returns to process.

Flow Switch — Monitors process fluid flow. If the flow rate is less than 30% of the Chiller's nominal flow rate, then power to the pump, condenser, and fan is removed and an alarm message displayed on the Control Panel LED.

RTD Temperature Probe — Measures temperature of process fluid downstream of the pump. This is the temperature used to determine cooling demand.

Pressure Gauge — Measures fluid pressure at the outlet of the Chiller.

Bypass Valve — Used to prevent deadheading of pump in the event that the process piping becomes restricted or clogged. Diverts flow from process line back to Reservoir Tank.

Process Water Side-Stream Filter System — This optional system consists of a Flow Meter (set at 1 GPM), Filter (50 micron), and Ball Valve. It is used to filter particulate from a portion of the process fluid flow.

2.2.3 Cooling System

The condenser on your Chiller is either air-cooled (DCA 500 and DCA 750) or water-cooled (DCW 500 and DCW 750. In addition, the air-cooling system may be either local or external (optional); water-cooling may use either a coil (standard) or shell and tube (optional) design. The following components are common to all systems.

Common Cooling System Components

Evaporator — Serves as the heat exchanger between the refrigeration and fluid flow system. Cools fluid before it returns to process.

Compressor — The unit incorporates either a 5 HP (Model 500) or 7.5 HP (Model 750) Copeland Scroll compressor. The Compressor is protected from overloads through high and low refrigerant pressure cutouts.

Liquid Line Ball Valve — A manual shutoff used when service is required.

Filter Dryer — Removes residual particulate and moisture from the refrigeration system. Must be replaced whenever the sealed refrigeration lines are opened for service.

Sight Glass — Used to observe refrigerant liquid flow to Evaporator.

Expansion Valve — Controls refrigerant superheat at the outlet of the Evaporator to prevent liquid from returning to the compressor.

Hot Gas Bypass Solenoid Valve — Injects refrigerant vapor into the Evaporator to stabilize temperature control when operating at less than a full heat load.

Refrigerant Relief Valve — Automatic safety used to vent refrigeration gas in the event that pressure exceeds a factory set value. This valve is set to open at 400 PSI on air-cooled units and 350 PSI on water-cooled units.

Local Air-Cooled Condenser

Condensing Fan — A 1 HP fan that draws air over condenser coils to cool refrigerant gas. The standard fan is fixed speed and cycles on/off based on refrigerant pressure. It turns on when refrigerant pressure is 250 PSI or greater, turns off when refrigerant pressure falls below 170 PSI. A variable speed fan is available as an option. The variable speed fan automatically adjusts its speed to maintain a refrigerant pressure of approximately 230 PSI.

Refrigerant High Pressure Switch — Automatically disconnects power from the Chiller system when refrigerant pressure exceeds 350 PSI. This switch must be manually reset if tripped.

Refrigerant High Temperature Switch — Automatically disconnects power from the condenser system when refrigerant temperature reaches 210°F. Restores power when the refrigerant temperature falls below 160°F.

Remote Air-Cooled Condenser

Remote Condenser — Optional.

Refrigerant High Pressure Switch — Automatically disconnects power from the Chiller system when refrigerant pressure exceeds 350 PSI. This switch must be manually reset if tripped.

Refrigerant High Temperature Switch — Automatically disconnects power from the condenser system when refrigerant temperature reaches 210°F. Restores power when the refrigerant temperature falls below 160°F.

Water-Cooled Condenser

Condensing Coils — Water-cooled coils used to cool refrigerant gas. Water flow through these coils should be regulated at 15.4 GPM for DCW 500 Chillers and 22.3 GPM for DCW 750 Chillers.

Condensing Water Regulating Valve — This valve regulates the flow of cooling water to the condenser to maintain a constant compressor discharge pressure. It opens when refrigerant pressure is 250 PSI or greater and closes when refrigerant pressure falls below 170 PSI.

Refrigerant High Pressure Switch — Automatically disconnects power from the condenser system when refrigerant pressure exceeds 290 PSI.

Refrigerant High Temperature Switch — Automatically disconnects power from the condenser system when refrigerant temperature reaches 210°F. Restores power when the refrigerant temperature falls below 160°F.

Water-Cooled Condenser (Shell and Tube)

Condenser— Water-cooled coils used to cool refrigerant gas. Water flow through these coils should be regulated at 15.4 GPM for DCW 500 Chillers and 22.3 GPM for DCW 750 Chillers.

Condensing Water Regulating Valve — This valve regulates the flow of cooling water to the condenser to maintain a constant compressor discharge pressure. It opens when refrigerant pressure is 250 PSI or greater and closes when refrigerant pressure falls below 170 PSI.

Refrigerant High Pressure Switch — Automatically disconnects power from the condenser system when refrigerant pressure exceeds 290 PSI.

Refrigerant High Temperature Switch — Automatically disconnects power from the condenser system when refrigerant temperature reaches 210°F. Restores power when the refrigerant temperature falls below 160°F.

Section 3 – Specifications

3.1 Air-Cooled Chillers – DCA 500 and DCA 750

Model	DCA 500	DCA 750
Process Temperature	32° to 86°F (0° to 30°C); 5° to 185°F (-15° to 85°C) optional	
Temperature Stability	±2.0°F (±1.11°C)	
Ambient Operating Temperature	60° to 95°F (16° to 35°C); 60° to 104°F (16° to 40°C) optional	
Compressor (nominal HP)	5 HP Copeland Scroll	7.5 HP Copeland Scroll
Refrigerant Charge (R22)	6.5 lbs.	10.6 lbs.
Cooling Capacity[1]	4.66 tons 16,384 watts 55,920 BTU/hr	6.36 tons 22,361 watts 76,320 BTU/hr
Nominal Evaporator Flow[2]	11.7 GPM (US)	15.7 GPM (US)
Pressure	35 PSIG	33 PSIG
Pump	1 HP stainless steel centrifugal	
Fan	1 HP	
Condenser Discharge Air Flow	3,500 CFM	5,300 CFM
Reservoir Tank Capacity	16 gallons	
Dimensions (D x W x H)	54 x 34.5 x 67 inches	
Nominal Rated Amps 230V, 3 phase, 60Hz 460V, 3 phase, 60Hz	 27.6A 14.1A	 36.9A 18.3A
Process Water Connections	1½ NPT	

1. Capacity based on 95°F (35°C) entering air and 120°F (49°C) condensing temperature. Leaving water 50°F (10°C). Allowance made for heat gain from pump.
2. Flow rate based on 2.4 GPM (US) per ton (0.54m^3/hr/ton).

3.2 Water-Cooled Chillers – DCW 500 and DCW 750

Model	DCW 500	DCW 750
Process Temperature	32° to 86°F (0° to 30°C); 5° to 185°F (-15° to 85°C) optional	
Temperature Stability	±2.0°F (±1.11°C)	
Ambient Operating Temperature	60° to 95°F (16° to 35°C); 60° to 104°F (16° to 40°C) optional	
Compressor (nominal HP)	5 HP Copeland Scroll	7.5 HP Copeland Scroll
Refrigerant Charge (R22)	6.5 lbs.	10.6 lbs.
Cooling Capacity[1]	5.07 tons 17,825 watts 60,840 BTU/hr	6.90 tons 24,260 watts 82,800 BTU/hr
Nominal Evaporator Flow[2]	12.7 GPM (US)	17.0 GPM (US)
Pressure	34.5 PSIG	32 PSIG
Pump	1 HP stainless steel centrifugal	
Condenser Water Flow-Tower Water	15.4 GPM (US)	22.3 GPM (US)
Reservoir Tank Capacity	16 gallons	
Dimensions (D x W x H)	53 x 34.5 x 40 inches	
Nominal Rated Amps 230V, 3 phase, 60Hz 460V, 3 phase, 60Hz	 24.0A 12.30A	 33.3A 16.5A
Process Water Connections	1½ NPT	
Condenser Water Connections	1 inch NPT	

1. Tower flow rate based on 85°F (29°C) entering water and 95°F (35°C leaving water. Allowance made for heat gain from pump.
2. Flow rate based on 2.4 GPM (US) per ton (0.54m^3/hr/ton).

3.3 Air-Cooled Chillers – DCA 1000, DCA1300, and DCA 1500

Model	DCA 1000	DCA 1300	DCA 1500
Process Temperature	32° to 86°F (0° to 30°C); 5° to 185°F (-15° to 85°C) optional		
Temperature Stability	±2.0°F (±1.11°C)		
Ambient Operating Temperature	60° to 95°F (16° to 35°C); 60° to 104°F (16° to 40°C) optional		
Compressor (nominal HP)	10 HP Copeland Scroll	13 HP Copeland Scroll	15 HP Copeland Scroll
Refrigerant Charge (R22)	18 lbs.	24 lbs.	27 lbs.
Cooling Capacity[1]	9.51 tons 33,436 watts 114,120 BTU/hr	11.75 tons 41,312 watts 141,000 BTU/hr	14.47 tons 50,876 watts 173,640 BTU/hr
Nominal Evaporator Flow[2]	23.8 GPM (US)	29.2 GPM (US)	35.7 GPM (US)
Pressure	42 PSIG	39 PSIG	35 PSIG
Pump	1 HP stainless steel centrifugal		
Fan	1 HP		
Condenser Discharge Air Flow	6,000 CFM	9,975 CFM	11,000 CFM
Reservoir Tank Capacity	45 gallons		
Dimensions (D x W x H)	75 x 34.5 x 67 inches		
Nominal Rated Amps 230V, 3 phase, 60Hz 460V, 3 phase, 60Hz	 57.8A 26.4A	 63A 32A	 73.4A 33.6A
Process Water Connections	1½ NPT	2 NPT	2 NPT

1. Capacity based on 95°F (35°C) entering air and 120°F (49°C) condensing temperature. Leaving water 50°F (10°C). Allowance made for heat gain from pump.

2. Flow rate based on 2.4 GPM (US) per ton (0.54m^3/hr/ton).

3.4 Water-Cooled Chillers – DCW 1000, DCW1300, and DCW 1500

Model	DCW 1000	DCW 1300	DCW 1500
Process Temperature	32° to 86°F (0° to 30°C); 5° to 185°F (-15° to 85°C) optional		
Temperature Stability	±2.0°F (±1.11°C)		
Ambient Operating Temperature	60° to 95°F (16° to 35°C); 60° to 104°F (16° to 40°C) optional		
Compressor (nominal HP)	10 HP Copeland Scroll	13 HP Copeland Scroll	15 HP Copeland Scroll
Refrigerant Charge (R22)	18 lbs.	24 lbs.	27 lbs.
Cooling Capacity[1]	10.32 tons 36,284 watts 123,840 BTU/hr	12.8 tons 45,004 watts 153,600 BTU/hr	15.66 tons 55,060 watts 187,920 BTU/hr
Nominal Evaporator Flow[2]	25.7 GPM (US)	31.7GPM (US)	38.6 GPM (US)
Pressure	42 PSIG	38 PSIG	33.5 PSIG
Pump	1 HP stainless steel centrifugal		
Condenser Water Flow-Tower Water	31.5 GPM (US)	38.8 GPM (US)	47 GPM (US)
Reservoir Tank Capacity	45 gallons		
Dimensions (D x W x H)	75 x 34.5 x 40 inches		
Nominal Rated Amps 230V, 3 phase, 60Hz 460V, 3 phase, 60Hz	 49.6A 22.8A	 64A 32A	 66.2A 30.1A
Process Water Connections	1½ NPT	2 NPT	2 NPT
Condenser Water Connections	1½ NPT	2 NPT	2 NPT

1. Tower flow rate based on 85°F (29°C) entering water and 95°F (35°C leaving water. Allowance made for heat gain from pump.

2. Flow rate based on 2.4 GPM (US) per ton (0.54m^3/hr/ton).

Section 4 – Installation and Startup

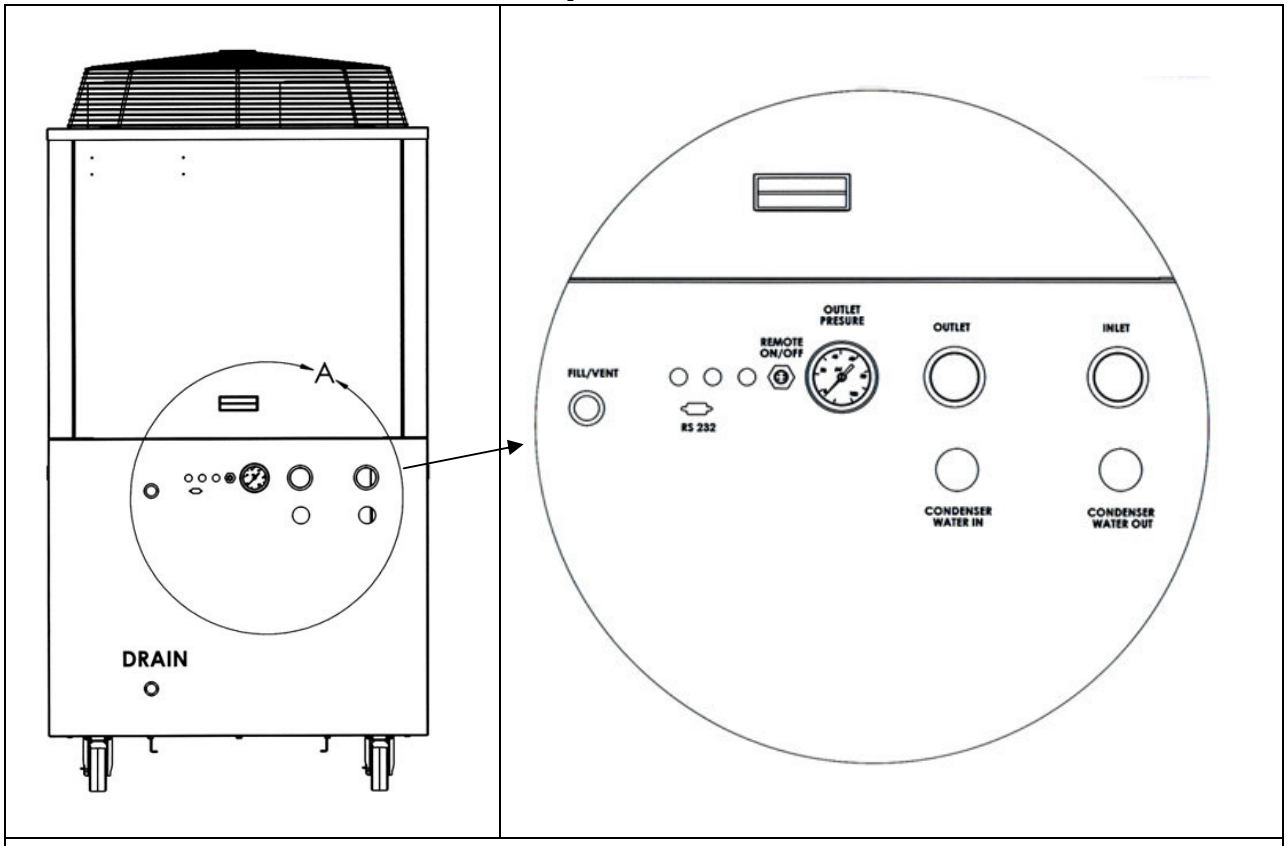


Figure 4-1

4.1 Site Requirements

4.1.1 Ambient Temperature and Relative Humidity

The DuraChill Chiller is designed for indoor installation in ambient temperatures between 60° and 95°F (16° to 35°C); relative humidity should be between 20% and 80% (non-condensing).

4.1.2 Location

The Chiller should be installed on a level surface capable of supporting 1500 pounds (680 kg) or more and should be located as close to possible to the process requiring cooling. It should not be installed closer than 4 feet (1.4 meters) to a heat generating source, such as heating pipes, boilers, etc.). If possible, it should be located near a suitable drain to prevent flooding in the event of leaks.

For ease of positioning and maneuverability, the Chiller is supplied with four heavy-duty locking casters (standard). Rail and foot-mounting are available as options.

4.1.3 Clearance

At least 18 to 24 inches (45.7 to 61 cm) of clearance should be allowed on the front, sides, and rear of the Chiller for access to connections and components. Air-cooled Chillers (DCA 500 and DCA 750) require at least 4 feet (1.4 meters) of overhead clearance to dissipate the exhaust from the Chiller's top-mounted fan.

4.2 Plumbing

See Figure 4-1.

4.2.1 Process Piping

The Chiller incorporates two 1½ inch female NPT fittings on the rear of the enclosure for the process inlet and outlet connections. It is strongly recommended that shutoff valves be installed on both of these connections.

NOTE: Do not connect process piping smaller than 1 inch to the Chiller inlet and outlet.

NOTE: Optional manual gate valves for the process inlet and outlet lines may have been provided with your Chiller.

To maintain a safe workplace and to avoid leaks, special care should be taken when choosing hoses and connections for the Chiller.

- Pressure Ratings — Hoses should be able to withstand a minimum of 100 PSI.
- Flexible Tubing — Avoid tubing that will expand and take up fluid volume when operating at the desired pressure.
- Couplings and Clamps — The use of screw-tightened hose clamps is necessary on all joints to insure good, tight connections. Quick connectors are not recommended as they have the potential for restricting flow rate.

4.2.2 Reservoir Vent

A 3/4 inch female NPT connection is provided for the reservoir vent line. This vent is intended to prevent siphoning and/or overflows in the event of a problem with process liquid circulation. The vent pipe should extend to a height at least 6 to 12 inches (15.2 to 30.5 cm) above the process equipment.

4.2.3 Reservoir Drain

A 3/4 inch female NPT connection is provided for the reservoir's gravity drain. It should be piped to a drain or receptacle positioned lower than the bottom of the reservoir. If a receptacle is used, be sure is of sufficient volume to hold all the water in the reservoir, process, and process lines.

4.2.4 Condenser Cooling Water Piping

Two 1 inch female NPT connections are provided for piping condenser cooling water to the unit on DCW 500 and DCW 750 Chillers.

4.2.5 Water Makeup Piping

If your Chiller is equipped with the Automatic Water Makeup option, a 3/4 inch NPT fitting is provided for this connection. It is the user's responsibility to connect a suitable backflow prevention device on this supply line.

4.2.6 Remote Condenser

If your Chiller was ordered with the Remote Air-cooled Condenser option, the condenser's discharge line and liquid line must be connected to the corresponding lines on the Chiller. Depending on the unit, the discharge and liquid lines will be either ½ inch or ¾ inch copper tubing.

IMPORTANT: Installation, charging, and setup of the remote condenser should be performed by a qualified refrigeration contractor.

4.3 Fan (Air-cooled Chillers only)

The Chiller's fan may be allowed to exhaust freely into the area in which the unit is located or may be vented to an exhaust duct of the appropriate size. If it is connected to an exhaust duct, the duct work should incorporate an auxiliary blower to prevent back pressure from impacting fan operation.

4.4 Signal Inputs/Outputs

See Figure 4-1.

All optional signal input/output connections are made on the rear of the Chiller. These connections should be made before connecting electrical power to the Chiller or beginning startup procedures.

4.4.1 Remote On/Off

This allows the user to turn the Chiller On and Off using a remote dry contact. The Chiller is On when the contact is open; it is Off when the contact is closed. A 10-ft. cord and connector are provided.

NOTE: When the Remote On/Off contact is closed, the On/Off button on the Chiller's front panel is disabled, preventing the unit from being turned On and Off locally.

4.4.2 Serial Output

This allows the user to control the Chiller's using an external computer. The maximum communications distance for Chillers equipped with RS232 serial output (standard) is 50 feet (15.25 meters). The maximum distance for units equipped with RS485 serial output (optional) is 200 feet (61 meters).

The serial interface on the Chiller should be connected to the serial port on the remote device (PC, etc.).

Communications Settings:

Comm Port	=	1
Baud Rate	=	9600
Data Bits	=	8
Parity	=	None
Stop Bits	=	1
Flow Control	=	None

Communications Protocol:

on(enter)	Turns Chiller On
off(enter)	Turns Chiller Off
f?(enter)	Returns the Chiller outlet temperature
d?(enter)	Retruns the unit of measure (°C or °F)
s?(enter)	Returns the set point temperature
s(number)(enter)	Changes the set point temperature
a0(enter)	No echo, no messages. All commands return a 0
a1(enter)	Echo (default, normal operation)
a2(enter)	No echo, messages returned followed by a 0

4.4.3 Remote Temperature Probe

This option allows you to control the cooling liquid temperature using the temperature reading at the process being cooled. The remote temperature probe is supplied with a 50-ft (15.25 meter) cable and appropriate connecting hardware.

The probe should be installed in the process liquid at a location where representative fluid temperatures are present. Care should be taken to avoid locations where temperature gradients exist or external sources of heat/cold may affect the temperature reading.

4.4.4 Tank Level Low Alarm Indicator

This is an option designed to alert you when the fluid level in the Chiller's reservoir drops too low. When the liquid level is low, a lamp on the front panel of the Chiller lights.

4.4.5 Remote Controller

This option permits you to mount the Chiller's microprocessor-based controller up to 50 feet (15.25 meters) from the unit.

4.5 Electrical Power

	All electrical connections should be made by a qualified, licensed electrician. Proper building codes and safety regulations should be followed.

	Make sure that the power supply to the Chiller is the same voltage, frequency, and phase as indicated on the identification label.

The Chiller is designed with cutouts on the right side and interior of the enclosure to accommodate the electrical power supply conduit. These cutouts are accessed by removing the enclosure's front panel. The panel is held in place with two 10-32 Philips head captive screws located at the top of the panel.

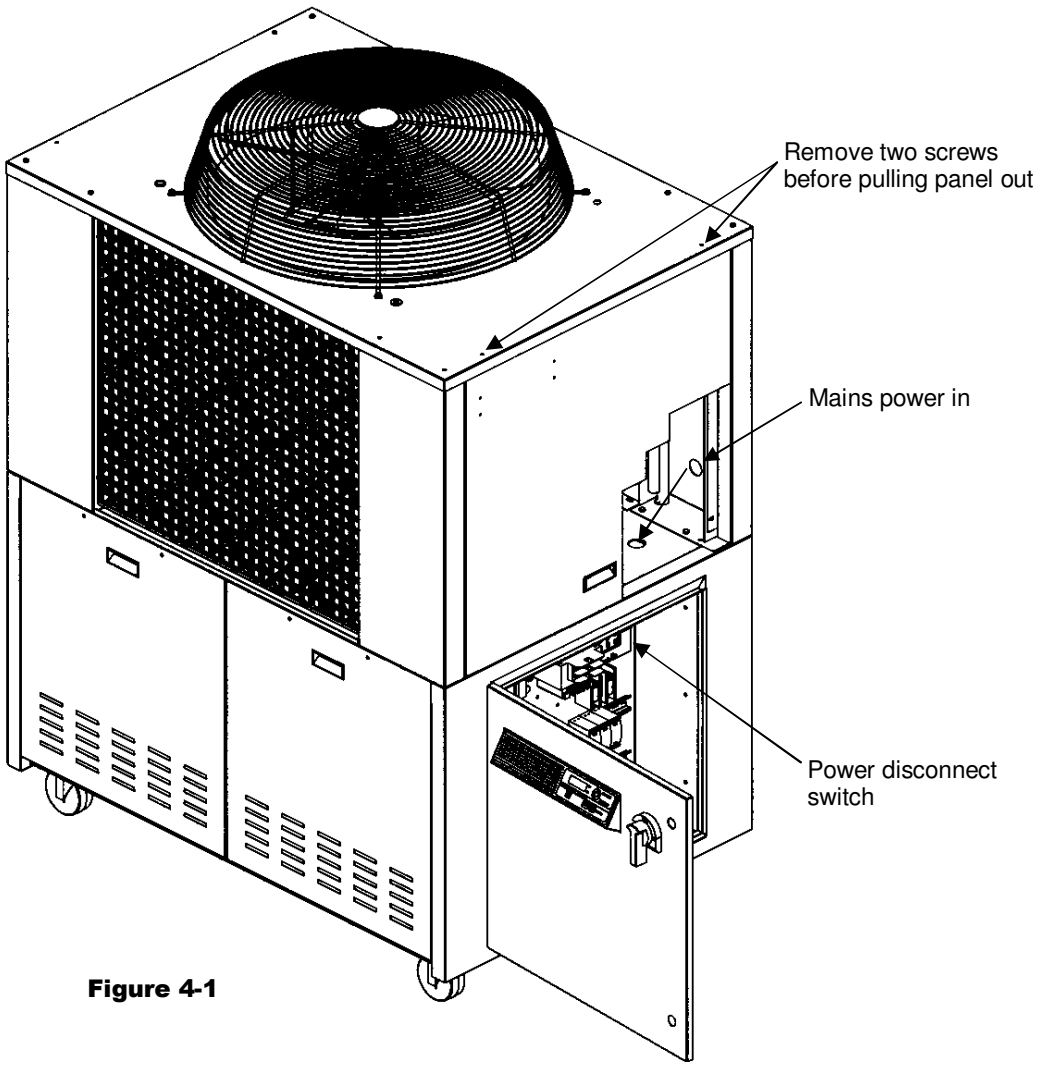


Figure 4-1

Once the front panel has been removed, place the Power Switch/Disconnect knob in the Off position, turn the two screw latches on the door ¼ turn counter-clockwise and open the enclosure door.

Route the wiring through the side of the Chiller, down to the electrical box, and to the main disconnect. Be sure to connect the wires in the proper phase sequence. I.e., L1,L2, and L3. Provide suitable conduit strain relief and grounding.

Once the power connection has been made, the enclosure door closed, and the Power Switch/Disconnect placed in the On position, you are ready for Chiller startup.

NOTE: When the Power Switch/Disconnect is placed in the On position, four decimal points (....) will appear on the Controller's LED. This signifies that the Controller is in "standby" and ready for power up.

IMPORTANT: Do not turn Controller power On until the Chiller reservoir has been filled. When Controller power is turned On, the pump automatically begins pumping. If the reservoir has not been filled, the pump could be damaged.

Turn main power Off before filling the reservoir.

4.6 Startup

IMPORTANT: Be sure to turn main power Off before filling the reservoir.

4.6.1 Process Coolant

Suitable Fluids

IMPORTANT: Only use fluids that will satisfy safety, health, and equipment compatibility requirements. Caustic, corrosive, or flammable fluids must never be used.

The Chiller is designed to accommodate a variety of coolant fluids. Water, glycol mixtures, etc. For most applications above 15°C (59°F), distilled water is satisfactory. For operation below 15°C (59°F), the Chiller must be protected with an antifreeze solution. Ethylene glycol (laboratory grade) or ethylene propylene (laboratory grade) and water in a 50/50 mixture is satisfactory from +15° to 0°C (59° to 32°F). Select a fluid that is compatible with the Chiller's wetted parts of brass, copper, polyethylene, polypropylene, PVC, nylon, and stainless steel.

NOTE: Do not fill the reservoir with deionized water unless your Chiller is equipped with the DI water compatible piping option.

Do not use flammable fluids as a fire hazard may result.

WARNING: Operation below 15°C (59°F) requires antifreeze in the circulating fluid.

Filling the Reservoir

Remove the panel from the rear left side of the enclosure. It is held in place with ¼-20 Philips head captive screws.

Remove the filler cap from the reservoir and fill it to a level approximately 2 inches (5.1 cm) from the top of the reservoir. Use a funnel with hose attached to fill the reservoir with fluid. When full, remove the funnel, but do not replace the cap at this time.

If the Chiller is equipped with the Automatic Water Makeup option, open any user-installed valves on the makeup water supply line.

NOTE: The Automatic Water Makeup system is controlled by the Chiller. When additional liquid is called for, the system's solenoid valve will open to bring the fluid level in the reservoir up to the proper level. However, this system does begin operating when Controller power is turned on. When using automatic water makeup, the cooling fluid should be periodically checked for proper freeze protection.

4.6.2 Starting Process Fluid Flow

WARNING: The Chiller's electrical power phase connection should be checked for proper wiring on initial startup. A reversed phase sequence will cause the pump, fan, and compressor to run in reverse, with potentially damaging results.

Check for proper pump rotation by looking through the slots on the back of the pump with a flashlight as the pump starts up. Because the pump comes up to speed extremely quickly, it may be necessary to have a helper cycle the Controller on and off while you observe the pump. You may also want to set the Chiller's temperature set point at its maximum to delay/prevent the compressor from turning on until you've verified that the phase connections are correct.

If the phase connection is incorrect, switch any two of the 3 phase inputs.

Open the valves on the process inlet and outlet lines.

If the Chiller is water-cooled (DCW500 and DCW 750), open any user-provided valves on the condenser cooling water lines.

Turn main power On.

Press the Controller's On button. The system startup sequence will begin and proceed as follows:

- The pump will turn on and four 8s (8888) will appear on the Controller's display.
- The current set point temperature will briefly appear on the display followed by the actual temperature reading. The "degrees" LEDs will flash while the set point value is displayed.
- The system will then go through a 10-second initialization sequence (display will countdown from 10).
- Once the initialization has been completed, the compressor will turn on. When the pressure in the discharge line reaches 250 PSI, the fan will turn on (air-cooled models) or the condenser water regulating valve (water-cooled units) will open.
- The Controller will display the actual process fluid temperature. The appropriate "degrees" LED will be lit continuously.

Check the fluid level in the reservoir. The liquid level should drop as fluid flows to the process. Slowly add fluid to the reservoir until the level in the reservoir stops going down. This means that the system is filled and any entrained air purged. If the Chiller is equipped with the Automatic Water Makeup option, fluid will be added automatically. Replace the reservoir cap and securely tighten.

Check for leaks in the process lines and at the process line connections.

While observing the outlet water pressure gauge, slowly close the valve on the process water outlet line until the outlet pressure value equals the proper value for your Chiller:

DCA & DCW 500	DCA & DCW 750
30 PSI (2.5 Bar)	26 PSI (2.3 Bar)

At these outlet pressure values, the outlet flow on DCA and DCW 500 Chillers is approximately 12 GPM (45.4 liters/minute); on DCA and DCW 750 Chillers, the outlet flow is approximately 16 GPM (60.6 liters/minute). At these flow rates, the inlet to outlet temperature differential is approximately 6° to 10°F (3° to 6°C).

4.6.3 Adjusting the Set Point

NOTE: The factory default set point temperature is 50°F (10°C).

Press the Set/Menu button on the Controller. The current set point temperature will be displayed and the "degrees" LED will flash, indicating the temperature can be changed.

Rotate the Setting Adjustment knob until the desired set point temperature is displayed. The setting is accepted after pressing the Set/Menu button or will be accepted automatically after a few seconds of keypad inactivity.

4.6.4 Selecting Celsius or Fahrenheit

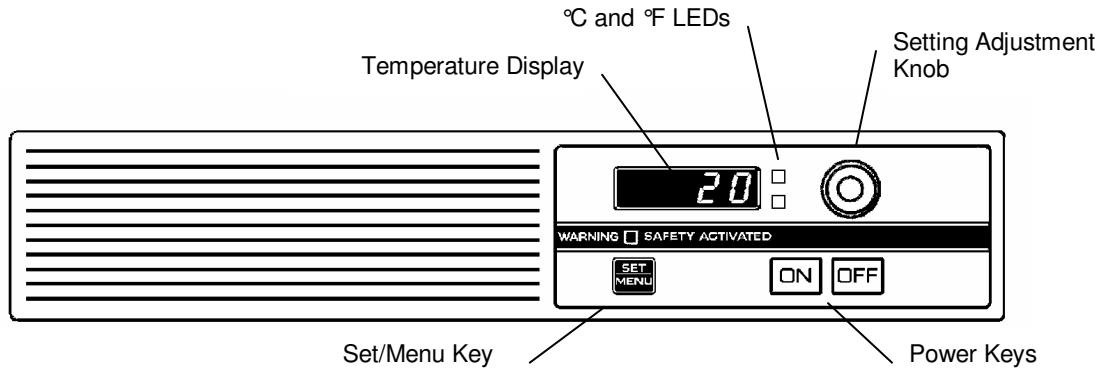
NOTE: The factory default units of measure is °C.

Press and hold the Set/Menu button until “UNITS” appears on the display.

Press Set/Menu again to display the current temperature scale (°C or °F). Rotate the Setting Adjustment knob until the desired temperature scale is displayed. The setting is accepted after pressing the Set/Menu button or will be accepted automatically after a few seconds of keypad inactivity.

The Chiller is now fully operational. To fine tune performance or adjust the factory-set temperature limit values, see Section 5 – Normal Operation.

Section 5 – Normal Operation



5.1 Power On

When the Power Switch/Disconnect is placed in the On position, the Controller goes into a "standby" mode. Four decimal points (....) will appear on the Controller's display.

IMPORTANT: Do not turn Controller power On until the Chiller reservoir has been filled. When Controller power is turned on, the pump automatically begins pumping. If the reservoir has not been filled, the pump could be damaged.

Press the Controller's On button. The system startup sequence will begin and proceed as follows:

1. The pump will turn on and four 8s (8888) will appear on the Controller's display.
2. The current set point temperature will briefly appear on the display followed by the actual temperature reading. The "°F" LED will flash while the set point value is displayed.
3. The system will then go through a 10-second initialization sequence (display will countdown from 10).
4. Once the initialization has been completed, the compressor will turn on. When the pressure in the discharge line reaches 250 PSI, the fan will turn on (air-cooled models) or the condenser water regulating valve (water-cooled units) will open.
5. The Controller will display the actual process fluid temperature. The appropriate "degrees" LED will be lit continuously.

5.2 Controller Display / Menu Structure

Display	Description
XX	When °F or °C LED is lit continuously, the actual fluid temperature is being displayed. When the °F LED is flashing, the set point temperature is being displayed.
UNITS	This menu item provides access to the Temperature Scale. It allows the user to select the temperature scale used to display all temperature values. See Section 5.5 for more information.
- 0 -	The menu item has no user-adjustable function.
HI-L	This menu item provides access to the Maximum Setpoint Temperature value. It allows the user to set a limit on how high the temperature set point can be set. See Section 5.6 for more information.
t_LO	This menu item provides access to the Low Temperature Safety value. It allows the user to set a minimum process fluid temperature value. the See Section 5.7 for more information..
t-HI	This menu item provides access to the High Temperature Safety value. It allows the user to set a maximum process fluid temperature value. See Section 5.8 below for more information.
dcb	This menu item provides access to the Down Control Band value. It is used in conjunction with the “ucb” setting to control how frequently the compressor cycles on and off. See Section 5.9 for more information..
ucb	This menu item provides access to the Up Control Band value. It is used in conjunction with the “ducb” setting to control how frequently the compressor cycles on and off. See Section 5.9 for more information.

NOTE: See Section 5.11 for Alarm and Error messages.

5.3 Controller Display / Menu Navigation

Actual Fluid Temperature — This is the Controller’s normal operating display.

Set Point Temperature — The set point temperature can be checked at any time by simply pressing the Set/Menu button.

Operational Setup Menus and Values — Operational Setup Menus are accessed by pressing and holding the Set/Menu button until UNIT is displayed. Rotating the Setting Adjustment knob scrolls through the available menu items. Scrolling can be from top down (clockwise rotation) or bottom up (counter-clockwise rotation). The operational value for a particular menu item is accessed by pressing the Set/Menu button when that menu item is displayed. Displayed values can be accepted by pressing either the Set/Menu button, the Power On button, or simply allowing a few seconds to pass without any keypad activity.

Once a displayed value is accessed and/or changed, the user can return to the operational setup menu by pressing the Set/Menu button or return to the normal operating display by pressing the Power On button.

NOTE: After a few seconds of keypad inactivity, the Controller automatically returns to the normal operating display.

5.4 Checking / Adjusting the Set Point

Press the Set/Menu button on the Controller. The current set point temperature will be displayed and the “°F” LED will flash, indicating the temperature can be changed.

To change the set point, rotate the Setting Adjustment knob until the desired set point temperature is displayed. Press the Set/Menu button or simply allow the display to “timeout” to accept the new value.

5.5 Selecting Celsius or Fahrenheit (UNITS)

Press and hold the Set/Menu button until “UNIT” appears on the display.

Press Set/Menu again to display the current temperature scale (°C or °F). Rotate the Setting Adjustment knob until the desired temperature scale is displayed.

Press the Set/Menu button to return to the Operational Setup Menus. Press the Power On button to return to the normal operating display.

5.6 Setting the Maximum Set Point Temperature Value (Hi-L)

The Maximum Set Point Temperature value limits how high the set point temperature can be set. It is intended to prevent the operator from inadvertently raising the setpoint temperature above a user-established maximum temperature. On Chillers with the standard operating temperature range, It can be set between 32° and 86°F (0° and 30°C); on Chillers with the expanded temperature range option, the range is 5° to 185°F (-5° to 85°C).

To view or change the Maximum Set Point Temperature Value setting, press and hold the Set/Menu button until “UNIT” appears on the display. Rotate the Setting Adjustment knob until Hi-L appears and press the Set/Menu button again.

Rotate the Setting Adjustment knob until the desired maximum set point temperature value is displayed.

Press the Set/Menu button to return to the Operational Setup Menus. Press the Power On button to return to the normal operating display.

5.7 Setting the Low Temperature Limit Value (t_LO)

The Low Temperature Limit setting is used to establish a low limit temperature for the Chiller. It can be set between -6° and +15°C (21° and 59°F). When the process fluid temperature drops below this value, a warning message flashes on the display and the compressor turned off. On air-cooled models, power to the fan is also disconnected.

To view or change the Low Temperature Limit setting, press and hold the Set/Menu button until “UNIT” appears on the display. Rotate the Setting Adjustment knob until t_LO appears and press the Set/Menu button again.

Rotate the Setting Adjustment knob until the desired minimum fluid temperature value is displayed.

Press the Set/Menu button to return to the Operational Setup Menus. Press the Power On button to return to the normal operating display.

5.8 Setting the High Temperature Safety Value (t-Hi)

The High Temperature Safety setting is used to establish a maximum operating temperature for the Chiller. It can be set between 0° and 50°C (32° and 122°F). When the process fluid temperature exceeds this value, a warning message flashes on the display and the compressor and pump turned off. On air-cooled models, power to the fan is also disconnected.

To view or change the High Temperature Safety setting, press and hold the Set/Menu button until “UNIT” appears on the display. Rotate the Setting Adjustment knob until HI-L appears and press the Set/Menu button again.

Rotate the Setting Adjustment knob until the desired maximum fluid temperature value is displayed.

Press the Set/Menu button to return to the Operational Setup Menus. Press the Power On button to return to the normal operating display.

5.9 Setting the Down/Up Control Bands (dcb / ucb)

The Down and Up Control Band values are used to control how frequently the compressor cycles on and off. In general, you should only be concerned with these settings if your process heat load is less than 50%.

The Down Control Band (dcb) value establishes how much below the set point the fluid temperature can drop before the compressor is turned off. The Up Control Band (ucb) establishes how much above the set point the fluid temperature can rise before the compressor is turned on. The dcb and ucb values can be set from 1.8° to 7.2°F (1.0° to 4.0°C).

EXAMPLE: If the dcb and ucb values are both set at 3.0°F and the temperature set point is at 50°F, the compressor will turn on at a fluid temperature of 53°F and remain on until the fluid temperature drops below 47°F.

NOTE: The tighter the temperature control, i.e., the smaller the dcb and ucb values, the more frequently the compressor will cycle on and off. Frequent cycling may shorten compressor life.

To view or change the Control Band values, press and hold the Set/Menu button until “UNIT” appears on the display. Rotate the Setting Adjustment knob until either dcb or ucb appears and press the Set/Menu button again.

Rotate the Setting Adjustment knob until the desired value is displayed.

Press the Set/Menu button to return to the Operational Setup Menus. Press the Power On button to return to the normal operating display.

5.10 Controller Default Settings

The Controller’s factory default settings are as follows:

Set Point	50°F (10°C)
Unit	°F
HI-L	86°F (30°C)
t_LO	39°F (4°C)
t-HI	95°F (35°C)
dcb	1.8°F (1.0°C)
ucb	1.8°F (1.0°C)

To reset the Controller to the factory default values:

1. Place the main Power Switch/Disconnect in the Off position.
2. Press and hold the Power On button on the Controller.
3. While still holding the Power On button, press and hold the Set/Menu key and place the main Power Switch/Disconnect in the On position.
4. The Controller will display “DEF” and go into the Standby mode.
5. Reset temperature set point and other operating parameters as required.

5.11 Controller Operating, Alarm, and Error Messages

The following table lists the various messages which may appear on the Controller's digital display. Some are normal operating displays, others indicate that an alarm condition or malfunction has been detected.

See Section 5.2 for information on Menu displays.

Display	Message	Description / Action Required
....	Standby mode	Controller power is Off. Press Power On button to begin Chiller operation.
8888	Power up self-test	Appears when Controller Power On button is pressed. Allow Controller to complete self-test sequence.
XX °LED lit	Actual fluid temperature	Normal operating display.
XX °LED flashing	Temperature set point	Appears when Set/Menu button is pressed. Rotate Setting Adjustment knob to change set point.
HI-L	High set point alarm	Temperature set point has been set above user-set high set point value. Power to pump turned Off (fan also turned Off on air-cooled units). Decrease temperature set point or increase HI-L value.
t_LO	Low temperature alarm	Fluid temperature has dropped below user-set low temperature value. Power to condenser and pump turned Off (fan also turned Off on air-cooled units). Correct problem or decrease t-LO value.
t_HI	High temperature safety alarm	Fluid temperature has exceeded user-set high temperature safety value. Power to pump turned Off (fan also turned Off on air-cooled units). Correct problem or increase t-Hi value.
DEF	Default reset	Briefly appears when Controller's operating parameters are restored to the factory default settings.
E-tF	Triac failure	Chiller malfunction. Power to compressor and pump turned Off (fan also turned Off on air-cooled units). Consult factory.
E-nF	No flow	Flow fault. Power to compressor and pump turned Off (fan also turned Off on air-cooled units).Remove restriction.

5.12 Remote On/Off

If the Chiller is wired for Remote On/Off operation, closing the remote switch will turn the Chiller Off; opening the switch will turn the Chiller On.

NOTE: When the remote switch is closed, the Chiller cannot be operated from the local control panel.

5.13 Remote Control

Chiller operation can be controlled remotely via the RS232 (RS485 optional) interface. See Section 4.4.2 for installation and protocol information.

The following commands may be executed remotely:

Power On/Off
Change Set Point
Read Fluid Temperature
Read Temperature Units

5.14 Loss of Power

In the event that power is lost while the Chiller is operating, the unit will automatically begin operating when power is restored.

If the unit was in the Standby mode when power was lost, it will power up in the Standby mode.

Section 6 – Routine Maintenance

6.1 Recommended Routine Maintenance Schedule

Routine Maintenance Procedure	Frequency
Inspect and clean inline strainer	Weekly for the first month of operation; every three months[1] thereafter.
Check reservoir coolant level	Monthly
Check coolant freeze protection	Monthly
Inspect and clean air filters (DCA Chillers only)	Weekly for the first month of operation; monthly[1] thereafter.
1. Maximum. Your plant condition may require more frequent inspection and cleaning.	

6.2 Routine Maintenance Procedures

6.2.1 Inline Strainer

The Chiller's Inline Strainer should be inspected and cleaned weekly for the first month of operation. Once you are certain that all debris that may have been generated or dislodged during startup has been filtered from the coolant, strainer inspection and cleaning can be performed less frequently.

The Inline Strainer is inspected and cleaned as follows:

1. Turn main Chiller power Off .
2. Using the Drain connection on the rear of the Chiller, remove a sufficient volume of coolant to bring the coolant level below the level of the Inline Strainer. You may want to collect the drained coolant in a clean receptacle so that it can be reused once the Inline Strainer has been cleaned and reinstalled.
3. Remove the Chiller's left rear side panel. The Inline Strainer is located just above the coolant reservoir.
4. Using an adjustable wrench or the proper size hex head socket, loosen and remove the Inline Strainer cap.

NOTE: There will be some residual coolant within the fitting housing the strainer which will drain out when the cap is removed. Take proper precautions to either collect or absorb this fluid when the cap is removed.

5. Remove the strainer from the cap (or fitting) and clean off all trapped debris. Either water or high pressure air can be used to remove the accumulated material.
6. Insert the strainer into the cap and reinstall in the fitting. Be sure to adequately tighten strainer cap.
7. Replace drained coolant.
8. Restore power and turn Chiller On.
9. Check for leaks.
10. Replace Chiller side panel.

6.2.2 Reservoir Coolant Level

The reservoir coolant level should be checked on a monthly basis and replenished as required. If your Chiller is not equipped with the optional Tank Fluid Level Indicator, it will be necessary to remove the left side panel and reservoir cap to check the coolant level. A proper fill level is approximately 2 inches (5.1cm) below the top of the reservoir.

If fluid replacement is required, slowly add coolant to the reservoir until the proper fill level is achieved.

6.2.3 Coolant Freeze Protection

Chillers being operated below 15°C (59°F) must be protected with an antifreeze solution (see Section 4.6.1). If this is the case with your Chiller, the coolant should be checked periodically for proper freeze protection.

6.2.4 Air Filters (Air-Cooled Chillers only)

Air-cooled Chillers incorporate two or more high-efficiency, reusable air filters. These should be inspected weekly during the first month of operation to determine how frequently cleaning is necessary. Chillers located in dusty environments will require more frequent filter cleaning.

IMPORTANT: Do not allow the air filters to become caked with dust. This significantly reduces air flow and can compromise cooling efficiency. It can also lead to filter breakthrough, allowing dust to get into the condenser coils.

The Chiller's air filters are removed and cleaned as follows:

1. Grasp the strap at the bottom center of the filter and gently lift up and away from the Chiller housing.
2. Using a water or high pressure air stream directed through the back of the air filter (the downstream side), rinse/blow accumulated dust from the filter. Allow the filter to dry, as required.
3. Replace the filter by positioning the top edge of filter in the upper channel of the Chiller housing and then gently lifting on the bottom strap while pushing the bottom edge of the filter toward the housing.

Section 7 – Troubleshooting

WARNING: Refer servicing to qualified service personnel. When power is on, dangerous voltages exist within chassis components. Use extreme care when measuring voltages on live circuits.

7.1 Troubleshooting Guide

Symptom	Possible Cause	Corrective Action(s)
Controller display reads "**. . . .**" Pump, condenser, and (air-cooled Chillers) fan OFF.	Controller power OFF	Press Controller ON button.
Controller display reads "Hi-L" Pump and (air-cooled Chillers) fan OFF.	High set point alarm — temperature set point has been set above the user-set high set point value	Decrease temperature set point. Increase Hi-L value.
Controller display reads "t_LO" Pump, condenser, and (air-cooled Chillers) fan OFF	Low temperature alarm — Coolant temperature has fallen below user-set low temperature value	Correct problem causing low coolant temperature. Decrease t_LO value.
Controller display reads "t_HI" Pump, condenser, and (air-cooled Chillers) fan OFF	High temperature alarm — Coolant temperature has exceeded user-set high temperature value	Correct problem causing high coolant temperature. Increase t_HI value.
Controller display reads "E-tF" Pump, condenser, and (air-cooled Chillers) fan OFF	Triac failure	Consult factory.
Controller display reads "E-nF" Pump, condenser, and (air-cooled Chillers) fan OFF	Flow fault caused by low coolant level, restricted fluid flow, or faulty pump	Check for proper coolant level. Remove restriction causing low flow condition. Check for proper pump operation.
Local Controller cannot be turned ON	Chiller connected wire for remote ON/OFF operation	Open remote ON/OFF contact.
Pump ON, condenser and (air-cooled Chillers) fan OFF	High ambient and/or fluid temperature has caused the high refrigerant pressure safety cutout to activate	Correct problem causing high temperature conditions and reset high refrigerant pressure safety cutout switch. See Section 7.2.
Unit will not operate (no display, no pumping, no cooling)	Main power off	Check fuse/circuit breaker on power line; verify that power is reaching Chiller. Verify that Power Switch/Disconnect is in ON position.
No or insufficient cooling	Heat load too high Blocked air filters (air-cooled Chillers only)	Check for excessive ambient and/or process heat load; correct as required. Check and clean air filters as required.

7.2 Resetting the High Refrigerant Pressure Safety Cutout

An excessive ambient and/or process heat load can cause the Chiller's high refrigerant pressure safety cutout to activate, removing power from the condenser and (on air-cooled Chillers) fan. The safety is factory-set to activate at a refrigerant pressure of 350 PSI.

To reset the high refrigerant pressure safety cutout switch, proceed as follows:

1. Correct the condition causing the excessive head load.
2. Turn power to the Chiller OFF.
3. Remove the Chiller's right front side panel.
4. Locate the high refrigerant pressure safety cutout switch. It is located near the compressor discharge and has a blue housing with red reset button.
5. Press the reset button on the top of the switch. There should be a tactile and/or audible click as it resets.

   NOTE: Allow sufficient time (approximately 15 minutes) for the pressure in the refrigeration system to decrease below 350 PSI before resetting the safety switch. If the reset action seems "soft" or the Chiller will not resume operation on power up, it's likely that the refrigerant pressure is still above the 350 PSI cutout value.
6. Replace the side panel.
7. Turn power to the Chiller back ON and resume normal operation.

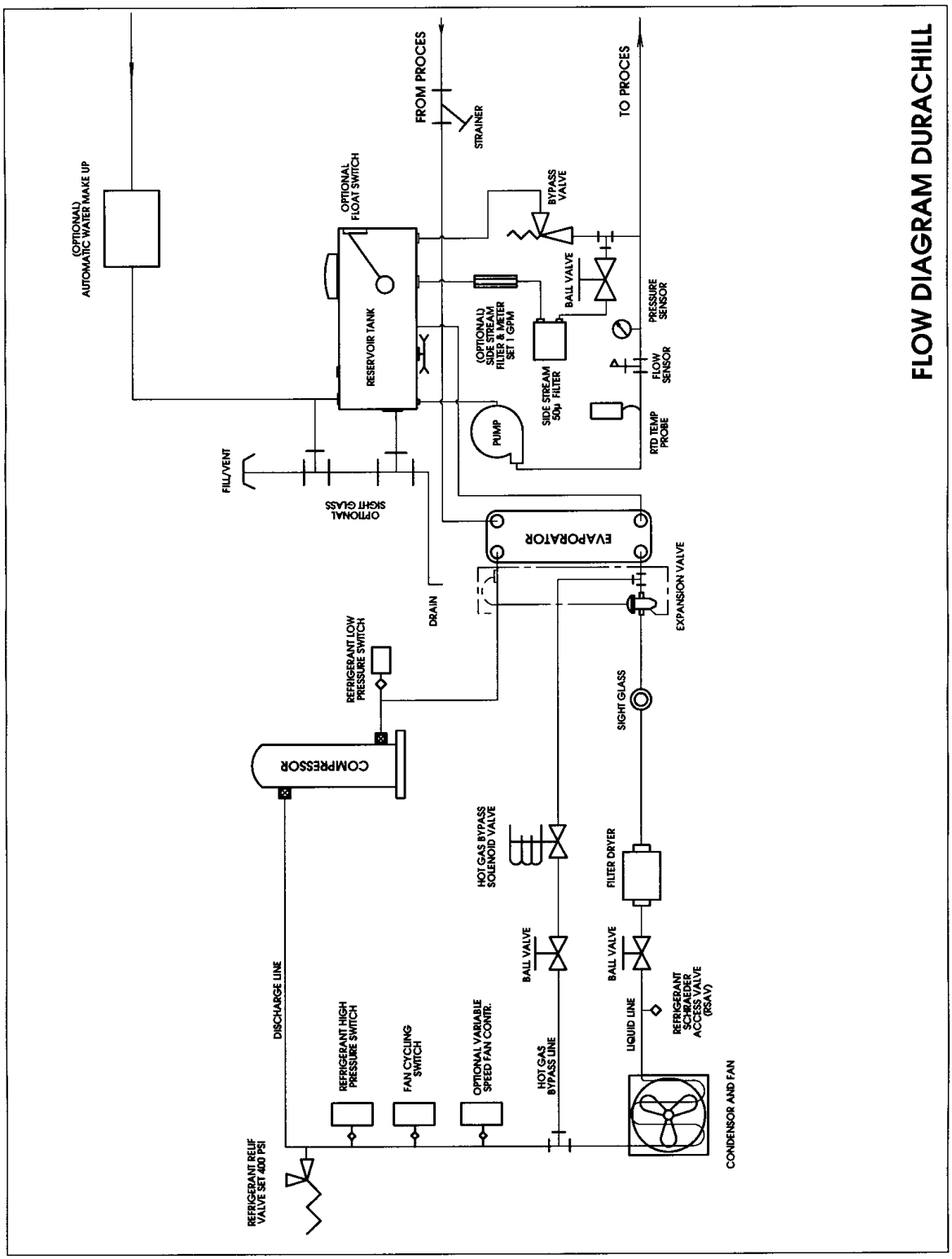
Section 8 – Service and Technical Support

If you have followed the troubleshooting steps outlined in Section 7 and your Chiller still fails to operate properly, contact the supplier from whom the unit was purchased. Have the following information available for the customer service person:

- Model, Serial Number, and Voltage (from side panel label)
- Date of purchase and purchase order number
- Supplier's order number or invoice number
- A summary of the problem

Appendix

A.1 Flow Schematic



A.2 Electrical Schematic