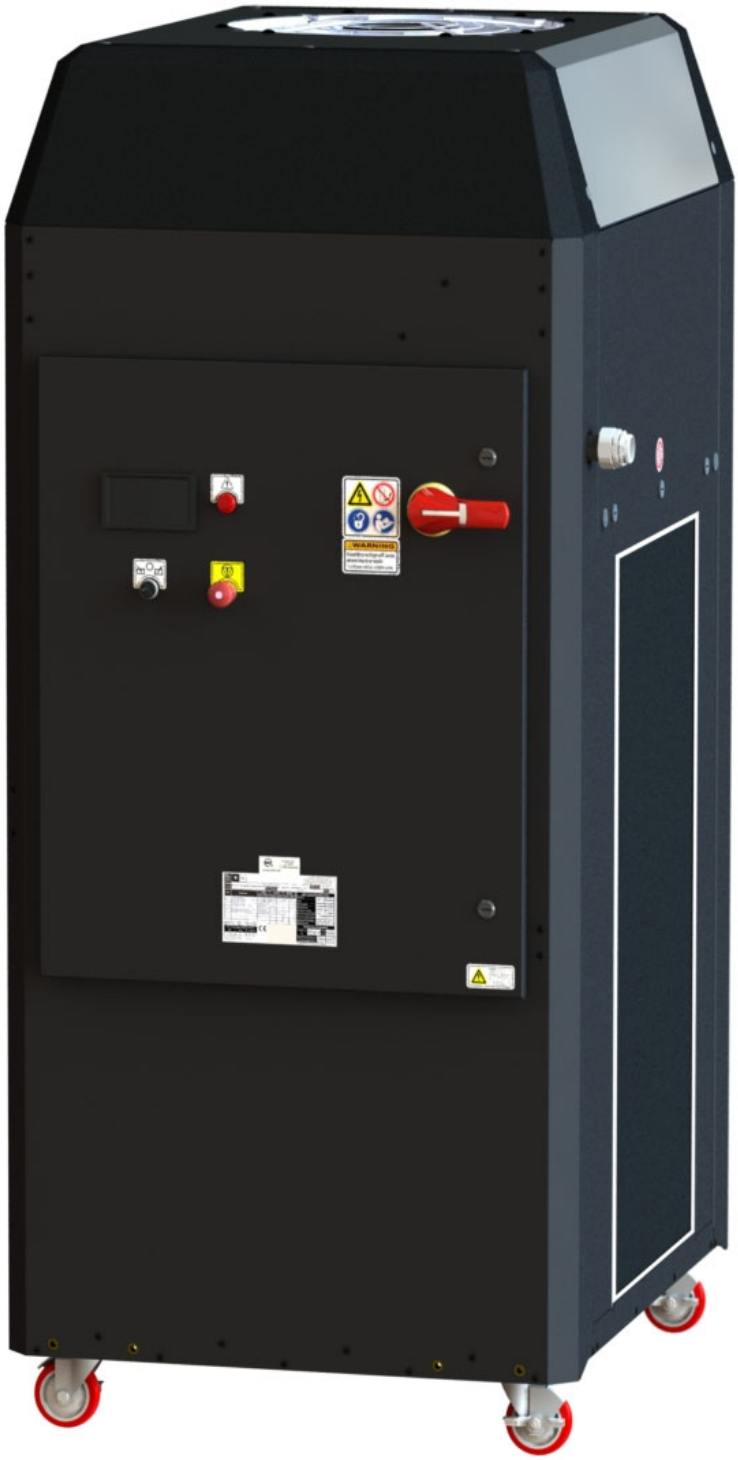
Glen Dimplex Thermal Solutions

Koolant Koolers

Koolant Koolers N-Series

Plasma Cutter Chiller

User Manual



Glen Dimplex Thermal Solutions | Koolant Koolers

ATTENTION

This manual provides the user, installer and maintenance technician the technical information for installation, operation, and routine maintenance to ensure smooth and long-lasting operation of the CHILLER. This manual has been written with general guidelines and specifications for this platform of chillers. Always refer to your CHILLER's specific drawings that have shipped with the unit. When contacting the factory for service or replacement parts reference your CHILLER's serial and model numbers. These can be found on the data tag on the CHILLER or on the Datapack information that shipped with the unit.

Information Subject to Change

While every effort has been made to ensure the accuracy and completeness of the information presented in this document, Dimplex Thermal Solutions assumes no responsibility and disclaims all liability for damages resulting from the use of this information or for any errors or omissions.

Register Your Chiller

See instructions in Appendix E for registering your chiller online. Registration is important to ensure accessibility to the Dimplex Thermal Solutions global service network and maximize your warranty coverage.

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1 Specifications

Table 1: Chiller Specifications

Criterion	50Hz	60Hz
Electrical		
Input power	380-415V ±10%, 3Phase	460-480V ±10%, 3Phase
FLA	23A	
MCA	26A	
MOPD	40A	
SSCR	12kA (RMS symmetrical)	
Refrigeration		
Refrigerant	R-407C	
Refrigerant Oil	Polyvinyl Ether (PVE)	
Nominal Refrigerant Charge	7lbs. (3.2kg)	
Number of Compressors	1	
Compressor Motor Power, each	5hp (3.73kW)	
Cooling Capacity	[1] 48,794 Btu/hr (14.3kW)	
Process Cooling Circuit		
Number of Process Pumps	1	
Process Pump Motor Power	1hp (0.75kW)	
Nominal Process Pump Flow Rate	1.3GPM (4.92LPM)	
Pressure Relief Valve Setting	190-230PSI (13.1-15.9bar)	
Nominal Process Coolant Supply Temperature	59°F (15°C)	
Recirculation Circuit		
Number of Recirculation Pumps	1	
Recirculation Pump Motor Power	0.34hp (0.25kW)	0.58hp (0.43kW)
Recirculation Pump Flow Rate	13.8GPM (52.2LPM)	16.2GPM (61.3LPM)
Physical		
Dimensions	[D] 49.4” (1,254mm) [H] 80.2” (2,038mm) [W] 37.8” (960mm)	
Uncrated weight	830lb. (376.5 kg)	
Crated weight	1,042lb. (473kg)	

[1] At 59°F (15.0°C) leaving fluid temperature and 104°F (40.0°C) ambient temperature condition.

2 Important Safety Instructions

This manual contains important safety instructions that should be followed during the installation and maintenance of the 5 Ton Koolant Koolers Plasma Cutter Chiller. Read this manual thoroughly before attempting to install or operate this unit. Failure to follow the instructions in this document may damage the equipment, cause hazardous conditions and void the warranty.

Only properly trained and qualified personnel should move, install, operate or service this equipment.

Adhere to all warnings, cautions and safety instructions on the unit and in this manual when installing, operating or maintaining the unit. Follow all operating and user instructions.

WARNING

This unit may present arc flash and electric shock hazards that could cause injury or death.

Open all local electric power disconnect switches and wear protective equipment before working within the chiller cabinet.

Earth ground to unit must be provided, per NEC, CEC and local codes, as applicable. Adhere to all other local codes as applicable.

Turning the ON/OFF switch to the OFF position does not isolate power from the unit. The only way to isolate all power from the unit is to turn the chiller's main circuit breaker disconnect to its OFF position. This should only be performed when intending to service the unit.

WARNING

The chiller has automatically starting, high-speed fans. Open all electric power disconnect switches before working in the unit. Contact with fans when the chiller is powered can cause injury or death.

Do not operate this unit with any cabinet panels or air filters removed.

CAUTION

Fan and pump motors, compressors, and refrigeration components can become extremely hot during operation. Allow sufficient time for them to cool before working within the unit. Wear protective gloves and arm protection when working on or near hot components.

Only HVAC/R qualified technicians should be working on refrigeration components.

CAUTION

Improper installation, application and service practices can result in water leakage from the unit, causing damage to property damage and loss of data center equipment.

Do not locate unit directly above any equipment that could sustain water damage.

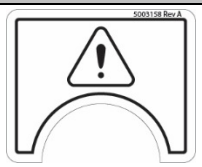
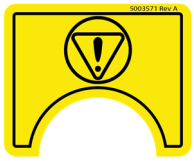
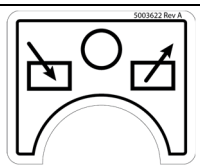
CAUTION

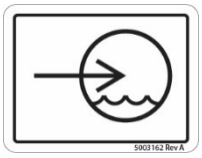
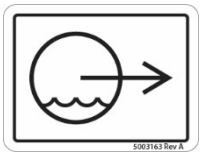
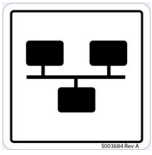
Improper storage can cause damage to the unit.

Keep the unit upright, indoors and protected from dampness, freezing temperatures and contact damage.

3 Machine Label Definitions

Table 2: Machine Label Definitions

Symbol	Description
	Alarm Light
	Emergency Stop
	Local/Off/Remote
	Tank Level High
	Tank Level Low
	Do No Remove Guards
	Caution Fan Starts Automatically

Symbol	Description
	Tank Drain
	Fluid Inlet
	Fluid Outlet
	Tank Fill, No Tap Water, Refer to Manual
	Electrical Shock Hazard, Do Not Turn Off, Lock Out Tag Out, Refer to Manual
	California Proposition 65 Warning
	Network Connection

4 Introduction

The **Koolant Koolers Indoor Industrial Process Chiller** is a single-circuit, single reservoir chiller designed to supply coolant to the Hypertherm Plasma Cutting System. Heat removal from the plasma cutting system to the chiller is facilitated through heat exchangers in a closed-loop fashion using an air-cooled refrigeration circuit. The chiller is capable of steadily supplying coolant with tight temperature tolerances over a varying and dynamic range of cooling capacity requirements. The chiller features:

- **Scroll Compressor**
  - Proven reliability
  - Low noise
- **Process circuit regenerative turbine pump**
  - Highly reliable (no sliding components)
  - Optimized for high pressure circuits
- **Recirculation circuit centrifugal pump**
  - Moderates the return coolant temperature from the plasma cutter prior to passing through the brazed plate heat exchanger
  - Highly reliable (no sliding components)
- **Variable speed condenser fan**
  - Minimizes acoustic noise
  - Improved energy efficiency
  - Manages refrigeration suction pressure under low ambient temperatures
- **Continuous coolant reservoir level sensing**
  - Provides low reservoir warnings
  - Prevents pumps from running dry
- **Process & recirculation flow sensing**
  - Protects pumps from running dry
  - Supports proper setting of throttling and relief valves
- **Refrigeration pressure and temperature sensors**
  - Enable the suction and discharge conditions of the refrigeration circuit to be monitored by the controller
  - Enable the controller to calculate superheat and subcooling conditions to support remote troubleshooting
- **Remote monitoring and control capabilities**
  - Plug-and-play communication via Modbus Ethernet
  - Built-in webserver for data logging and remote monitoring

4.1 Rated Capacity

Table 3: Koolant Koolers Plasma Cutter Chiller Model Information

DTS Part Number	Model	Description	Maximum Heat Load
801880	NVI-5001-CE-MC-M	5 Ton Plasma Cutter Chiller	*69,800 Btu/hr (20.5kW)
802092	NVI-5001-NR-CE-MC-M	5 Ton Plasma Cutter Chiller w/o Refrigerant	*69,800 Btu/hr (20.5kW)

* Rated capacity based on 59°F (15°C) leaving fluid temperature and 75°F (23.9°C) ambient.

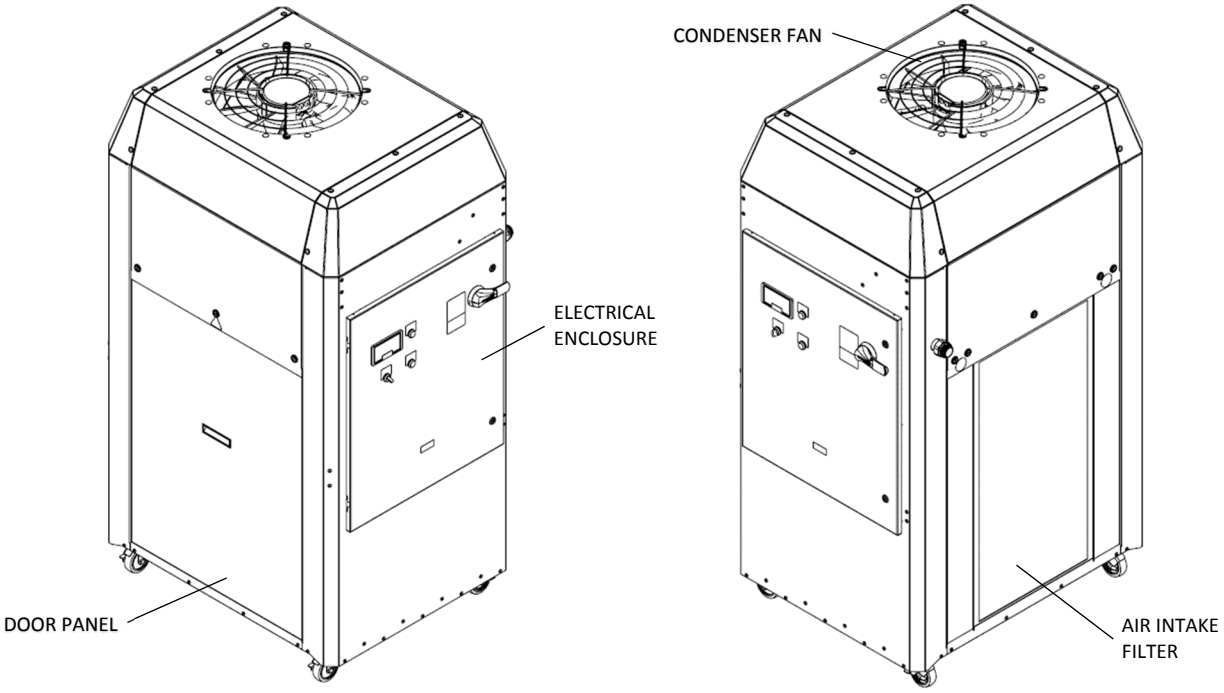


Figure 1: Plasma Cutter Chiller (Electrical Enclosure Side)

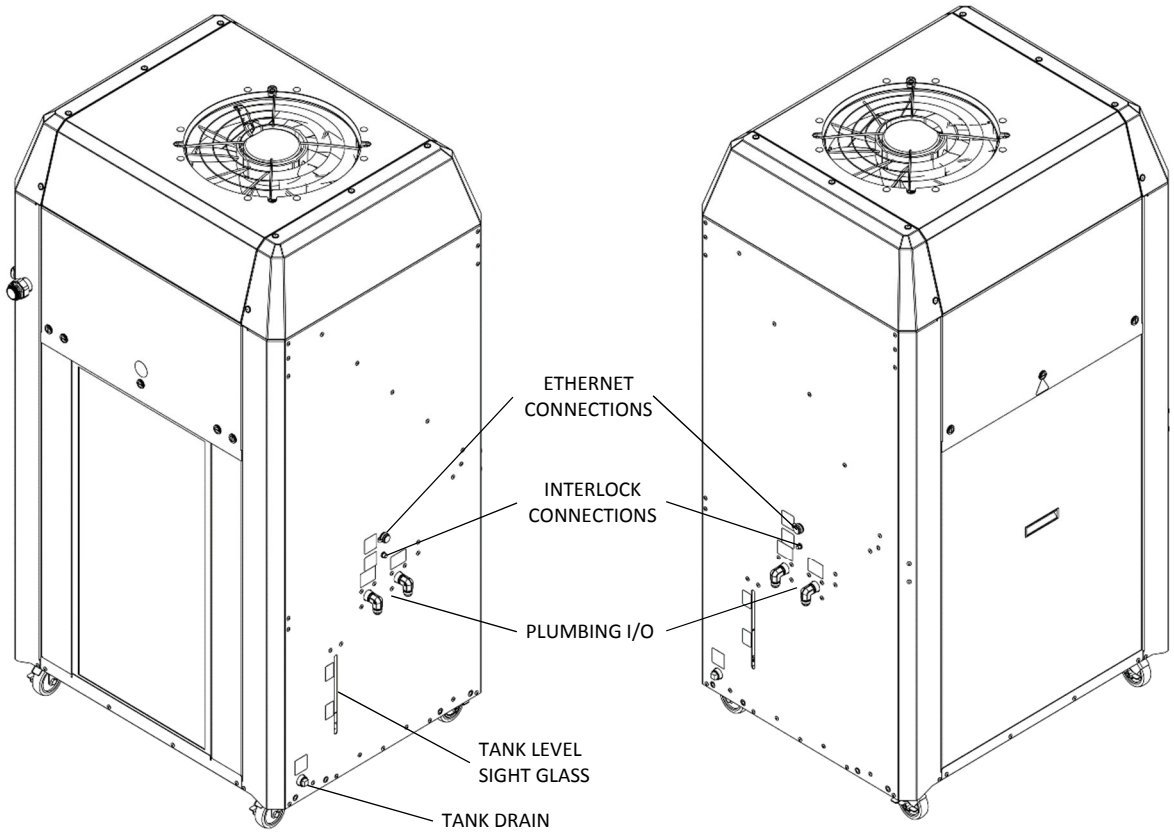


Figure 2: Plasma Cutter Chiller (Plumbing I/O Side)

5 Site Planning

5.1 Overall Dimensions

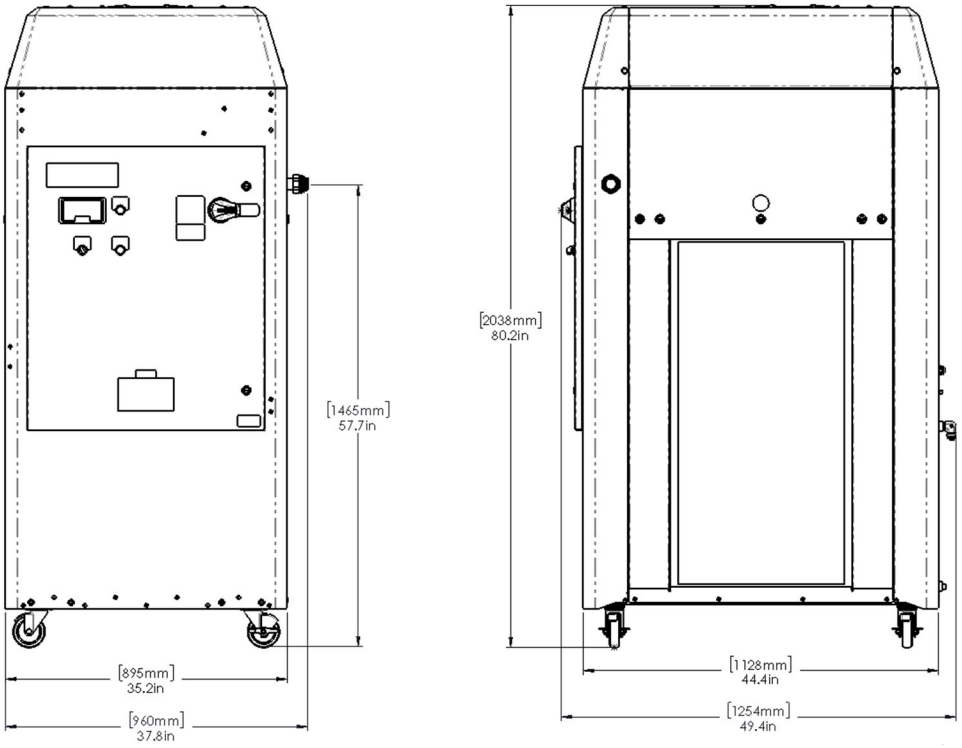


Figure 3: Chiller Overall Dimensions

5.2 Location Considerations

5.2.1 Environmental Requirements

Table 4 defines the environmental requirements for proper chiller operation. For consideration of special applications that do not adhere to the requirements in the table below contact Glen Dimplex Thermal Solutions (GDTS) engineering for review.

Table 4: Chiller Operating Environmental Requirements

Criterion	Value
Location	Indoors only
Minimum Temperature	14°F (-10°C)
Maximum Temperature	104°F (40°C)
Minimum Relative Humidity	10%
Maximum Relative Humidity	90%
Minimum Altitude	At sea level
Maximum Altitude	8,000ft (2,4384m) above sea level

5.2.2 Elevation

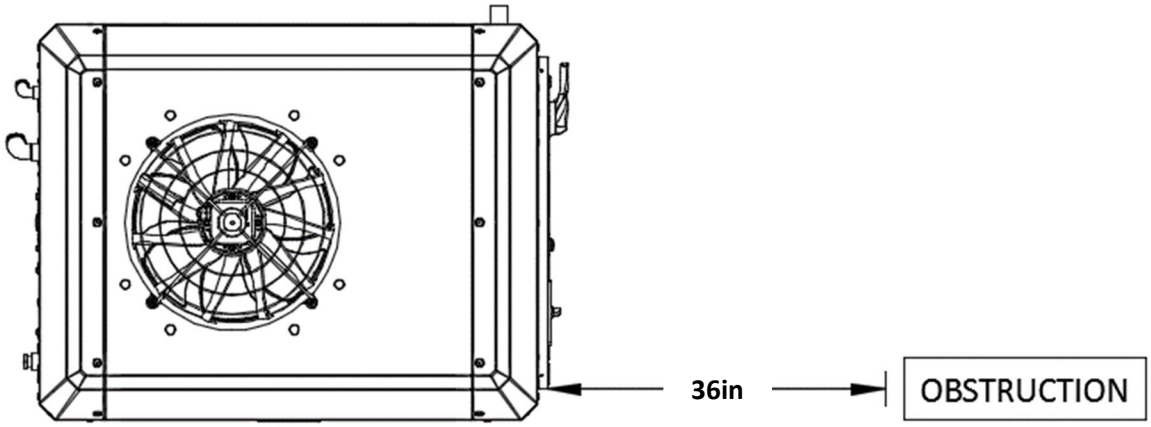
The chillers are intended to be installed on the same floor level as the plasma cutting system. Installation on a mezzanine is acceptable as long as the requirements identified in Section 5.2.3 through Section 5.2.6 are met.

CAUTION

The chillers are not equipped with an anti-backflow device. Installing the chiller at a lower elevation than the plasma cutting system or installing overhead plumbing between the chiller and the plasma cutting system can cause the chiller fluid reservoir to overflow.

5.2.3 Electrical Enclosure Clearance

OSHA and the NEC both mandate a minimum clearance of 36 inches on electrical enclosure doors of less than 600 volts and less than 65,000 symmetrical fault amps.



5.2.4 Service Door Clearance

The chillers are equipped with removable service doors on one side of the machine. At least 3 feet of clearance is required between the chiller and any other obstructions to enable service access to the internal components of the chiller.

5.2.5 Air Intake and Exhaust Clearance

5.2.5.1 Supply Clearance

The chillers are equipped with removable intake air filters on one side of the machine. Care must be taken to ensure that adequate clearance is provided to ensure fresh air is able to enter the intake air filters. At least 3 feet of clearance is required between the intake air filter and any obstructions. If the intake air filter is facing a facility wall at least 6 feet of clearance is required.

5.2.5.2 Exhaust Clearance

At least 8 feet of vertical clearance is required from the top of the exhaust fans to the building ceiling or any other obstructions that could impede exhaust air flow.

CAUTION

Installing the chiller in a building corner should be avoided. Placing the chiller in a corner prevents proper dissipation of the hot exhaust air and causes the exhaust air to re-circulate into the chiller air intake. This leads to high refrigeration head pressure, poor chiller performance, and over-heating the exhaust fan motors.

CAUTION

The chiller condenser fans are not designed for ducting. Ducting creates excessive backpressure on the fans and can cause the fan motors to overheat.

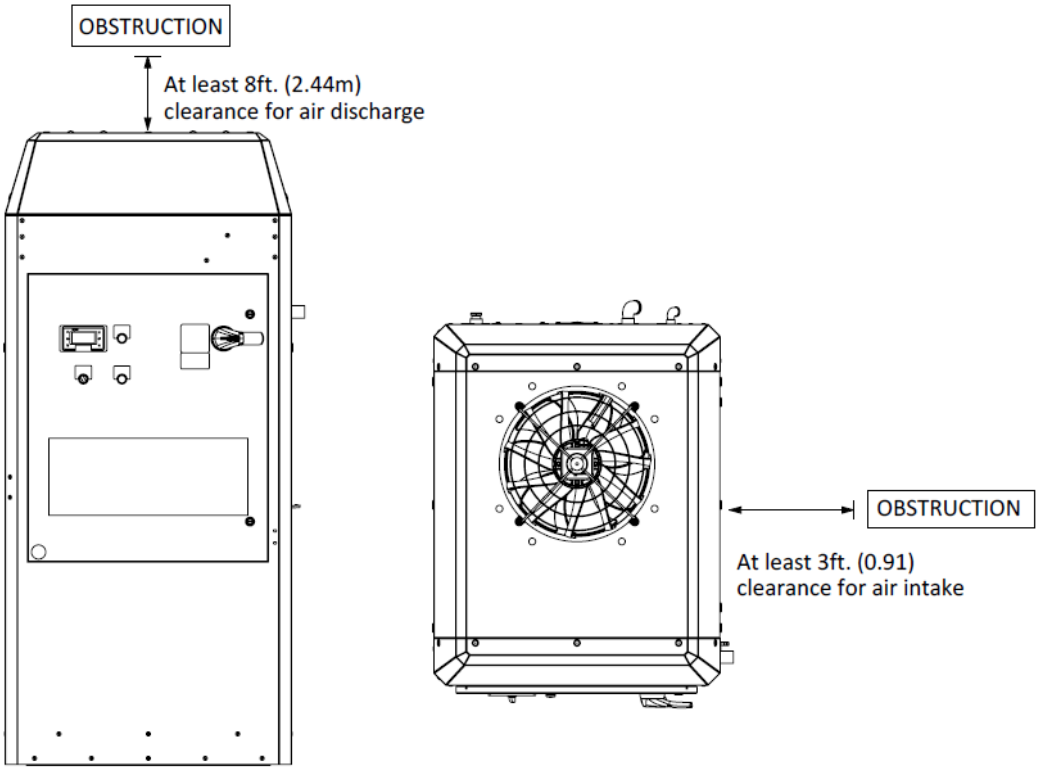


Figure 4: Chiller Air Intake and Discharge Clearances

5.2.6 Proximity to the Plasma Cutting System

The Hypertherm HPR800XD plasma cutting system is supplied with a standard hose kit for connecting the process cooling circuit water from the chiller to the plasma cutting system. The chiller location must be close enough to the plasma cutting system to enable connectivity with the standard hose kit.

CAUTION

Exceeding the standard hose lengths can cause excessive pressure drop through plumbing systems that leads to chiller flow faults and/or premature chiller pump failures.

6 Installation

6.1 Checking for Shipping Damage

Upon delivery of the chiller always verify that the shipment matches the bill of lading.

Inspect the chiller immediately for signs of shipping damage both visible and concealed. Damaged crating indicates likely damage to the chiller and may require the removal of the panel and/or air filter(s) for further inspection. Refer to section 6.4 Internal Access to remove the panel or air filter(s) of the chiller.

Any damage must be reported to the shipping carrier and a copy of the damage claim submitted to GDTS or your sales representative.

6.2 Transportation

The chiller is shipped in a crate with protective packing and wrapping that should remain in place until the unit is transported to its final installation location. It is recommended that the chiller (crated or uncrated) be moved with a forklift.

WARNING

The chiller is heavy and there is risk of tilting or falling when moved. Transportation of the chiller must only be performed by trained and qualified personnel using appropriate equipment.

Ensure that the chiller is securely positioned (tines of forklift spread as far as permitted along the chiller's long edge and extend thoroughly through the opposite lifting face) before moving the chiller.

Improper handling or insecure lifting of the chiller during transportation can cause it to tip and fall leading to injury or death.

WARNING

The chiller is only intended to be lifted from the sides (filter or door). Lifting the chiller from the ends (Electrical enclosure or plumbing I/O) can cause it to tip and fall leading to injury or death.

6.3 Unpacking from the Crate

The chiller is secured to the skid at the bottom of the crate with metal shipping brackets. The crate is held together with wood screws. To remove the chiller from its crate:

1. Move the crated chiller as close as practical to its installation location.
2. Start disassembly of the crate by removing the T25 Torx® head wood screws securing the top panel of the crate.
3. Continue disassembly by removing the T25 Torx® head wood screws holding the two short panels of the crate. This will allow access to the internal bracing.
4. Remove the T25 Torx® head wood screws securing the internal bracing to the two long sides.
5. Remove the 3/8-16 bolts securing the shipping brackets to the base of the chiller using a 9/16” wrench.
6. Cut the shipping bag that the chiller was placed in.
7. Cut or unwrap the plastic shrink-wrap from the unit.
8. Remove the desiccant bag located in the ebox, along with the desiccant bag located inside the chiller, referencing section 6.4 on how to gain internal access to the chiller.
9. Remove the lag bolts securing the shipping brackets to the skid using a 1/2” wrench.
10. Remove the shipping brackets.
11. Use a forklift to lift the chiller until its casters clear the top boards of the skid.
12. Pull the skid from under the chiller.
13. Lower the chiller onto the floor.
14. Move the chiller into its final installation position.
15. Lock the casters.

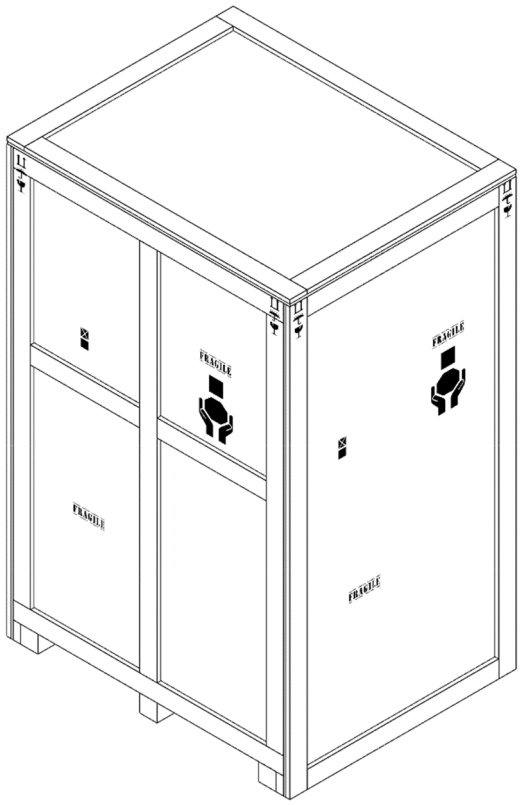


Figure 5: Crated Chiller

WARNING

Use extreme care when lifting the chiller as it is top heavy. Tipping over the chiller during lifting could cause severe injury or death. The forklift forks should be spread as far apart as possible when positioned under the chiller. Lifting the chiller should only be performed by a trained forklift operator.

6.4 Internal Access

To access the chiller's internal components (refer to Figure 6: Chiller Internal Access):

6.4.1 From the Air Intake/Filter Side

1. Use a slotted screwdriver to turn the quarter-turn *Air Filter Latches* above the *Air Filters* counterclockwise.
2. Gently lift the *Air Filter* upward by its mesh and then pull outward to remove the filter.
3. For more access:
    a. Use a slotted screwdriver to turn the quarter-turn *Side Blocker Latch* counterclockwise.
    b. Lift the *Side Blockers* to release the guide fingers from the base and remove them from the machine.
    c. Use a slotted screwdriver to turn the quarter-turn *Upper Blocker Latch* located on the right counterclockwise and the *Upper Blocker Latch* on the left clockwise.
    d. Grab the bottom of the *Upper Blocker* and pull outward to release the fingers at the top of the *Upper Blocker* from the machine sides and remove the *Upper Blocker*.
4. Reinstall in the opposite order when access is no longer required.

NOTICE

The air filter(s) have a label that indicate the proper installation orientation. The filter(s) should be installed with this label facing upwards and with the intake side of air outside the chiller.

6.4.2 From the Door Side

1. Use a slotted screwdriver to turn the quarter-turn *Door Latch* counterclockwise.
2. Gently lift the *Door* upward using the *Door Handle* and pull the *Door* outward to remove from the machine.
3. For more access:
    a. Use a slotted screwdriver to turn the quarter-turn *Upper Blocker Latch* located on the right counterclockwise and the *Upper Blocker Latch* on the left clockwise.
    b. Grab the bottom of the *Upper Blocker* and pull outward to release the fingers at the top of the *Upper Blocker* from the machine sides and remove the *Upper Blocker*.
4. Reinstall in the opposite order when access is no longer required.

NOTICE

The chiller must have all air filters and panels properly and securely installed when operating. Failure to do so can result in refrigeration circuit faults that will interrupt cooling to the plasma cutting system.

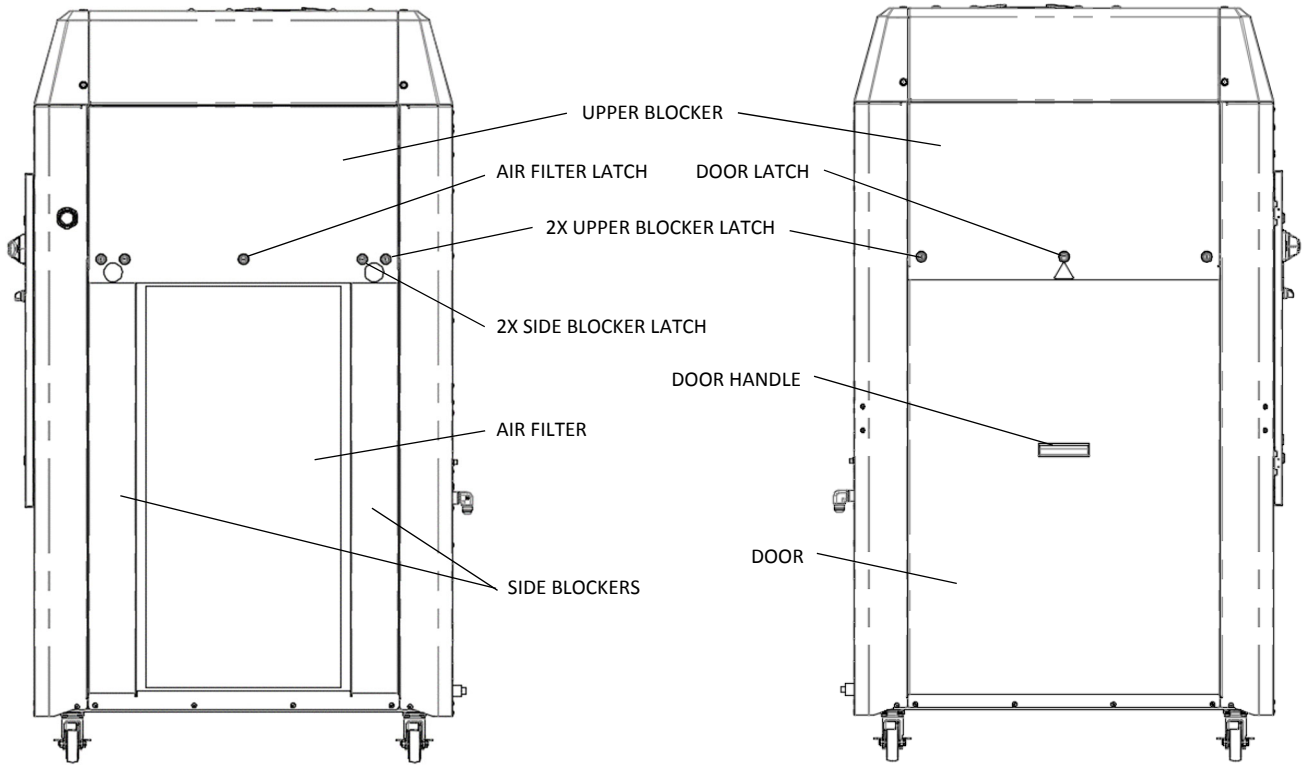


Figure 6: Chiller Internal Access

6.5 Electrical Supply Mains

6.5.1 Mains Power Requirements

Ensure that the supply power is sufficient to meet the chiller power requirements defined in Table 5 and conforms to all local and national electrical codes:

Table 5: Chiller Electrical Supply Power Requirements

Criterion	50Hz	60Hz
Voltage [V]	380-415V ±10%	460-480V ±10%
Phase	3	
FLA [A]	23	
MCA [A]	26	
MOPD [A]	40	
SCCR [kA]	12	

Note: This information can also be found on the chiller's data tag, located on the front of the electrical enclosure (refer to Figure 7, data tag not shown).

6.5.2 Mains Connectivity

Follow the procedure below to connect the appropriate 3-Phase power to the chiller's main circuit breaker disconnect. The chiller is equipped with a 1-3/8" conduit fitting on the right side of the electrical enclosure (See Figure 7) to facilitate mains connectivity.

1. Open the electrical enclosure by turning the main circuit breaker disconnect handle to the OFF position and releasing the quarter-turn latches using a flathead screwdriver (refer to Figure 7).
2. Remove the cap on the electrical enclosure conduit (1-3/8") located on the right side of the chiller.
3. Route the supply power through the conduit and into the electrical enclosure.
4. Wire mains power to the main circuit breaker disconnect according to the label located above the disconnect.
5. Wire the ground lead to the provided ground lug (refer to Figure 9).

WARNING

This procedure involves a risk of electric shock that could cause property damage, injury and/or death.

All electrical connections should be performed only by properly trained and certified electricians wearing proper protective gear and using properly insulated tools.

Before attempting to make any electrical connections or disconnections to the chiller:

- Verify that the chiller's main circuit breaker disconnect handle is in the OFF position
- Verify that the incoming power to the chiller has been turned off
- Lock out and tag out the main electrical service disconnect
- Use a voltmeter to verify that there is no incoming power to the chiller

WARNING

The largest wire size that can be safely accepted by the main circuit breaker disconnect is 6 AWG. Always follow all applicable electrical standards for selecting and installing wires for the required power and current ratings.

CAUTION

The chiller is equipped with a phase monitor that prevents incorrect phase wiring of incoming main power. ***If the chiller's controller displays a phase monitor alarm (alarm code AL*26) swap any two of the three incoming main power wires that connect to the main circuit breaker disconnect.*** Do not swap any of the compressors', fan(s') or pumps' wiring within the electrical enclosure. All the chiller's components have been wired correct and tested at the factory prior to shipping. ***Swapping any of the chiller's components will lead to incorrect component motor rotation, damage to the chiller, and void the warranty.***

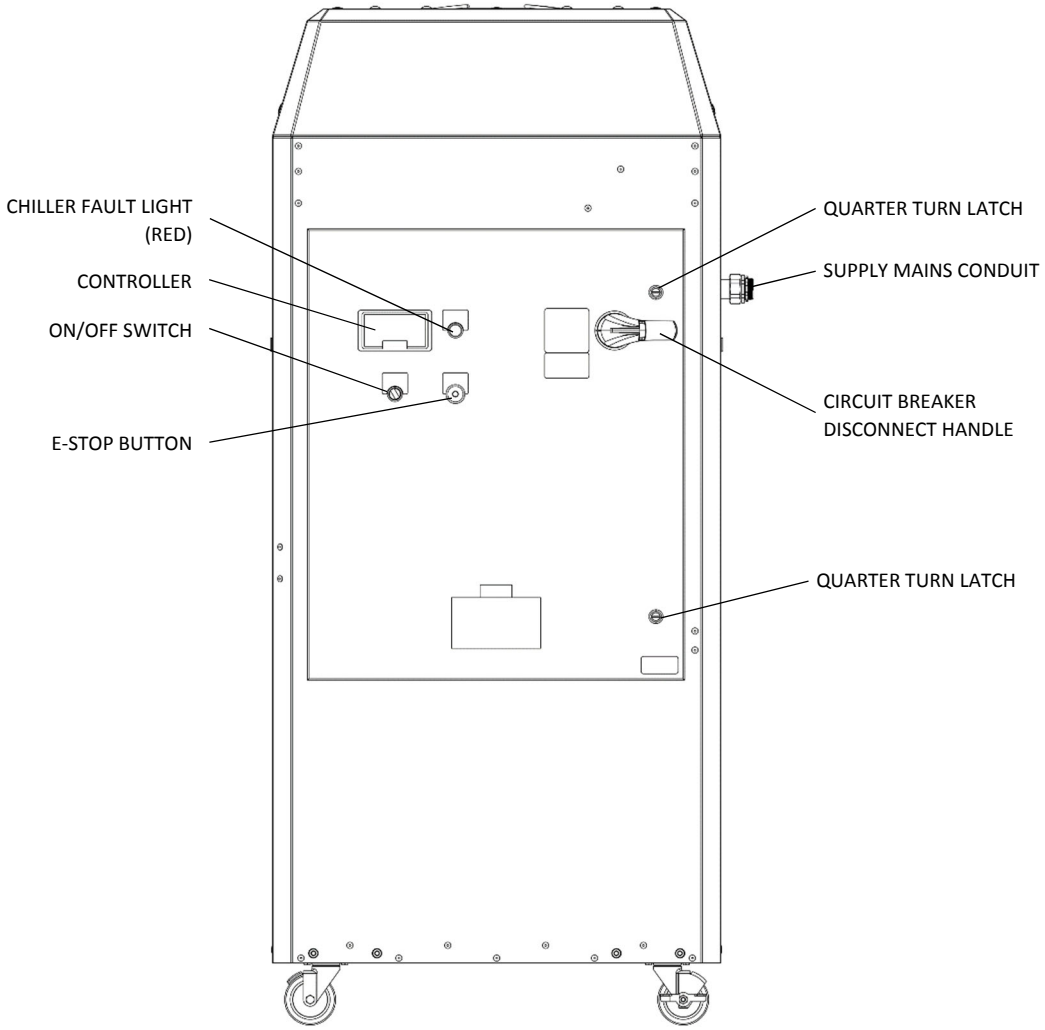


Figure 7: Chiller Electrical Enclosure Side

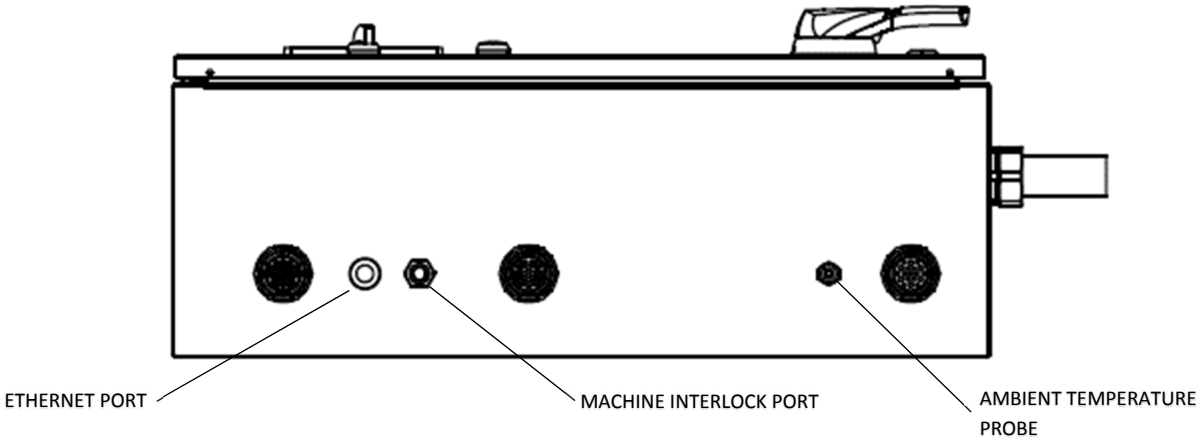


Figure 8: Electrical Enclosure Bottom View (Inside Chiller)

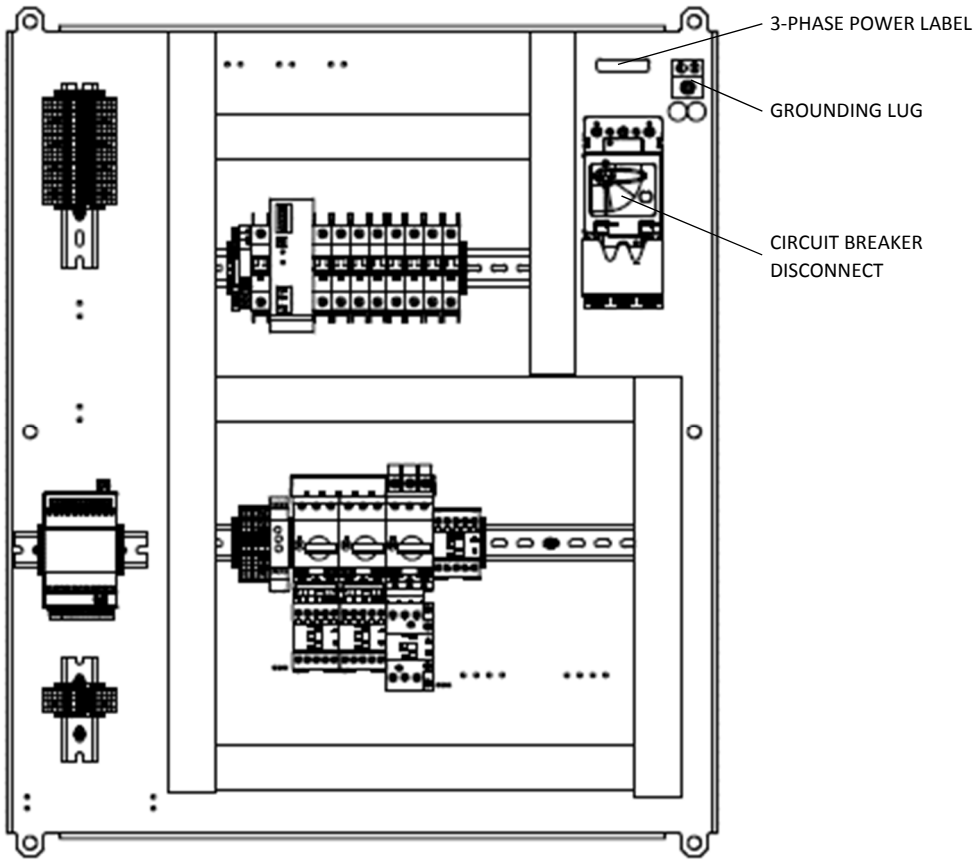


Figure 9: Electrical Panel (Simplified)

6.6 Interlock Connections

The chiller is equipped with a standard 4-pin male M12 Eurofast® connector for the interlocks (refer to Figure 10). The pin-out for the interlock connector is shown on the Logic Page of the Electrical Prints in Appendix B.

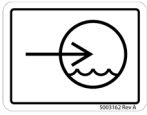
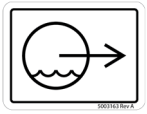
6.7 Ethernet Connection

The chiller is equipped with a standard RJ-45 connector to enable Ethernet connectivity to the chiller controller.

6.8 Plumbing Connections

The chiller's plumbing connections are located on its plumbing I/O side (refer to Figure 10). The chiller has the following plumbing connections:

Table 6: Chiller Plumbing Connections

Symbol	Description	Connection Type	Hose Size
	Process fluid inlet to the chiller from the plasma cutting system.	3/4-16 Male 37° Flare, (#8 JIC)	Please reference Hypertherm, Inc. HPR800XD manual for approved hoses and lead lengths
	Process fluid outlet from the chiller to the plasma cutting system.	3/4-16 Male 37° Flare, (#8 JIC)	

CAUTION

It is highly recommended to use the hose kits supplied by the plasma cutting system manufacturer. Exceeding recommended plumbing lengths can increase system pressure beyond the capabilities of the pumps and can cause the pumps to supply less than the required flow rate for proper operation. Consult the factory if recommended lengths are to be exceeded.

To install connecting plumbing between the chiller and plasma cutting system:

1. Remove all caps at each plumbing port on the chiller.
2. Install the manufacturer provided hose kits between the chiller and plasma cutting system.
3. Ensure that hoses are routed in an orderly fashion and free of kinks.
4. Fully open all valves (if present) between the chiller and plasma cutting system.

WARNING

All plumbing connections should be performed only by properly trained and certified operators wearing proper protective gear and using appropriate tools. Failure to correctly install plumbing fittings can lead to leaks, loss of coolant, and/or water damage to nearby equipment.

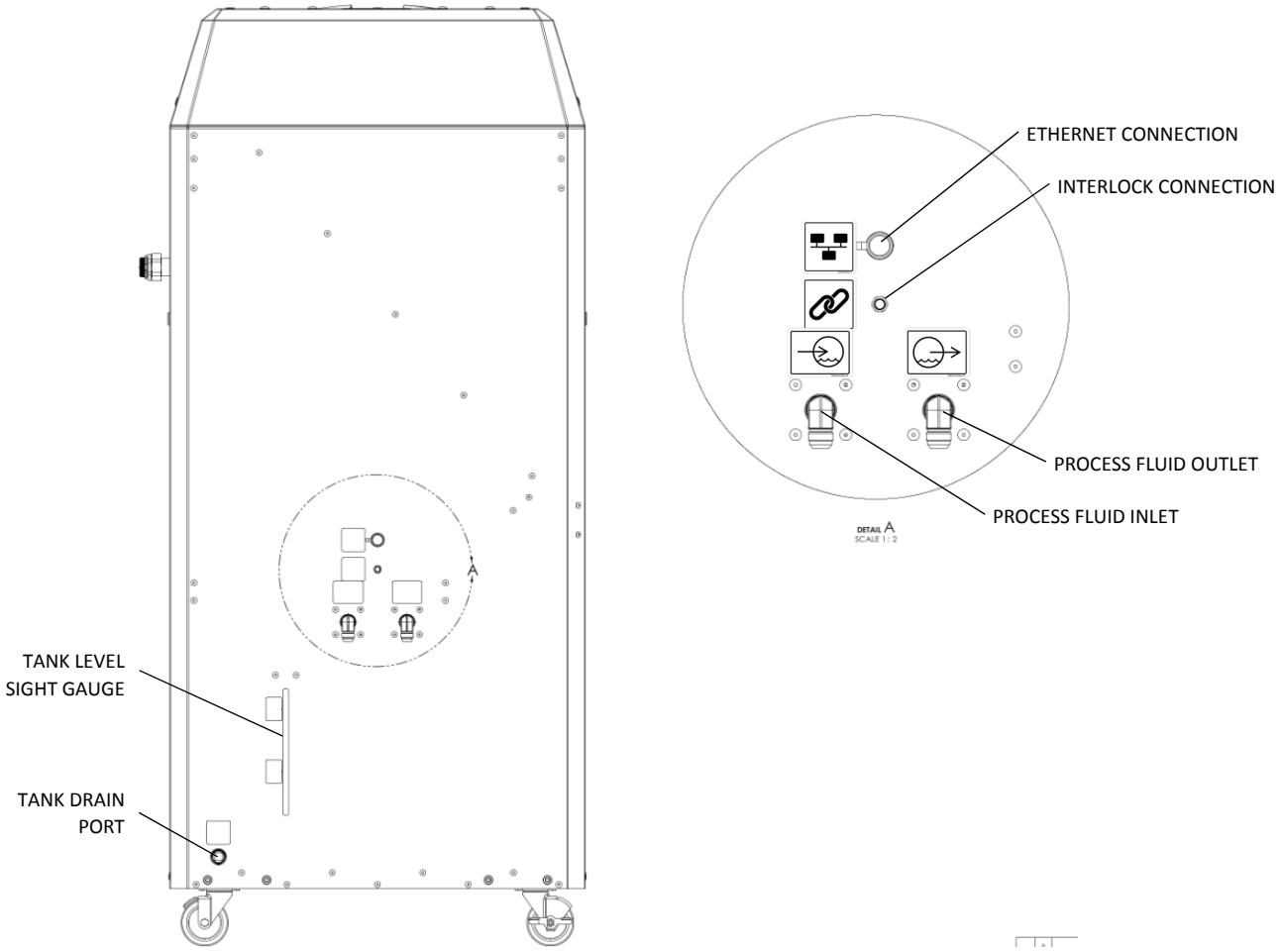


Figure 10: Chiller Plumbing & Electrical Connectivity

6.9 Coolant Reservoir Filling

When the chiller's plumbing connections have been installed the reservoir **must be** filled *with Plasma Cutting System Manufacture's* recommended coolant. Refer to Hypertherm equipment coolant requirements for proper coolant requirements. **Do not** use tap water.

To fill the chiller's coolant reservoir:

1. Remove the door panel, side blocker panels, and upper blocker panel as described in Section 6.4.2.
2. Remove the fill port cap from the top of the tank.
3. Fill the reservoir with the manufacturer's recommended fluid while monitoring the *Tank Level Sight Gauge* (Refer to Figure 10). The reservoir should be filled until the level is near the High Tank Level label. The reservoir capacity is 10.5gal (40L).
4. Reinstall the reservoir fill port cap and hand tighten.
5. Replace the upper blocker panel, side blocker panels, and door panel as described in Section 6.4.2.

NOTICE

The chiller will require more coolant than the volumes listed above to fill the chiller internal plumbing, plasma cutting system internal plumbing, and the connecting hoses.

After the pumps have been started for the first time, additional coolant will likely be required as the internal system components are filled with coolant.

When the chiller's controller is powered, the coolant reservoir level can be monitored via the controller (refer to Section 8.5).

6.10 Refrigerant Filling

If the chiller is installed in a fluorinated gas import restricted country or the European Union, it is subject to the F-gas regulations. For these applications the DTS chiller part number 802092 is shipped with a nitrogen charge and has no refrigerant. Prior to startup the chiller is required to be charged with refrigerant. DTS can support charging the refrigeration through its certified contractor network. For DTS service information refer to Section 12.

6.11 Installation Checklist

- **Transport and Location of Chiller**
  - ☐ Unpack and check received chiller.
  - ☐ Sufficient clearance for intake and exhaust air has been maintained around the chiller.
  - ☐ Sufficient clearance for service access has been maintained around the chiller.
- **Electrical**
  - ☐ Supply voltage, current, phase, and frequency match chiller's requirement.
  - ☐ Incoming main power is wired correctly.
  - ☐ Incoming power ground wire is connected to ground lug on electrical panel.
  - ☐ Chiller has been energized (main circuit breaker disconnect turned to ON position) for at least 8 hours prior to first run (refer to section 7.1).
  - ☐ Electrical service conforms to all applicable national and local codes.
  - ☐ Change frequency setpoint on the controller if installed in a 50Hz country (see Figure 31 in Section 8.7)
- **Plumbing**
  - ☐ Supply and return connections are correct for both cooling circuits.
  - ☐ Plumbing is not dead-headed: no kinks in hoses, valves between chiller and plasma system are fully opened, etc.)
  - ☐ Plumbing has been checked for leaks.
  - ☐ Coolant reservoir is filled with the correct quality and to the correct level.

7 Operation

7.1 Pre-Startup

7.1.1 Power-up

A. Ensure the system On/Off Switch selector is in the “O” position.
B. Turn the Main Disconnect Handle to the “On” position.

NOTE
The PLC controller will turn on and go through an automatic self-test. When the self-test is complete, the controller will begin to monitor the system, but the chiller will not start.

7.1.2 Fault Check

Once the chiller is powered on, any active alarms or warnings will be displayed on the controller after its start-up and self-test sequences are complete. To access the alarm list, press the Alarm Button ⚠ on the controller. Most chiller alarms indicate a condition that prevents the chiller and/or plasma cutting system from operating safely. When this is the case the chiller controller deactivates the plasma cutting system Chiller OK interlock circuit and illuminates the “Chiller Fault” light (red) next to the controller.

7.1.2.1 Sensor Check

Upon power-up, the controller will begin monitoring the chiller system for proper operation. If any sensors read open, short, or out of range, the controller will display warning messages on the screen and the controller alarm will sound.

7.1.2.2 Phase Monitor

The chiller is equipped with a phase monitor which checks for proper phasing and phase imbalance. If the incoming power line connections to the main circuit breaker disconnect are not connected properly or if there is more than a 10% imbalance between phases the controller will display a “Phase Monitor Alarm” (AL26) upon power-up. To correct a phase monitor alarm, swap any two phases on the incoming power line connections to the chiller Main Circuit Breaker Disconnect. If the phase monitor alarm does not go away after swapping the phase leads, a power conditioner may need to be installed.

7.1.3 Setting the Line Power Frequency

If the chiller is installed in a country that uses 50Hz electrical power, the setpoint for the “Operating Frequency” will need to be changed from its default value of 60Hz to 50Hz. To change the frequency refer to Figure 31 in Section 8.7. The “Operating Frequency” setpoint is only used to calculate the theoretical compressor capacity shown in Figure 14 of Section 8.5. It does not affect the chiller performance.

7.1.4 Compressor Warm-up

Once the Main Disconnect Handle on the chiller is turned on, power is supplied to crankcase heaters on the compressor crankcase. The crankcase heaters heat the oil in the compressor crankcases to ensure that there is no liquid refrigerant has condensed in the crankcase oil. **Allow the chiller to sit for at least 8 hours with the Main Disconnect Handle in the “On” position,** prior to turning on the chiller with the Local/Off/Remote Switch. Table 7 provides a list of recommended warm-up times based on how long the Main Disconnect Handle has been in the off position.

Table 7: Recommended Compressor Warm-up Time

Disconnect off Time	Compressor Warm-up Time
< 30 min	0 min
30 min to 2 hrs	2 hrs
2 hrs to 4 hrs	4 hrs
> 4 hrs	8 hrs

CAUTION

Starting the chiller pre-maturely without allowing adequate time for the compressors to warm-up can allow the liquid refrigerant to be pumped through the compressor lubrication system and cause permanent damage to the compressor bearings and void the chiller warranty.

7.2 Initial Startup

7.2.1 Local Mode Start-up

The chiller can be operated in a Local Mode where it operates independent of the plasma cutting system, or in a Remote Mode where it starts and stops automatically based on the state of the Remote Start/Stop interlock from the plasma cutting system. Upon initial startup the chiller should be started in Local Mode to checkout chiller operation independent of the plasma cutting system.

7.2.1.1 Starting the Chiller in Local Mode

To start the chiller turn the Local/Off/Remote Switch below the controller to the position. The pumps will turn on and start circulating water.

7.2.1.2 Leak Check

- Thoroughly check all the plumbing hoses and fittings between the chiller and plasma cutting system to ensure no leaks are present.
- Remove the filter panel from the side of the chiller and inspect the internal chiller plumbing to ensure there are no internal plumbing leaks.
- Replace the filter panel.
- If any leaks are found turn the Local/Off/Remote Switch to the "O" position and wait for the pumps to automatically shut off (The process pump shuts down in ~3s and the recirculation pump in ~10s).
- Once any leaks have been repaired restart the procedure at 7.2.1 Local Mode Start-up.

7.2.1.3 Process Pump Check

From the chiller controller home screen press and/or to highlight the MONITORING selection. Press to access the MONITORING menu and press until the "Process Fluid Circuit" monitoring screen appears. Check the process pump "Flow Rate" to make sure it exceeds 1.3gpm (4.92lpm) at 50Hz or 2.2gpm (8.33lpm) at 60Hz. Also check the process fluid circuit discharge pressure ("Dis Press") to ensure it is at least 10psi (68.9kPa) below the shutdown pressure of 240psi (1,655kPa). The process pump circuit is equipped with a pressure relief bypass valve that is set to start opening at 190psi (1,310kPa) and fully bypass the flow at 230psi (1,586kPa).

7.2.1.4 Recirculation Pump Check

From the chiller controller home screen press ↑ and/or ↓ to highlight the MONITORING selection. Press ↵ to access the MONITORING menu and press ↓ until the "Recirculation Circuit" monitoring screen appears. Check the recirculation pump "Flow Rate" to make sure it exceeds 13.8gpm (52.2lpm) at 50Hz or 16.2gpm (61.3lpm) at 60Hz. If the recirculation pump flow rate is low, the flow rate can be increased by opening the globe valve at the recirculation pump outlet.

7.2.1.5 Temperature Check

From the chiller controller home screen press ↑ and/or ↓ to highlight the MONITORING selection. Press ↵ to access the Monitoring menu. The first screen will be the Process Temperature Monitoring screen. Check the "Tout" on this screen. On initial startup the outlet temperature may be below the setpoint. To increase the temperature quickly the chiller will turn on the tank heater to warm up the coolant. Within a few minutes the outlet temperature should settle in close to the setpoint.

7.2.2 Remote Mode

Once the chiller temperature is in the desired range, the chiller is ready to be controlled remotely by the plasma cutting system. To enable Remote Mode, turn the Local/Off/Remote Switch below the controller to the ⌐ position. There should now be a "Unit on in Remote Mode" message on the home screen. The chiller will now be running in Standby Mode awaiting the Remote Start signal from the plasma cutting system. While in Standby Mode the refrigeration system will not run, but the chiller will start the pumps and heater as needed to keep the water warm.

NOTICE

While waiting for the Remote Start signal, the chiller water temperature may exceed the setpoints if the ambient temperature is high. As soon as the chiller receives the Remote Start signal, the refrigeration system will start and the water temperatures will drop to the setpoints.

7.3 Shutdown

For normal shutdown, turn the Local/Off/Remote Switch below the controller to the "O" position. The chiller controller will begin the normal shutdown sequence and display a "Shutdown in Progress" status message. The normal shutdown sequence typically takes 2-5 minutes. During this time the controller closes the liquid line solenoid in the refrigeration system and pumps the refrigerant into the coil, so there is no risk of slugging liquid refrigerant through the compressor on the next startup. It also turns off the tank heater while the recirculation pump continues to run to dissipate any residual heat in the heater element. Once the shutdown sequence is complete, the chiller controller will display a "UNIT OFF" status message.

CAUTION

Shutting off the chiller using the Main Disconnect Handle will bypass the normal shutdown sequence and should only be used in emergency situations. Repeated shutdown using the main disconnect handle will cause damage to the compressor system and void the chiller warranty. It can also cause overheating of the inline heater and trip the heater limit switch.

7.4 Service

For chiller service, turn the Local/Off/Remote Switch below the controller to the “O” position and allow the chiller to complete its normal shutdown sequence. Once the shutdown sequence is complete and the controller indicates “Unit Off” turn the Main Disconnect Handle to the “Off” position.

WARNING

Do not service unit until power is secure. Follow standard Lockout/Tag-out procedures.

After completing service, turn the Main Disconnect Handle back to the “On” position and allow the crankcase heaters to warm-up the compressors prior to restarting the chiller. Reference Table 7 in Section 7.1.4 for recommended warm-up times.

8 Controller

Figure 11: Chiller's Controller

The chiller's controller is located on the electrical enclosure door as shown in Figure 7. During normal operation, all control functions should be performed directly from the plasma system machine. The controller displays process measurement values as well as warnings and alarms due to faults from the chiller or process.

Alarms are logged in the controller's memory based on their time and date of occurrence.

A USB storage device can be connected to the controller via its micro USB port to either update the controller's program/firmware or to extract alarm logs. Open the micro USB cover to access this port (refer to Figure 11). To extract alarm logs, refer to section 8.8 Maintenance & Service.

8.1 Navigation

To navigate through the controller's screens:

- At the main menu level
  - Use the ↑ and ↓ buttons to select the desired option.
  - Press the ↵ button when the desired option has been selected to access it.
- Within a menu selection
  - Press the ↑ or ↓ buttons to navigate through each of the available screens.
  - To change the value of a setting (if permissible)
    1. Select the desired screen.
    2. Press the ↵ button until the desired field has been highlighted (noted by a blinking cursor).
    3. Press the ↑ or ↓ buttons to increase, decrease or toggle the field's value.
       ***Note**: For numeric fields holding the ↑ or ↓ buttons will accelerate the rate of increase or decrease of the value, respectively.*
    4. Press the ↵ button to confirm the field's current value or press the ↩ button to cancel changes.
  - Press the ↩ button to return to the previous menu.

8.2 Alarms

When a warning or fault is present, the Chiller Fault Light will be lit (Refer to Figure 7), the ⚠ button on the controller will be lit red, and the controller buzzer will sound.

8.2.1 Turning off the Buzzer

When an alarm is present the buzzer can be turned off by pressing the ⚠ button. Anytime a new alarm is triggered the buzzer will resound.

8.2.2 Viewing Active Alarms

If at least one alarm is active, press the ⚠ button to access the alarm menu and view the alarm. If there is more than one active alarm, press the ↑ or ↓ buttons to navigate through the alarm list.

8.2.3 Resetting Alarms

There are three different types of alarms used on the chiller. Table 9 in section 9.1 defines each alarm and how it is reset.

8.2.3.1 Auto Reset Alarms

Auto Reset Alarms are alarms that automatically reset when the condition that is creating the alarm goes away.

8.2.3.2 Manual Reset Alarms

Manual Reset Alarms are alarms that require manual intervention to reset such as the inline heater limit switch (Section 9.2) or the high pressure switch (Section 9.3).

8.2.3.3 User Reset Alarms

User Reset Alarms are alarms that must be reset by the user through the controller. If the condition that caused the alarm is no longer present, then the chiller will return to normal operation when the user resets the alarms. To reset the alarms:

- Press the ⚠ button to access the alarm menu.
- Use the ↓ button to navigate to the end of the alarm list until the alarm reset screen is reached which says “Press ALARM for 3s to reset all alarms”.
- Press and hold the ⚠ button for 3 seconds to reset the alarms.
- Press the ↩ button as required to return to the main menu.

8.3 Main Menu

This screen displays the main menu options, date, day and time, chiller status and submenu options.

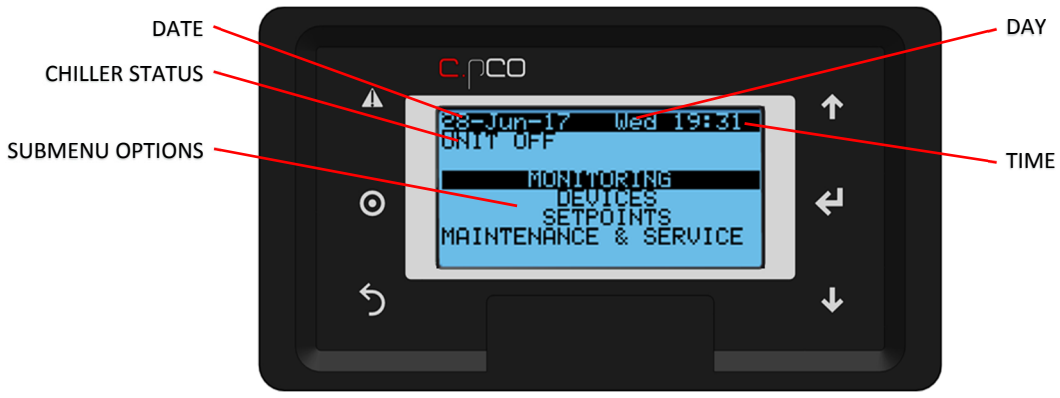


Figure 12: Controller Main Menu

8.4 Chiller Status

The controller main menu displays a Chiller Status field that provides the operator with information regarding the operational mode the chiller is currently in. Table 8 defines each Chiller Status.

Table 8: Chiller Statuses

Unit Status	Description	Action/Response
UNIT OFF	The Local/Off/Remote switch is either in the O position or the position and is receiving a “stop” signal from the plasma cutter remote start/stop interlock.	The chiller can be turned on by switching the Local/Off/Remote switch from the O to position, or if the switch is in the position the chiller will start when it receives a “start” signal from the plasma cutter start/stop interlock.
UNIT IN STANDBY…	The chiller has been in the “UNIT OFF” status for more than 10 min and now has entered STANDBY mode were it will run the tank maintenance heater to keep the coolant warm.	The chiller can be turned on by switching the Local/Off/Remote switch from the O to position, or if the switch is in the position the chiller will start when it receives a “start” signal from the plasma cutter start/stop interlock.
UNIT ON IN REMOTE MODE	The Local/Off/Remote switch is in the position and is receiving a “start” signal from the plasma cutter remote start/stop interlock.	The chiller is functioning normally.
UNIT ON IN LOCAL MODE	The Local/Off/Remote switch is in the position.	The chiller is functioning normally, but cannot receive commands from the plasma system. If the chiller receives a “stop” command from the plasma cutter start/stop interlock it will be ignored.
REFRIGERATION FAULT!	A refrigeration circuit related fault has occurred.	The chiller’s refrigeration circuit has shut down but the process circuit components

Controller - Chiller Status

Unit Status	Description	Action/Response
		(pumps, valves, etc.) are still functional. Refer to the alarm codes in section 9.1 Alarm List for more information.
UNIT OFF DUE TO FAULT!	The chiller has turned off due to one or more faults.	Refer to the alarm codes in section 9.1 Alarm List for more information.
SHUTDOWN IN PROGRESS…	A shutdown has been requested from either the plasma system or Local Mode.	The chiller is in the process of shutting down (typically between 2 to 5 minutes).

8.5 Monitoring

These screens display information regarding the chiller and process.

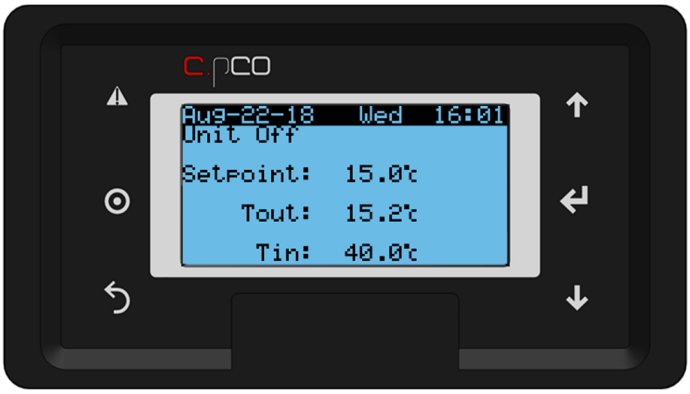


Figure 13: Monitoring, Temperatures

Setpoint: *Coolant supply setpoint temperature (this is adjusted in **SETPOINTS** under the main menu).*
Tout: *Measured coolant supply temperature.*
Tin: *Measured coolant return temperature.*

Figure 14: Monitoring, System Status

HeatLoad: *Calculated process heat load based on measured flow rate, outlet temperature, and inlet temperature.*
Comp Cap: *Cooling capacity of the compressors at current operating conditions.*
Delta Temp: *Difference between Inlet and Outlet Temperature.*
Cool Dem: *Percentage ratio of combined cold and Coolant heat loads to cooling capacity of compressor at current operating conditions.*
Hotgas Req: *Percentage of bypassed cooling capacity.*

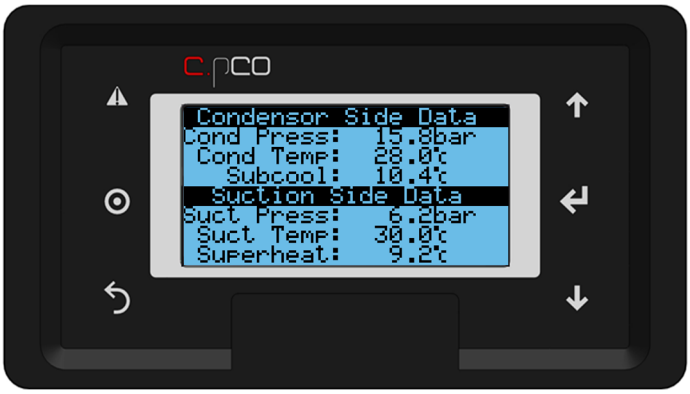


Figure 15: Monitoring, Condenser & Suction Data

Cond Press: *Measured pressure of refrigerant at condenser outlet.*
Cond Temp: *Measured temperature of refrigerant at condenser outlet.*
Subcool: *Calculated sub cooling value of refrigerant at condenser outlet.*
Suct Press: *Measured pressure of refrigerant at compressor suction.*
Suct Temp: *Measured temperature of refrigerant at compressor suction.*
Superheat: *Calculated superheat value of refrigerant at compressor suction.*

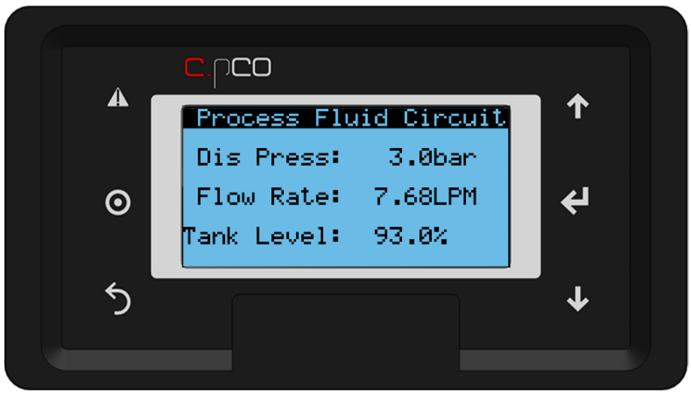


Figure 16: Monitoring, Process Fluid Circuit

Dis Press: *Measured supply pressure of cold water circuit from chiller.*
Flow Rate: *Total process pump flow rate = Plasma system flow rate + bypass flow rate.*
Tank Level: *Measured coolant reservoir level.*

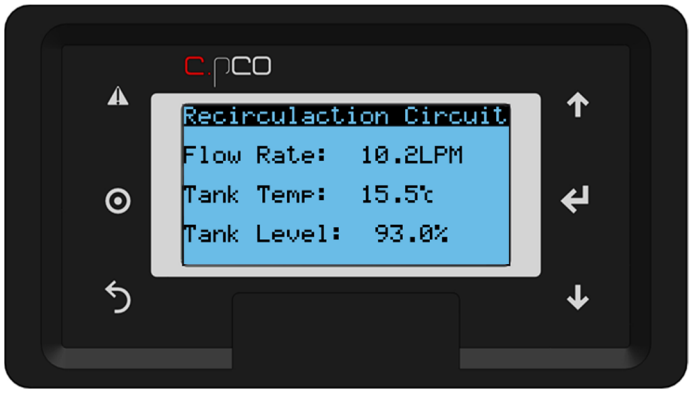


Figure 17: Monitoring, Recirculation Circuit

Flow Rate: *Measured Inlet Fluid flow rate.*
Tank Temp: *Measured fluid temperature in tank.*
Tank Level: *Measured coolant reservoir level.*

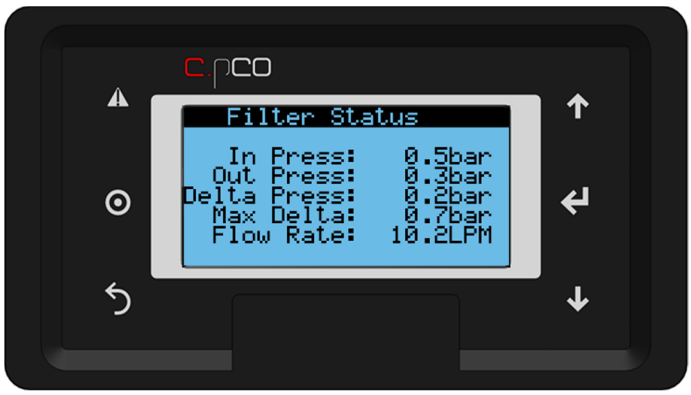


Figure 18: Monitoring, Filter Status

In Press: *Inlet pressure to the Fluid filter on the facility fluid circuit.*
Out Press: *Outlet pressure form the fluid filter on the facility fluid circuit.*
Delta Press: *Difference between the Fluid pressure on the inlet and outlet of the Fluid filter on the facility fluid loop.*
Max Delta: *Maximum delta pressure threshold allowed between the inlet and outlet of the fluid filter on the facility fluid loop.*
Flow Rate: *Measured cold water circuit supply flow rate through the filter.*

Figure 19: Monitoring, Ambient Temperature

Ambient Temperature: *Measure temperature of air entering the condenser coil.*

Specific Heat: *Specific heat Constant of the Process Fluid, refer to set-points for fluid type selection.*

Modbus Master Status: *If the heater is connected to a MODBUS Master Controller.*

8.6 Devices

These screens display information regarding the chiller's components.

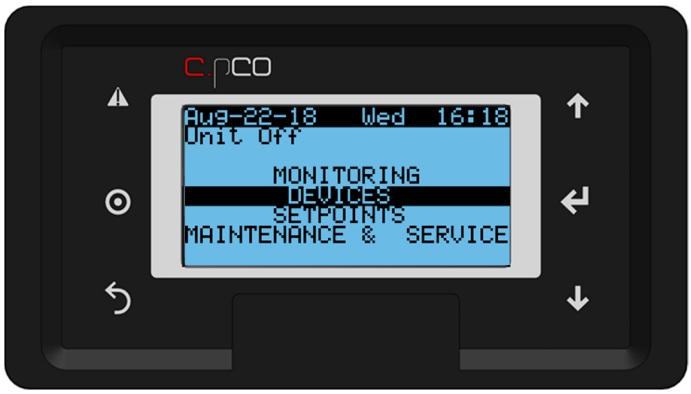


Figure 20: Devices

DEVICES: *The screens in this menu display information regarding the chiller's components.*

Figure 21: Devices, Compressor Status

Status: Status of compressor (**On** = running, **Off** = not running).
Comp Required: *Indicates whether or not the compressor is needed for the current operating condition (**Off** = Not required, **On** = Required).*
Able to on (off) in: *Number of seconds before the compressor is able to start or stop.*
Run Time: *Total time (in hours) the compressor has been operating.*
Hotgas: *Percentage of hot gas valve open.*
EEV: *Percentage of electronic expansion valve open.*

Figure 22: Devices, Process Pump Status

Status: *Status of process pump (**On** = running, **Off** = not running).*
Overload: *Status of pump overload (**Ok** = overload is functioning normally, **Fault** = overload has tripped).*
Runtime: *Total time (in hours) the pump has been operating.*

Figure 23: Devices, Recirculation Pump Status

Status: *Status of process pump (**On** = running, **Off** = not running).*
Overload: *Status of pump overload (**Ok** = overload is functioning normally, **Fault** = overload has tripped).*
Runtime: *Total time (in hours) the pump has been operating.*

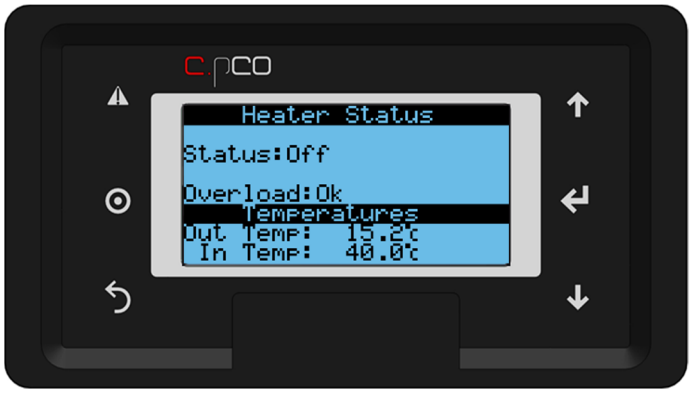


Figure 24: Devices, Heater Status

Status: *Status of Heater (**On** = heating, **Off** = not heating).*
Overload: *Status of pump overload (**Ok** = overload is functioning normally, **Fault** = overload has tripped).*
Out Temp: *Process fluid supply temperature.*
In Temp: *Process fluid return temperature.*

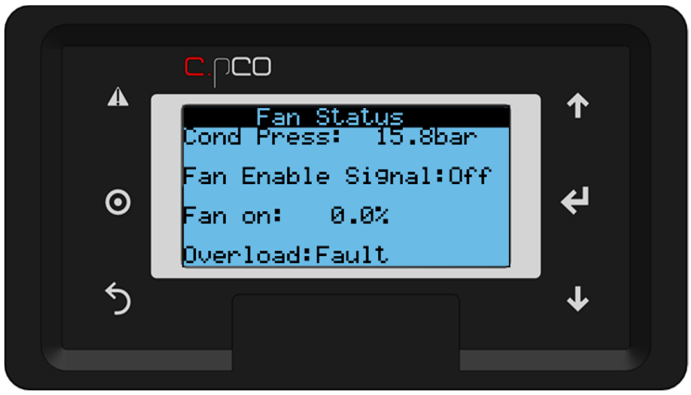


Figure 25: Devices, Fan Status

Cond Press: *Pressure of refrigerant for vapor to liquid phase change.*
Fan Enable Signal: *Status of fan (**On** = running, **Off** = not running).*
Fan On: *Percentage of full fan speed.*
Overload: *Status of fan overload (**Ok** = overload is functioning normally, **Fault** = overload has tripped).*

Figure 26: Devices, Motorized Hot Gas, LOP Protection

No. of Steps: *Opening (in steps) of the motorized hot gas valve.*
Valve Open %: *Opening (in percentage) of the motorized hot gas valve.*
Hot gas Required %: *Percentage of hot gas required for cooling condition.*
Status: *Status of LOP (**On** = running, **Off** = not running).*
Valve Open %: *Opening (in percentage) of the hot gas valve to the full open position.*

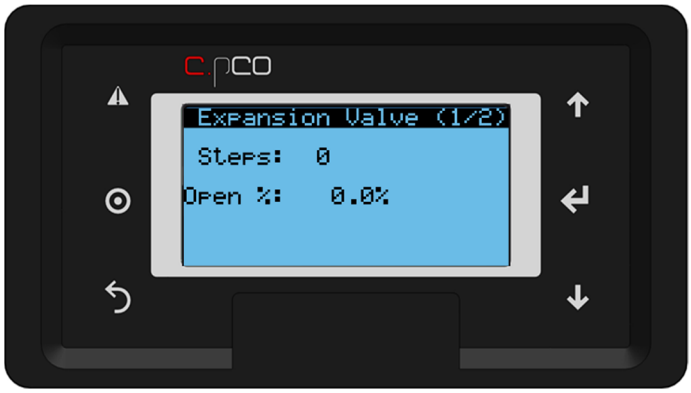


Figure 27: Devices, Expansion Valve 1

Steps: *Opening (in Steps) of the expansion valve.*
Open %: *Opening (in percentage) of expansion valve to the full open position.*

Figure 28: Devices, Expansion Valve 2

Evap Press: *Pressure of refrigerant for liquid to vapor phase change.*
Evap Temp: *Temperature at which the refrigerant evaporates from liquid to vapor.*
MOP Protect: *Enable Loop protection control (reducing refrigerant).*
LOP Protect: *Enable Loop protection control (increase refrigerant).*
SH Protect: *Enable Loop protection for compressor suction.*
Superheat: *Calculated superheat value of refrigerant at compressor suction.*

Figure 29: Devices, I/O Module

Status: Status for the controller's I/O module.
Address: Modbus address of the I/O module.

8.7 Setpoints

These screens display the user settable setpoints for the chiller.

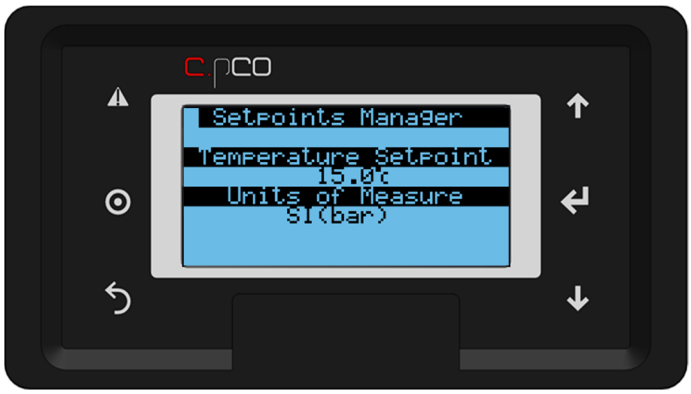


Figure 30: Setpoints, Temperature

Temperature Setpoint: *Outlet temperature setpoint for the process cooling water.*
Units of Measure: *Select the units of measure to be displayed on the user interface.*

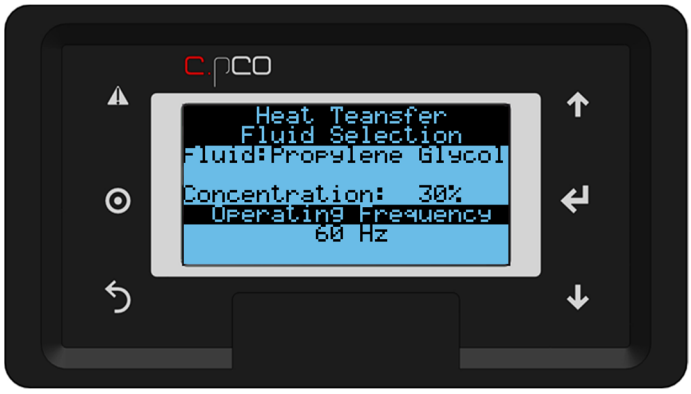


Figure 31: Setpoints, Plasma system Outlet Flow

Fluid: *Heat Transfer Fluid type.*
Concentration: *Percentage of Heat Transfer Fluid vs. water.*
Operating Frequency: *Frequency of mains power.*

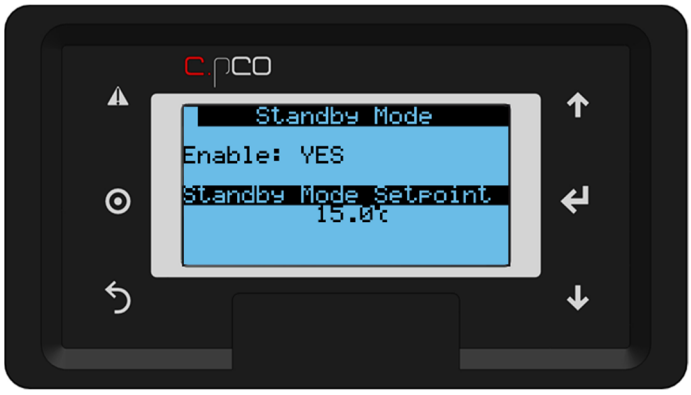


Figure 32: Setpoints, Standby Mode

Enable: *Status of Standby Mode operation (**YES** = enabled, **NO** = disabled).*
Standby Mode Setpoint: *Minimum allowable process coolant temperature when Standby Mode is enabled.*

8.8 Maintenance & Service

This screen and its submenus contain information regarding the total operational hours of the chiller's components as well as contact information of the factory. The Local Mode is also enabled or disabled in this section.

Figure 33: Maintenance & Service, Main Menu

MAINTENANCE & SERVICE: *This is the main menu under the Maintenance & Service option.*

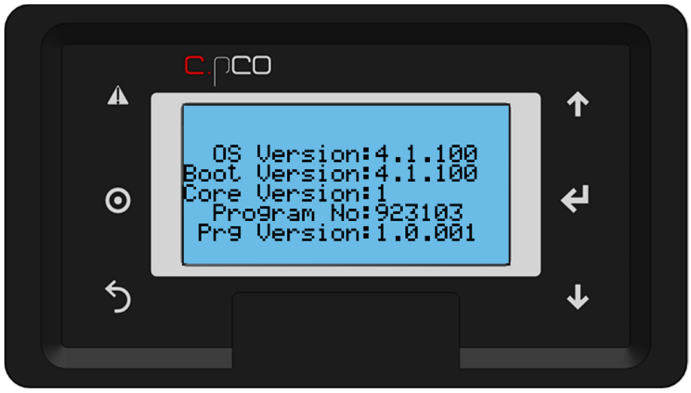


Figure 34: Maintenance & Service, About

Under the **ABOUT** option:

OS Version: *Current Operating system version of the controller.*

Boot Version: *Current Boot version of the controller.*

Core Version: *Current Core (CPU) version of the controller.*

Program No: *Current program number loaded onto the controller.*

Program Version: *Current program version.*

Figure 35: Maintenance & Service, Contact Service

Under the **CONTACT SERVICE** option:

Contact information for the factory's service department is displayed here.

Figure 36: Maintenance & Service, Contact Parts

Under the **CONTACT PARTS** option:

Contact information for the factory's replacement parts department is displayed here.

Figure 37: Maintenance & Service, Compressor and Fan Run Time

Under the **RUN TIMERS** option (page 1):

Comp: *Total operating time (in hours) of the compressor.*

Fan: *Total operating time (in hours) of the Fan.*

***Note**: These timers are also available in the* **DEVICES** *menu (refer to* Figure 21*)*

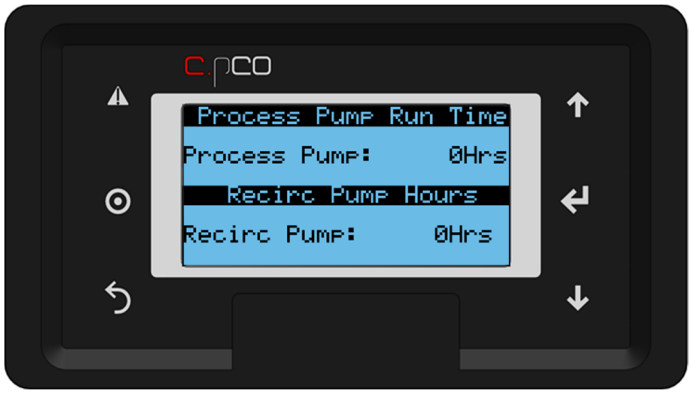


Figure 38: Maintenance & Service, Pump Run Time

Under the **RUN TIMERS** option (page 2):

Process Pump: *Total operating time (in hours) of the process pumps.*

Recirc Pump: *Total operating time (in hours) of the recirculation pump.*

***Note**: These timers are also available in the* **DEVICES** *menu (refer to* Figure 23*)*

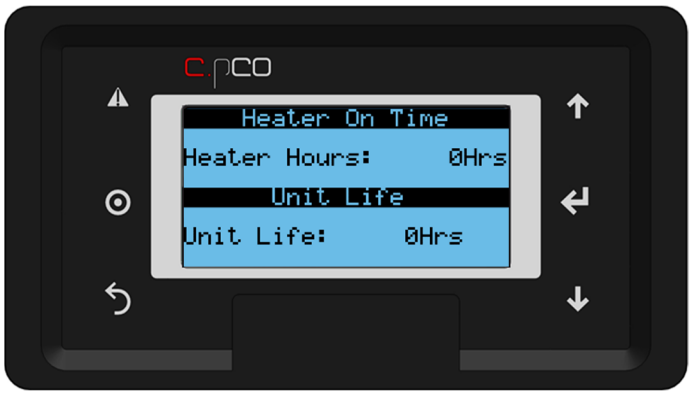


Figure 39: Maintenance & Service, Heater and Unit Run Time

Under the **RUN TIMERS** option (page 2):

Heater Hours: *Total operating time (in hours) of the heater.*

Unit Life: *Total operating time (in hours) of the chiller.*

***Note**: These timers are also available in the* **DEVICES** *menu (refer to* Figure 24*)*

Figure 40: Maintenance & Service, Alarm Log Export

Under the **RUN TIMERS** option (page 4):

Memory type: INTERNAL = Alarm log will be saved to internal controller memory. **USB** = Alarm log will be saved to a micro USB memory stick in the micro USB port.

File name: File name for the alarm log file (00 – 99).

Export Logs: NO = alarm log not exported, **YES** = alarm log exported to **Memory type** location and saved as **File name**.

To export the most recent alarm log:

1. Press the ↵ button when in this screen.
2. Under **Memory Type** press the ↑ or ↓ arrow to toggle the export location (**INTERNAL** will export the log onto the controller's local storage, **USB** will export onto an attached device via the controller's USB port). Press the ↵ button to confirm.
3. Under **File name** press the ↑ or ↓ arrow to set the name of alarm log file (between 00 to 99). Press the ↵ button to confirm.
4. If **USB** was selected in step 2 open the micro USB cover on the controller and attach a USB storage device. Otherwise, go to step 5.
5. Under **EXPORT LOGS** press the ↑ or ↓ button to toggle to **YES**. Press ↵ to export the alarm log.
6. The alarm log has now been exported to the root location of the selected location step 2 as a .txt file. The controller's internal storage can be accessed like any other storage disk via micro USB.

9 Troubleshooting

9.1 Alarm List

If the chiller has encountered a warning or fault it will be displayed in the alarm menu (refer to section 8.1 Navigation to access this menu).

Table 9: Alarm List

Alarm Code	Alarm Name	Type	Description	Corrective Action
AL*02	cPCOe offline alarm	Auto reset	The controller's I/O module has been disconnected or has the incorrect DIP switch settings.	• Verify that the I/O module (301PLC) is connected. • Verify that the I/O module DIP switch settings are correct (refer to Table 15 in Appendix C).
AL*017	Pump Overload Fault	Auto reset	The manual motor protector for the process or recirculation pump has tripped.	• Verify that fluid circuits are clear from obstructions (debris, hose kinks, clogged filters, closed valves, etc.) • Reset the manual motor protectors (122MS and 124MS).
AL*018	Phase Monitor Fault	Auto reset	There is a phase reversal, phase loss, or phase imbalance on the main power supplying the chiller	• If the "R" LED is AMBER the main power is phased properly. If the "R" LED is unlit there is a phase reversal. Swap any two of the three main power supply leads. • If the "Un" LED is GREEN the main power is balanced. If the "Un" LED is unlit there is a phase loss or imbalance. Measure the incoming main power to check for a phase loss and then inspect the power distribution circuit breakers. If a phase imbalance >10% exists a power conditioner may be necessary for the main power supply.
AL*019	High Pressure Fault	Auto reset	The maximum pressure for the refrigeration circuit has been exceeded and the high pressure switch has tripped.	• Verify that the doors and air filter(s) have been installed. • Verify that the environmental and clearance conditions specified in sections 5.2.1, 5.2.2, and 5.2.5 have been met. • Reset the refrigeration high pressure switch (refer to Section 9.3) and restart the chiller.
AL*020	Fan/Comp Otemp Fault	Auto reset	Fan(s) and/or compressor(s) internal thermal overloads have tripped.	• Verify that the doors and air filter(s) have been installed. • Verify the chiller is operating within the specified environment conditions (refer to Section 5.2.1). • Verify that air intake and exhaust clearances have been adhered to (refer to Section 5.2.5).
AL*021	Heater Switch Tripped	Auto reset	The heater limit switch has tripped because the tank temperature has exceeded 140°F (60°C)	• Contact DTS Service
AL*022	Multiple On Signals	Auto reset	Multiple signals trying to turn on the chiller. Specifically the Local/Off/Remote switch is in the ⍁ position and the unit is receiving conflicting start/stop signals between Modbus and the chiller start/stop interlock.	• Check the connectivity to the plasma cutter to ensure the chiller is receiving remote start/stop signals through the physical interlock **or** Modbus but not both.
AL*023	Fluid Over Temp Fault	Auto reset	Process water outlet temperature is > 10°F (5.6°C) above its setpoint.	• Verify that the doors and air filter(s) have been installed.

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Troubleshooting - Alarm List

Alarm Code	Alarm Name	Type	Description	Corrective Action
				• Verify the chiller is operating within the specified environment conditions (refer to Section 5.2.1). • Verify that air intake and exhaust clearances have been adhered to (refer to Section 5.2.5). • Verify the compressor status is “ON” (refer to Figure 21). • Verify the motorized hot gas valve is fully closed (0%) (refer to Figure 21). • Verify the Superheat is < 20°F (refer to Figure 15). If the Superheat is > 20°F the refrigerant charge may be low. • Contact DTS Service.
AL*024	Fluid Under Temp Fault	Auto reset	Process water outlet temperature is < 10°F (5.6°C) below its setpoint.	• Verify the tank heater status is “ON” (refer to Figure 24). • Verify the compressor status is “OFF” (refer to Figure 21). • Contact DTS Service
AL*025	Tank Level Low	Auto reset	The coolant reservoir level is low, but pumps are operable.	Refill the coolant reservoir (refer to Section 6.9).
AL*026	Tank Critically Low	Auto reset	The coolant reservoir level is too low to safely operate the pumps.	Refill the coolant reservoir (refer to Section 6.9).
AL*027	Low Pressure Fault	Auto reset	The refrigeration circuit suction pressure has gone too low.	• Verify the chiller is operating within the specified environment conditions (refer to Section 5.2.1). • Verify the Superheat is < 20°F (refer to Figure 15). If the Superheat is > 20°F the refrigerant charge may be low. • Contact DTS Service.
AL*028	Process Flow Fault	User reset	The process coolant flow rate is below the minimum threshold 0f 0.4GPM	• Verify that all valves in the process fluid circuit are open. • Verify that there are no kinks or other obstructions in the process fluid hoses. • Verify that the fluid reservoir is not low. • Check the Process circuit fluid filter to ensure the filter is clean. If the filter is contaminated replace the filter (refer to Section 10.2). • Reset the alarms (refer to Section 8.2.3) and restart the chiller. • If the fault persists contact DTS Service.
AL*029	Recirc Flow Fault	User reset	The flow rate in the recirculation circuit is below the minimum threshold of 6GPM.	• Check the Process circuit fluid filter to ensure the filter is clean. If the filter is contaminated replace the filter (refer to Section 10.2). • Fully open the globe valve at the outlet of the recirculation pump. Reset the alarms (refer to Section 8.2.3) and restart the chiller. If the chiller starts adjust the globe valve until the recirculation flow rate reaches the flow specified in Table 1. • If the fault persists contact DTS Service.
AL*030	Process Fluid Press Hi	User reset	The process outlet pressure has exceeded its maximum threshold of 240PSI.	• There is likely a problem with the pressure relief bypass valve. Contact DTS Service.
AL*031	Temp Limit Shutdown	Auto reset	Outlet fluid temperature has exceeded 130°F.	• Verify that the plasma cutter heat load does not exceed the specifications defined in Table 1.

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Troubleshooting - Alarm List

Alarm Code	Alarm Name	Type	Description	Corrective Action
AL*032	Recirc Flow Prb Err	Auto reset	The flow signal from the flow meter in the recirculation circuit is reading open, short, or out of range.	• Check the M12 Eurofast electrical connector on the flow meter to ensure it is fully tightened. • If the fault persists contact DTS Service.
AL*033	Recirc Temp Prb Err	Auto reset	The temperature signal from the flow meter in the recirculation circuit is reading open, short, or our of range.	• Check the M12 Eurofast electrical connector on the flow meter to ensure it is fully tightened. • If the fault persists contact DTS Service.
AL*034	Flit In Press Prb Err	Auto reset	The pressure signal from fluid filter inlet pressure transducer is reading open, short, or out of range.	• Check the M12 Eurofast electrical connector on the pressure transducer to ensure it is fully tightened. • If the fault persists contact DTS Service.
AL*035	Filt Out Press Prb Err	Auto reset	The pressure signal from fluid filter outlet pressure transducer is reading open, short, or out of range.	• Check the M12 Eurofast electrical connector on the pressure transducer to ensure it is fully tightened. • If the fault persists contact DTS Service.
AL*036	Process Press Prb Err	Auto reset	The pressure signal from process outlet pressure transducer is reading open, short, or out of range.	• Check the M12 Eurofast electrical connector on the pressure transducer to ensure it is fully tightened. • If the fault persists contact DTS Service.
AL*037	Process Flow Meter Err	Auto reset	The flow signal from the process flow meter is reading open, short, or out of range.	• Check the M12 Eurofast electrical connector on the flow meter to ensure it is fully tightened. • If the fault persists contact DTS Service.
AL*038	Inlet Temp Prb Err	Auto reset	The temperature signal from the process flow meter is reading open, short, or out of range.	• Check the M12 Eurofast electrical connector on the flow meter to ensure it is fully tightened. • If the fault persists contact DTS Service.
AL*039	Tank Level Sensor Err	Auto reset	The level signal from the ultrasonic tank level sensor is reading open, short, or out of range.	• Check the M12 Eurofast electrical connector on the tank level sensor to ensure it is fully tightened. • If the fault persists contact DTS Service.
AL*040	Cond Temp Prb Err	Auto reset	The temperature signal from the condenser thermistor is reading open, short, or out of range.	• Check the Deutsch electrical connector on the thermistor to ensure it is fully inserted into the mating connector on the wiring harness. • If the fault persists contact DTS Service.
AL*041	Suction Temp Prb Err	Auto reset	The temperature signal from the suction thermistor is reading open, short, or out of range.	• Check the Deutsch electrical connector on the thermistor to ensure it is fully inserted into the mating connector on the wiring harness. • If the fault persists contact DTS Service.
AL*042	Out Temp Prb Err	Auto reset	The temperature signal from the outlet fluid thermistor is reading open, short, or out of range.	• Check the Deutsch electrical connector on the thermistor to ensure it is fully inserted into the mating connector on the wiring harness. • If the fault persists contact DTS Service.
AL*043	Cond Press Prb Err	Auto reset	The pressure signal from the condenser pressure transducer is reading open, short, or out of range.	• Check the electrical connector on the pressure transducer to ensure it is fully inserted into the mating connector on the wiring harness. • If the fault persists contact DTS Service.
AL*044	Suc Press Prb Err	Auto reset	The pressure signal from the condenser pressure transducer is reading open, short, or out of range.	• Check the electrical connector on the pressure transducer to ensure it is fully inserted into the mating connector on the wiring harness. • If the fault persists contact DTS Service.
AL*045	Ambient Temp Prb Err	Auto reset	The temperature signal from the ambient thermistor is reading open, short, or out of range.	• Contact DTS Service.

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Troubleshooting - Alarm List

Alarm Code	Alarm Name	Type	Description	Corrective Action
AL*046	Ambient Temp Very Low	Auto reset	The ambient temperature is below the chiller's approved environmental conditions defined in Table 4.	• Wait for the ambient temperature to increase to within the approved environmental conditions defined in Table 4.
AL*047	Ambient Temp Very High	Auto reset	The ambient temperature has exceeded the chiller's approved environmental conditions defined in Table 4.	• Wait for the ambient temperature to decrease to within the approved environmental conditions defined in Table 4.
AL*048	Change Filter	Auto reset	The pressure drop across the fluid filter has exceeded its threshold and the filter needs to be changed.	• Replace the filter (refer to Section 10.2).

Always contact the factory if faults persist after performing corrective actions.

9.2 Inline Heater Temperature Limit Switch

The chiller is equipped with a mechanical, temperature limit switch that disengages (trips) the heater in the event of a malfunction to prevent excessive fluid temperatures that could result in fire hazards. If the switch has tripped it can be reset by performing the following steps:

1. Access the chiller's air intake/filter side (refer to section 6.4 Internal Access).
2. Locate the temperature limit switch (refer to
3. Figure 41).
4. Unscrew the cap on the temperature limit switch to access the green reset button.
5. Press the reset button with a screwdriver of appropriate size until a tactile click is felt. If the button is loose and there is no click then the switch is already closed. If the button will not remain closed (engaged) after attempting to press, then the temperature of the pipe, in which the inline heater is located, is still too hot. Allow the pipe surface to cool before attempting to reset the switch.
6. Reinstall the cap on the temperature limit switch.
7. Reinstall the air intake filter(s) before restarting chiller.

9.3 Refrigeration High Pressure Switch

WARNING

The refrigeration discharge lines may be extremely hot – avoid contact. Resetting of the refrigeration high pressure switch should only be performed by qualified personnel equipped with proper safety gear and tools.

The chiller's refrigeration circuit is equipped with a mechanical, high pressure switch that disengages (trips) the refrigeration circuit when dangerously high pressures occur to prevent damage to the refrigeration system. If the switch has tripped it can be reset by performing the following steps:

1. Access the chiller's air intake/filter side (refer to section 6.4 Internal Access).
2. Locate the refrigeration high pressure switch (refer to
3. Figure 41).
4. Depress the red reset button until a tactile click is felt.
5. Reinstall the air intake filter(s) before restarting chiller.

10 Maintenance

Establishing and following a proper maintenance schedule will substantially reduce down time, reduce repair costs and extend lifetime of the chiller. A suggested checklist has been provided in section 10.1 Suggested Maintenance Checklist.

10.1 Suggested Maintenance Checklist

Items in this list should be initially performed on a weekly basis to determine their respective maintenance frequencies. For example, if a component requires cleaning or replacement after 12 weeks of operation then the maintenance frequency of that component is 12 weeks. Maintenance frequencies must be re-established when operating environments or conditions have changed.

1. **Inspect and clean the condenser coil and air intake filter**
   Excessive buildup of dirt, oil and/or other debris on the condenser coil and air intake filters will cause reduced air flow rates for heat dissipation leading to lower cooling capacities. Ensure that the fins of the condenser coil are clean and undamaged. Use compressed air at no more than 30psi (2.0bar) to blow out the condenser coil and air intake filters in the direction opposite to normal air flow. For the condenser coil the cleaning air should enter the discharge side and exit from the intake side (refer to Figure 41 and Figure 42). The air intake filters show the direction of cleaning and installation. If the air filters cannot be cleaned then they must be replaced. Contact the factory for replacement parts if required.
2. **Inspect the supply pressures.**
   Record the supply pressure of both circuits after the initial startup and then periodically. If plumbing connections between the chiller and plasma system (hose lengths, fittings, valve positions, etc.) have remain unchanged it is expected that the supply pressures should remain relatively constant over time. An increase in pressure is indicative of a clogged filter/strainer or buildup of debris in the coolant circuits.
3. **Inspect the cold water particulate filter.**
   Inspect the particulate filter to determine if it needs to be replaced. Refer to Figure 41 for the location. The particulate filter's sump can be removed and reinstalled using the provided filter wrench (typically stored in the inside door pocket of the electrical enclosure when shipped). After `inspection or replacement reinstall the filter and sump correctly and securely using the filter wrench to prevent leaks. Contact the factory for replacement parts if required.
4. **Inspect the cooling water y-strainer.**
   Inspect the y-strainer's screen weekly to determine if it needs to be cleaned or replaced. Refer to Figure 41 for the location. Remove the y-strainer's plug to access the screen. After inspection, cleaning or replacement reinstall the screen and plug correctly and securely to prevent leaks. If the screen cannot be cleaned it must be replaced. Contact the factory for replacement parts if required.
5. **Inspect the quality of the coolant in the reservoir.**
   Access the coolant in the reservoir via the access cap (refer to Figure 42). If debris are present in the coolant the particulate filter is most likely clogged (refer to item 2 to inspect and replace the particulate filter). If algae or bacteria is growing in the reservoir then the system must be drained and the coolant must be replaced. Contact the factory for recommendations on this procedure.

6. **Schedule planned maintenance services.**
   Consult the factory to schedule and perform planned maintenance services on the chiller by qualified refrigeration technicians.

10.2 Replacing the Particulate Filter Cartridge

The chiller's process circuit is equipped with a particulate filter. Although this prolongs the lifespan of the Chiller, the filter cartridge will eventually deplete. The chiller monitors when the cartridge is no longer functional and will display a warning on the controller. If this warning occurs the cartridge must be replaced according to the following steps:

1. Shut the chiller down by turning the Local/Off/Remote Switch below the controller to the "O" position.
2. Access the chiller's air intake/filter side (refer to section 6.4 Internal Access).
3. Locate the particulate filter refer to Figure 41.
4. Carefully unscrew the sump of the filter using the provided filter wrench (typically stored in the inside door pocket of the electrical enclosure when shipped). The sump will be full of coolant when removed.
5. Remove and discard the depleted filter cartridge and empty the sump of coolant.
6. Reinstall a new filter cartridge into the sump.
7. Reinstall the sump with the new filter cartridge taking care to ensure the sump o-ring is properly seated.
8. Tighten the filter sump using the filter wrench.
9. Reinstall the air intake filter(s) before restarting chiller.

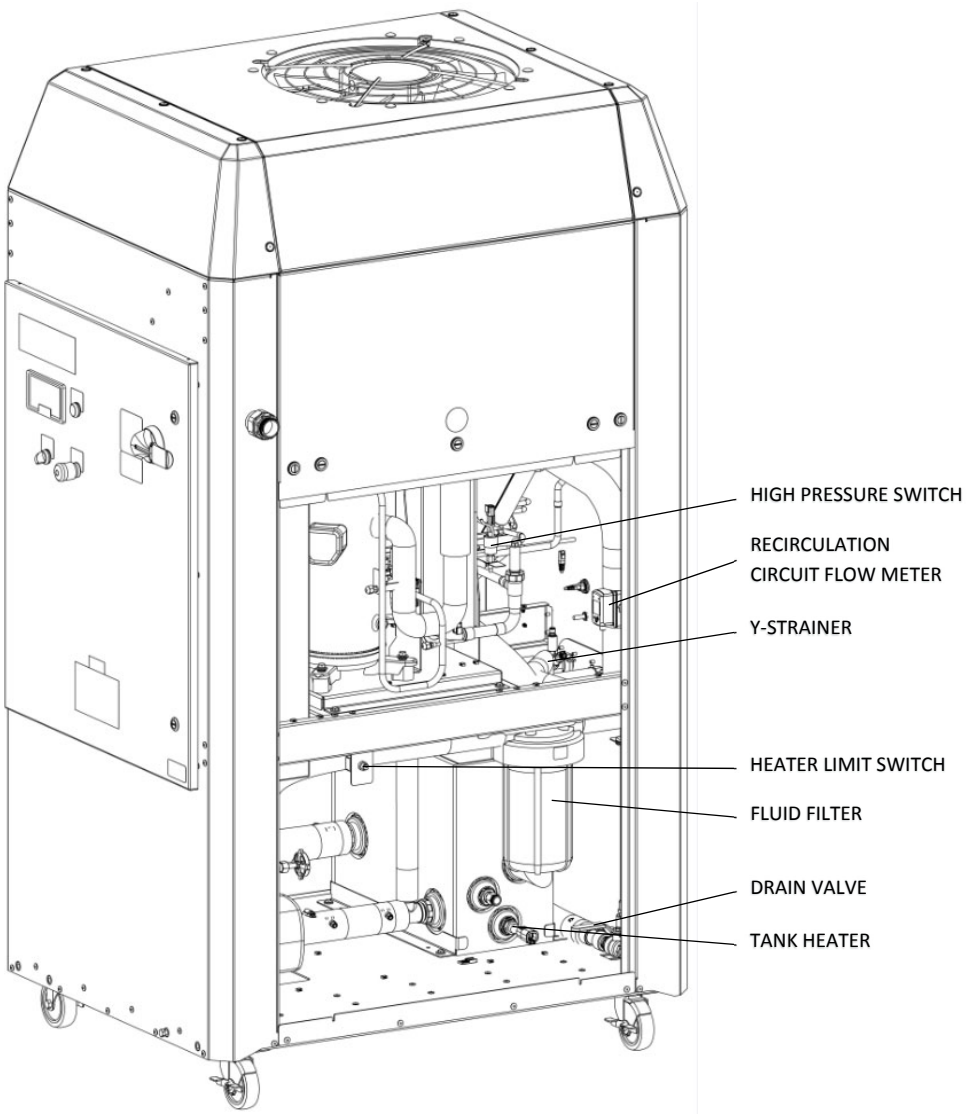

Figure 41: Chiller Internal Components (Air Filter/Intake Side)

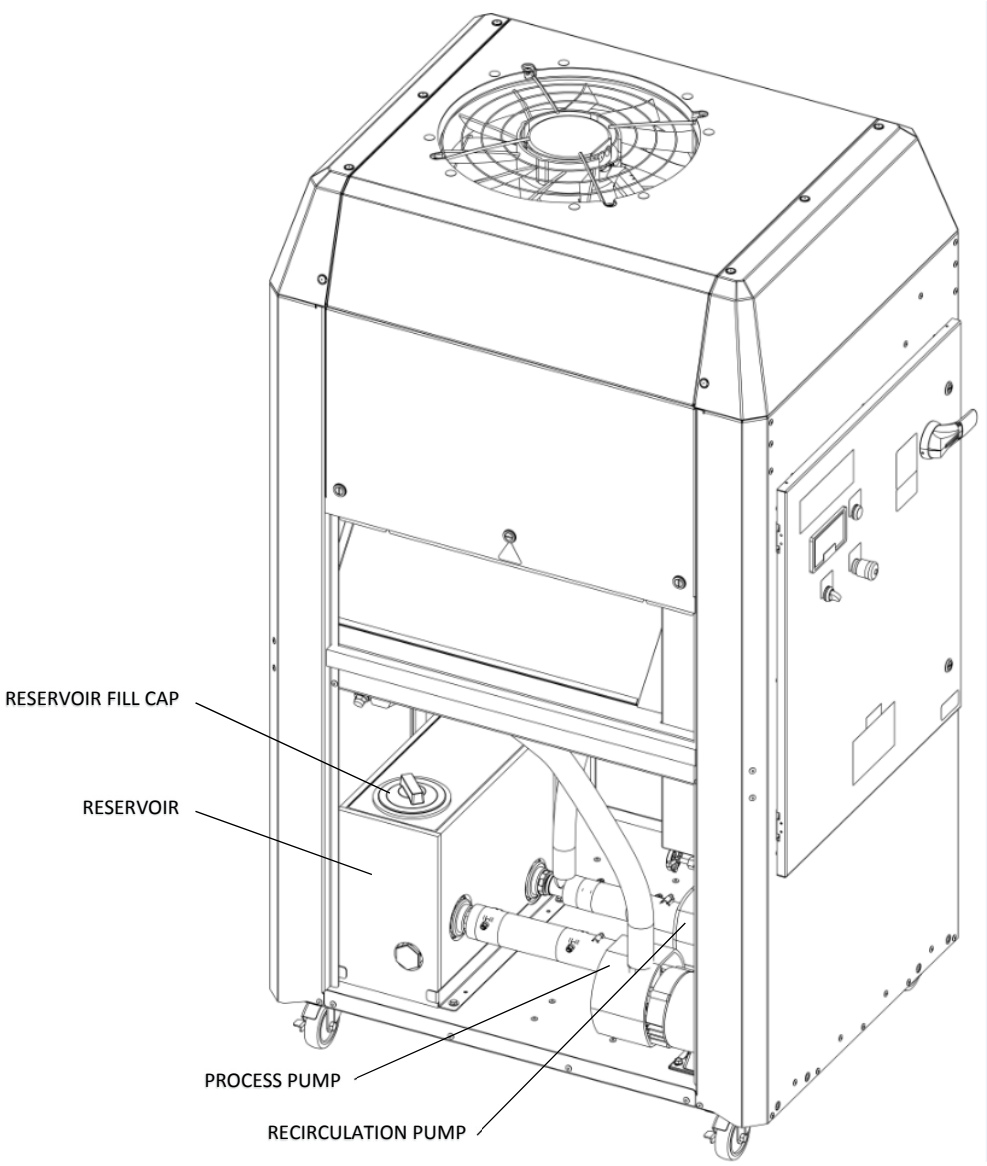

Figure 42: Chiller Internal Components (Panel Side)

11 Chiller Data Tag

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For Technical Support, Parts and Service:
(800) 968-5665 | Outside US: +1(269) 349-6800
Email Service: serviceteam@dimplexthermal.com
Email Parts: partsdept@dimplexthermal.com
2625 Emerald Drive | Kalamazoo, MI 49001 | USA

Model	NVI-5001-CE-MC-M	Mfg. Date	17-Sep-2018
Serial		Part Number	801880
		Rev	B

Qty	Component	Power		FLA (A)		LRA (A)	
		60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz
1	COMPRESSOR	5.0 HP	5.0 HP	12.5	12.5	72.0	72.0
1	PROCESS PUMP	1.0 HP	1.0 HP	1.5	1.9		
1	RECIRCULATION PUMP	0.58 HP	0.34 HP	0.95	0.55		
1	FAN	0.9kW	0.9kW	1.25	1.55		
1	MAINTENANCE HEATER	2.8kW	1.9kW	5.9	4.9		

Main Connection Information		
Frequency	60 Hz	50 Hz
Phase	3~	
Main Voltage(s)	460 V	380-415 V
Full Load Current	23 A	23 A
Min. Circuir Ampacity	26 A	26 A
Max. Overcurrent Protection	40 A	40 A
Short Circuit Current Rating	12 kA	
Electrical Enclosure Rating	Nema 4	IP 56
Manufactured For	Indoor Use Only	

Refrigeration Information				
Refrigerant	R407C	GWP	1774	
Qty.	7 Lbs.	3.2 kg	CO2e	5.633 tonne
High Side DesignPressure	350 psi	24.13 bar		
Low Side Design Pressure	50 psi	3.45 bar		

Contains fluorinated greenhouse gases

☑ UL-1995 ☑ CE ☐ No Ref

CE

NRTL Listed Complies with UL 1995 only for

Volts	Phase	Frequency
460 V	3~	60 Hz

For online manual for and other docs:
http://documentation.dimplexthermal.com:1010
or scan QR code

Figure 43: Chiller Data Tag

12 Factory Contact

Hours of operation are 8:00 a.m. to 5 p.m. EST, Monday to Friday.

Website: https://www.dimplexthermal.com

12.1 Service Support Team

- serviceteam@dimplexthermal.com
- (800) 968-5665 ext. 709
- (269) 349-6800

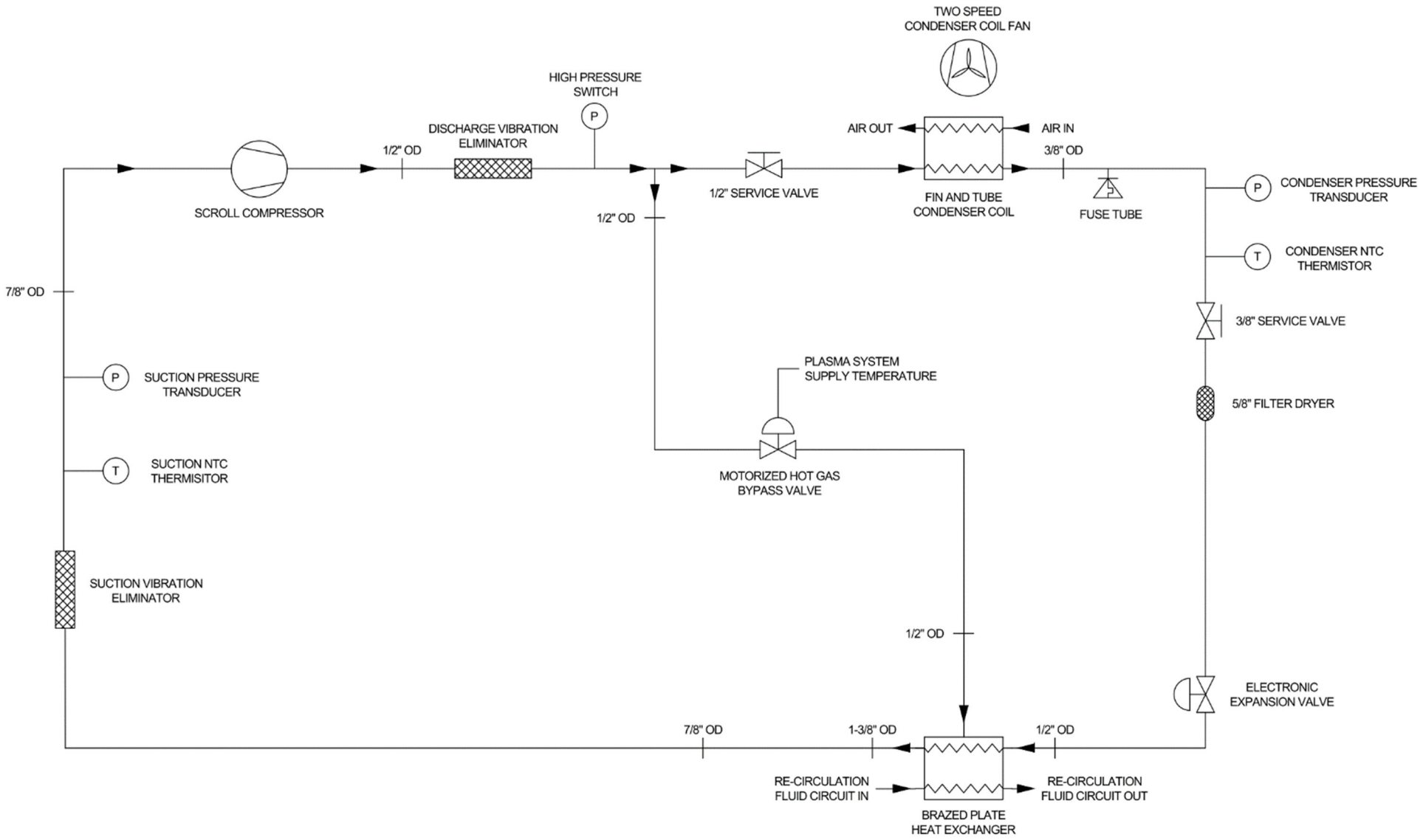
12.2 Parts Department

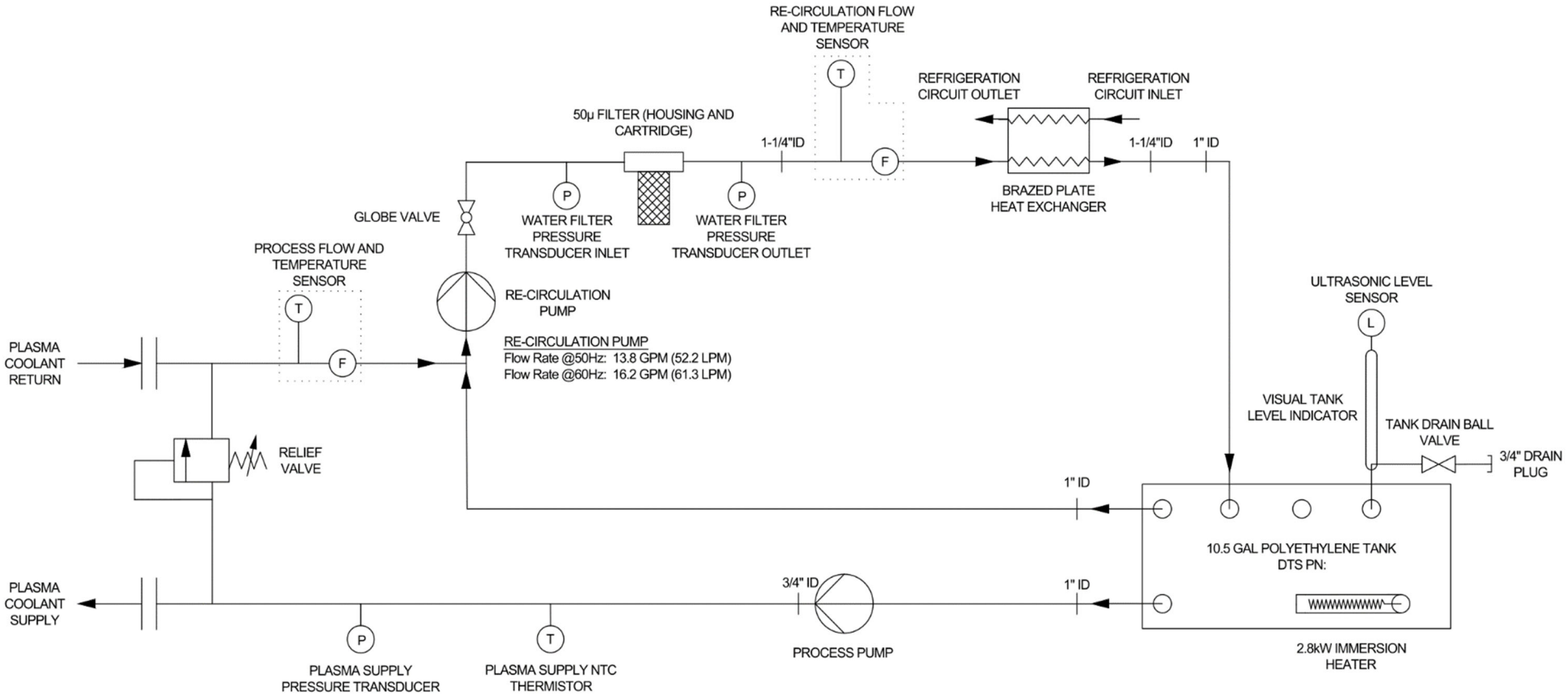
- partsdept@dimplexthermal.com
- (800) 968-5665 ext. 709
- (269) 349-6800

13 Revisions

Table 10: Manual Revisions

Rev	Description	By	Date
A	Initial Release	J. Roby	10/08/2018
B	Multiple updates based on Hypertherm review	J. Roby	11/1/2018
C	Added SI units to Tables 13 & 14, Added SI units to AL021 in Table 9	J. Roby	11/3/2018
D	Updated warranty period from 18 mo.	S. Kadosh	12/14/2018
E	Added DoC to Appendix E. Changed Original Translation (English) to Original Instructions on title page.	J. Roby	12/18/2018
F	Updated DoC documentS	S. Kadosh	01/14/2019
G	Updated section 6.3, Figure 5, and DoC documents	S. Kadosh	01/22/2019
H	Updated DoC documents	I.Mclaurin	4/4/2019


TWO SPEED
CONDENSER COIL FAN
HIGH PRESSURE
SWITCH
P
DISCHARGE VIBRATION
ELIMINATOR
1/2" OD
AIR OUT
AIR IN
3/8" OD
SCROLL COMPRESSOR
1/2" OD
1/2" SERVICE VALVE
FIN AND TUBE
CONDENSER COIL
FUSE TUBE
P
CONDENSER PRESSURE
TRANSDUCER
T
CONDENSER NTC
THERMISTOR
7/8" OD
3/8" SERVICE VALVE
P
SUCTION PRESSURE
TRANSDUCER
PLASMA SYSTEM
SUPPLY TEMPERATURE
5/8" FILTER DRYER
T
SUCTION NTC
THERMISITOR
MOTORIZED HOT GAS
BYPASS VALVE
SUCTION VIBRATION
ELIMINATOR
1/2" OD
ELECTRONIC
EXPANSION VALVE
7/8" OD
1-3/8" OD
1/2" OD
RE-CIRCULATION
FLUID CIRCUIT IN
RE-CIRCULATION
FLUID CIRCUIT OUT
BRAZED PLATE
HEAT EXCHANGER


RE-CIRCULATION FLOW AND TEMPERATURE SENSOR
T
REFRIGERATION CIRCUIT OUTLET
REFRIGERATION CIRCUIT INLET
50µ FILTER (HOUSING AND CARTRIDGE)
1-1/4"ID
F
1-1/4"ID
1" ID
BRAZED PLATE HEAT EXCHANGER
GLOBE VALVE
P
WATER FILTER PRESSURE TRANSDUCER INLET
P
WATER FILTER PRESSURE TRANSDUCER OUTLET
PROCESS FLOW AND TEMPERATURE SENSOR
T
RE-CIRCULATION PUMP
RE-CIRCULATION PUMP
Flow Rate @50Hz: 13.8 GPM (52.2 LPM)
Flow Rate @60Hz: 16.2 GPM (61.3 LPM)
ULTRASONIC LEVEL SENSOR
L
PLASMA COOLANT RETURN
F
VISUAL TANK LEVEL INDICATOR
TANK DRAIN BALL VALVE
3/4" DRAIN PLUG
RELIEF VALVE
1" ID
10.5 GAL POLYETHYLENE TANK
DTS PN:
PLASMA COOLANT SUPPLY
3/4" ID
1" ID
P
PLASMA SUPPLY PRESSURE TRANSDUCER
T
PLASMA SUPPLY NTC THERMISTOR
PROCESS PUMP
2.8kW IMMERSION HEATER

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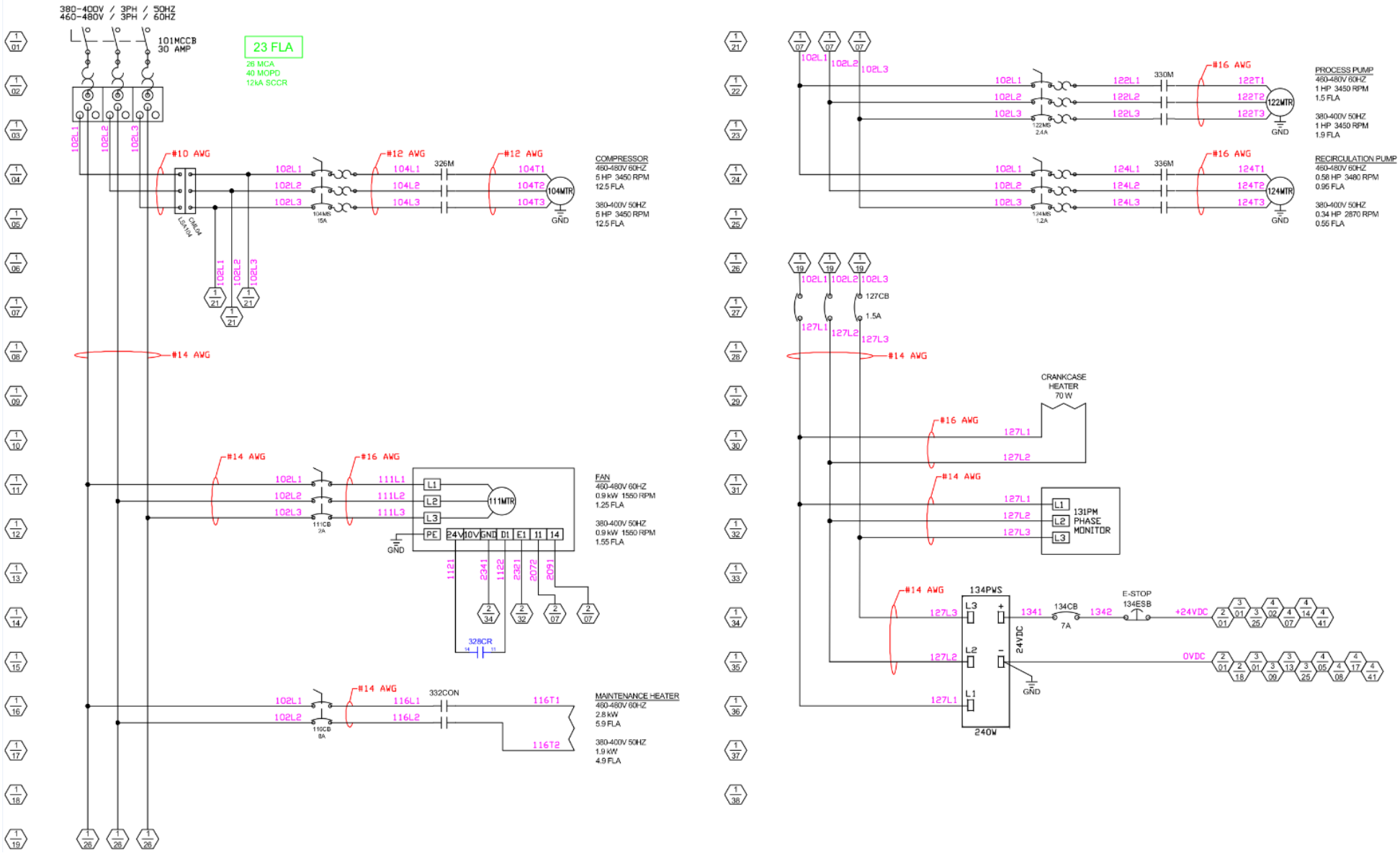
Appendix B (Electrical Schematics) - Power Page



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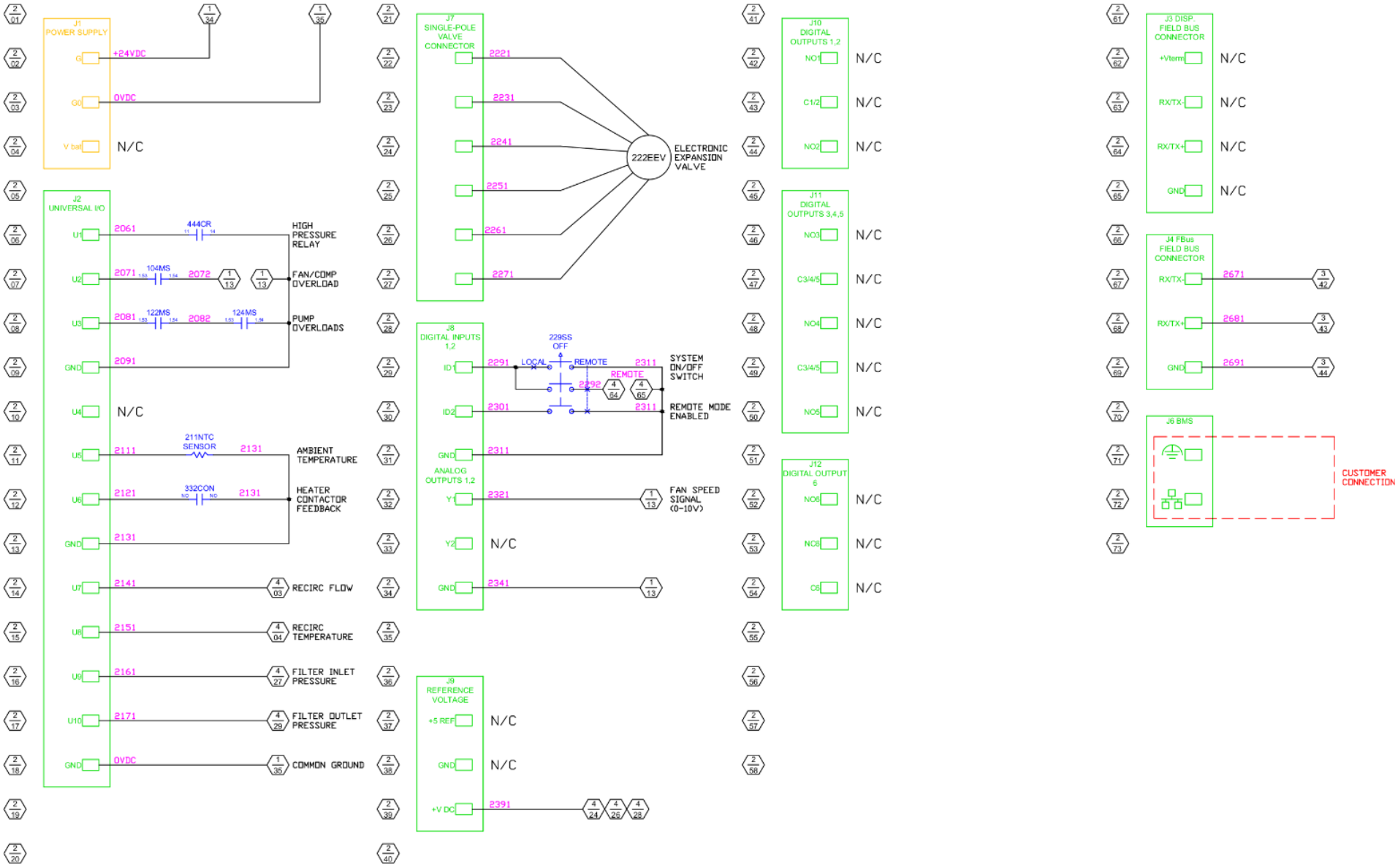
Appendix B (Electrical Schematics) - PLC



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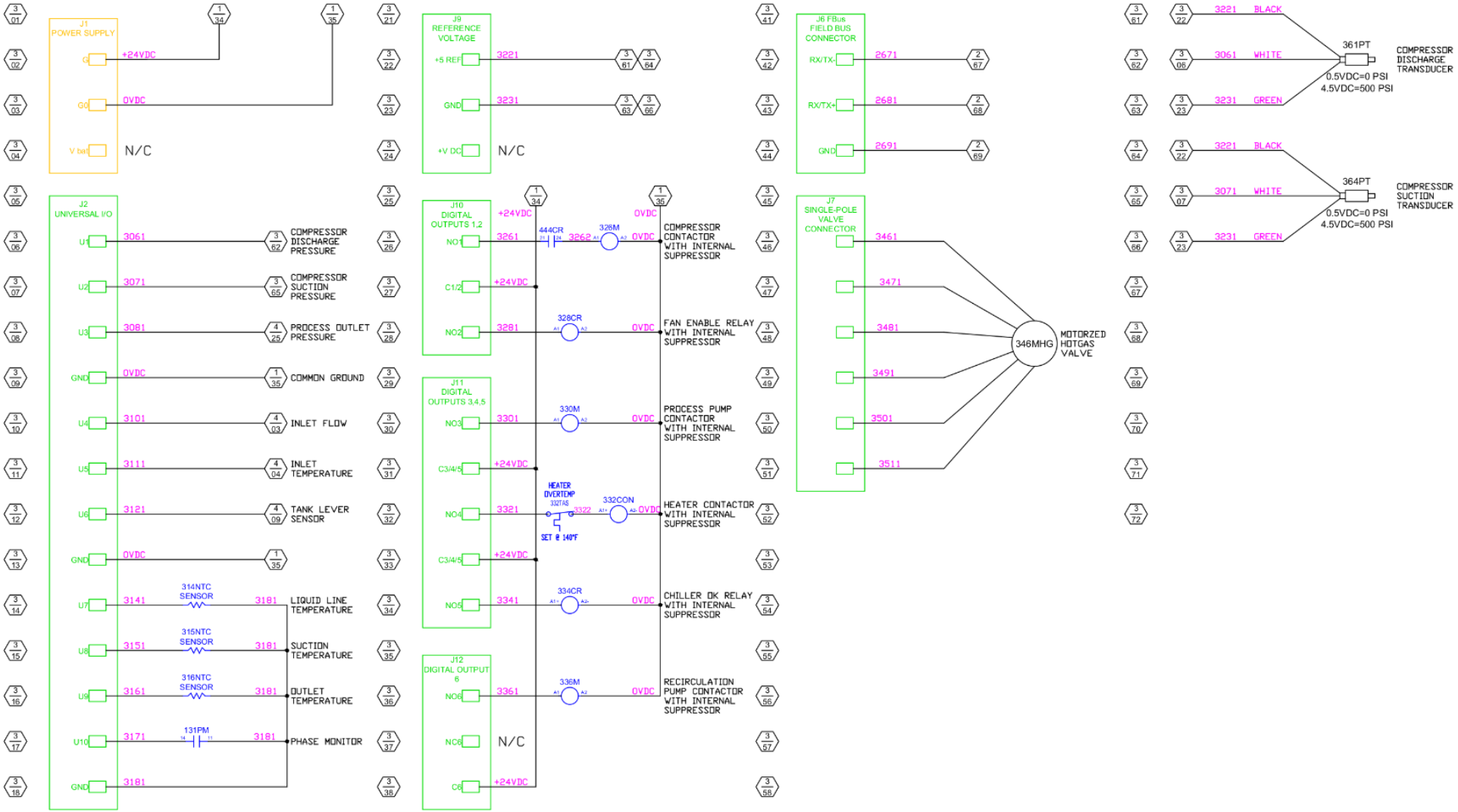
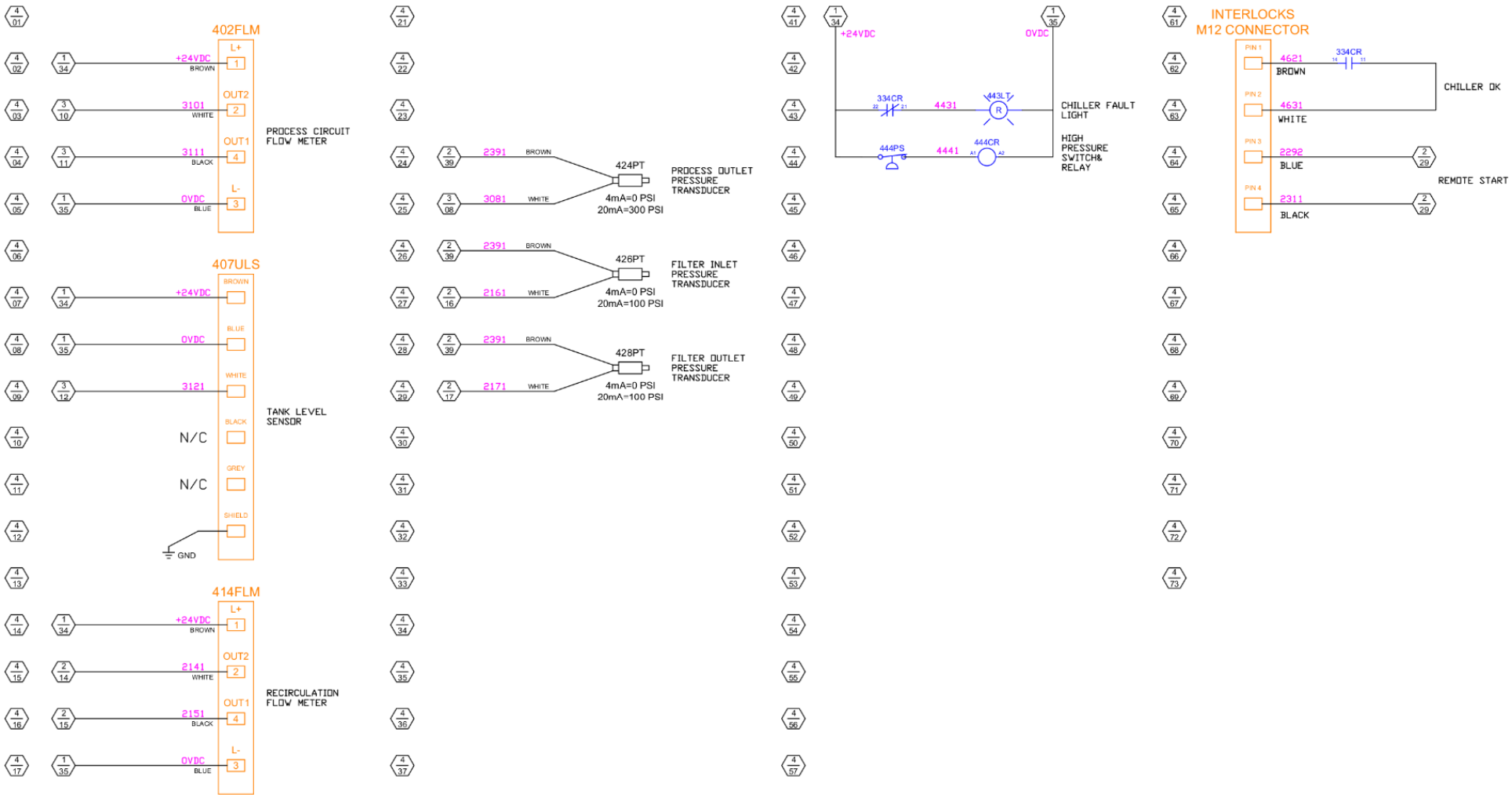
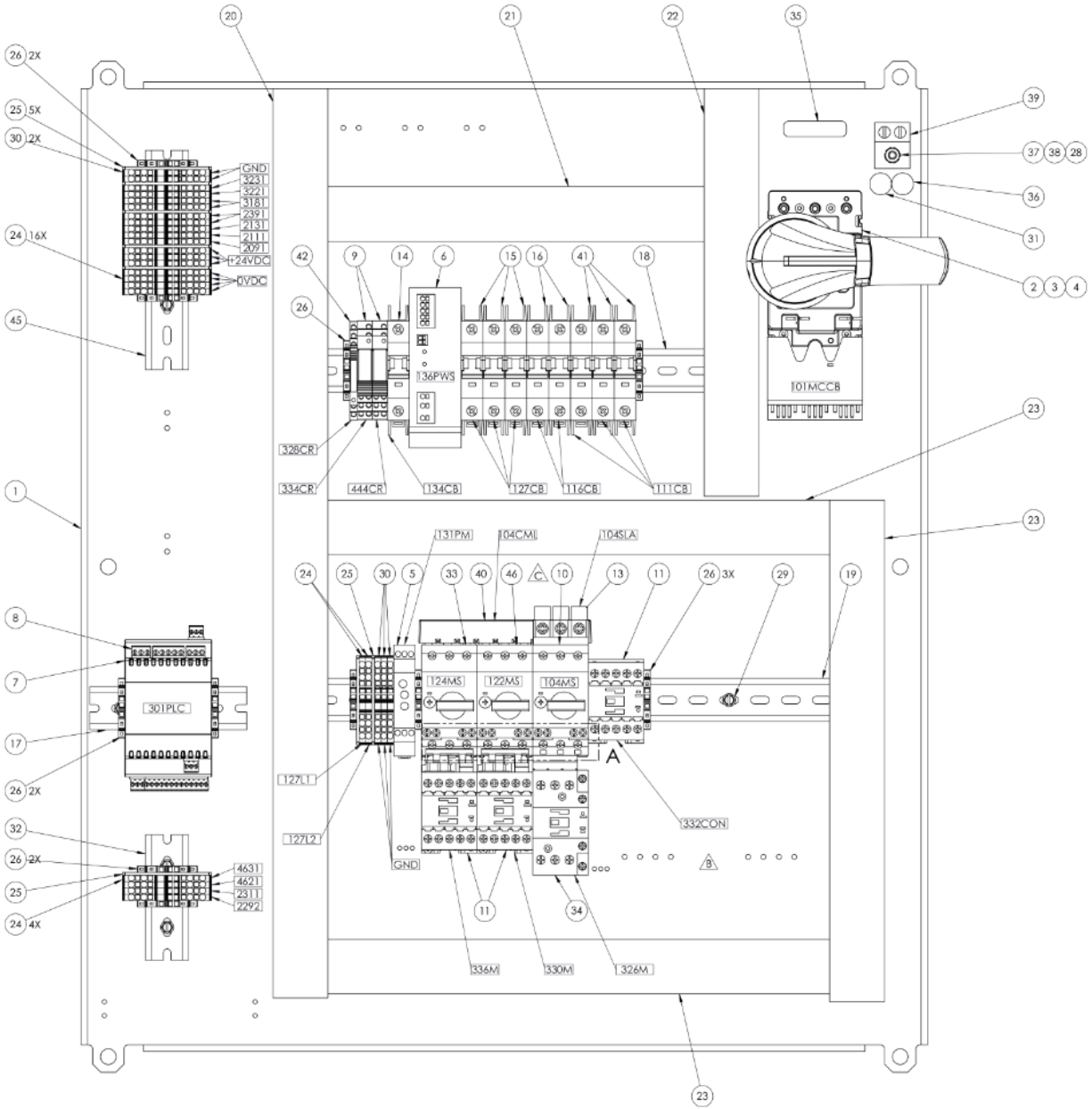
Appendix B (Electrical Schematics) - I/O Module




402FLM
L+
OUT2
OUT1
L-
+24VDC
BROWN
3101
WHITE
3111
BLACK
0VDC
BLUE
PROCESS CIRCUIT FLOW METER
407ULS
BROWN
BLUE
WHITE
BLACK
GREY
SHIELD
+24VDC
0VDC
3121
N/C
N/C
GND
TANK LEVEL SENSOR
414FLM
+24VDC
2141
2151
0VDC
RECIRCULATION FLOW METER
2391
3081
424PT
4mA=0 PSI
20mA=300 PSI
PROCESS OUTLET PRESSURE TRANSDUCER
2161
426PT
4mA=0 PSI
20mA=100 PSI
FILTER INLET PRESSURE TRANSDUCER
2171
428PT
4mA=0 PSI
20mA=100 PSI
FILTER OUTLET PRESSURE TRANSDUCER
334CR
4431
443LT
R
CHILLER FAULT LIGHT
444PS
4441
444CR
HIGH PRESSURE SWITCH& RELAY
INTERLOCKS
M12 CONNECTOR
PIN 1
PIN 2
PIN 3
PIN 4
4621
4631
2292
2311
CHILLER OK
REMOTE START

Glen Dimplex Thermal Solutions | Koolant Koolers

Appendix B (Electrical Schematics) - Electrical Panel



Electrical BOM

Table 11: Electrical Panel Bill of Materials

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	204042	PANEL - EBOX, 30" X 36"	1
2	5002086	30A,MOLDED CASE CB, E FRAME,TYPE H	1
3	5001779	EG HANDLE KIT	1
4	5001786	3 TERMINAL LUGS EG FRAM MCCB 2-14AWG	1
5	5000472	PHASE MONITOR 3PH 1.8VA	1
6	5001600	400-500VAC 240W 24VDC PSU	1
7	5003655	c.pCOe BASIC 16 I/O MODULE	1
8	5001634	CONNECTOR KIT FOR C.PCOE BASIC	1
9	5001058	RELAY 24VDC 10A DPDT W/DIODE	1
10	5001243	10-16A MANUAL MOTOR PROTECTOR 10 B	1
11	5000752	CONTACTOR 9A 24VDC 1NO FRAME B	2
12	5001574	MMP CONNECTOR SCREW IN FRAME B TO B	3
13	5001576	MMP LINE SIDE ADAPTER FRAME B	1
14	5000785	CIRCUIT BREAKER UL489 1P 7A D	1
15	5000816	CIRCUIT BREAKER UL489 3P 1.5A D	1
16	5000805	CIRCUIT BREAKER UL489 2P 8A D	1
17	204668	CUT DIN RAIL, 17"LG	1
18	204669	CUT DIN RAIL, 5"LG	1
19	204671	CUT DIN RAIL, 12"LG	1
20	204672	CUT DIN RAIL, 16"LG	1
21	204674	CUT WIRE WAY, 29"LG	1
22	204675	CUT WIRE WAY, 12"LG	1
23	204676	CUT WIRE WAY, 13"LG	1
24	204677	CUT WIRE WAY, 16"LG	3
25	5000972	30/24A TERMINAL BLOCK 4 CONNECTIONS	36
26	5000973	30/24A TERMINAL BLOCK END BARRIER	11
27	5000971	END CLAMP QUICK MOUNT DIN RAIL	13
28	5001573	MMP FRONT AUX CONTACT 1NO 1NC	3
29	7719129	SCREW 1/4-20 X 1 FLANGE BOLT	1
30	7701028	SCREW 10-32 X 3/8 HEX THREAD CUT	40
31	5000974	30/24A GROUND BLOCK 4 CONNECTIONS	5
32	9900106	GROUND LABEL	1
33	204670	CUT DIN RAIL, 4"LG	1
34	5001569	1-1.6A MANUAL MOTOR PROTECTOR 10 B	2
35	5000755	CONTACTOR 18A 24VDC 1NO FRAME C	1
36	5003260	LABEL-L1/U, L2/V, L3/W	1
37	5003712	PHYSICAL EARTH LABEL	1
38	7714006	NUT 1/4-20 K LOCK NUT	1
39	7714001	NUT 1/4-20 HEX NUT	1
40	5003585	GROUND LUG, 2 BARREL 14-1/0 AWG	1
41	5001871	MMP COMMONING LINK 3 DEVICES FRAME A	1
42	5000823	CIRCUIT BREAKER UL489 3P 8A D	1
43	5001057	RELAY 24VDC 6A SPDT W/DIODE	1

Appendix C (Default Controller Settings)

Program Settings

Table 12: Default Program Settings

Category	Parameter	Values	UOM
Compressor Settings	On Devn	Setpoint +1.0 (0.56)	°F (°C)
	Off Devn	Setpoint -3.0 (-1.67)	°F (°C)
Heater Settings	On Devn	Setpoint -3.0 (-1.67)	°F (°C)
	Off Devn	Setpoint +0.0 (0.0)	°F (°C)
PID Regulation For Fan	Deadband	2 (0.14)	PSI (bar)
	Gain	10.0	----
	Integral Time	25.0	s
	Derivative Time	0	s
	Cond Press Setpoint	280.0 (19.30)	PSI (bar)
Fan Start Settings	Start Fan @100% for Ambient Temp Over	95.0 (35.0)	°F (°C)
	Keep Fan @ 100% For	2	Min
PID Regulation for Motorized Hot Gas	Deadband	0.1 (.056)	°F (°C)
	Gain	10.0	----
	Integral Time	45	s
	Derivative Time	6	s
	LOP Setpoint	55.0 (3.79)	PSI (bar)
	Prepos Time	20	S
EEV Settings (1/3)	SH Setpoint	15.0 (8.3)	°F (°C)
	Gain	8.0	----
	Integral Time	30	s
	Derivative Time	0	s
EEV Settings (2/3)	Low SH Threshold	5.0 (2.8)	°F (°C)
	SH Integral Time	12.0	s
	LOP Threshold	35.0 (1.7)	°F (°C)
	LOP Integral Time	12.0	s
EEV Settings (3/3)	MOP Threshold	23.0 (12.8)	°F (°C)
	MOP Integral Time	15.0	s
	Open on Start	100	%
	Pre-Pos Time	20	s
Recirc Pump Shut Down Time at Stop	Time	10	s
Pump Out Settings	Pump Out Time Limit	5	s
	Pump Out Press Limit	35.0 (2.4)	PSI (bar)
Temperature Limit Setpoints	Min.	41.0 (5.0)	°F (°C)
	Max.	77.0 (25.0)	°F (°C)

Sensor Calibration

Table 13: Default Sensor Calibration Settings

Category	Parameter	Values	UOM
Compressor Discharge Pressure Transducer	0.5V	0.0 (0.00)	PSI (bar)
	4.5V	500.0 (34.47)	PSI (bar)
Compressor Suction Pressure Transducer	0.5V	-15.0 (-1.03)	PSI (bar)
	4.5V	185.0 (12.76)	PSI (bar)
Process Outlet Pressure Transducer	4mA	0.0 (0.00)	PSI (bar)
	20mA	300.0 (20.68)	PSI (bar)
Filter Inlet Pressure Transducer	4mA	0.0 (0.00)	PSI (bar)
	20mA	100.0 (6.89)	PSI (bar)
Filter Outlet Pressure Transducer	4mA	0.0 (0.00)	PSI (bar)
	20mA	100.0	PSI (bar)
Tank Level Transducer	4mA	0	%
	20mA	100	%
Recirculation Flow Meter	4mA	0.00 (0)	GPM (LPM)
	20mA	26.4 (100)	GPM (LPM)
Process Flow Meter	4mA	0.0 (0)	GPM (LPM)
	20mA	5.3 (20)	GPM (LPM)
Recirculation Temperature	4mA	20 (-6.7)	°F (°C)
	20mA	150 (65.6)	°F (°C)
Process Inlet Temperature	4mA	20 (-6.7)	°F (°C)
	20mA	150 (65.6)	°F (°C)

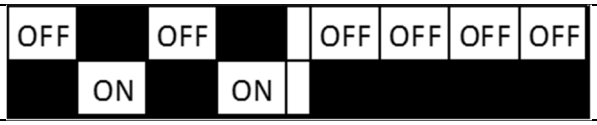
Alarm Settings

Table 14: Default Alarm Settings

Category	Parameter	Values	UOM
Temperature Alarms	Deviation	10.0 (5.6)	°F (°C)
	Otemp Inhibit	10	Min
	Utemp Inhibit	10	Min
Process Flow Alarms	Setpoint	0.4 (1.5)	GPM (LPM)
	Inhibit Time	20	s
Recirc Flow Alarms	Setpoint	6 (22.7)	GPM (LPM)
	Inhibit Time	20	s
Process Fluid Pressure Alarm	Setpoint	240 (16.54)	PSI (bar)
	Inhibit Time	3	s
Tank Level Warnings and Faults	***Warning***		
	On At	60.0	%
	Off At	80.0	%
	Faults		
	On At	40.0	%
	Off At	60.0	%
Low Refrigeration Pressure Fault	On At	25.0 (1.72)	PSI (bar)
	Off At	50.0 (3.45)	PSI (bar)
	Inhibit Time	5	s
Filter Change Alarm	Max Percent Increase	25.0 (1.72)	PSI (bar)
	Inhibit Time	20	Min
Ambient Condition Warnings	***Lower Limit***		
	On At	10.4 (-12.0)	°F (°C)
	Off At	14.0 (-10.0)	°F (°C)
	Upper Limit		
	On At	125.6 (52.0)	°F (°C)
	Off At	122.0 (50.0)	°F (°C)
System Limits	Temp Limit Shutdown	115.0 (46.1)	°F (°C)
	Inhibit Time	10	Min
	Enable buzzer	YES	---

I/O Module

Table 15: I/O Module Default Settings

Address	5
DIP Switch Settings	

Appendix D (Warranty)

Warranty Coverage

WARRANTY OF WORKMANSHIP AND MATERIALS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE AND, EXCEPT AS SPECIFICALLY SET FORTH HEREIN, ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, ARE HEREBY DISCLAIMED AND EXCLUDED BY THIS AGREEMENT. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION HEREOF. SELLER'S WARRANTIES HEREIN APPLY ONLY TO THE ORIGINAL PURCHASER AND DO NOT EXTEND, EXPRESSLY OR BY IMPLICATION, TO ANY OTHER PERSON OR PERSONS.

Seller guarantees all North American installed equipment and materials of its manufacture or start-up services performed by Seller against defects in workmanship and material—under normal and intended use, service, maintenance and proper installation—for a period of **twenty-four (24) months for Koolant Kooler Brand Chillers** from date of shipment. Equipment installed outside of North America will be warranted for parts only, standard delivery shipment. The Seller obligation under this agreement is limited solely to repair or replacement at Seller's option, in Seller's factory or in the field, with Seller approval, within said warranty period. If the equipment is returned to Seller's factory, the unit must be returned freight prepaid, with prior approval from Seller, with Buyer having obtained a returned goods authorization (RGA) number from Seller. Seller will make any needed repairs at no charge to Buyer if the damage is determined not to be the fault of the Buyer. Seller will then return the equipment to Buyer freight prepaid; in other words, Seller will be responsible for one leg of the transportation costs. The above warranty shall not apply to any equipment, or components thereof, which have been subject to abnormal or improper use, negligence (including failure to maintain the equipment as recommended in writing by Seller) or accident or which have been altered or repaired by other than Seller or Seller's authorized representative. Nothing shall be construed as an additional warranty unless specifically designated as such in writing and signed by Seller ("Additional Warranty"). The Additional Warranty shall be subject to the provision of this document as to duration and limitation of remedy, unless the Additional Warranty expressly amends such provisions. The above warranty shall not apply to any parts sold independently of the unit sold. All parts sales are subject to a ninety (90) day warranty.

General Warranty Procedures

Warranty Work

Before doing any work on a chiller covered under warranty, call Dimplex Thermal Solutions (DTS) and explain the problem to one of our service technicians who can then determine the best course of action. DTS will not be obligated to pay for warranty service performed without our prior approval.

Please Note: It is the service contractor's responsibility to enclose a service report/work order with each invoice. Unless pre-authorized for special circumstances, DTS will not honor invoices for work done by two or more people at a time, or for overtime labor charges. If the customer requests work that falls into either of these categories, the customer is responsible for the extra charges incurred.

Warranty Parts

All replacement parts under warranty must come from Dimplex Thermal Solutions. When it is necessary for DTS to replace parts which are under warranty, we will issue a Returned Goods Authorization (RGA) for all parts we wish to have shipped back to our factory, freight prepaid. RGAs are valid for a period of thirty (30) days. If DTS has not received the requested parts by the expiration date, the customer will be invoiced for the replacement cost at that time.

Please Note: While DTS is willing to pay freight charges one way for replacement parts, special freight charges, such as next day service, Saturday delivery, etc., are not included. If the customer requests one of these special services, they are responsible for the charges incurred.

Please note DTS standard warranty terms can change and be updated at any time. Please view our website for the most recent version.

Appendix E (Declaration of Conformity)

Dimplex Thermal Solutions
2625 Emerald Drive
Kalamazoo, Michigan 49001, USA

Declaration of Conformity (DoC)

We,

Company Named: **Dimplex Thermal Solutions**

Postal Address: 2625 Emerald Drive

City, State, Zipcode: Kalamazoo, Michigan 49001, USA

Telephone number: 800-968-5665

Email Address: jroby@dimplexthermal.com

declare that the DoC is issued under our sole responsibility of the manufacture and belongs to the following product:

Product model: NCI-5001-CE-MC-M
Type: Process Chiller
Part number: 801880
Refrigant Type: R407C
Amount of Refrigerant: 3.2 kg
GWP: 1774
CO_2e: 5.633 tonne

Object of the declaration

Indoor Industrial Process Chiller which utilizes a braze plate to transfer heat between the process fluid and cooling fluid.

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

2006/42/EC - Machinery Directive
2014/30/EU - Electromagnetic Compatibility Directive

The following harmonized standards and technical specifications have been applied:

Title, Date of standard specification:

EN ISO 12100: 2010 - Safety of machinery, General principles for design. Risk assessment and risk reduction.
EN 61000-6-2: 2005 - Generic Immunity Standards for Industrial Environments.

EN 60204-1: 2006+A1: 2009 - Safety of Machinery Electrical Equipment of Machines. Part 1: General Requirements.
EN 55011:2009+A1: 2010, Group 1, Class A-Industrial, Scientific and Medical Equipment Emissions Standard.

Notified body (where applicable):

Notified body ID number:

Additional information:

Signed for and on behalf of

Company: Dimplex Thermal Solutions
Date Issued: 1/21/2019

Name Josh Roby
Title Director of Engineering
Signature Joshua L. Roby

ENG-FM-033

Dimplex Thermal Solutions
2625 Emerald Drive
Kalamazoo, Michigan 49001, USA

Declaration of Conformity (DoC)

We,

Company Named:	**Dimplex Thermal Solutions**
Postal Address:	2625 Emerald Drive
City, State, Zipcode:	Kalamazoo, Michigan 49001, USA
Telephone number:	800-968-5665
Email Address:	jroby@dimplexthermal.com

declare that the DoC is issued under our sole responsibility and belongs to the following product:

Product model:	NCI-5001-CE-MC-M
Type:	Process Chiller
Part number:	801880

Object of the declaration

Indoor Industrial Process Chiller which utilizes a braze plate to transfer heat between the process fluid and cooling fluid.

We, Glen Dimplex Thermal Solutions declare the object described above is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

2011/65/EU - Restriction of Hazardous Substances Directive

Signed for and on behalf of

Company:	Dimplex Thermal Solutions
Date Issued:	1/21/2019

Name	Josh Roby
Title	Director of Engineering
Signature	Joshua L. Roby

ENG-FM-033

Dimplex Thermal Solutions
2625 Emerald Drive
Kalamazoo, Michigan 49001, USA

Declaration of Conformity (DoC)

We,

Company Named:	**Dimplex Thermal Solutions**
Postal Address:	2625 Emerald Drive
City, State, Zipcode:	Kalamazoo, Michigan 49001, USA
Telephone number:	800-968-5665
Email Address:	jroby@dimplexthermal.com

declare that the DoC is issued under our sole responsibility of the manufacture and belongs to the following product:

Product model:	NCI-5001-CE-MC-M	Refrigant Type:	Nitrogen
Type:	Process Chiller	Amount of Refrigerant:	2.07 bar
Part number:	802092	GWP: N/A	CO_2e: N/A

Object of the declaration

Indoor Industrial Process Chiller which utilizes a braze plate to transfer heat between the process fluid and cooling fluid.

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

2006/42/EC - Machinery Directive
2014/30/EU - Electromagnetic Compatibility Directive

The following harmonized standards and technical specifications have been applied:

Title, Date of standard specification:

EN ISO 12100:2010 - Safety of machinery, General principles for design. Risk assessment and risk reduction.
EN 61000-6-2:2005 - Generic Immunity Standard for Industrial Environments.

EN 60204-1:2006+A1:2016 - Safety of Machinery Electrical Equipment of Machines. Part 1: General Requirements.
55011:2009+A1:2010, Group 1, Class A - Industrial, Scientific and Medical Equipment Emissions Standard.

Notified body (where applicable):

Notified body ID number:

Additional Information:

Signed for and on behalf of

Company:	Dimplex Thermal Solutions	Name	Josh Roby
Date Issued:	4/02/2019	Title	Director of Engineering
		Signature	Joshua L. Roby

ENG-FM-033

Dimplex Thermal Solutions
2625 Emerald Drive
Kalamazoo, Michigan 49001, USA

Declaration of Conformity (DoC)

We,

Company Named:	**Dimplex Thermal Solutions**
Postal Address:	2625 Emerald Drive
City, State, Zipcode:	Kalamazoo, Michigan 49001, USA
Telephone number:	800-968-5665
Email Address:	jroby@dimplexthermal.com

declare that the DoC is issued under our sole responsibility of the manufacture and belongs to the following product:

Product model:	NCI-5001-CE-MC-M
Type:	Process Chiller
Part number:	802092

Object of the declaration

Indoor Industrial Process Chiller which utilizes a braze plate to transfer heat between the process fluid and cooling fluid.

We, Glen Dimplex Thermal Solutions declare the object described above is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

2011/65/EU - Restriction of Hazardous Substances Directive

Signed for and on behalf of

Company:	Dimplex Thermal Solutions	Name	Josh Roby
Date Issued:	4/02/2019	Title	Director of Engineering
		Signature	Joshua L. Roby

ENG-FM-033

Appendix F (Chiller Registration)

The registration form must be submitted within 30 days of installation date or warranty coverage will be calculated from the date the chiller was shipped from the factory.

http://www.dimplexthermal.com/service/register-chiller-location

Register Your Chiller's Site Location

Why register your chiller?

Dimplex Thermal Solutions chillers are sold across the globe, and often bundled with other manufacturers' equipment. In order to provide a reliable chiller service network across North America, please register the chiller's site location with our inside service team. The team will map your location and make efforts to provide a reliable service experience in your area for years to come.

Serial Number of Chiller		Model Number of Chiller	
Purchase Information			
OEM/Reseller Company Name			
Contact Name		Contact Position	
Email Address			
Phone Number		Fax Number	
Chiller Location Information			
Installation/Startup Date		Position	
Company Name			
Street Address		Address 2 (Suite/Apt)	
City	State/Province/Region	Country	ZIP/Postal Code
Primary Contact Name		Contact Position	
Email Address			
Phone Number		Fax Number	

Service and Parts:
partsdept@dimplexthermal.com

Technical Support:
serviceteam@dimplexthermal.com

Sales Department:
salesdept@dimplexthermal.com

Assembled in USA. | ISO 9001 Certified

2625 Emerald Drive | Kalamazoo, Michigan 49001

800.968.5665 | 269.349.6800 | dimplexthermal.com

ENG-MAN-0013