DURACHILL™

by PolyScience

Operators Manual

DuraChill™

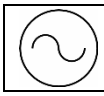
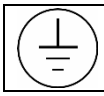
Air and Water Cooled

5, 7.5 and 10 HP Chillers

110-279
040511

Table of Contents

Section 1 – Safety and Warranty Information

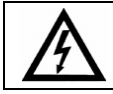
	This symbol alerts you to a wide range of potential dangers.
	This symbol advises you of danger from electricity or electric shock.
	This symbol indicates that a hot surface may be present.
	This symbol marks information that is particularly important.
	This symbol indicates alternating current.
	This symbol indicates protective earth (ground). Only connect the unit to a power socket with earth (ground) contact (PE – protective earth)! The power supply connector plug serves as a safe disconnecting device from the line and must always be easily accessible.
	This symbol on the Power Switch indicates that it places the unit into a fully powered state.
	This symbol on the Power Switch indicates that it disconnects power to the unit.
	This symbol on the Power Switch indicates that it places the unit in a standby mode. It DOES NOT fully disconnect the unit from the power supply.

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

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.

	CAUTION: Be sure to follow your company's procedures and practices regarding the safe lifting and relocation of heavy objects.
	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 label 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 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 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 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 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.

"Warranty on Durachill and other custom-designed products apply only to the original end-user and cannot be transferred or sold to another end-user without written consent from the manufacturer."

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. If the unit is damaged or does not operate properly, contact the transportation company, file a damage claim and contact the company where you unit was purchased immediately.

Section 2 – Description

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.

2.2 Features – Standard and Optional

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

Standard Features

- Process temperature range: 32 to 86°F (0 to 30°C)
- Ambient temperature range: 60 to 104°F (16 to 40°C)
- Temperature stability: ±2°F (±1.11°C)
- High efficiency vertical air exhaust
- Accurate microprocessor control with a digital LED readout
- Pump protection by means of a Full Flow Bypass valve
- Copeland Scroll® compressor
- Compressor protection through high and low refrigerant pressure cutouts
- Process protection provided by over and under temperature alarms
- RS-232 communications interface
- Reservoir level sight glass
- Remote on / off control (dry contact)
- Dry contact Status Alarm output
- Power Phase Monitor on 3 phase units
- Heavy duty locking casters provide easy maneuverability
- Stainless Steel Centrifugal Pump (1HP – 5 & 7.5, 2HP – 10)

Optional

- Assorted Centrifugal and Turbine pumps
- RS-485 communications interface
- Remote on / off control (24VDC)
- Process Shutoff Valves
- External Bypass Valve
- Stainless Steel Reservoir
- Heaters
- Feet to replace casters
- Reservoir Level Float Switch
- Side Stream Filter assemblies
- External Inlet / Outlet Filter assemblies
- Deionized compatible process plumbing

A configuration Data Sheet showing how your chiller is equipped will be included with the manual if applicable.
(See inside of front cover.)

2.3 Component Identification

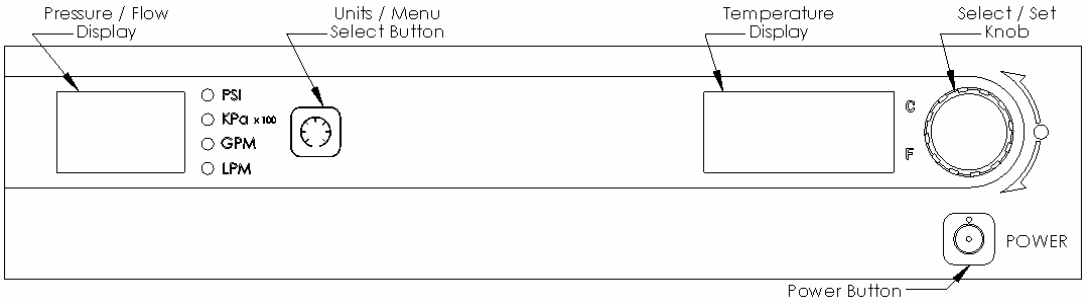
Your Model 500 – 750 – 1000 Chiller consists of 3 basic sub-systems:

- 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.

2.3.1 Control System

Control Panel – Temperature set point, temperature units, and operating parameters are set via the Control Panel. Operating information is displayed on a local LED readout.



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 / Disconnect is placed in the "OFF" position.

NOTE: Loss of Power – In the event that power is lost while the Chiller is operating, the unit will automatically resume operation when the power is restored.
If the unit was in the standby mode when power was lost, it will power up in the standby mode.
The above is also true if power is removed via the "Power Switch / Disconnect".

Temperature Probe – An internal RTD is used to measure fluid temperature downstream of the pump. Its reading is displayed on the Control Panel LED display.

Flow Sensor – Monitors process fluid flow. If the flow rate is less than the user settable alarm value, power to the pump, compressor and fan is removed and an alarm message is displayed on the Control Panel LED display.

Flow Switch – Requires a minimum of ~4GPM to close. If the flow rate is too low the switch will open and power to the pump, compressor and fan is removed and an alarm message is displayed on the Control Panel LED display.

Fluid Pressure Sensor – Measures fluid pressure at outlet of pump. If the fluid pressure exceeds the user settable alarm value, power to the pump, compressor and fan is removed and an alarm message is displayed on the Control Panel LED display.

Refrigerant Pressure Switches – These switches, if activated will remove power to the pump, compressor and fan and display an alarm message on the Control Panel LED display.

The Low Pressure switch opens if the refrigerant pressure falls below 10 PSI and closes if the pressure is above 30 PSI. The Low Pressure will auto-reset by itself.

The High Pressure Switch will open if the refrigerant pressure exceeds 630 PSI. The High Pressure Switch must be manually reset (See 7.9).

Fan Cycling Switch – This switch controls fan operation. The fan turns on when the discharge pressure of the refrigerant exceeds 400 PSI and will remain running until the pressure falls below 300 PSI.

NOTE: 10 HP units have 2 fans; one fan comes on with the compressor and runs continuously as long as the compressor is on. The 2nd fan will operate on refrigerant discharge pressures ("On" at 400, "Off" at 300).

Reservoir Float Switch (optional) – Measures liquid level in the unit's reservoir and, if the level drops too low, power to the pump, compressor and fan is removed and an alarm message is displayed on the Control Panel LED display.

2.3.2 Fluid Circulation System

This system governs the circulation of flow through the unit.

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

Reservoir Tank – This 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. A stainless steel reservoir tank is available as an option.

Sight Glass or Level Indicator – This indicator serves as a convenient means of checking the liquid level within the Reservoir Tank. The sight glass is located on the rear panel.

Pump – The pump is used to pump fluid from the reservoir to the process and back to the Chiller. A variety of pumps are available for operation at different pressures, flow rates and distance from the process to the Chiller.

Full Flow Bypass – Allows the maximum operating pressure to be regulated and protects the pump in the event that the process piping becomes restricted or clogged. Diverts flow from the process line back to the evaporator and reservoir.

Y-Strainer – Located on the inlet to the Chiller; has a removable, cleanable 20 mesh (841micron) stainless steel screen to remove larger particulate matter from process fluid.

External Bypass / Shutoff Valves (optional) – Allows for unit to be operated independent of process for servicing of process equipment and / or hoses. Can also be used to fine tune pressures and flows to process.

Process Side-Stream Filter System (optional) – Consists of 50 micron filter and ball valve connected between inlet and outlet; used to filter particulate matter from a portion of the process fluid flow.

2.3.3 Cooling System

The condenser on your chiller is either air-cooled (DA models) or water-cooled (DW models). The following components are common to all systems.

Common Cooling System Components

Evaporator – Serves as the heat exchanger between the refrigeration and fluid flow systems. Cools fluid before it returns to process. Removes heat from process fluid.

Compressor – The Chiller incorporates a 5 to 10 HP Copeland Scroll® compressor. The compressor is protected from overloads through high and low refrigerant pressure cutouts.

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.

Thermostatic Expansion Valve (TXV) – 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 help maintain a constant temperature when the temperature of the process fluid falls below the set point temperature. Under low and no-load conditions, temperature typically continues to fall until it reaches the "Lb" lower band and shuts off the compressor.

Refrigerant Safety Relief Valve – Automatic safety used to vent refrigeration gas if it exceeds 650 PSI.

Air-Cooled Chillers

Condenser – The compressor pumps vapor into the condenser at high pressure. As the surrounding air is cooler than the hot vapor, heat energy is passed into the air from the condenser tubes.

Condensing Fan – A 1 HP fan (2 fans on the 10 HP) that draws air over the condenser coils to cool refrigerant gas. The standard fan cycles on and off based on refrigerant pressure (The 2nd fan on the 10 HP runs whenever the compressor is on). The standard fan turns on at 400 PSI and off at 300 PSI.

Water-Cooled Chillers

Brazed-Plate Heat Exchanger / Condenser – Serves as the heat exchanger between the refrigeration system and facility water supplied by customer. Removes heat from refrigerant.

Condensing Water Regulating Valve – This valve regulates the facility water flow to maintain optimal discharge pressure for heat exchange in the condenser by increasing flow to decrease pressure and decrease flow to raise the pressure.

Receiver – Its main purpose is to temporarily store excess refrigerant in its liquid state that is not required when load conditions are low. The receiver also provides a constant supply of liquid to the Thermostatic Expansion Valve (TXV).

Section 3 – Chiller Specifications and Pump Performance

3.1 Chiller Specifications

3.1.1 Air-Cooled Chillers – DA500, DA750 and DA1000

Model	DA500	DA750	DA1000
Process Temperature Range	32 to 86ºF (09 - 30ºC)		
Temperature Stability	±2.0ºF (±1.11ºC)		
Ambient Operating Temperature	60 to 104ºF (16 – 40ºC)		
Copeland Scroll® Compressor	5 HP	7.5 HP	10 HP
Refrigerant Charge (R-410A)	8 lbs.	12 lbs.	16 lbs.
Cooling Capacity[1]	4.66 tons 16,384 watts 55,920 BTU/hr	6.36 tons 22,361 watts 76,320 BTU/hr	9.51 tons 33,436 watts 114,120 BTU/hr
Nominal Evaporator Flow[2] (USGPM)	11.7	15.7	23.8
Fan	1 HP		1 HP x 2
Condenser Discharge Air Flow	3500 CFM	5300 CFM	6000 CFM
Reservoir Tank Capacity	16 Gallons		45 Gallons
Process Water Connections	1-1/2 FPT		
Dimensions (L x W x H)	56 x 35 x 67" (142.3 x 88 x 170 cm)		77 x 35 x 68" (195.6 x 88 x 172.7 cm)
Voltage / Phase / Hertz	Nominal Rated Amps[3]		
230 / 3 / 60 380 / 3 / 50 460 /3 / 60 575 / 3 / 60	30 15 15 13	N/A 20 20 16	N/A 30 30 25

Notes: 1. Capacity based on 68ºF (20ºC) entering air, and leaving process water 68ºF.
2. Chiller flow rate base on 2.4 USGPM/ton (0.54m³/hr/ton).
3. Based on 1 HP Centrifugal Pump on DA500 & DA750 and a 2 HP Centrifugal pump on the DA1000 Chillers.

Refer to pump performance chart (3.2) for other pumps.

See nameplate on rear panel of chiller for amperage of your unit's configuration and options.

Specifications and dimensions subject to change without notice.

3.1.2 Water-Cooled Chiller - DW500

Model	DW500
Process Temperature Range	32 to 86ºF (09 - 30ºC)
Temperature Stability	±2.0ºF (±1.11ºC)
Ambient Operating Temperature	60 to 104ºF (16 – 40ºC)
Copeland Scroll® Compressor	5 HP
Refrigerant Charge (R-410A)	8 lbs.
Cooling Capacity	5.07 tons 17,825 watts 60,840 BTU/hr
Nominal Evaporator Flow[1] (USGPM)	12.7
Condenser Water Flow – Tower Water (USGPM)[2]	15.4
Reservoir Tank Capacity	16 Gallons
Process Water Connections	1-1/2 FPT
Condenser Water Connections	¾ FPT
Dimensions (L x W x H)	56 x 35 x 32.1" (142.3 x 88 x 81.6 cm)
Voltage / Phase / Hertz	Nominal Rated Amps[3]
230 / 3 / 60 380 / 3 / 50 460 /3 / 60 575 / 3 / 60	25 15 15 13

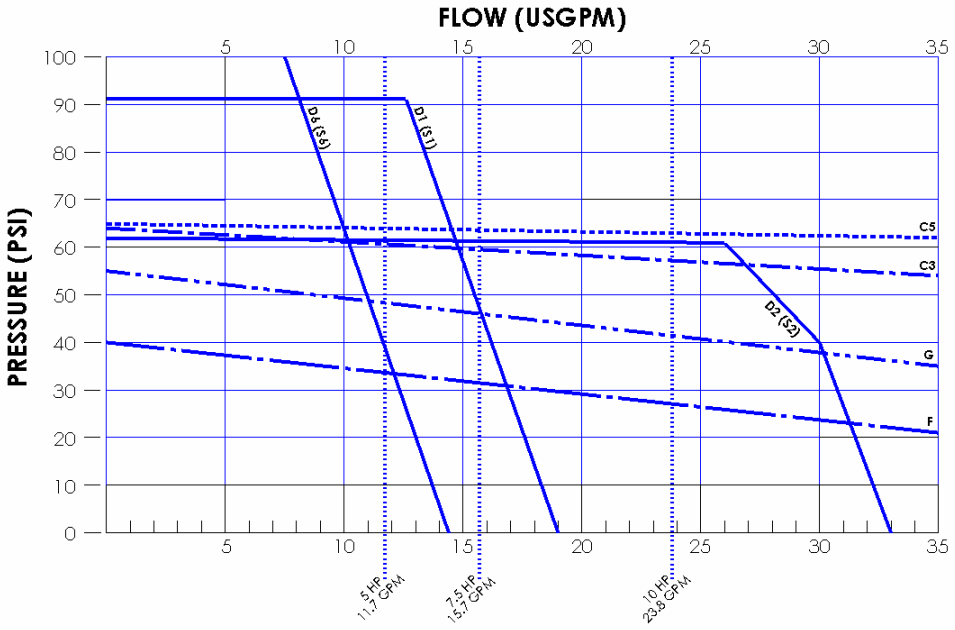
Notes: 1. Flow rate base on 2.4 USGPM/ton (0.54m³/hr/ton).
2. Tower Flow rate based on 85ºF (29ºC) entering water and 95ºF (35ºC) leaving water.
3. Based on 1 HP Centrifugal Pump.

Refer to pump performance chart (3.2) for other pumps.

See nameplate on rear panel of chiller for amperage of your unit's configuration and options.

Specifications and dimensions subject to change without notice.

3.2 Pump Performance



NOMINAL EVAPORATOR FLOW
Flows and pressures will vary with external load.
Connection tubing size and length will also add to external pressure drop.

STAINLESS STEEL CENTRIFUGAL	NOM.	230/460V 3 PHASE
1 HP CENTRIFUGAL[1]	**F**	215-733
2 HP CENTRIFUGAL[2]	**G**	215-678
3 HP CENTRIFUGAL	**C3**	215-738
5 HP CENTRIFUGAL	**C5**	215-780

[1] Standard 5 & 7.5 [2] Standard 10 HP

BRONZE TURBINE	NOM.	230/460V 3 PHASE
1.5 HP TURBINE	**D1**	215-483
2 HP TURBINE	**D6**	215-354
3 HP TURBINE	**D2**	215-484
5 HP TURBINE	**D3**	215-485

STAINLESS STEEL TURBINE	NOM.	230/460V 3 PHASE
1.5 HP TURBINE	**S1**	215-536
2 HP TURBINE	**S6**	215-479
3HP TURBINE	**S2**	215-537

Section 4 – Installation and Startup

	WARNING: Be sure all power is off before proceeding.

4.1 Site Requirements

Ambient Temperature and Relative Humidity

The chiller is designed for indoor installation in ambient temperatures between 60 and 104°F (16 and 40°C); relative humidity should not exceed 80% (non-condensing).

Location

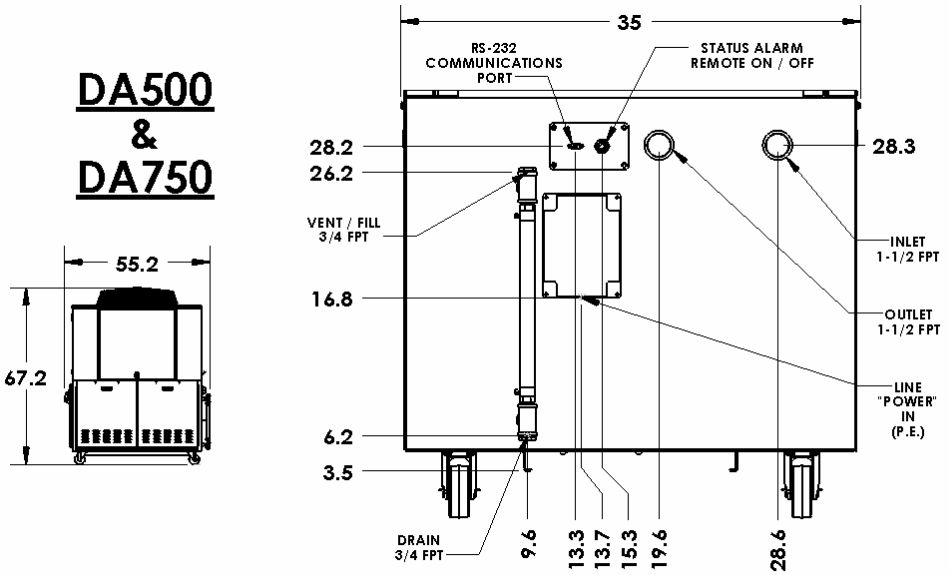
The Chiller should be installed on a strong, level surface capable of supporting 1050 lbs. (5 – 7.5 HP) or 1500 lbs. (10 HP). It should be located as close to possible to the process requiring cooling. It should not be installed closer than 4 feet (1.4 meters) to a heat generating source, such as heating pipes, boilers, etc. If possible, the Chiller should be located near a suitable drain to prevent flooding in the event of leaks. Do not place it where it where corrosive fumes, excessive moisture, excessive dust, or high room temperatures are present.

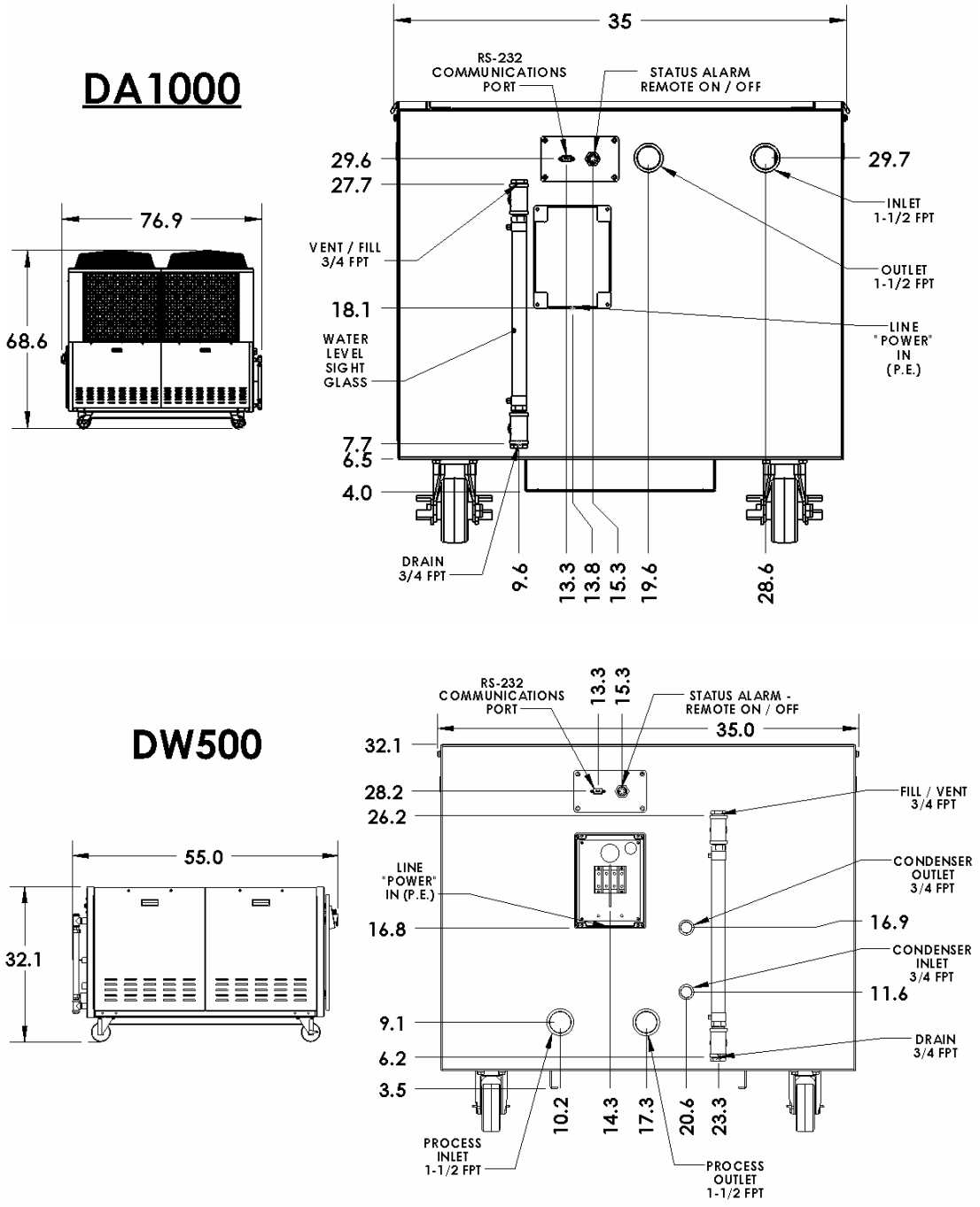
For ease of positioning and maneuverability, the Chiller is supplied with casters. The casters can be locked to keep the Chiller in place while in use.

To help prevent voltage drops, position the Chiller as close as possible to the power distribution panel. Avoid voltage drops by using a properly grounded power outlet wired to meet the electrical data plate requirements. The use of an extension cord is not recommended.

Clearance

Adequate clearance should be allowed on the front, sides and rear of the Chiller for access to connections and components. The front and rear vents of the Chiller must be a minimum of 24 inches (61 cm) away from walls or vertical surfaces so air flow is not restricted.





4.2 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 on the rear of the unit.

	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.

The Chiller is designed with a junction box on the rear of the unit to connect the electrical power supply conduit.

Be sure to connect the wires in the proper phase sequence; i.e. L1, L2 and L3. Provide suitable conduit strain relief and grounding.

Your Chiller is equipped with a phase monitor. It is located inside the electrical controls enclosure at the front of the unit. It will prevent startup if the phases are incorrect. It will also turn off the unit in the event of a loss of one phase or if there is a voltage mismatch between any 2 phases greater than 8%.

Do NOT remove the ground wire while diagnosing any power supply problem!

Make sure all electrical connections are tight.

⚠	**CAUTION!** – Make sure electrical connections comply with all applicable electrical codes – Ground the chiller in accordance with NEC Article 250 – Operation voltage must be within 10% of the nameplate rating – Phase imbalance must be below 5%
⚠	**WARNING: DO NOT apply power to the Chiller until the unit is ready for Startup (Section 4.5).**

4.3 Signal Inputs / Outputs

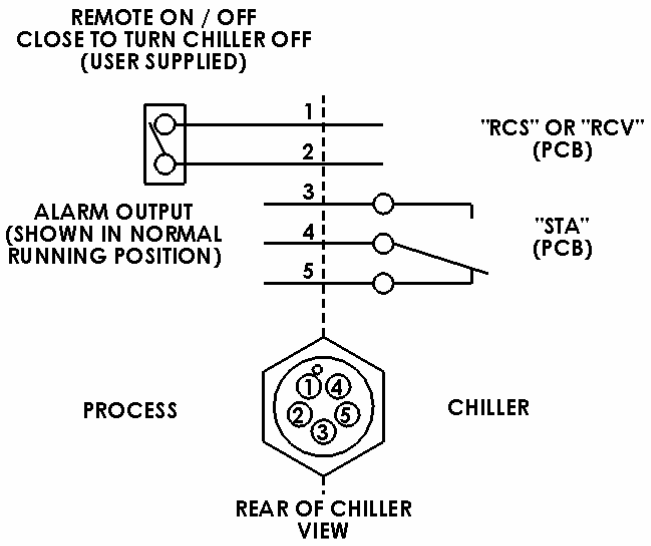


FIG 4.3

4.3.1 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 contacts is open; it is "Off" when the contact is closed. A 10 foot cord with mating 5-Pin plug 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 Chiller from being turned "On" and "Off" locally. The right hand display will read "E-C" for external control.

4.3.2 Alarm Output

This allows the user to connect a remote alarm device to the Chiller. The alarm output consists of NO and NC contacts which are switched whenever an alarm, fault or error condition is detected or when the chiller is off. A 10 foot cord with mating 5-Pin plug are provided.

4.3.3 RS-232 Serial Communications (RS-485 Option)

This allows the user to remotely control the Chiller and / or output temperature readings to an external recorder or other auxiliary device. A 9-pin D-connector is provided on the rear or the Chiller.

Serial Output

Serial Connector – A serial cable with the following connections should be used to connect the Chiller to a computer.

Pin # 2 – data read (data from computer)
Pin # 3 – data transmit (data to computer)
Pin # 5 – signal ground

RS-232 Protocol – The Chiller uses the following protocol

Data bits – 8
Parity – None
Stop bits – 1
Flow control – None
Baud rate – Selectable (Chiller and PC must match)

Communications Commands – Commands must be entered in the exact format shown. Do not send a [LF] (line feed) after the [CR] (carriage return). Be sure to follow character case exactly.

A response followed by and exclamation point (!) indicates that a command was executed correctly. A question mark (?) indicates that the Chiller could not execute the command (either because it was in an improper format or the values were outside the allowable range). A response must be received from the Chiller before another command can be sent. All responses are terminated with a single carriage return [CR].

Set Command Echo On	SE1[CR]	1	![CR]
Set Command Echo Off	SE0[CR]	0	![CR]
Turn Chiller On	SO1[CR]	1	![CR]
Turn Chiller Off	SO0[CR]	0	![CR]
Set Set Point Temperature	SSXXX[CR]	41 - 95°F (5 - 35°C)	![CR]
Read Set Point Temperature	RS[CR]	----	XX.X
Read Temperature	RT[CR]	----	XX.X
Read Temperature Units	RU[CR]	----	°C or °F
Read Fluid Pressure in PSI	RP[CR]	----	XX.X
Read Fluid Pressure in kPa	RK[CR]	----	XX.X
Read Flow in GPM	RG[CR]	----	XX.X
Read Flow in LPM	RL[CR]	----	XX.X
Read Ambient Temperature on PCB	RA[CR]	----	XX.X

4.4 Plumbing

All Chillers have two 1-1/2 FPT connections for the process inlet and outlet connections.

Water-Cooled Chillers also have two ¾ FPT connections for facility water for the condenser.

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 250 PSI.
- Flexible Tubing – Avoid tubing that will expand and take up fluid volume when operating at the desired pressure.

4.4.1 Reservoir Fill / Vent

A ¾ FPT connection is provided at the top of the water level sight glass.

If desired you may add water to chiller through this connection to maintain an adequate level. It is recommended that you fill the reservoir initially via the fill port at the top of the reservoir.

It may be necessary to vent and / or add a venting pipe to chiller to prevent siphoning and / or overflow due to amount of fluid external to the chiller's reservoir and / or the location of the process itself.

NOTE: If the amount of fluid at rest (unit "OFF") is beyond the capacity of the reservoir a normally closed solenoid valve may be necessary on the inlet to the chiller, along with a check valve on the outlet to prevent backflow into the chiller.

4.4.2 Reservoir Drain

A ¾ FPT connection is provided at the bottom of the water level sight glass for the reservoir's gravity drain.

4.4.3 Closed System

Connect the Chiller's inlet and outlet to the external apparatus with hoses or pipes. The direction of flow through the system can be controlled by the way the connections are made. Fluid is pumped out of the Chiller through the "Outlet" connection and returns to the unit through the "Inlet" connection.

NOTE: When Chillers are connected to an external apparatus with a built-in shutoff, an external bypass assembly (PolyScience Assembly No.: 520-518) is recommended for larger higher operating pressure pumps. This bypass assembly continues flow circulation to and from the pump even though the main flow to the external apparatus has been blocked.

4.4.4 Full Flow Bypass

This allows the user to adjust for a maximum operating pressure to the process. For low pressure pumps the pressure range is 7-35 PSI and on higher pressure pumps the range is 30 – 100 PSI.

NOTE: The full flow bypass also protects the pump when running continuously under dead head conditions due to external blockage to the flow.

Adjusting the Pressure Regulating Full Flow Bypass Setting

WARNING: Hazardous voltages are present.

The pressure regulating full flow bypass may be adjusted as follows:

1. Set the minimum flow rate limit to zero (see Section 5.4 "***FL***"). This will prevent the unit from activating the flow alarm while you are adjusting the maximum pressure setting.
2. Completely block the Chiller's outlet flow. This should cause the outlet pressure to rise.
3. Set the Pressure / Flow rate display to read in either PSI or kPA.
4. Remove the pressure regulating valve cap. There may be some coolant in the cap. This is normal. Using a flat blade screwdriver, adjust the pressure until the display reading matches the desired maximum pressure. Rotate clockwise to increase pressure and counterclockwise to decrease current pressure value. Replace and tighten cap.
5. Return the minimum flow limit value to the previous setting.
6. Scroll the Pressure / Flow rate display to preferred reading; GPM, LPM, PSI or kPa.

4.5 Startup

4.5.1 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.

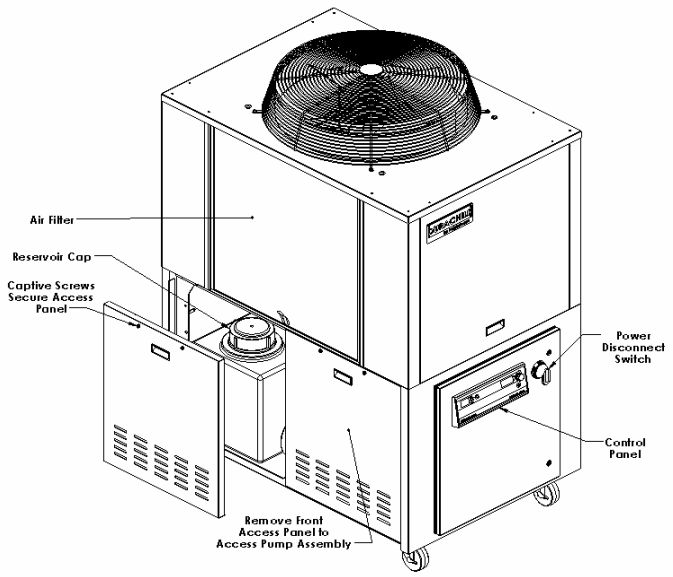
The Chiller is designed to accommodate a variety of coolant fluids, such as water, glycol mixtures, etc. For most applications above 60ºF (16ºC), distilled water is satisfactory. For operation below 60ºF (16ºC), the Chiller must be protected with an antifreeze solution. Ethylene glycol (laboratory grade) or polypropylene glycol (laboratory grade) and water in a mixture which provides adequate antifreeze protection for the process temperature.

Warning: Coolant freeze protection must be 25ºF (14ºC) below the lowest possible temperature. The lowest possible temperature is equal to the process temperature minus the Lower Band "**Lb**" setting.

Use PolyScience Catalog No. 004-300040 Algaecide or equivalent to prevent algae growth.

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

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



4.5.2 Filling the Reservoir

Remove the left rear panel. It is held in place with 2 captive screws.

Remove the reservoir cap and fill to a level approximately 2 inches (5.1 cm) from the top of the reservoir. Do NOT replace the cap at this time.

4.5.3 Starting Process Fluid Flow

Turn main power "ON".

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

⚠	**WARNING**: The first time the chiller is operated it should be run 12 hours in the standby mode. The compressor crankcase heater will boil off any refrigerant absorbed in the compressor oil.

⚠	**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 "POWER" button. The system startup sequence will begin and proceed as follows:

- The pump will turn on.

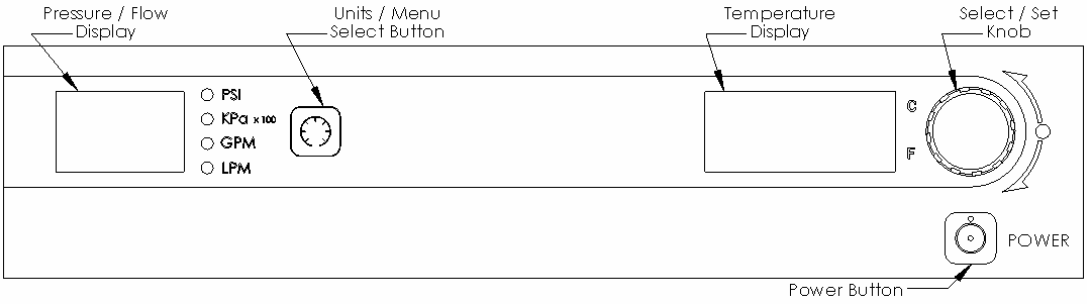
  NOTE: On initial startup and after long periods of inactivity, run the unit for 10 seconds, shut off unit and restart 3 times to remove any air in the lines.

- The current set point temperature will briefly appear on the "Temperature Display". After a short time delay or upon pressing the knob the actual temperature reading will appear. The right decimal point on the "Temperature Display" will flash while the set point value is displayed.
- The system will then go through a short initialization sequence.
- Once the initialization has been completed, the compressor will turn on. When the pressure in the discharge line reaches 400 PSI, the fan will turn on.
- The Controller will display the actual process fluid temperature. The appropriate "degrees" LED will be lit continuously (Celsius "C" or Fahrenheit "F").

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. Replace the reservoir cap and securely tighten.

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

Section 5 – Normal Operation



5.1 Power On

When the "Power Disconnect Switch" is placed in the "ON" position, the Controller goes into a "Standby" mode. Five decimal points (.....) will appear on the Controller's displays.

⚠	**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 "Power" button. The system startup sequence will begin and proceed as follows:

1. The pump will turn on.
2. The current set point temperature will be displayed briefly, followed by the actual process temperature reading. The °F (or °C) LED will flash while the set point value is displayed.
3. The system will then go through an initialization sequence.
4. Once the initialization has been completed, the compressor will turn "ON. When the pressure in the discharge line reaches 400 PSI, the fan will turn on.
5. The Controller will display the actual process fluid temperature. The corresponding "Degrees" LED will be lit continuously.

5.2 Adjusting the Set Point

Press the Select/Set Knob on the front panel. The current set point temperature will be displayed and the decimal point at the bottom right of the display will flash, indicating the temperature can be changed.

Rotate the Select/Set Knob until the desired set point temperature is displayed. The setting is accepted after either pressing the Select/Set Knob a second time or will be accepted automatically after a few seconds of inactivity.

5.3 Selecting Celsius or Fahrenheit / Reset Factory Default Values

The LED's adjacent to the Temperature Display indicate the unit of measure (°C or °F). To change from °C to °F or vice versa, proceed as follows:

To change to °F — Place the main Disconnect Switch on the front of the chiller in the "OFF" position. Press and hold the Units/Menu Select Button while returning the Disconnect Switch to the "ON" position.

To change to °C — Place the main Disconnect Switch on the front of the chiller in the "OFF" position. Press and hold the Power Button on the front panel while returning the Disconnect Switch to the "ON" position.

IMPORTANT: All user settings, calibration offset, return to the original factory default values when the unit in which temperature is displayed is changed. The Chiller's temperature set point and various alarm settings should be reset to the desired values.

5.4 Setting Operational Parameters / Limits

The Chiller's various operational parameters, such as high and low temperature limits, minimum flow rate and maximum pressure alarm values, are all user adjustable. They are accessed by pressing and holding the "Units / Menu Select" button until "HL" appears on the "Pressure / Flow" display on the left of the control panel. Pressing and releasing the "Units / Menu Select" button allows you to scroll through the parameter menu; rotating the "Select / Set" knob allows you to change the value / selection of the parameter shown. You can accept the displayed value by pressing and releasing the "Select / Set" knob or by waiting for the display to timeout. Operational limit parameter alarms will shut down the compressor, fan(s), pump and heaters. Some temperature values are only displayed and settable in degrees celsius (°C). A few parameters require a special keystroke sequence to allow access to change values.

NOTE: Some parameters listed may not be included in your version of software.
Whenever you change default values record new values here for reference.

Menu Item	Description	Choices / Ranges	Default Setting
HL High Temperature Limit	1. Limits the maximum allowable set point temperature. 2. Alarm – Audio and Visual alarm indication when the measured fluid temperature reaches the "HL" temperature setting. NOTE: Setting the High Limit setting below the current set point will result in "EHL" High Limit Error.	5 to 131°F (-15 to 55°C)	95°F (35°C)
LL Low Temperature Limit	1. Limits the minimum allowable set point temperature. 2. Audio and Visual alarm indication when the measured fluid temperature reaches the "LL" temperature setting. NOTE: Setting the Low Limit setting above the current set point will result in "ELL" Low Limit Error.	4 to 80°F (-20 to 27°C)	39°F (4°C)
HA High Ambient Temperature Limit	Alarm – Maximum ambient temperature limit. Displayed and settable only in °C. NOTE: Air-Cooled Chiller's rated cooling capacity is dependent on an ambient temperature below 104°F (40°C) and performance will decrease as the ambient temperature rises. Continuous operation at ambient temperatures above 104°F (40°C) is not recommend for any air or water cooled chiller.	30 to 75C Always displayed and set in °C	45°C
FP Fluid Pressure Limit - PSI - kPa	Alarm – Maximum fluid pressure settable in PSI with "PSI" LED lit and settable in Kilopascals with "kPa" LED lit (Reading x 100 = kPa). NOTE: When "FP" first appears, the "PSI" LED will be lit. To view or change the "FP" value in "kPa" press the "Unit / Menu Select" button again. The display will still read "FP", but the "kPa" LED will be lit and the value will be displayed in kilopascals. NOTE: The chiller also incorporates a built in pressure regulated bypass valve. It will maintain a maximum outlet pressure by diverting the flow of the process fluid to the reservoir. The bypass valve may be adjusted, see Section 5.8. **CAUTION: Maximum operating pressure of the chiller is 100 PSI. Different pumps have different operating pressures allowed.** NOTE: When Chillers are connected to an external apparatus with a built-in shutoff, an external bypass assembly (PolyScience Assembly No.: 520-518) is recommended for larger higher operating pressure pumps. This bypass assembly continues flow circulation to and from the pump even though the main flow to the external apparatus has been blocked.	10 – 100 PSI 0.68 – 6.8 (x 100) kPa For Reference [0.68 = 68 kPa] [6.8 = 680 kPa] 68.95 kPa = 10 PSI 689.5 kPa = 100 PSI	100 PSI 6.8 (x100) kPa
FL Minimum Flow Rate - GPM - LPM	Alarm – Minimum flow rate settable in gallons per minute with "GPM" LED lit and settable in liters per minute with "LPM" LED lit. NOTE: When "FL" first appears, the "GPM" LED will be lit. To view or change the "FL" in "LPM" press the "Unit / Menu Select" button again. The display will still read "FL", but the "LPM" LED will be lit and the value displayed will be in liters per minute.	0 - 50 GPM 0 – 190 LPM	0 GPM 0 LPM
Lb Lower Band	This sets the amount in degrees celsius that the process temperature can drop below set point that turns the compressor off.	1.0 to 5.0°C Always displayed and set in °C	2.0°C
Ub Upper Band	This sets the amount in degrees celsius that the process temperature can rise above set point that turns the compressor on.		2.0°C
C1 Internal Calibration Offset C2 External Calibration Offset C3 External Calibration Offset	Allows the chiller's displayed and control or externally sensed temperature to be offset to match an independent traceable standard. "C1" for the internal probe and "C2" and "C3" for external or supplemental optional probes. To prevent accidentally changing the calibration offset, a special sequence of keystrokes is required – 1. Press and **hold** the "Unit / Menu Select" button until "HL" appears on the left display. 2. Press and release until the desired parameter is next. "Ub" for "C1" or "C1" for "C2" or "C2" for "C3" 3. Press and **hold** the "Unit / Menu Select" button, **while holding**, press and release the "Select / Set" knob. "CAL" will appear briefly in the right display, release the "Unit / Menu Select" button. 4. Rotate the "Select / Set" knob until the desired offset value is displayed.	± 2.9°C Always displayed and set in °C	0.0°C

Menu Item	Description	Choices / Ranges	Default Setting
Cd Compressor Delay	Allows you to set the minimum amount of time in between which the compressor can cycle off then back on. i.e.: If the compressor has turned off upon reaching the "Lb" setting it will stay off until the "Ub" setting is reached **and** the "Cd" time has expired.	10 – 300 seconds	20
FC Flow Calibration	Allows calibration of the flow rate. Flow rate is calibrated at the factory at the nominal flow value for your pump selection. Further adjustment is normally not necessary. If, however, you wish to calibrate to a known standard proceed as follows. To prevent accidentally changing the calibration offset, a special sequence of keystrokes is required – 1. Press and **hold** the "Units / Menu Select" button until "HL" appears on the left display. 2. Press and release the "Units / Menu Select" button until "Cd" appears. ("Fc" will be the next parameter) 3. Press and **hold** the "Units / Menu Select" button, **while holding**, press and release the "Select / Set" knob. 4. "CAL" will appear briefly in the right display, release the "Units / Menu Select" button. 5. Rotate the "Select / Set" knob until the desired value is displayed.	When calibrating, use left hand display to read desired flow rate in GPM. The right hand display will read a reference "Gain" value which may be recorded in the event of PCB replacement. After installing a new PCB, perform calibration and set right hand display to read referenced "Gain" value.	Varies – record current right hand display reference "Gain" value here _____
dS Coolant Density	For Factory use only.	0.1 to 9.00	8.35
Sh Specific Heat		0.1 to 1.00	1.00
PC Communications Baud Rate	Baud rate equals display value x 1000 (i.e.: 24 = 2400)	2400, 4800, 9600 or 19200	9600
LA Low Ambient	Alarm – Minimum ambient temperature limit. Raise the ambient temperature or lower the "LA" temperature limit.	1 to 7°C Always displayed and set in °C	2°C
Pd Password	For Factory use only.	0 - 999	0
Ld HGB Valve Delay			2

Fb

Logic settings for remote control operation and float assemblies.

To set fuse bits:

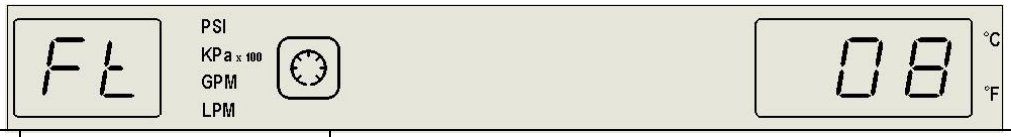
1. Turn power "OFF" at the "Power Disconnect Switch" on the front of unit.
2. While pressing the "Select / Set" knob and "Power" button at the same time, turn power "ON" with the "Power Disconnect Switch".
3. The right display will show "CFb", release both the knob and button.
4. The left display will show "Fb" and the right will show the current fuse bit setting "h0?".
5. Rotate the "Select / Set" knob to the desired fuse bit setting.
6. Press and release the "Select / Set" knob or simply allow the display to time out to accept the fuse bit setting.

Fuse Bit Setting

Input	Logic State	h00	h01	h02	h04	h05	h06
Remote Dry Contact On / Off	CLOSED	OFF	ON	N/A	OFF	ON	N/A
	OPEN	ON	OFF		ON	OFF	
Remote 24 VDC On / Off	24 VDC	OFF	N/A		ON	OFF	N/A	ON
	O VDC	ON			OFF	ON		OFF
Water Level Float Switch	OPEN	OK	OK	OK	LOW	LOW	LOW
	CLOSED	LOW	LOW	LOW	OK	OK	OK

5.5 Display, Alarm and Error Messages

When an alarm or error condition is detected, "Ft" appears in the left display and a corresponding code flashes on the right display. Operational limit parameter alarms will shut down compressor, fan, pump and heaters. Alphabetical codes will also appear on the right display. An audio alarm will also sound. After taking corrective action, restart unit to clear fault or error.



Code	Description	Action required	Default
To access and change operational parameters – see section 5.5			
02	Low limit temperature alarm	Alarm – Process fluid temperature has dropped below low limit temperature setting. Increase heat load or decrease "LL" low temperature alarm setting.	39°F (4°C)
03	High limit temperature alarm	Alarm – Process fluid temperature has reached high temperature limit setting. Decrease heat load or increase "HL" high temperature alarm setting.	95°F (35°C)
04	Over-Temperature Alarm (Select Models Only)	Alarm – Process fluid temperature is above factory set high temperature cutout. On air-cooled condenser units the cutout will reset automatically after the temperature of the fluid is lowered. On water-cooled condenser units the cutout must be manually reset after the temperature of the fluid is lowered. A red button is accessible through the rear panel.	Units without heater option "OTP" jumpered on PCB
05	Low liquid level alarm (Select Models Only)	Delayed Alarm – Activated when the liquid level in the reservoir falls below an acceptable level for 30 seconds. On units with the liquid level float switch option. Wired in series with mechanical flow switch – see "07 Low Flow Alarm"	See Fuse Bit Setting 5.4
07	Low Flow Alarm	Alarm – Flow rate has dropped below minimum flow rate setting. Correct cause of low flow rate or decrease "FL" minimum flow rate setting (See "FL" Section 5.4) Secondary – Mechanical Flow Switch closes with flow (~4 GPM Minimum). If installed in combination with optional water level float switch they are wired in series and both must be closed, if either opens due to low water level or low flow this alarm or "EFL" Flow Error (See "EFL" below) may be activated.	~4 GPM Minimum Required for Flow Switch
08	High Pressure Alarm	Delayed Alarm – Activated when fluid outlet pressure has exceeded high pressure limit setting for 30 seconds. Decrease outlet pressure or raise "FP" fluid pressure limit setting.	100 PSI 689 kPa
09	Internal software fault	Fault – Default unit to °C or °F, if fault persists replace Control PCB NOTE: Some parameters will reset to default values – this could activate another fault code if is cleared. Review and return all parameters to user settings.	N/A
10	Triac fault		
11	Internal RTD probe fault	Fault – RTD Sensor, check for open or shorted sensor (Reference resistance values 100Ω (ohms) @ 0°C / 138.51Ω @ 100°C If probe tests good, replace control PCB.	
12	External RTD probe fault		
13	Communications fault	Fault – Default unit to °C or °F, if fault persists replace Control PCB NOTE: Some parameters will reset to default values – this could activate another fault code if is cleared. Review and return all parameters to user settings.	
14	ADC fault, internal probe		
15	ADC fault, external probe		
16	Front Panel – High Ambient Temperature Alarm	Alarm – Maximum ambient temperature limit. Displayed and settable only in °C. NOTE: Air-Cooled Chiller's rated cooling capacity is dependent on an ambient temperature below 104°F (40°C) and performance will decrease as the ambient temperature rises. Continuous operation at ambient temperatures above 104°F (40°C) is not recommend for any air or water cooled chiller.	45°C
17	Rear Panel – High Ambient Temperature Alarm (Select Models Only)		
18	Ambient Temperature Probe (P3) Fault (Select Models Only)	Fault – RTD Sensor, check for open or shorted sensor (Reference resistance values 100Ω (ohms) @ 0°C / 138.51Ω @ 100°C If probe tests good, replace control PCB.	N/A
19	Pump Overload (DAP1) Fault	Pump – Check continuity across "DAP1" on PCB through NO contacts on overload relay, reset overload relay, and check pump fuses.	
20	Compressor Overload (DAF2)	Compressor Pressure Sensors – See Troubleshooting 7.5.	
21	Fan Overload (DAF1) Fault	Fan(s) – Check continuity across "DAF1" on PCB through NO contacts on overload relay(s), reset overload relay, check fan(s) fuses. NOTE: On 10 HP Chillers both overload relays NO contacts wired in series with "DAF1".	
22	Pump 2 Overload (DAP2) Fault (Select Models Only)	Pump 2 Option only – Check continuity through NO contacts on overload relay, reset overload relay, check "Pump 2 Fuses".	"DAP2" jumpered on PCB

The alarms below will be displayed in the right hand display.			
EFL	Low fluid level or Low fluid flow	Warning / Alarm – Audible alarm will sound 5 times, once every 8 seconds. If alarm condition continues the unit will shut down. - Fluid level too low for units with fluid level float switch. - Fluid flow too low for units with flow switch ("P0" no pump - no reservoir option).	
EHA	High Ambient Temperature Alarm	Alarm – The ambient temperature (measured on Control PCB) is higher the high ambient temperature setting. Lower the ambient temperature or increase the "HA" temperature limit setting.	45ºC
EHL	High limit temperature alarm	Alarm – Process fluid temperature has reached high temperature limit setting. Decrease heat load or increase "HL" high temperature alarm setting.	95ºF 35ºC
ELL	Low limit temperature alarm	Alarm – Process fluid temperature has dropped below low limit temperature setting. Increase heat load or decrease "LL" low temperature alarm setting.	39ºF 4ºC
LO H2O	No fluid flow and pressure	Warning – Indicates the chiller did not detect any fluid flow or pressure upon startup. Unit will normally run after 5 minutes – leave chiller with error code displayed for 5 minutes.	
The codes below will be displayed in the right display and indicate display control status.			
LLO	Local Lockout	Normal – Indicates the Local Lockout feature has been enabled. Prevents settings from accidentally being changed. To enable the local lockout feature "LLO", press and hold the "Select / Set" knob until "LLO" is displayed (approximately 5 seconds).	
CAN	Cancel Local Lockout	Normal – Appears when Local Lockout feature has been canceled. To cancel the local lockout feature, press and hold the "Select / Set" knob until "CAn" is displayed (approximately 5 seconds).	
EC	External remote control active	Normal – Chiller in standby until remotely activated. (Option)	

5.5.1 Automatic Restart from Alarm Mode

This Chiller is equipped with an automatic restart feature to avoid false alarms. If any alarm condition is detected the chiller will turn off, wait 30 seconds and then turn on.

This is to avoid nuisance trips due to temporary flow obstructions, temperature swings or electrical line noise.

Three restart attempts will be made. If the alarm condition continues to exist then an alarm will sound and the chiller will remain off until the problem is corrected.

Section 6 – Routine Maintenance

6.1 Recommended Routine Maintenance Schedule

Routine Maintenance Procedure	Frequency[1]
Inspect and clean inline strainer	Weekly for the first month of operation; every 3 months thereafter.
Check reservoir coolant level	Monthly.
Check coolant freeze protection	Monthly.
Inspect and clean air filters	Weekly for the first month; monthly thereafter.
1. Minimum maintenance frequency. Your plant conditions may require more frequent inspection and cleaning.	

6.1.1 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 has been filtered from the coolant, strainer inspection and cleaning can be performed less frequently or as required.

1. Turn main Chiller power "OFF".
2. Remove the Chiller's left side rear panel. The inline strainer is located just above the reservoir at the inlet to the chiller.
3. Using an adjustable wrench or the proper size hex head socket, loosen and remove the inline strainer drain cap and screen.
   NOTE: There will be a small amount of residual coolant within the housing of the inline strainer which will drain out when the cap is removed.
4. Clean the screen, either water or high pressure air can be used to remove the accumulated debris.
5. Replace and tighten the drain cap with screen.
6. Restore power and check for leaks before replacing the left side rear panel.

6.1.2 Reservoir Coolant Level

The reservoir coolant level should be checked on a monthly basis and replenished as required. A proper fill level is approximately 2 inches (5.1 cm) below the top of the reservoir. If fluid replacement is required, slowly add coolant until the proper fill level is achieved. You may add through the reservoir cap or the top of the water level sight glass on the rear of the unit.

6.1.3 Coolant Freeze Protection

Chillers operating below 59ºF (15ºC) must be protected with an antifreeze solution (see Section 4.5.1). If this is the case with your chiller, the coolant should be checked periodically for proper freeze protection.

Warning: Coolant freeze protection must be 25ºF (14ºC) below the lowest possible temperature. The lowest possible temperature is equal to the process temperature minus the Lower Band "**Lb**" setting.

6.1.4 Air Filters

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 or oily environments will require more frequent filter cleaning.

IMPORTANT: Do not allow the air filters to become caked with dust or coated with an oily film. This significantly reduces air flow and will decrease cooling efficiency. It can also lead to filter breakthrough, allowing dust and oil to get into and on the fins and coils of the condensers.

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

1. Grasp the strap at the bottom center of the air 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 filter (downstream side) opposite the air flow arrow. Allow the filter to dry if applicable.
3. Replace the filter by positioning the top edge of the 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 Unit Will Not Operate (no cooling or pumping)

- Check that the power cord is plugged in or power source is "ON".
- Check that the "Power Disconnect" switch is "ON".
- Check the phase monitor indicator light for correct phase wiring.

7.2 No Pumping

- Check the fluid level in whole system to make sure the pump is receiving fluid.
- Check if pump motor is operating.
- Check for blockage in the connecting tubing.

7.3 Insufficient Pumping

- Check for low line voltage.
- Check for too small of a hose diameter on connecting tubing.
- Check for too high of a fluid viscosity.
- Check for restrictions in the connecting tubing.

7.4 No Cooling or Insufficient Cooling

- Check for low or high line voltage.
- Check for blocked airflow through air filters
- Check for high ambient temperature. High ambient temperatures may cause the compressor to shut down on its internal thermal overload.
- Check for excessive heat being transferred to the cooling fluid as the load may exceed the cooling capacity of the refrigeration system.

7.5 Compressor Overload "FL 20"

The Chiller has 2 refrigerant pressure sensors. A low pressure and a high pressure sensor. These sensors are wired in series and connect to "DAF2" on the control PCB. If either sensor opens the "FL 20" alarm is activated. To troubleshoot measure the continuity across each sensor.

The low pressure sensor opens if the suction pressure drops below 15 PSI and automatically closes if the pressure is above 30 PSI. If a continuity check shows this sensor open, it could be a faulty sensor but usually indicates a loss of refrigerant, contact your local HVAC technician to troubleshoot refrigeration system.

Resetting the High Refrigerant Pressure Cutout

Warning: Compressor and copper tubing may be very hot.

The high pressure sensor opens if the discharge pressure exceeds 630 PSI. Once opened the high pressure sensor must be manually reset. It may be accessed by removing the right side front panel. Locate the blue sensor with a red reset button located on the compressors discharge line. Press downward on the red reset button.

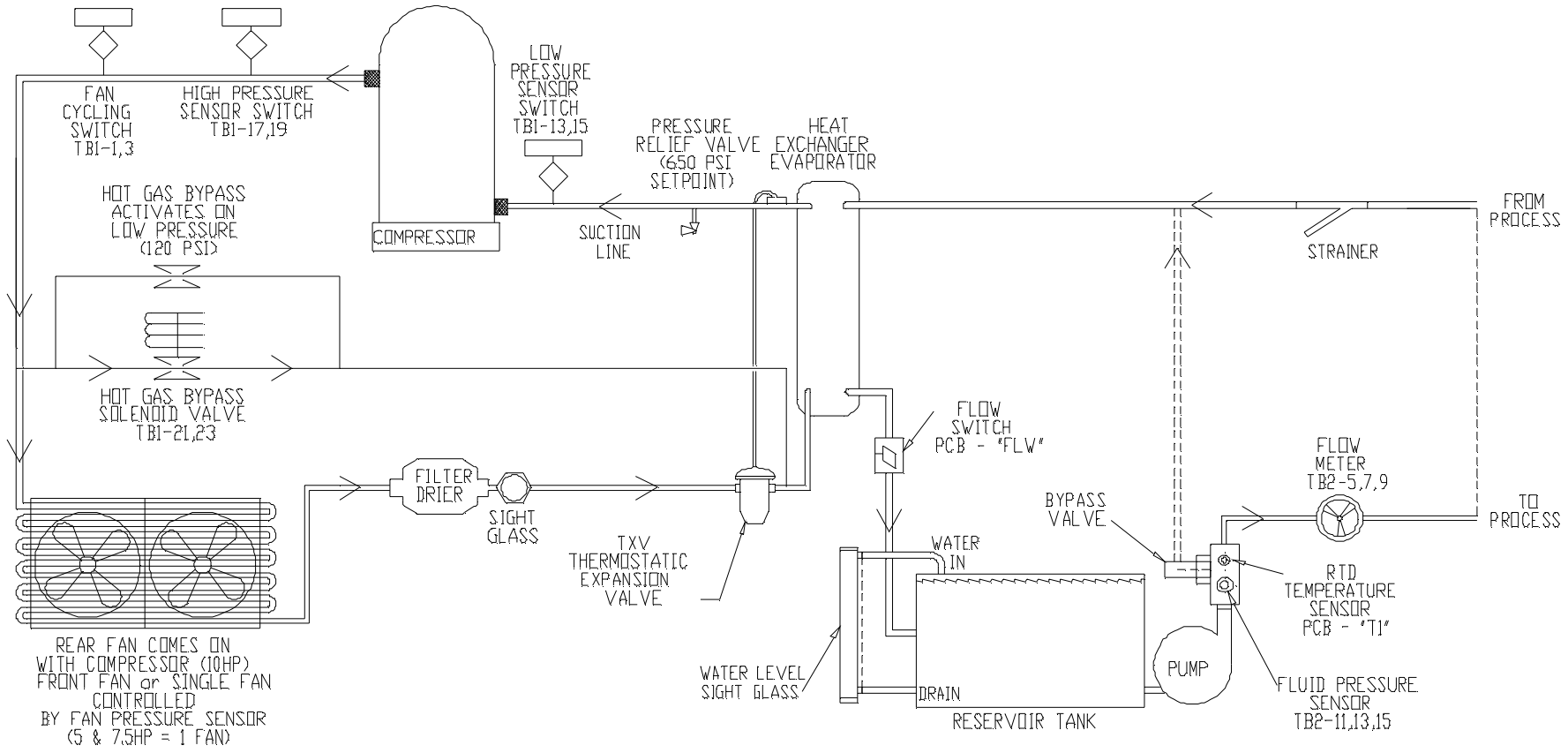
High ambient temperature, dirty filters and large loads are the most common causes of this sensor opening. If sensor stays open or continues to open contact your local HVAC technician to troubleshoot refrigeration system.

Section 8 – Service and Technical Support

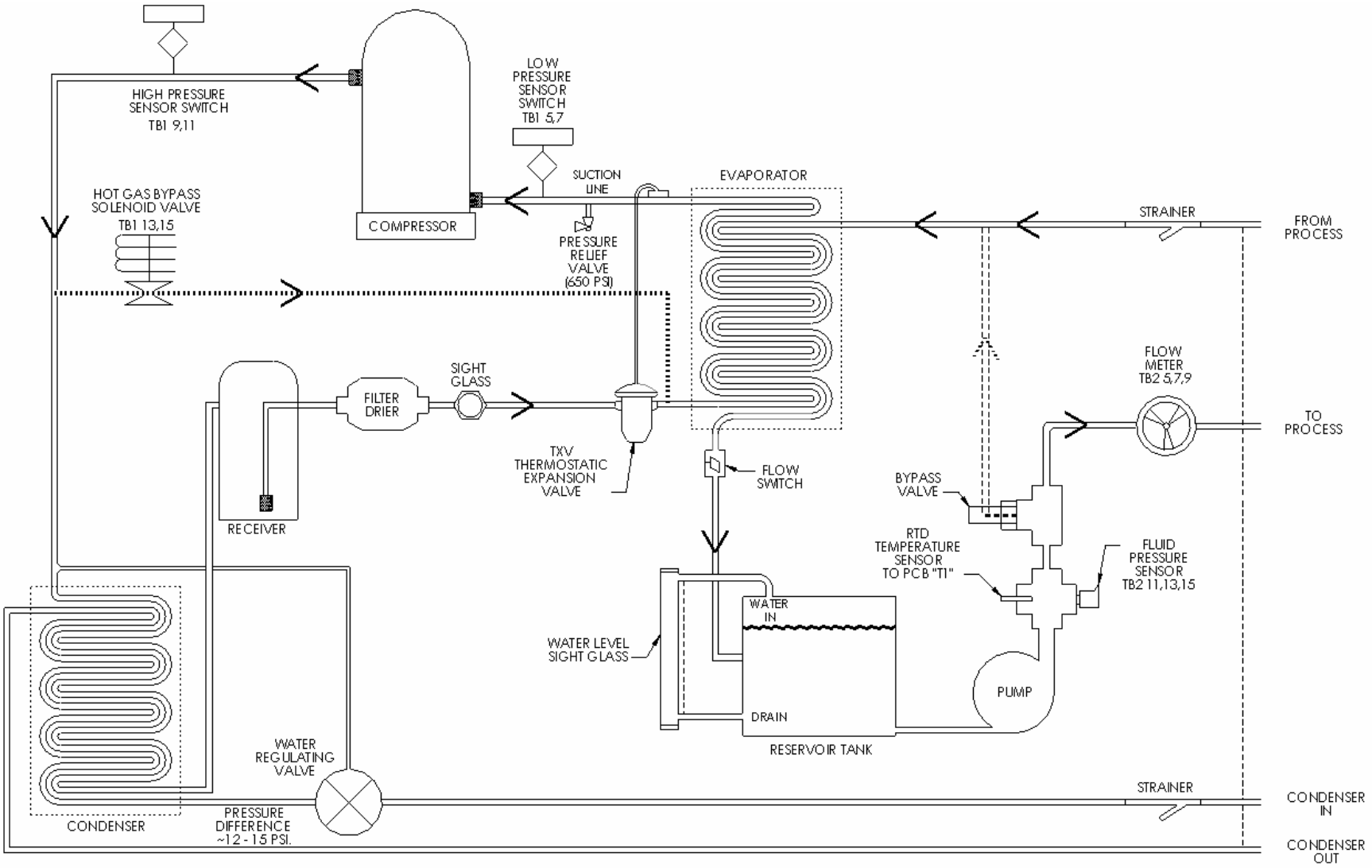
If you have followed the troubleshooting steps outlined in Section 7 and your Chiller still fails to operate properly, contact the supplier from whom the unit was purchased. Have the following information available for the customer service person:

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

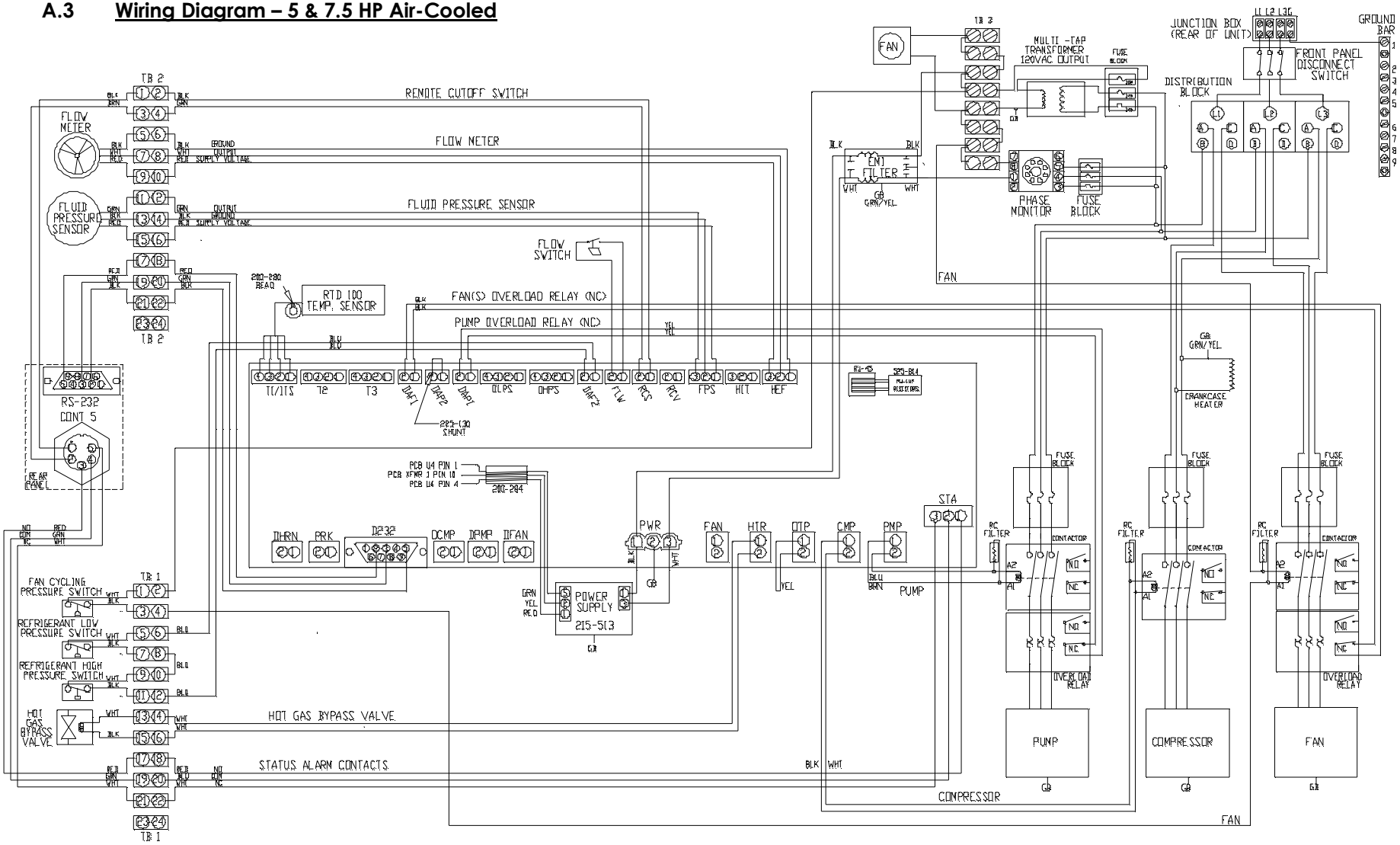
A.1 Flow Diagram - Air-Cooled



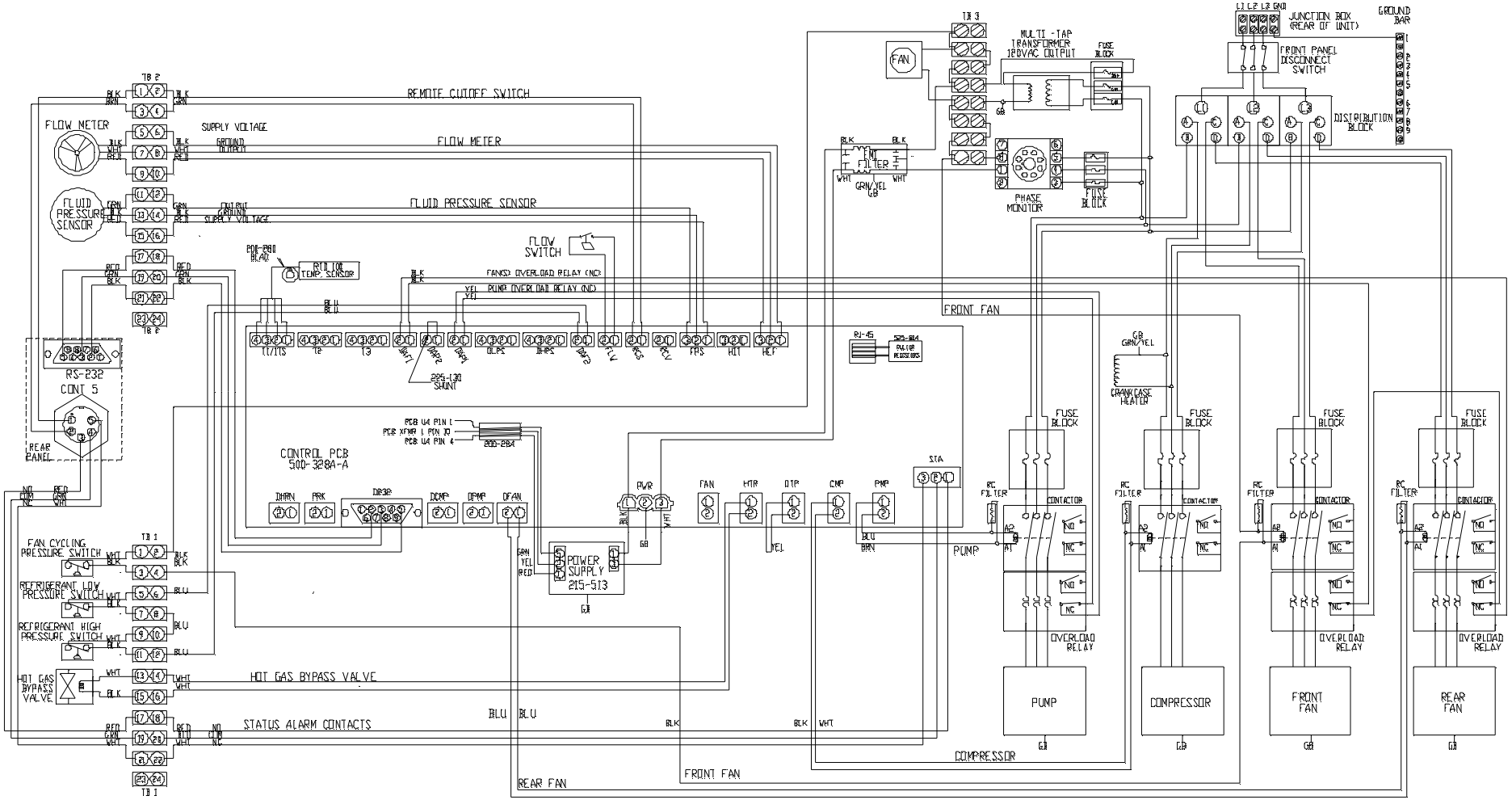
A.2 Flow Diagram - Water-Cooled



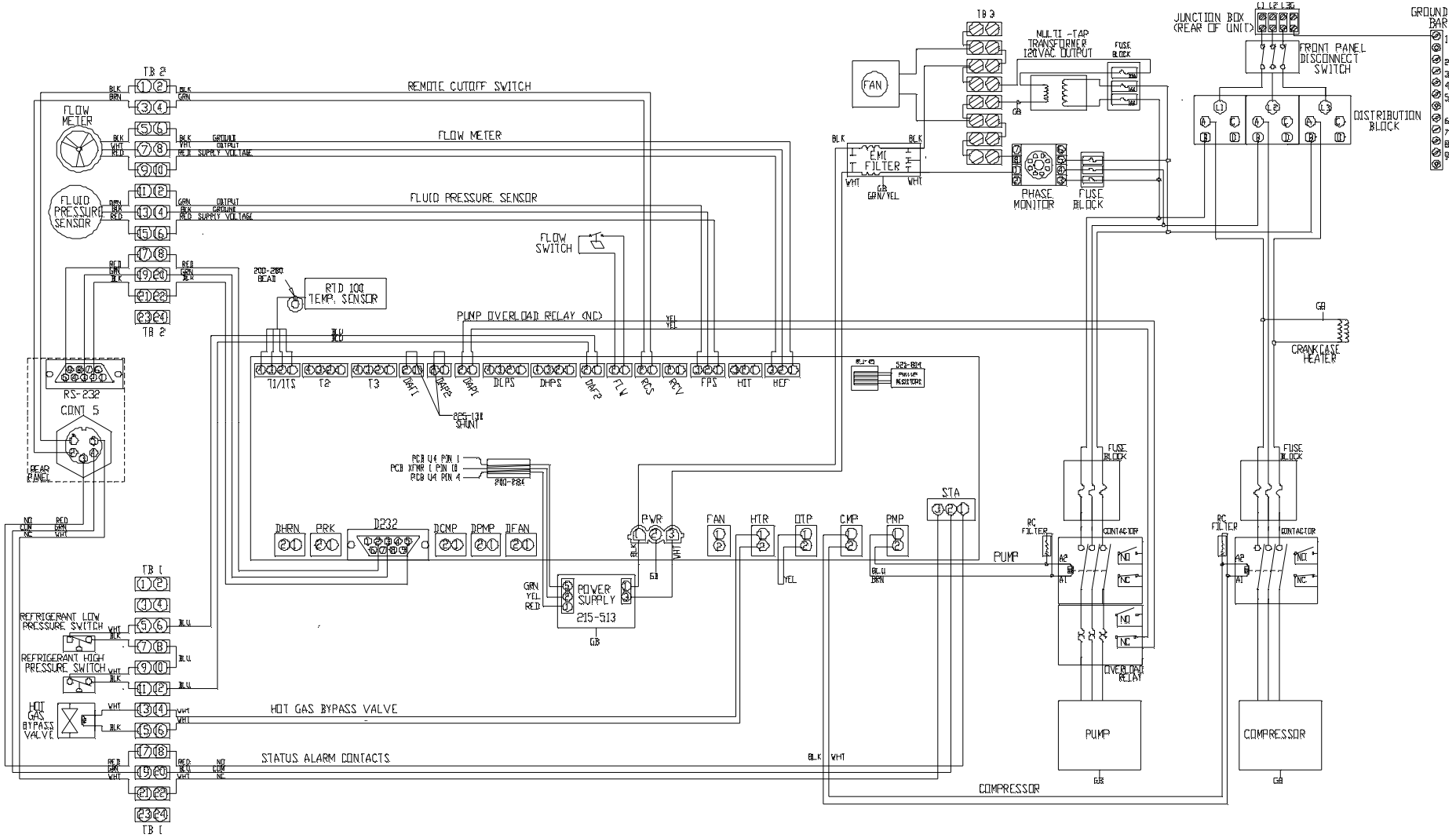
A.3 Wiring Diagram – 5 & 7.5 HP Air-Cooled



A.4 Wiring Diagram – 10 HP Air-Cooled



A.5 Wiring Diagram – Water-Cooled



WEEE Instructions for PolyScience Products

Or

A label with a crossed-out wheeled bin symbol and a rectangular bar indicates that the product is covered by the Waste Electrical and Electronic Equipment (WEEE) Directive and is not to be disposed of as unsorted municipal waste. Any products marked with this symbol must be collected separately, according to the regulatory guidelines in your area.

The objectives of this program are to preserve, protect and improve the quality of the environment, protect human health, and utilize natural resources prudently and rationally. Specific treatment of WEEE is indispensable in order to avoid the dispersion of pollutants into the recycled material or waste stream. Such treatment is the most effective means of protecting the customer's environment.

Requirements for waste collection reuse, recycling, and recovery programs vary by regulatory authority at your location. Contact your local dealer from whom you originally purchased the equipment for information regarding applicable disposal regulations.

CSA INTERNATIONAL

Certificate of Compliance

Certificate: 2302161 **Master Contract:** 155859

Project: 2302161 **Date Issued:** 2010/05/14

Issued to: **Polyscience**

Division of Preston Industries, Inc
6600 W Touhy Ave
P.O. Box 48312
Niles, IL 60714
USA
Attention: Steve Rundle

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

C US

Peter Wong

Issued by: Peter Wong

PRODUCTS

CLASS 8721 85 - ELECTRICAL EQUIPMENT FOR LABORATORY USE - Certified to US Standards

CLASS 8721 05 - LABORATORY EQUIPMENT - Electrical

DuraChill™, P/N: DA504; DA506; DA508; DA509.

APPLICABLE REQUIREMENTS

CAN/CSA-C22.2 No. 61010-1-04 - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements

CAN/CSA-C22.2 No.61010-010-04 - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use—Part 2-010: Particular Requirements for Laboratory Equipment for the Heating of Materials.

UL Std. No. 61010-1 (2nd Edition) - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements

EC Declaration of Conformity

PolyScience

The Products herewith complies with the requirements, as stated below, in accordance to the EC Low Voltage Directive 2006/95/EC and EC Electromagnetic Compatibility Directive 2004/108/EC , and carries the CE marking accordingly.

We herewith declare:

PolyScience
Division of Preston Industries, Inc.
6600 West Touhy Avenue
P.O. Box 48312
Niles, Illinois 60714, USA

That the following equipment complies with the essential requirements in respect to safety and health, in accordance to the EC Directives based on its design and type, as brought into circulation by us. In case of alteration of the equipment, not agreed upon by us, this will lose its validity.

Product Description: DURACHILL

Models :

DA756, DA758, DA759, DA1006, DA1008, DA1009
DCA203, DCA204, DCA206, DCA208
DCA303, DCA304, DCA306, DCA308
DCA508D01, DCA508D601, DCA758D01
DCA758D801, DCA1008D201, DCA1008D901
DCW303, DCW304, DCW306, DCW308
DW504, DW506, DW508, DW509
DW756, DW758, DW759
DW1006, DW1008, DW1009

Applicable Directives and Harmonized Standards: Low Voltage Directive 2006/95/EC & Electromagnetic Compatibility 2004/108/EC to the following Harmonized Standards:

EN 61010-1: 2001
IEC 61010-2-10 : 2005
IEC 61326-1:2005

Testing Bodies: CSA International (Certification & Testing Division)

Signature on Behalf of Manufacturer or Authorized Representative: Jeff. Rome

Date of Validity: April 05, 2011

Title of Signatory: Quality Manager

110-508 01/18/2011