

LACO TECHNOLOGIES

ASCENT

CHILLERS



ASCENT CHILLERS

OPERATIONS AND MAINTENANCE MANUAL

Product Group: LACO Technologies Ascent Chillers
Manual Rev. Number: A2 (5/28/2024)

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1. Technical Assistance and/or Service Contact

Congratulations on the purchase of your new Ultra-Low Temperature Chiller. LACO Technologies Ascent Chillers is committed to building the highest quality equipment. Please take the time to read and understand this manual prior to operating your chiller. If you should have any questions do not hesitate to contact us:

LACO Technologies Ascent Chillers
 (801) 486-1004
 3085 West Directors Row
 Salt Lake City, UT 84104
info@lacotech.com

Important! Please have your **model number** and **serial number** ready prior to contacting us. The model number and serial number can be found on the chiller nameplate. The nameplate can be found either on the back of the chiller or on the inside of the electrical panel door.

Model No. _____ **Serial Number:** _____

1.1. Parts Replacement

In the case of a component failure, it is recommended that only OEM approved components be installed in the system. Please contact the manufacturer for replacement parts or service.

2. Ultra-Low Temperature Model Numbers

This owner's manual is to be used for the following LACO Technologies Ascent Chillers:

Table 1 - Chiller Model Numbers

Type	Model Number	Cooling Capacity	UL/CSA Outdoor Rated (E)	Extended Ambient (A)	Voltage Options
Ultra Low Temperature	AC0500xx-xxx/x	6,000 (1/2 ton)	N/A	N/A	208-240VAC/Single Phase, 208-240VAC/3 Phase, 480VAC/3 Phase
Ultra Low Temperature	AC1000xx-xxx/x	12,000 (1 ton)	N/A	N/A	208-240VAC/3 Phase, 480VAC/3 Phase
Ultra Low Temperature	AC2000xx-xxx/x	24,000 (2 ton)	Optional	Optional	480VAC/3 Phase, 208-240VAC/3 Phase
Ultra Low Temperature	AC5000xx-xxx/x	60,000 (5 ton)	Optional	Optional	480VAC/3 Phase

3. Cautions and Warnings

This system is intended to supply hot or cold fluid through a closed loop fluid circuit. Any use outside of this scope must be approved by the manufacturer.

1. **Read** this entire operational manual prior to operating chiller.



DANGER: Any failure to adhere to safety warnings can result in injury, death, or property damage.

2. **Service** - Only qualified service personnel should perform any service on the chiller.
3. **Refrigeration Circuit** - Only qualified HVAC refrigeration technicians should perform any service or repair on the refrigeration circuit.
4. **Extreme Temperatures** - These systems are designed to operate at extreme hot and cold temperatures. **NO SERVICE** should be performed on **ANY** fluid containing component until the fluid has returned to a non-hazardous temperature.
5. **Power** - (**ALWAYS** check the chiller nameplate and verify operational voltage before connecting power to chiller).
 - a. Only connect LACO Technologies Ascent Chillers to a properly grounded circuit.
 - b. Never connect your LACO Technologies Ascent Chillers to voltage that is outside the acceptable voltage range. Connecting your chiller to any voltage outside of these ranges will damage the compressor.
 - i. 110V model will operate on voltages between 100 ~ 130V
 - ii. 230V model will operate on voltages between 200 ~ 250V
 - iii. 460V model will operate on voltages between 440 ~ 480V
 - c. Only use power sources that are 60Hz, running the chiller at 50Hz will void the warranty and will damage the compressor.
6. **Never Run the Pump Dry** - only turn on the chiller after the fluid reservoir has been filled. Running the chiller without fluid will permanently damage the pump and void the warranty.
7. **This Chiller is Air Cooled and Must Have Good Ventilation** - for proper function there must be a minimum clearance on the front, sides, top, and at the back of the chiller I accordance with the following table:

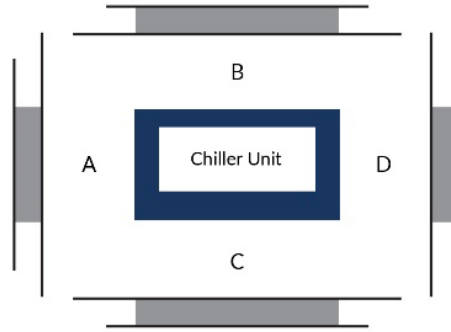


Table 2 - Chiller Minimum Clearance

Chiller Model	Minimum Clearance (Inches)				
	A	B (Control Panel)	C (Fluid Inlet/Outlet)	D	E (Top)
AC0500-ULT	30	36	36	30	36
AC1000-ULT	30	48	36	30	36
AC2000-ULT	30	48	36	30	36
AC3500-ULT	30	48	36	30	36
AC5000-ULT	30	48	36	30	36

Chiller Model	Minimum Clearance (Inches)				
	A (Refrigerant Inlet/Outlet)	B (Air Inlet)	C (Air Outlet)	D (Electrical Panel)	E (Top)
AC0500-ECU	30	48	72	30	36

8. **Use Only Approved Fluids** - LACO Technologies Ascent Chillers designs every chiller for specific fluids. Only used approved fluids or consult with the manufacture prior to using an alternate fluid. Each chiller is tested prior to shipping and will have some residual fluid in the system.



9. **FLAMMABLE FLUIDS:** Fluids used in this system are flammable above their flashpoint.

- a. The recommended chiller heat transfer fluid is Syltherm XLT manufactured by Dow Chemical:

(<https://www.dow.com/en-us/pdp.syltherm-xlt-heat-transfer-fluid.23834z.html>)

Its flash point is 116°F. The flash point is the lowest temperature at which there will be enough flammable vapor to induce ignition when an ignition source is applied.



b. **DANGER:** If using Syltherm, do not operate this chiller in an ambient environment above 115°F.

- 10. If you are utilizing the pressurized nitrogen blanket option, the fluid system is closed loop. This prevents the fluid from coming in contact with oxygen.
- 11. If you are not using the pressurized nitrogen blanket, your chiller should be equipped with a desiccant breather. In this case, the fluid reservoir/expansion tank is open to ambient and will have oxygen present inside the tank.
- 12. All connections outside of the chiller must be rated for the pressure and temperature.
- 13. All connections to the chiller and outside of the chiller must be liquid and airtight.



14. Any flammable fluid leakage will create a fire hazard.

- 15. **Models with Heaters** - On models equipped with heaters, the expansion tank has a temperature switch that will turn off the heater if the return fluid exceeds 100° F ± 5°F. The heater will not turn back on until the expansion tank temperature drops to 85° F ± 10° F.

3.1. Chiller Warning Labels



WARNING: Adhere to all safety and warning labels. No not remove any of these labels.

05-12	WARNING	052-7205-00
RISK OF ELECTRIC SHOCK. CAN CAUSE INJURY OR DEATH: DISCONNECT ALL REMOTE ELECTRIC POWER SUPPLIES BEFORE SERVICING. TURN POWER OFF BEFORE SERVICING. REPLACE ELECTRICAL BOX COVER BEFORE APPLYING POWER.		
⚠️ AVERTISSEMENT		
RISQUE DE CHOCS ÉLECTRIQUES. PEUT CAUSER DES BLESSURES ET MÊME ENTRAÎNER LA MORT. COUPER LES SOURCES D'ALIMENTATION À DISTANCE AVANT LE DÉPANNAGE. COUPER L'ALIMENTATION AVANT D'EFFECTUER L'ENTRETIEN. REPLACER LW COUVERCLE DE LA BOITE DE RACCORD ELECTRIQUE AVANT D'ALIMENTER LE CIRCUIT.		

Removing or opening panels with this warning will expose live electrical circuits. All power should be disconnected from equipment prior to removing or opening these panels.



DANGER: Fluids used in this equipment have low flash points and are flammable above the flash point temperature. Caution should always be exercised when working with these fluids. Reference the SDS data sheet for the specific fluid in your system.



WARNING: Removing or opening panels with this warning will expose live electrical circuits. All power should be disconnected from equipment prior to removing or opening these panels.



CAUTION: Earth (Ground) Protective conductor terminal.

4. Technical Specifications

Table 3 - Chiller Technical Specifications

Model	AC0500-ULT-240/3	AC1000-ULT-240/3	AC2000-ULT-480/3	AC5000-ULT-480/3	AC5000-ECU-480/3
Dry Weight (approx...lbs)	1110 lbs	1150 lbs	1350 lbs	1965 lbs	1080 lbs
Dimensions	36" L x 34" W x 66" H	36 1/2" L x 52 1/2" W x 65 1/2" H	70 3/4" L x 35 3/4" W x 75 3/4" H	84" L x 36" W x 72" H	48 1/2" L x 68 5/16" W x 36 3/4" H
Voltage	208-240VAC / 3P / 60Hz (Standard) 208-240VAC / 1P / 60Hz 480VAC / 3P / 60Hz	208-240VAC / 3P / 60Hz (Standard) 208-240VAC / 1P / 60Hz 480VAC / 3P / 60Hz	480VAC / 3P / 60Hz (Standard) 208-240VAC / 3P / 60Hz	480VAC / 3P / 60Hz (Standard)	480VAC / 3P / 60Hz (Standard)
FLA / MCA	16 Amps / 20 Amps	25 Amps / 30 Amps	20 Amps / 30 Amps 55 Amps / 65 Amps	26.7 Amps / 31.4 Amps	27.3 Amps / 34.2 Amps
Fluid Temp Range	-112° F (-80° C) to 70° F (21° C)	-112° F (-80° C) to 70° F (21° C)	-112° F (-80° C) to 70° F (21° C)	-112° F (-80° C) to 70° F (21° C)	N/A
Cooling Capacity 70° F (21° C) Ambient	-94° F (-70° C) 1,900 BTU/hr (560 Watts) -75° F (-59.4° C) 3,300 BTU/hr (970 Watts) -40° F (-40° C) 4,800 BTU/hr (1,410 Watts)	-94° F (-70° C) 4,400 BTU/hr (1,290 Watts) -75° F (-59.4° C) 7,200 BTU/hr (2,110 Watts) -40° F (-40° C) 10,000 BTU/hr (2,930 Watts)	-94° F (-70° C) 1,900 BTU/hr (560 Watts) -75° F (-59.4° C) 3,300 BTU/hr (970 Watts) -40° F (-40° C) 4,800 BTU/hr (1,410 Watts)	-94° F (-70° C) 1,900 BTU/hr (560 Watts) -75° F (-59.4° C) 3,300 BTU/hr (970 Watts) -40° F (-40° C) 4,800 BTU/hr (1,410 Watts)	-94° F (-70° C) 1,900 BTU/hr (560 Watts) -75° F (-59.4° C) 3,300 BTU/hr (970 Watts) -40° F (-40° C) 4,800 BTU/hr (1,410 Watts)
Refrigerant	R404a/R508b	R404a/R508b	R404a/R508b	R-508b	R-404a
Reservoir	5 Gallon Stainless Steel	5 Gallon Stainless Steel	10 Gallon Stainless Steel	20 Gallon Stainless Steel	N/A
Inlet and Outlet	1/2" FNPT	1/2" FNPT	3/4" FNPT	1 1/4" FNPT	5/8" and 1 3/8"
Pump	Continuous Duty 0.75kW Vortex Pump	Continuous Duty 0.75kW Vortex Pump	Continuous Duty 2.2kW Vortex Pump	Continuous Duty 5 HP Centrifugal Pump	N/A
Pump Performance	0 GPM @ 107 PSI 4.5 GPM @ 50 PSI 8.9 GPM @ 16 PSI	0 GPM @ 107 PSI 4.5 GPM @ 50 PSI 8.9 GPM @ 16 PSI	0 GPM @ 117 PSI 7 GPM @ 65 PSI 14 GPM @ 14 PSI	0 GPM @ 44 PSI 45 GPM @ 41 PSI 90 GPM @ 28 PSI	N/A
Heat Transfer Fluid	Syltherm XLT	Syltherm XLT	Syltherm XLT	Syltherm XLT	N/A
Quality	UL/CSA Certified (Full Assembly) ETL 3170655 UL STD 61010-2-011 CAN/CSA STD, C22.2 No. 61010-2-011 Certified ISO 9001:2015 Company	UL/CSA Certified (Full Assembly) ETL 3170655 UL STD 61010-2-011 CAN/CSA STD, C22.2 No. 61010-2-011 Certified ISO 9001:2015 Company	UL/CSA Certified (Full Assembly) ETL 3170655 UL STD 61010-2-011 CAN/CSA STD, C22.2 No. 61010-2-011 Certified ISO 9001:2015 Company	UL/CSA Certified (Full Assembly) ETL 3170655 UL STD 61010-2-011 CAN/CSA STD, C22.2 No. 61010-2-011 Certified ISO 9001:2015 Company	UL/CSA Certified for Outdoor use cULus

*E = UL/CSA Certified for Outdoor use, A = Extended Ambient to -15 °F

5. Chiller Component Overview

5.1. AC1000-ULT

Figure 1 - AC1000-ULT Chiller Front

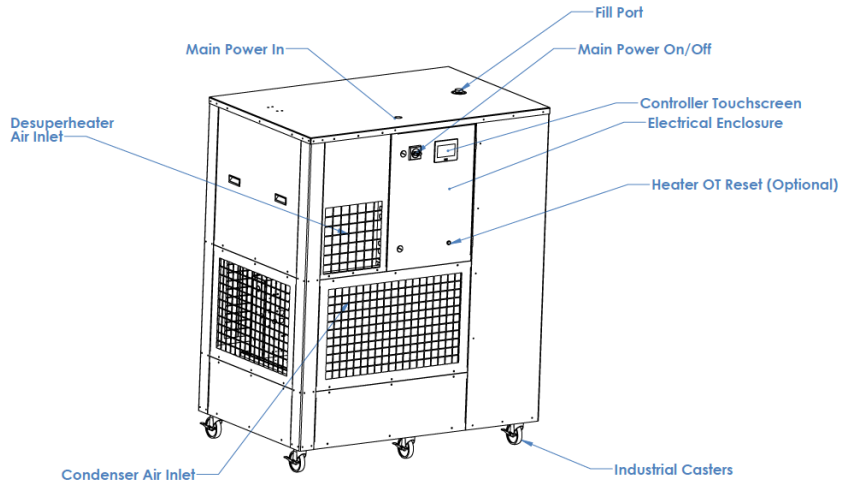


Figure 2 - AC1000-ULT Chiller Back

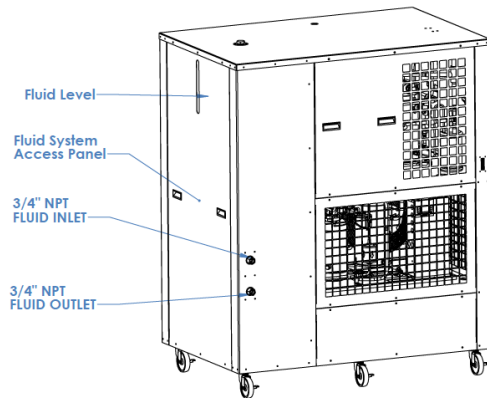
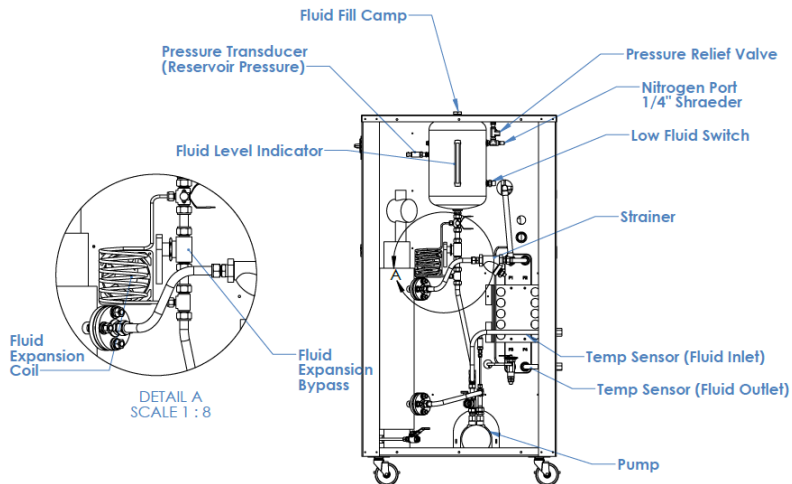


Figure 3 - AC1000-ULT Chiller Fluid Section



5.2. AC2000-ULT

Figure 4 - AC2000-ULT Chiller Front

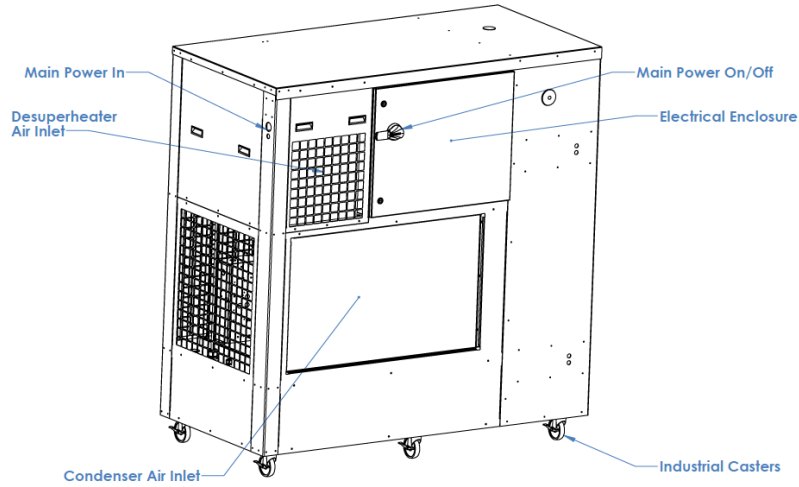


Figure 5 - AC2000-ULT Chiller Back

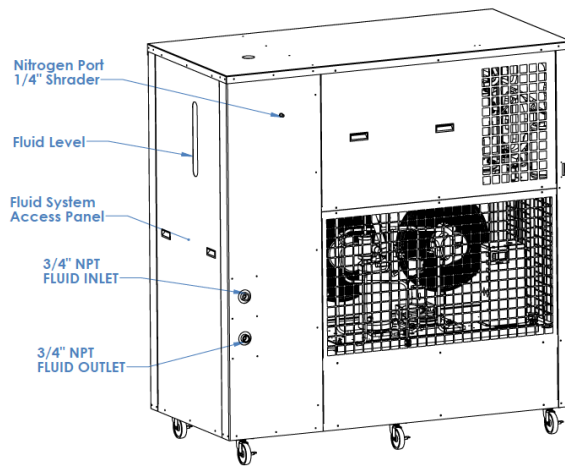
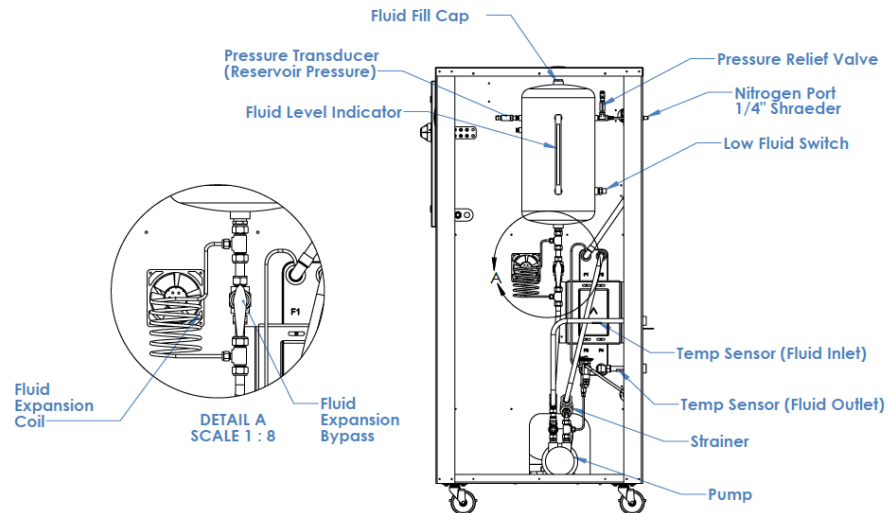


Figure 6 - AC2000-ULT Chiller Fluid Section



5.3. AC5000-ULT

Figure 7 - AC5000-ULT Chiller Front

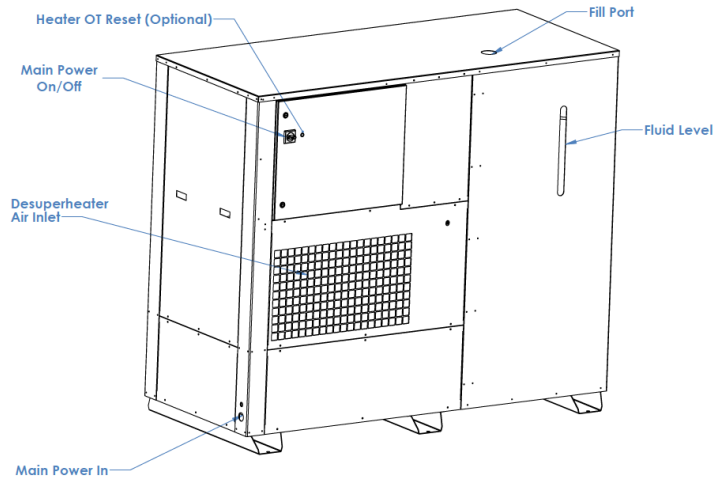


Figure 8 - AC5000-ULT Chiller Back

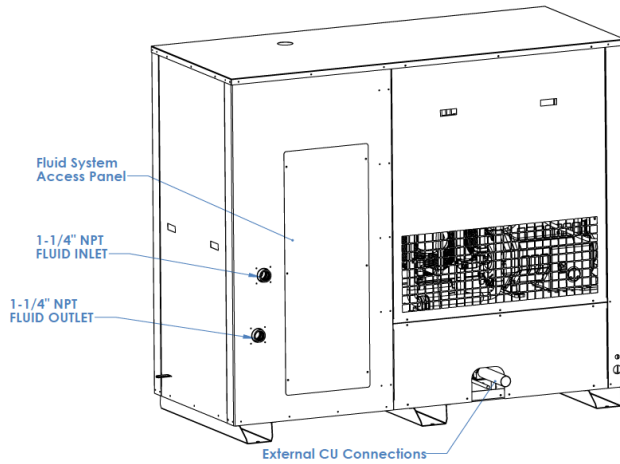
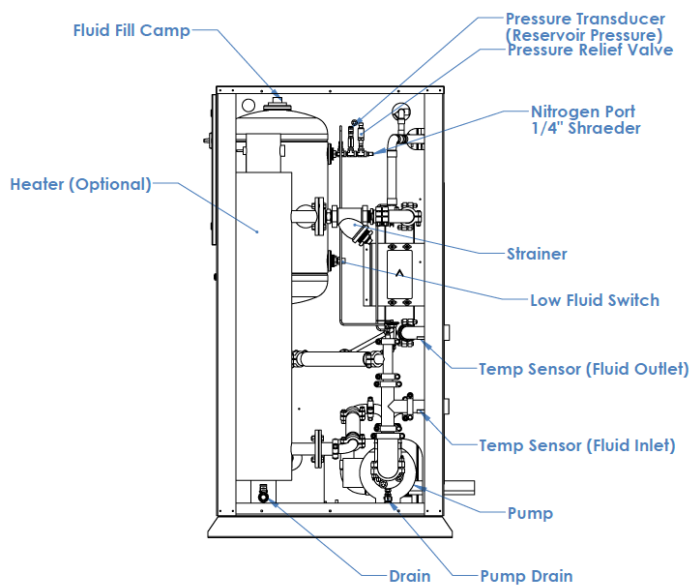
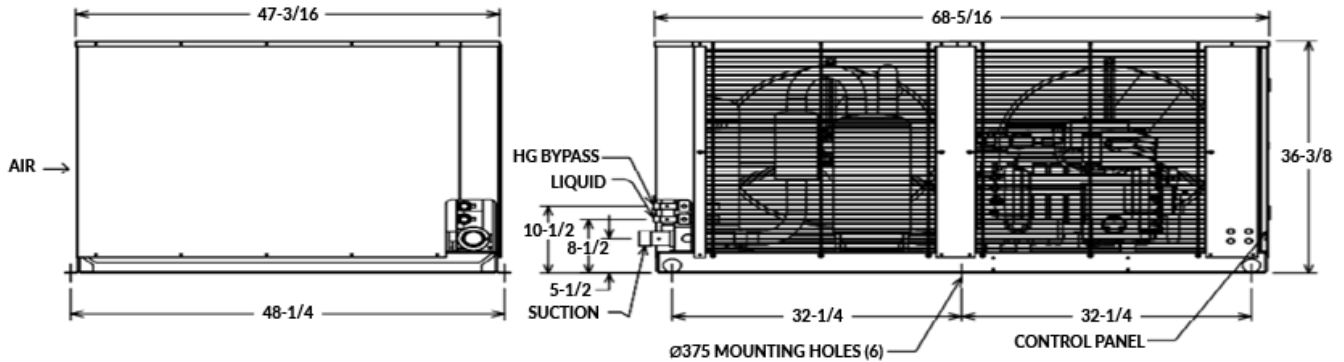


Figure 9 - AC5000-ULT Chiller Fluid Section



5.4. AC5000-ECU

Figure 10 - AC5000-ECU Chiller



6. Installation and Assembly

6.1. Lifting, Carrying, and Moving Equipment

Chillers equipped with casters can be moved on a flat surface.



WARNING: When chiller is in place, be sure to lock all casters.

If it is required to lift the chiller, a forklift rated for the weight should be used. Pick up the chiller from the front. Forks should be completely under the equipment. Center the forks between the equipment.

6.2. Chiller Placement

Place unit on a flat level surface in a well-ventilated area

Leave adequate space around chiller for good ventilation and access to panels. See Chiller Spacing figure for minimum clearances.

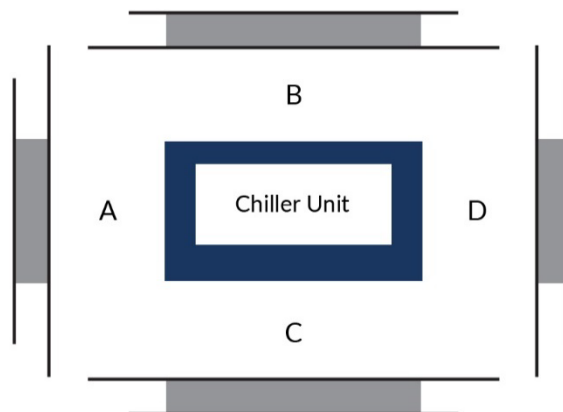




Table 4 - Chiller Minimum Clearance

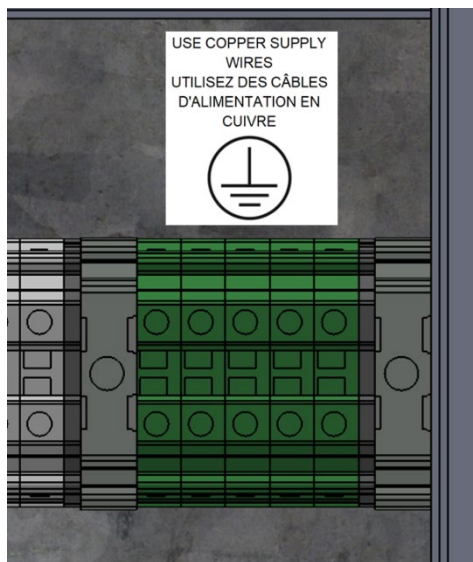
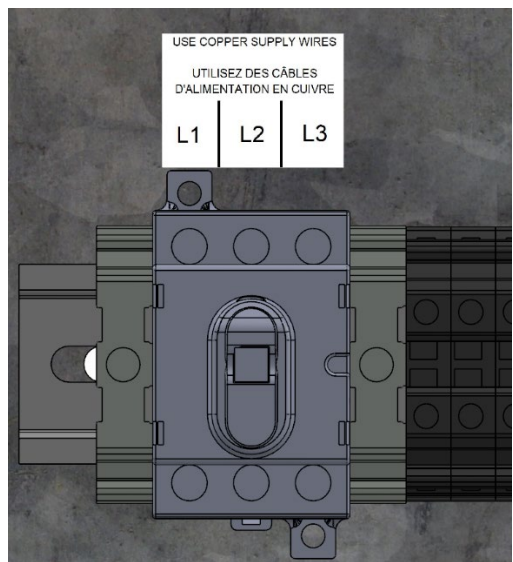
Chiller Model	Minimum Clearance (Inches)				
	A	B (Control Panel)	C (Fluid Inlet/Outlet)	D	E (Top)
AC0500-ULT	30	36	36	30	36
AC1000-ULT	30	48	36	30	36
AC2000-ULT	30	48	36	30	36
AC3500-ULT	30	48	36	30	36
AC5000-ULT	30	48	36	30	36

Chiller Model	Minimum Clearance (Inches)				
	A (Refrigerant Inlet/Outlet)	B (Air Inlet)	C (Air Outlet)	D (Electrical Panel)	E (Top)
AC0500-ECU	30	48	72	30	36

 **WARNING:** Do not position equipment in such a way that the main power disconnect is difficult to operate.

6.1. Connect to Electrical Service

 **WARNING:** Only a licensed electrician should connect the chiller to electrical service.



Prior to connecting to electrical service review the nameplate on the equipment and verify that the supply breaker is sized correctly and is the correct voltage. Failure to do this will result in damage to the equipment.

Equipment must be run on a circuit breaker that is properly sized based on the nameplate. It is recommended that the circuit breaker be located near the equipment.

Use ONLY copper supply wires.

Connect incoming power directly to the main disconnect inside the chiller electrical panel.

NOTE: When powering up the chiller it is necessary to verify proper wiring. This system is equipped with a phase monitor that will not allow the refrigeration circuit to run if wired backwards.

Ground terminals must be connected to a properly grounded circuit.

6.2. Making Connections to Chiller



WARNING: Extreme caution **MUST** be exercised when making connections to the chiller. Fluid leaks above the flashpoint will create a fire hazard. **ONLY** use connections that are compatible with the fluid and that are rated for the temperature range intended for use.

Connect hoses to inlet and outlet.

Ensure all wetted parts in the chiller fluid circuit are compatible with the chiller fluid and the temperature range.

6.3. Turning on the System

Turn on main disconnect.

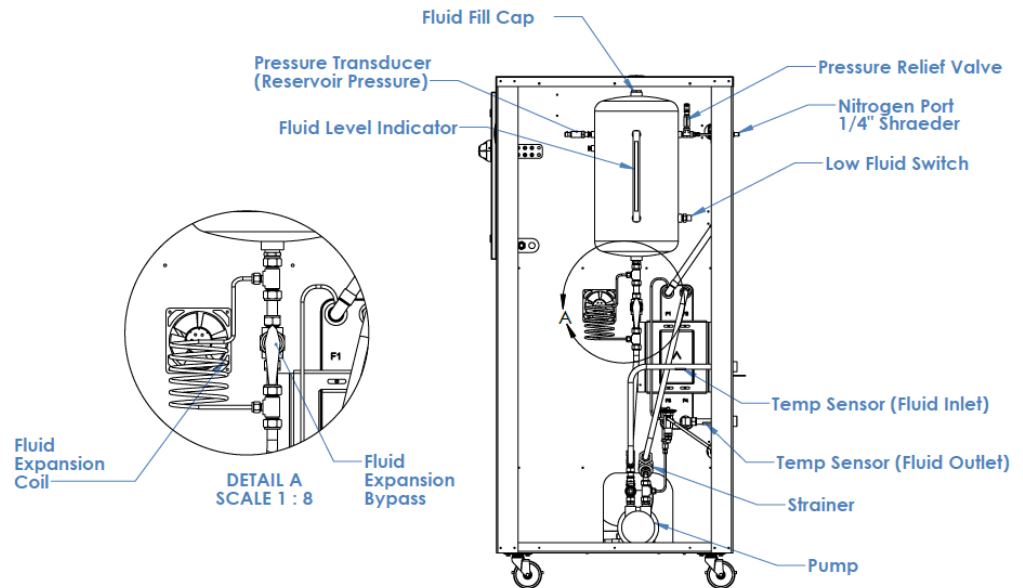
Verify that the phase monitor has a green light (if not switch two legs of the incoming power).




WARNING: This system is equipped with a crankcase heater. It is necessary to power up the system completely for 30 minutes prior to turning on the refrigeration circuit. This is only required if the main disconnect has been turned off for 12 hours or more.

6.4. Charging the System with Fluid

Figure 11 - Fluid System

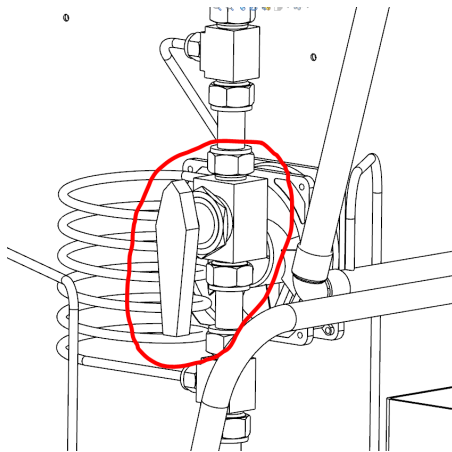


1. Remove panel to access fluid system.
2. Remove the fluid fill cap from the top of the chiller.

 **CAUTION:** If the system is pressurized, while wearing safety goggles, slowly release the pressure from the system.

3. Open Fluid Expansion Bypass Valve.

Figure 12 - Fluid Expansion Bypass Valve



4. Carefully fill the system with fluid.



WARNING: The fluid in the system will become denser as the temperature drops. This results in a decrease in total system volume. The expansion tank is designed to supply more fluid as the volume decreases. If there is not enough fluid in the reservoir the low fluid level switch will shut off the system when the fluid gets too low.



WARNING: The fluid will expand when heated, if the reservoir is filled too high the pressure increase inside the reservoir as the fluid heats up will go too high and cause nitrogen or fluid to be vented through the pressure relief valve. There is a pressure transducer that will alarm at a preset pressure value prior to venting occurring.



WARNING: To prevent low fluid or high-pressure alarms fill the tank between the recommended fill marks.

5. Turn on the pump and allow the system to run so that any air bubbles in the system vent into the expansion tank. Run the pump until all bubbles are eliminated. You can view air bubbles by looking into the expansion tank through the fill port with a flashlight. Typically, this takes 20-30 minutes.
6. Close Fluid Expansion Bypass Valve.
7. Connect Nitrogen to the nitrogen port on reservoir.
8. Flow Nitrogen through tank to flush out all moisture baring air.
9. Reinstall the fluid fill port plug.
10. Pressurize expansion tank/reservoir with Nitrogen gas. Typically charging to 10 to 15 PSI will be sufficient, the important thing is to make sure the tank does not go into vacuum when the fluid is at its coldest temperature.
11. It is recommended to connect a constant supply of Nitrogen to the Nitrogen port with a pressure regulator set to 10 PSI. This will insure that regardless of fluid level the pressure will always be positive, and no moisture can come in from outside.
12. While the system is at ambient temperature, verify that the fluid level is between the minimum and maximum fill lines.
13. Adjust desired setpoint and setup is complete.

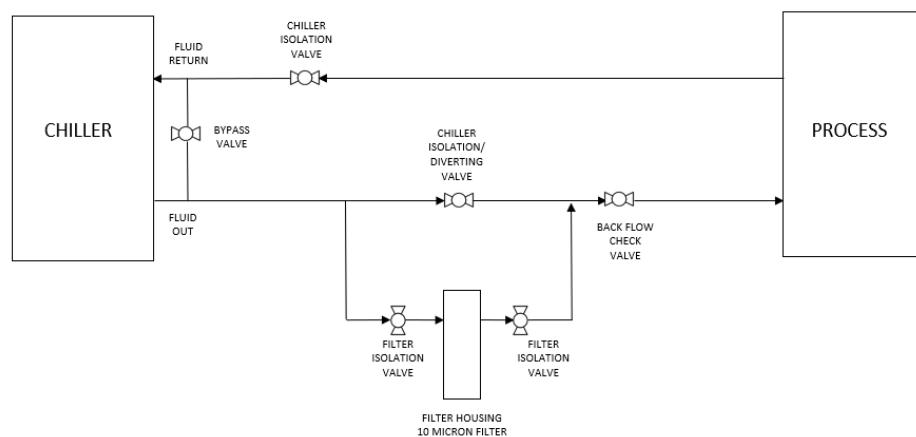


WARNING: Extreme caution must be taken to prevent moisture from entering the system. The system shipped dry from LACO Technologies Ascent Chillers. It is the responsibility of the end user to make sure that there is **ABSOLUTELY** no moisture in their side of the system. If moisture gets into the process fluid, it must be removed immediately. Moisture in the system **WILL** freeze and **WILL DAMAGE** the chiller.

6.4.1. Suggested Plumbing Schematic

Figure 13 - Recommended Chiller Plumbing & H₂O Filter Diagram

RECOMMENDED CHILLER PLUMBING & H₂O FILTER DIAGRAM



It is recommended to install a filter on the discharge line of the system. This filter will keep particulate out of the system and also remove moisture if moisture accumulates in the system. Dow Chemical recommends a 10-micron filter for ice crystal removal.

1. Turn on the chiller and cool the chiller fluid to about 20° F.
2. Once at 20° F, open both Filter Isolation Valves then close the Chiller Isolation/Diverting Valve. The chiller fluid is now flowing through the filter.
3. Run the chiller fluid through the filter for about 30 minutes then open the Chiller Isolation/Diverting Valve and close both Filter Isolation Valves.



4. While wearing safety goggles, slowly release the pressure inside the Filter Housing.

5. Remove and replace the filter then close and seal the filter housing.
6. Open both Filter Isolation Valves.
7. Perform the steps to remove air from the fluid circuit outlined in the "Charging the System with Fluid" section starting on page 14.

7. User Interface (HMI)

7.1. Connecting to the Controller

Table 5 - Connecting to the Controller

Default Network Settings	IP Address: <i>Request from Sales Rep</i> Subnet Mask: <i>Request from Sales Rep</i> Gateway: <i>Request from Sales Rep</i>
Wifi Access	Default SSID: AscentChiller Default Password: ASC12345
Admin Access	Username: admin (case sensitive) Default Password: A\$centbyLaco1
Operator Access	Username: Operator (case sensitive) Default Password: NSC9876chi!!

Step 1

Turn on Chiller, verify phase monitor has green indicator light

Step 2

Connect to the *AscentChiller* Wi-Fi network, default password is ASC12345 (If using mobile phone put phone in Airplane mode first)

Step 3


Type in the default IP address 192.168.10.10 in a browser

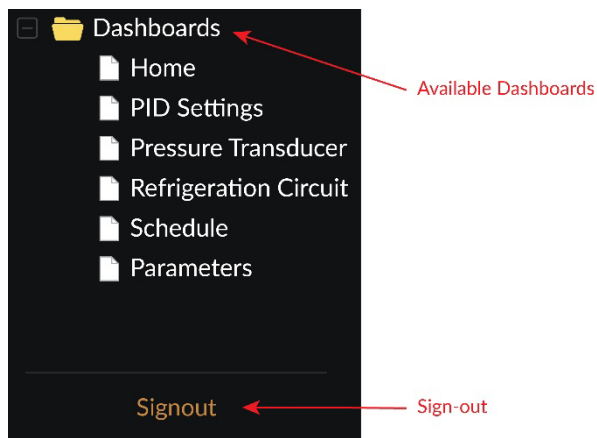
Step 4

Enter username and password (Default Username: Operator (case sensitive), Default Password: NSC9876chi!!)

8. User Interface

8.1. Main Menu

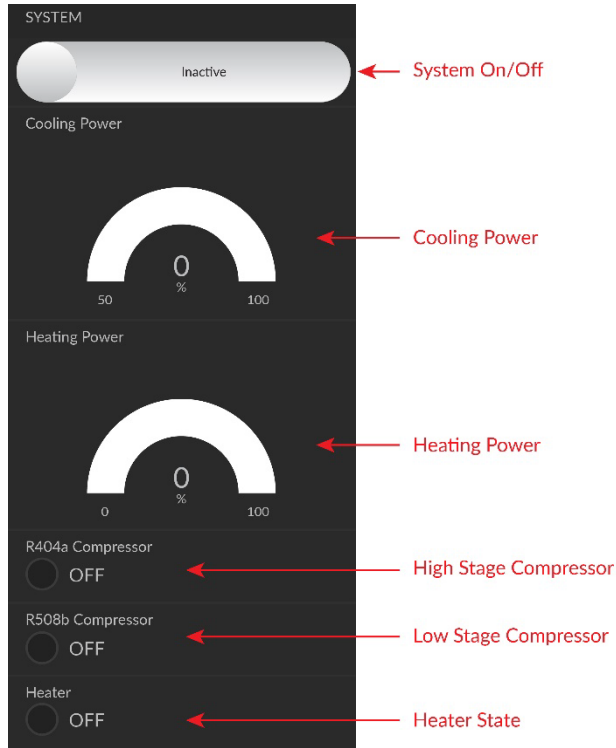
 The main menu can be accessed by pressing the + Icon at the bottom left of the screen.



8.2. Dashboards

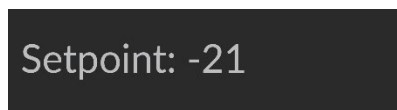
8.2.1. Home Screen

8.2.1.1. System On/Off



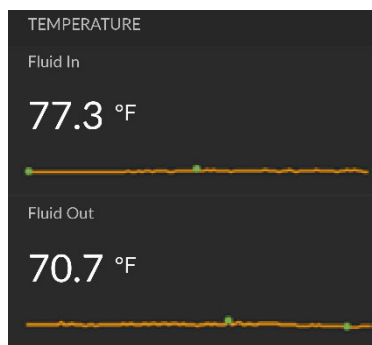
This slider will turn the system on/off. When on the pump will run and the chiller will run to maintain the target setpoint.

8.2.1.2. Setpoint



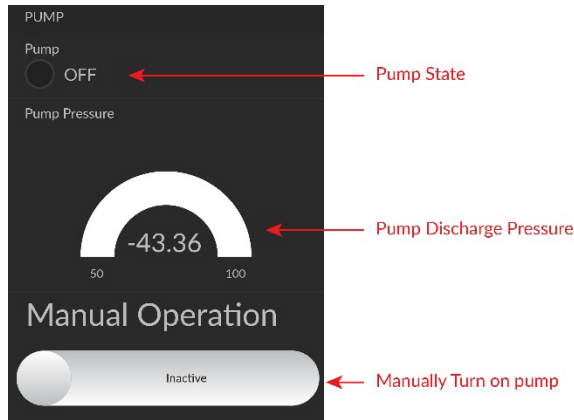
Changing this value will adjust the temperature the chiller will maintain.

8.2.1.3. Temperatures



This display shows the temperature of the fluid leaving the chiller and the temperature of the fluid returning to the chiller.

8.2.1.4. Pump

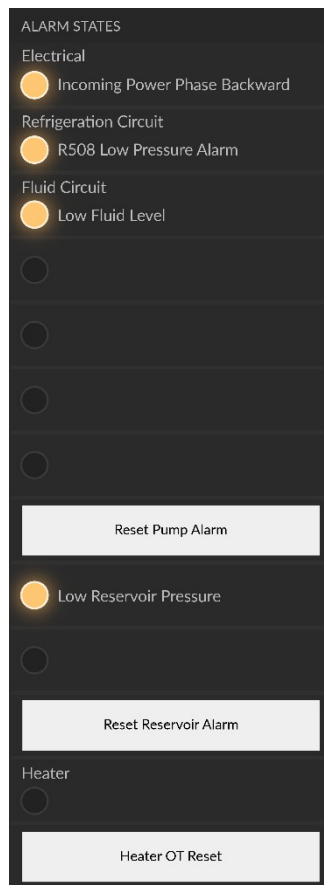


The pump state shows whether the controller is sending a signal for the pump to turn on/off.

Pump discharge pressure is the pressure measured at the discharge of the pump.

The Manual button allows the user to turn the pump on/off without the system running.

8.2.1.5. Alarm States



If the pump triggers a high-pressure alarm it will stay triggered until the “Reset Pump Alarm” button has been pressed.

If the reservoir experiences high or low pressure alarms the alarm will stay active until the “Reset Reservoir Alarm” button is pressed.

When the chiller is first started there will be a Heater Overtemp alarm. The “Heater OT Reset” button will reset this alarm.

This pane shows any active alarms.

8.2.2. PID Settings (Only Adjustable by Admin)

COOLING PID PARAM	HEATER PID PARAMS
Integral: 5	Integral: 5
Proportional: 10	Proportional: 10
Derivative: 0.5	Derivative: 0.5
Period (ms): 10000	Period (ms): 10000

8.2.2.1. Cooling PID Parameters

The R508b cooling system has a solenoid that modulates refrigerant flow in the system. The period determines how often it opens and closes. It is recommended to keep this at 10 seconds (10,000 ms).

8.2.2.2. Heating PID Parameters

The heating system will modulate heater power based on the PID lop. The period determines how often the heater contactor will open and closes. It is recommended to keep this at 10 seconds (10,000 ms).

8.2.3. Pressure Transducers (Only Adjustable by Admin)

Consult the factory prior to adjusting these settings, these settings allow for using various transducers and are preset from the factory.

8.2.4. Refrigeration Circuit

This dashboard is helpful for service personnel during troubleshooting.

8.2.5. Schedule (Only Adjustable by Admin)

Schedule is where you can set the system to auto turn on/off

8.2.5.1. Auto-Run Times

AUTO RUN TIMES
Format HHMM-HHMM (8am to 4pm -> 0800-1600)
Sunday:
Monday:
Tuesday:
Wednesday:
Thursday:
Friday:
Saturday:

Enter the on time for the day you want the chiller to auto-run on and the stop time.

8.2.5.2. Holidays

HOLIDAYS (DO NOT AUTOSTART)

Format
MM/DD/YY

Holiday 1:

Holiday 2:

Holiday 3:

Holiday 4:

Holiday 5:

Holiday 6:

Holiday 7:

Holiday 8:

Holiday 9:

Holiday 10:

Enter the dates that you do not want the chiller to autostart. For example, if you have the chiller programmed to turn on every Monday at 8:00 AM. You might want the chiller to not run on Memorial Day, so you would type in 05/29/23.

8.2.6. Parameters (Only Adjustable by Admin)

8.2.6.1. Suction Accumulator Solenoid

SUCTION ACCUMULATOR SOLENOID

FORCE ON
 FORCE OFF
 AUTO RUN

On Temp (F): -40

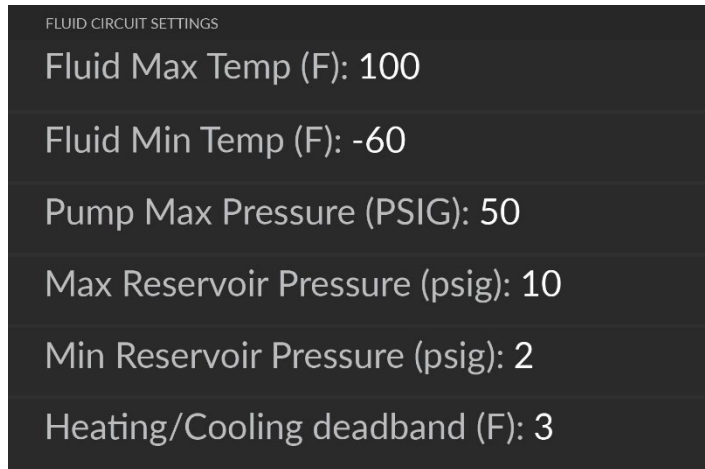
Temp is read as Evap Outlet

Solenoid Status

Off

This should only be adjusted by qualified service personnel.

8.2.6.2. Fluid Circuit Settings



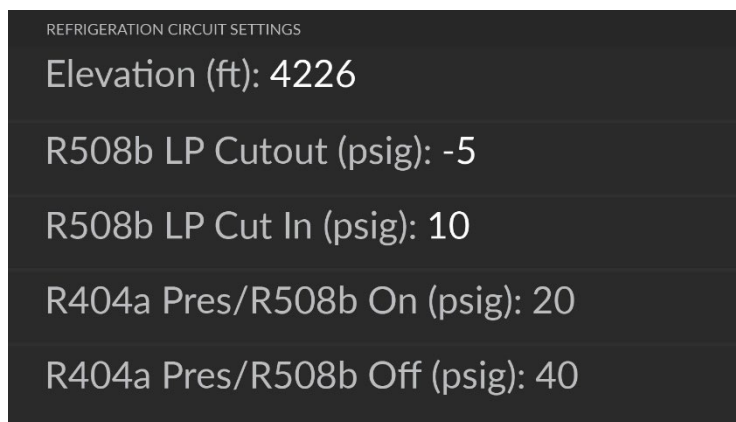
Fluid max and min temperature will throw an alarm if the fluid goes above or below the limits. This will not turn off the system, it will just notify the operator that the fluid is out of range.

Pump Max Pressure will throw an alarm if the pressure exceeds the setting. This alarm needs to be reset manually on the home page.

Reservoir max and min pressure will throw an alarm if the pressure in the reservoir goes above or below the limits. This will not turn off the system but will notify the operator that the pressure is low or high.

Heating/Cooling deadband (F) is how far below or above the setpoint the fluid temperature will need to go before it will switch from heating to cooling or vice versa.

8.2.6.3. Refrigeration Circuit Settings



Elevation is how far above sea level the chiller is. It is used to accurately calculate parameters on the Refrigeration Circuit page.

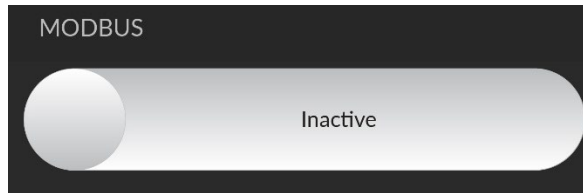
R508b LP Pressure Cutout (psig) is the safety pressure that will cause the chiller to shut off. This is preset by the factory.

R508b LP Pressure Cutin (psig) is the pressure that the chiller will turn back on at. This is preset by the factory.

R404a Pres/R508b On (psig) controls when the R508b circuit comes on when the R404a circuit is ready to handle the load.

R404a Pres/R508b Off (psig) controls when the R508b circuit turns off when the R404a circuit can no longer handle the load.

8.2.6.4. Modbus



Activate this switch when communicating with the chiller via Modbus.

8.3. Modbus

To operate the chiller via Modbus TCP Modbus must be enabled in the parameters screen.

8.3.1. Modbus Parameters

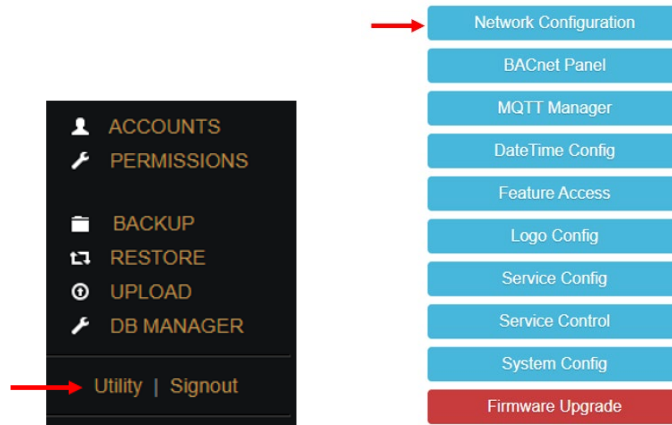
Table 6 - Modbus Parameters

Type	Description	Access	Data Type	Read Address	Write Address
Parameters	System Run On/Off	R/W	Bit	0	1
	Manual Pump Run	R/W	Bit	2	3
	Target Setpoint	R/W	Float	4	6
States	Pump State	R	Bit	8	
	Pump Pressure	R	Float	9	
	Reservoir Pressure	R	Float	35	
	Fluid In Temp	R	Float	11	
	Fluid Out Temp	R	Float	13	
	Cooling Power	R	Float	15	
	Heating Power	R	Float	17	
	R404a Compressor State	R	Bit	19	
	R508b Compressor State	R	Bit	20	
Heater State	R	Bit	21		
Alarm	Phase Monitor	R	Bit	22	
	R508b Low Pressure Alarm	R	Bit	23	
	Low Fluid	R	Bit	24	
	Pump Error	R	Bit	25	
	High Temp Alarm	R	Bit	26	
	Low Temp Alarm	R	Bit	27	
	Pump High Pressure Alarm	R	Bit	28	

Type	Description	Access	Data Type	Read Address	Write Address
	Reservoir Low Pressure Alarm	R	Bit	29	
	Reservoir High Pressure Alarm	R	Bit	30	
	Heater Overtemperature Alarm	R	Bit	31	
Alarm Resets	Reset Pump Alarm	W	Bit		32
	Reset Reservoir Alarm	W	Bit		33
	Reset Overtemp Alarm	W	Bit		34

8.3.2. Network Settings (Only adjustable by Admin)

Main Menu



SVM Network :		
Network Settings:	DHCP	<input type="checkbox"/>
	IP Address	<input type="text" value="000"/> , <input type="text" value="000"/> , <input type="text" value="000"/> , <input type="text" value="000"/>
	Subnet Mask	<input type="text" value="000"/> , <input type="text" value="000"/> , <input type="text" value="000"/> , <input type="text" value="000"/>
	Gateway	<input type="text" value="000"/> , <input type="text" value="000"/> , <input type="text" value="000"/> , <input type="text" value="000"/>
	Hostname	<input type="text" value="AscentChiller"/>
IPV6 Network Settings:	Enable	<input type="checkbox"/>
	IPV6 DHCP	<input type="checkbox"/>
	IPV6 Address	<input type="text"/>
	IPV6 Subnet Prefix	<input type="text"/>
	IPV6 Gateway	<input type="text"/>
Wireless Settings:	IPV6 DNS	<input type="text"/>
	Enable	<input checked="" type="checkbox"/>
	Hidden	<input type="checkbox"/>
	SSID	<input type="text" value="AscentChiller"/>
DHCP Settings:	Password	<input type="password" value="....."/> <input type="checkbox"/>
	DHCP Server	<input checked="" type="checkbox"/>
	DHCP Start	<input type="text" value="100"/>
DNS Settings:	DHCP Limit	<input type="text" value="100"/>
	DNS	<input type="text" value="8"/> , <input type="text" value="8"/> , <input type="text" value="8"/> , <input type="text" value="8"/>

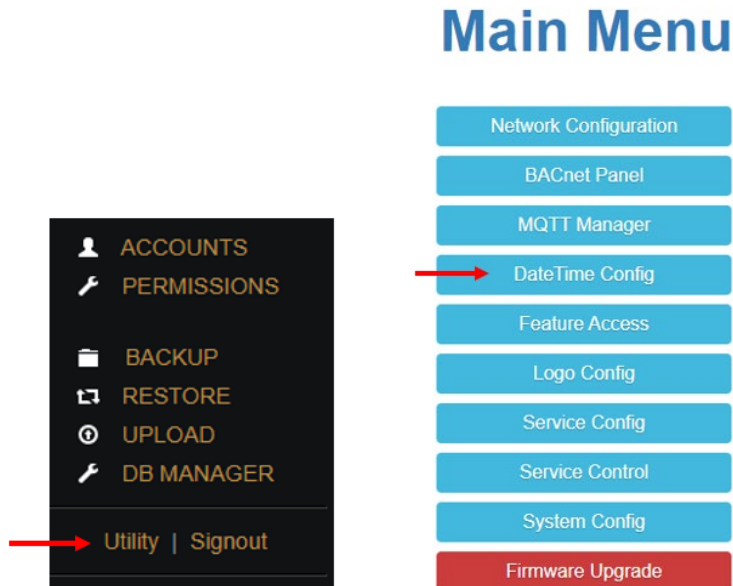
Annotations with red arrows:

- IP Address for chiller (request from sales rep) - points to the IP Address field.
- WIFI SSID - points to the Hostname field.
- WIFI SSID - points to the SSID field.
- WIFI Password - points to the Password field.

8.4. Date/Time (Only adjustable by Admin)



The main menu can be accessed by pressing the + Icon at the bottom left of the screen, then selecting Utility and then DateTime Config. Type in the time and time zone and press Save.



Date/Time:

TimeZone:

UTC Offset:

Save

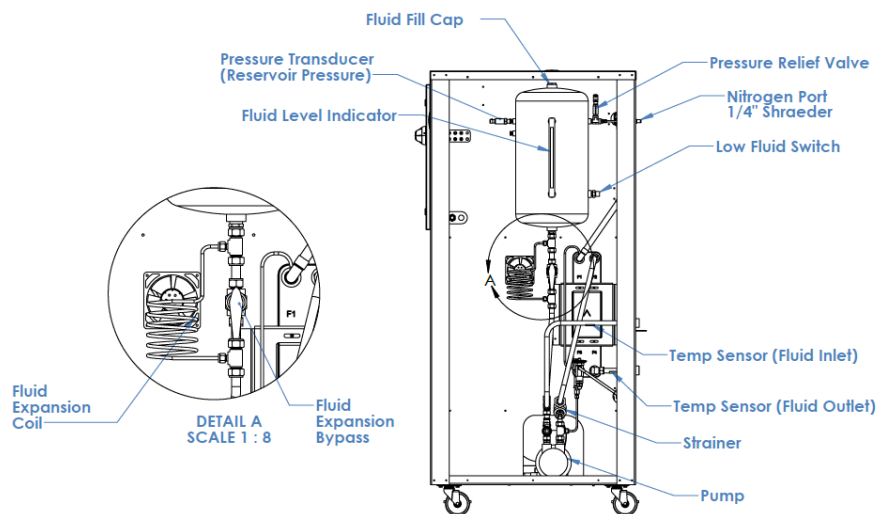
9. Maintenance

9.1. System Safety Checks



These checks should be performed annually or any time there is concern that a sensor may be malfunctioning. It is the Owner's responsibility to ensure that these checks are performed. Failure to perform these checks could result in an unsafe condition which could result in injury, death, equipment damage or property damage.

9.1.1. Temperature Sensors



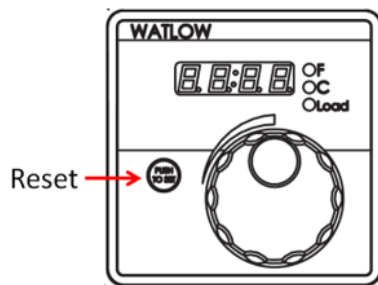
Inlet and outlet temperature is measured using RTD sensors.

Use the following steps to verify the temperature reading. Use a calibrated temperature probe, preferably a thermocouple. Adhere the thermocouple to the pipe next to the temperature sensor.

Take temperature to maximum setting and allow system to reach steady state. Compare the temperatures.

Take temperature to minimum setting and allow system to reach steady state. Compare the temperatures.

9.1.2. Heater Over-temp Function (If Equipped with Heater)



With the fluid temperature below 100° F, adjust the over temperature thermostat to 120° F. Set the temperature of the controller to 110° F. Verify that the Heater Over-temp alarm shuts down the heater and requires a manual reset at or below the 110° F.

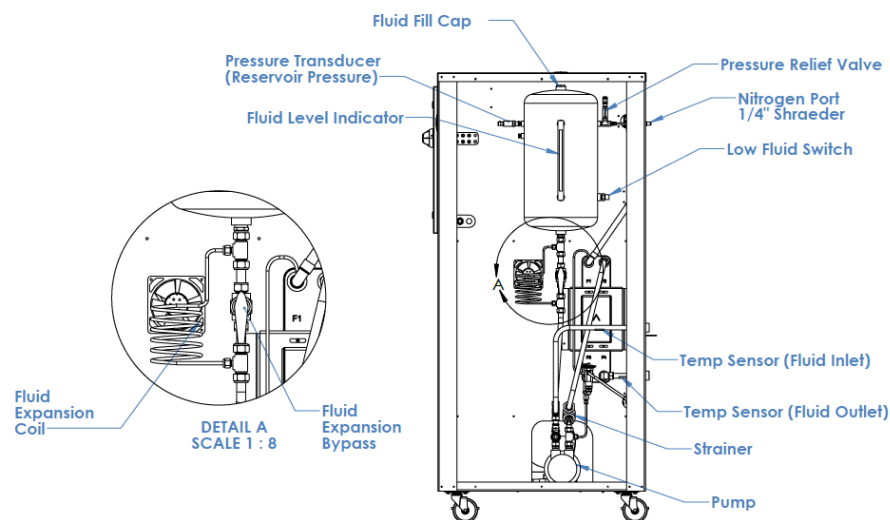
Reset the over temperature alarm to its default value of 150° F.

9.1.3. Liquid Level Protection

1. Turn off the system.
2. Drain the fluid out of the reservoir.
3. Power on the system.
4. Verify that the low fluid level alarm is activated.
5. Turn on the pump, verify that the pump DOES NOT turn on.
6. Turn on the heater, verify that the heater DOES NOT turn on.
7. Turn off system.
8. Refill the system.
9. Power on the system.
10. Verify that the low fluid level alarm is off.
11. Turn on the pump, verify that the pump DOES turn on.
12. Turn on the heater, verify that the heater DOES turn on.

9.2. Parts to be Examined Regularly

9.2.1. Strainer



The chiller is equipped with a 1/32" mesh strainer, it is recommended that this strainer be cleaned out annually or as needed. When the system is first commissioned, the pressure should be recorded. If this pressure increases over time, it may indicate that the strainer needs to be cleaned.

9.3. Cleaning and Decontamination

If hazardous material is spilled on the equipment, appropriate decontamination must be carried out to remove the hazardous material. DO NOT use any decontamination or cleaning agents which could cause a hazard as the result of a reaction with parts of the equipment or material contained within. Consult the manufacturer if there is any doubt

about the compatibility of the decontamination or cleaning agents with parts of the system or the material contained in it.

9.4. Maintenance Schedule

Table 7 - Maintenance Schedule

Maintenance	Maintenance to Perform	Frequency
System Operation	Verify & record display temperature against NIST traceable instrument <ul style="list-style-type: none"> • Check pump pressure • Run fluid drying cycle • Perform pulldown test • Take fluid sample for testing as needed 	6 Months
Electrical System	<ul style="list-style-type: none"> • Check for burnt or loose wiring and tighten all electrical terminal connections • Check control system, indicator lights, contactors, & relays • Check & record voltage and amp draw 	6 Months
High Stage Compressor (R404a)	<ul style="list-style-type: none"> • Clean Condenser Coil (applicable for Air-Cooled Condensers Only) • Clean and inspect compressor area • Check oil level in compressor • Check fan motor(s) for condenser coil • Check insulation • Perform pulldown test (System Operation) 	1000 Hours or 6 Months
Low Stage Compressor (R508b)	<ul style="list-style-type: none"> • Clean Desuperheater coil • Clean and inspect compressor area • Check oil level in compressor • Check fan motor(s) for Desuperheater coil • Check insulation 	1000 Hours or 6 Months
Heater	<ul style="list-style-type: none"> • Check electrical connections inside of heater • Check all electrical connections going to heater • Verify ohms on each leg of heater • Test overload circuit 	1000 Hours or 6 Months
Fluid Circuit/Pump	<ul style="list-style-type: none"> • Check Moisture Eliminating Filter (if applicable) • Check and record pump head pressure and compare to previous reading (Clean fluid strainer as needed) • Check all external piping is leak tight • Check fluid storage tank level fluid condition and pressure • Check insulation • Check pump motor and lubricate if applicable • Replace water/ice collection filter (As Needed) • Check pump pressure (System Operation Test) • Run fluid drying cycle (System Operation Test) • Take fluid sample for testing as needed (System Operation Test) 	1000 Hours or 6 Months
High Stage Compressor Starts (R404a)	Replace Contactor	250,000 Cycles

Maintenance	Maintenance to Perform	Frequency
Low Stage Compressor Starts (R508b)	Replace Contactor	250,000 Cycles
Cooling Solenoid	Replace Solenoid SSR Relay	15,000,000 Cycles
Heater	Replace Heater SSR Contactor	15,000,000 Cycles
Pump	Replace Pump Contactor	1,000,000 Cycles

10. Troubleshooting

10.1. Alarms

Table 8 - Alarms

Alarm	Description	Controller Status	Potential Causes	Diagnose	Potential Remedies
Pump Error	The controller is calling for the pump to turn on, but the contactor is not closing.	Alarm = ON Heater = OFF Refrigeration Circuit = OFF	PLC Output Failure	Verify PLC output voltage.	<ul style="list-style-type: none"> Switch PLC Outputs.
			Loose Wire	Check for loose wires.	<ul style="list-style-type: none"> Tighten any loose electrical connections.
			Contactor Overload	Check to see if Pump Overload is tripped.	<ul style="list-style-type: none"> Verify that overload setting is correct for the amp draw on the pump. Verify that no electrical phases have been lost. If overload keeps tripping monitor amperage going to motor.
Low Fluid	The fluid level in the reservoir has dropped too low.	Alarm = ON Pump = Off Heater = Off Refrigeration Circuit = Off	Not enough fluid in system.	Visually check the fluid level. Fluid will be lowest at the lowest operational temperature.	<ul style="list-style-type: none"> Fill fluid so that at the lowest operating temperature the fluid level does not drop below the low fluid switch.
			Leak in system.	Check for leaks on plumbing.	<ul style="list-style-type: none"> Locate leaks and repair as needed.
Heater Over-temp	The temperature sensor inside the heater is reading too high of a temperature.	Alarm = ON Pump = Off Heater = Off Refrigeration Circuit = Off	Pump Failure	Discharge pressure = 0	<ul style="list-style-type: none"> Investigate pump failure root cause.
			Fluid outlet temperature is too high.	Check actual fluid outlet temperature. Check to see if this temperature is above the Max Outlet Temperature setting.	<ul style="list-style-type: none"> Reset Max Outlet Temperature to factory setting. RTD on outlet measuring inaccurately.
Phase Monitor	Phase monitor has detected abnormal incoming power.	Alarm = ON Pump = Off Heater = Off Refrigeration Circuit = Off	Incoming power has lost a leg	Verify power between each phase.	<ul style="list-style-type: none"> Repair incoming power as required.
			Power is wired backwards.		<ul style="list-style-type: none"> Switch two legs of the incoming power.
Reservoir HP	The pressure in the Reservoir has exceeded the max pressure setting.	Alarm = ON	Fluid Level is too high and fluid outlet temp is high.	Check fluid level and pressure when system is at ambient temperature. If fluid level is too high there will not be a large enough pocket of air for the fluid to expand during heating. This will result in excessive reservoir pressure.	<ul style="list-style-type: none"> Remove fluid as needed.
			Too much fluid in system	Each ULT is designed around a maximum volume of Syltherm. Exceeding this volume can result in excessively high pressures in the reservoir.	<ul style="list-style-type: none"> Remove fluid as needed. Add additional expansion tank.

Alarm	Description	Controller Status	Potential Causes	Diagnose	Potential Remedies
				Check the fluid volume in system against product specifications.	
			Reservoir is overcharged with Nitrogen.	Check pressure when system is sitting at ambient against recommended pressure setting.	<ul style="list-style-type: none"> Lower pressure as needed.
Reservoir LP	The pressure in the reservoir has dropped below the minimum pressure setting.	Alarm = ON	Reservoir is undercharged with Nitrogen.	Check pressure when system is sitting at ambient against recommended pressure setting.	<ul style="list-style-type: none"> Add pressure as needed.
			Too much fluid in system.	Each ULT is designed around a maximum volume of Syltherm. Exceeding this volume can result in excessively low pressures in the reservoir. Check the fluid volume in system against product specifications.	<ul style="list-style-type: none"> Remove fluid as needed.
Pump HP	The discharge pressure of the pump has exceeded the maximum pressure setting.	Alarm = ON	Strainer is clogged.	Check pressure on the chiller outlet and subtract this value from the reservoir pressure. If there is a large pressure difference between the pump discharge reading and this calculated value, the strainer or heat exchanger is clogged. If pressure drops when system was warmed up there is probably moisture in the system that is freezing in the heat exchanger.	<ul style="list-style-type: none"> Drain system of process fluid. Remove plug on strainer. Clean strainer. Replace strainer. Recharge system with process fluid.
			Closed valve in fluid system.	Check entire fluid system for closed valves.	<ul style="list-style-type: none"> Open valves as needed.
			Moisture/Ice in system.	Moisture/Ice in the system will usually result in high pump discharge pressure, low cooling capacity and low suction pressures on the low stage.	<ul style="list-style-type: none"> Follow the procedure for removing moisture from process fluid.
High Fluid Temp	The fluid outlet temperature has exceeded the maximum outlet temperature setting.	Alarm = ON	Cooling circuit is not operating.	Check to see if the refrigeration circuit is running or not.	<ul style="list-style-type: none"> Follow instructions for system not cooling.
			Max temp outlet is set below desired fluid temperature.	Check max temp setting.	<ul style="list-style-type: none"> Change Max temp setting as needed.
Low Fluid Temp	The fluid outlet temperature had dropped below the minimum	Alarm = ON	Cooling solenoid is not closing.	Connect manifold to Low Stage and check suction pressure while trying to maintain -60C. When -60C is achieved the cooling solenoid will start	<ul style="list-style-type: none"> Replace solenoid coil or valve as necessary.

Alarm	Description	Controller Status	Potential Causes	Diagnose	Potential Remedies
	outlet temperature setting.			cycling. When the solenoid is closed the pressure on the suction side will drop to 0-4 PSI.	
			Min temp outlet is set above desired fluid temperature.	Check min temp setting.	<ul style="list-style-type: none"> • Change Min temp setting as needed.
R508b Low Pressure Alarm	The Suction pressure on the Low Stage compressor has dropped below the allowable setting.	Alarm = ON Pump = Off Heater = Off Refrigeration Circuit = Off	Low refrigerant charge	Turn off system, after entire system is at 70F (8 hours minimum) check R508b pressures against specifications.	<ul style="list-style-type: none"> • Add refrigerant as needed.

11. Standard Product Warranty

11.1. Limited Warranty

Manufacturer warrants LACO Technologies Ascent Chillers Products sold as “new” to be free from defects in material and workmanship for a period of one (1) year from the date of purchase by a retail customer when used, stored, inspected, and serviced as specified in any operating instructions provided with the LACO Technologies Ascent Chillers Product. Exclusions from warranty consideration include but are not limited to normal wear and tear, abuse, misuse, or non-standard application, act of nature, lack of proper maintenance, improper care or storage, unauthorized repair, unauthorized modification, or attachment to another product, use with any attachment or as integrated into another product. Neither Manufacturer, nor its representatives, assumes any responsibility for any other products used with the LACO Technologies Ascent Chillers Product or for results of or damages caused to persons or property by the use of the LACO Technologies Ascent Chillers Product. Only the Manufacturer is authorized to make any warranty or representation and the customer may not rely on any other warranty or representation. All implied warranties are hereby disclaimed.

Manufacturer makes no other warranty or representation of any kind, expressed or implied, in fact or in law, including without limitation any warranty of merchantability, noninfringement or fitness for a particular purpose or use other than the limited warranty set forth above.

11.2. Limitation of Liability

Manufacturer’s sole liability shall be as set forth herein, and shall extend only to inspection, replacement, or repair of the LACO Technologies Ascent Chillers product, at the discretion of the manufacturer, within the time-period and on the terms set forth herein. Manufacturer has no liability for any other products used with, attached to or with which the LACO Technologies Ascent Chillers product may be integrated into, or from the results of such use, attachment, or integration. In no event will the manufacturer be liable for special, incidental,

indirect, punitive, or consequential damages. In no event shall manufacturer's liability exceed the payments received by the manufacturer for the LACO Technologies Ascent Chillers product.

11.3. Returns

- a. When any LACO Technologies Ascent Chillers Product has been authorized to return for any inspection, or replacement, it must be returned as specified in the Return Merchandise Authorization Form.
- b. A Manufacturer-issued Returned Material Authorization (RMA) number authorizing a product return must be acquired prior to sending any return. In addition, documentation of model, product serial number, dealer invoice number, dated proof of resale, and description of failure shall accompany all returns.
- c. All returns must come freight prepaid and in their original containers, or in a manner conducive to proper shipping and handling procedures. Product(s) replaced or shipped in accordance with the Return Merchandise Authorization Form will be returned freight prepaid.
- d. Manufacturer reserves the right to postpone, delay, or refuse warranty claim consideration for either unauthorized returns or returns made by dealers or distributors whose open and active accounts are past due or delinquent. The dealer or distributor agrees that no warranties or other guarantees on any products shall be made in excess of those made by Manufacturer. This agreement excludes Manufacturer or its representatives from all liability not covered in this Warranty.

11.4. Indemnification

Customer acknowledges that LACO Technologies Ascent Chillers has no control over and is not responsible for the manner in which the Customer uses the Product(s). The Customer hereby agrees to indemnify, defend and hold harmless (collectively, "indemnify" or "indemnification") Customer, its affiliates, and their respective officers, directors, employees, agents, representatives, successors and assigns from and against any and all suits, proceedings, demands, judgments (including applicable pre-judgment and post-judgment interest, if any), awards, losses, damages, costs, penalties, expenses, claims and liabilities, including reasonable attorneys' fees, witness fees and court costs, and any other losses and liabilities of any kind or nature whatsoever ("Damages") of, or awarded to or settled with third parties in third party claims or actions, and the reasonable costs of LACO Technologies Ascent Chillers in successfully enforcing this indemnification obligation, in each case arising out of one or more of the following: (a) the use, operation or modification of any Product, provided however, that Customer shall have no indemnification obligation to the extent that the claim arises solely out of any negligent acts or omissions by LACO Technologies Ascent Chillers; (b) negligent acts or omissions or willful or intentional misconduct of Customer (including its employees, agents, representatives, successors and assigns); and (c) failure to comply with any relevant federal, state or local laws, regulations, rules or ordinances (including but not limited to those related to hazardous waste and materials).

