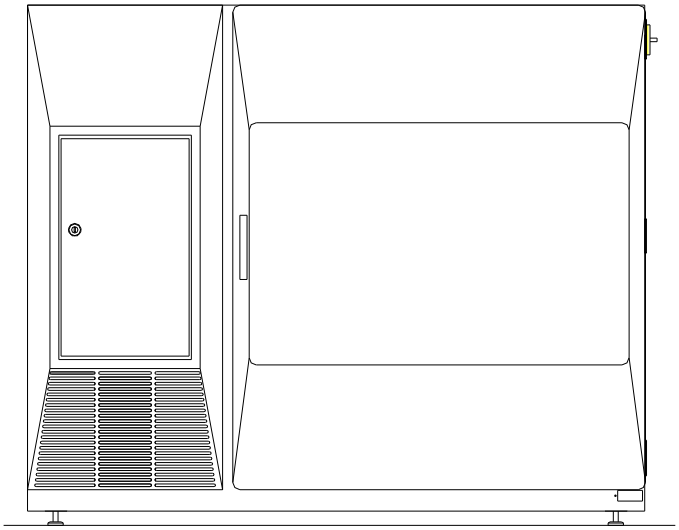
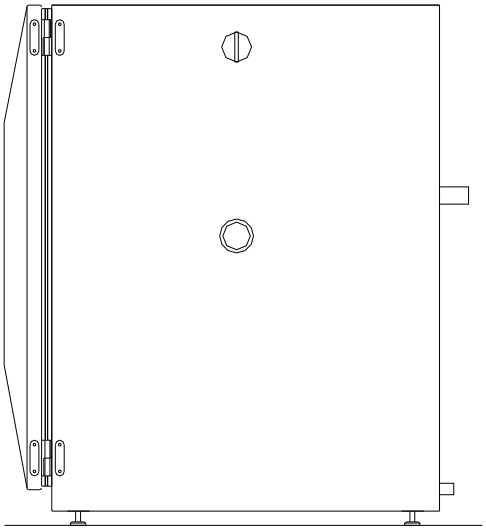
CARON MODEL 6010
ENVIRONMENTAL TEST CHAMBER





SERVICE MANUAL

TABLE OF CONTENTS

SECTION **PAGES**

INTRODUCTION

OVERVIEW

The CARON Model 6010 Environmental Test Chamber provides multiple capabilities to create repeatable environmental conditions for numerous applications. A PID controller controls chamber temperature and humidity (optional).

On/off outputs are used to drive duct heaters and cooling solenoids. The refrigeration system uses a single compressor allowing independent cooling and dehumidification. This prevents the compressor from rapid cycling "on" and "off" which shortens compressor life. A high limit thermal snap disk and thermal fuse prevent a heating run-away. The horizontal airflow pattern creates air uniformity and temperature control.

SPECIFICATIONS

Temperature Range without lights	5°C to 60°C
Temperature Range with lights*	10°C to 60°C
Heater	580 Watts @ 115VAC
Compressor	1/6hp, 1400 BTU/Hr@7°C Evaporator
Temperature Control	± 0.1°C
Temperature Uniformity	± 0.3°C
Relative Humidity*	20 to 98% RH**
Humidity Control*	± 2%
Interior Dimensions	23"W x 25.8"D x 29.8"H (58.4cm x 65.5cm x 75.7cm)
Exterior Dimensions	44"W x 35"D x 37.5"H (111.8cm x 88.9cm x 95.3cm)
Work Space	10 cu.Ft. (283.2 liters)
Shelves	
Number of shelves	4 Stainless Steel, Wire Rod Standard
Shelf Spacing	1.5" on center (15 positions)
Shelf Size	Each Shelf: 22.8"W x 25.4"D (57.9cm x 64.5cm)
Shelf Area	4 $ft.^2$ each, 16 $ft.^2$ total
Materials / Finishes:	
Interior	Stainless Steel Interior Door-Tempered Glass
Exterior	Metal with powder coated finish
Feet	Adjustable leveling pads
Electrical	115V/16A/60Hz 1Ph.
Shipping Weight	400 lb. (181kgs)

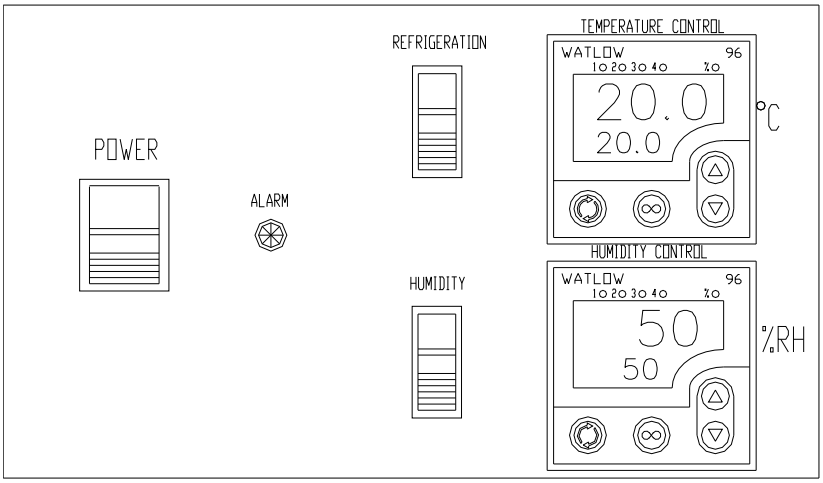
*Optional items

**RH levels limited by 4°C minimum dewpoint

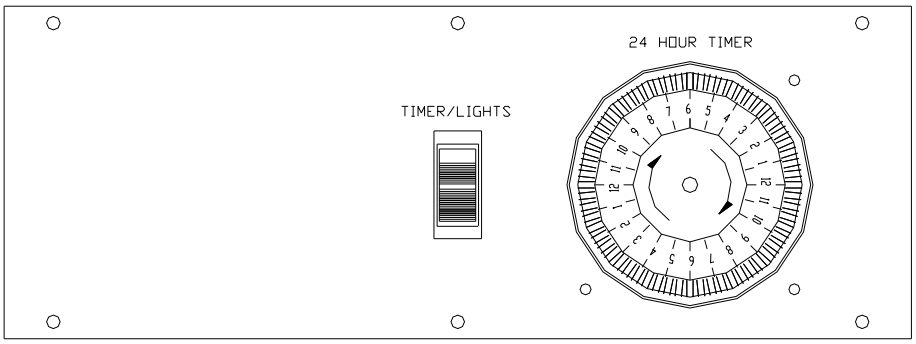
Specifications were established at 20°C with 50% RH ambient conditions.

OPTIONS
This 6010 Environmental chamber maybe equipped with one or more of the following options.

Humidity Control
A bi-modal humidification system allows for independent humidification and dehumidification. The humidity injection system utilizes atomizers to inject moisture into the chamber. An evaporator coil accomplishes dehumidification.

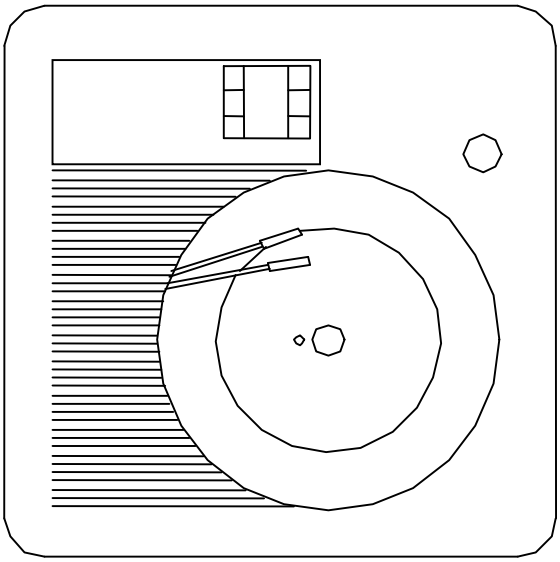


Lights and Timer
The Diurnal Lighting System (dual setpoint / light cycle timer) allows the operator to simulate day and night testing. The timer/light switch enables all light banks on & off simultaneously as well as operate the two setpoint temperature/humidity system.

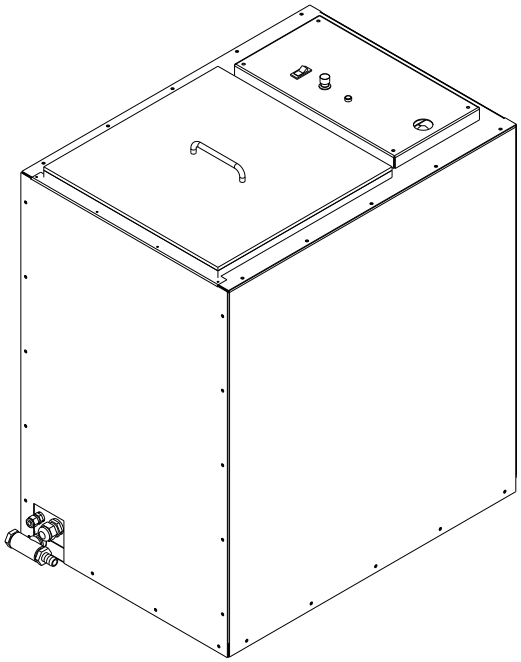


DUAL SETPOINT/LIGHT CYCLE TIMER PANEL
MODEL 6010

Chart Recorder
The Honeywell Circular Chart Recorder graphs temperature and/or humidity over time. The humidity input is 0-5 volt wired from the humidity controller. A separate RTD inside the chamber monitors temperature. Refer to the Chart Recorder User's Manual for operation instructions.

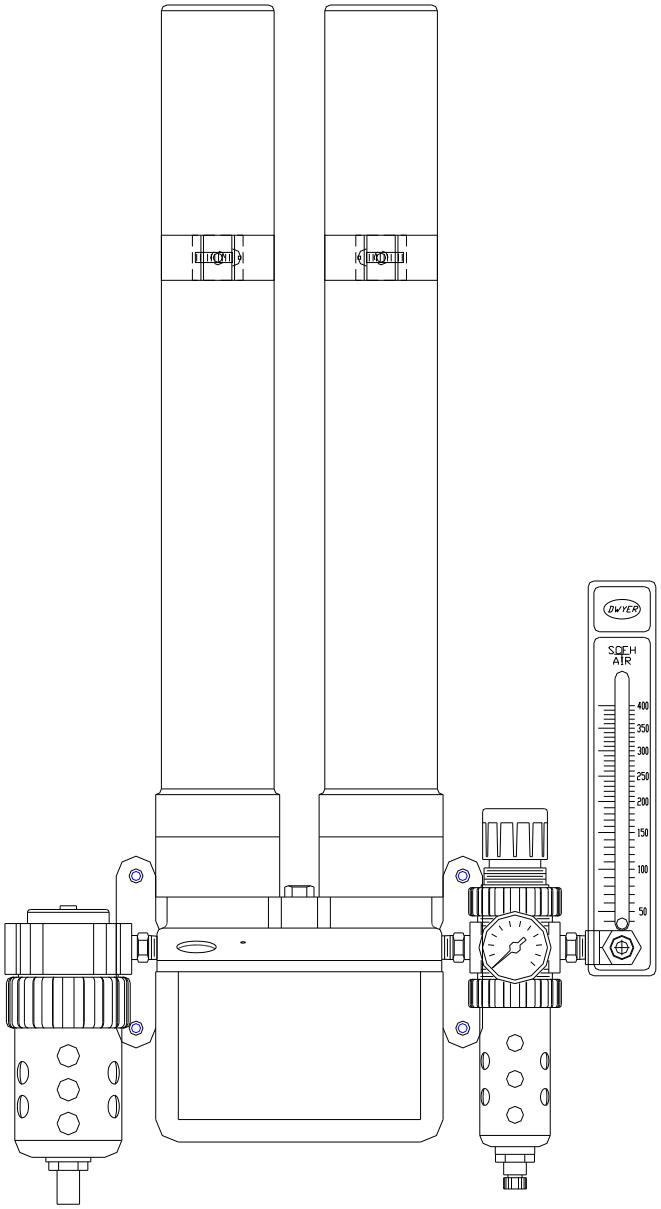


Condensate Recirculating System
The Condensate Recirculating System is used in facilities where a floor drain or water source is not available. The system collects and recycles the condensate from the chamber and provides continuous, filtered water to the chamber's humidity injection system.

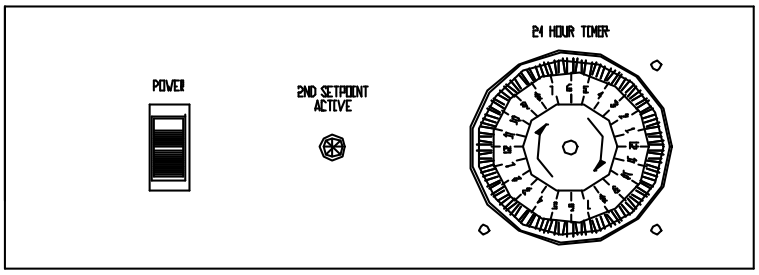


Dryer Package

Heatless Dryer Packages extend the chamber's operational limits to a minimum humidity control point of 10% RH and improve the dehumidification rate. This uses 90-100 psi compressed air to purge moist air from the chamber.

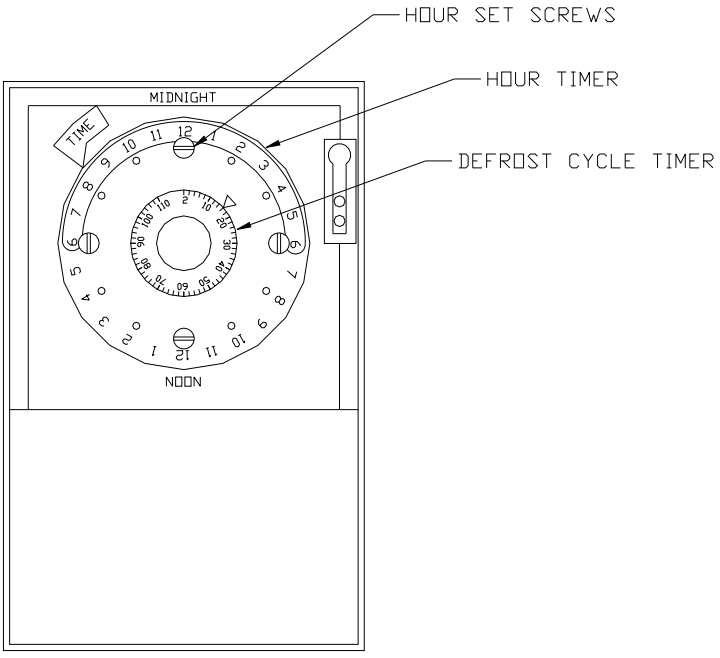


Contact Closure System
The Contact Closure System uses a 24-hour timer to switch between two setpoints.



Remote Alarm Contact
Remote Alarm Contacts are contacts located on the back of the chambers for connection to an external alarm or dialing system. Both normally open & normally closed contacts are provided to signal a deviation from control safety settings.

Defrost Timer
The optional defrost timer allows the chamber to operate at low temperatures down to 0°C. When operating the chamber with this option, it is recommended to utilize the defrost system to prevent ice build-up on the condensing coil. The defrost time is pre-set to provide four defrost cycles every 24 hours (once every 6 hours) with the defrost duration at 16 minutes. While the unit is in the defrost mode, the temperature may drift up a couple degrees. To adjust timer settings remove top cover of unit. Timer located in front right hand corner of unit.



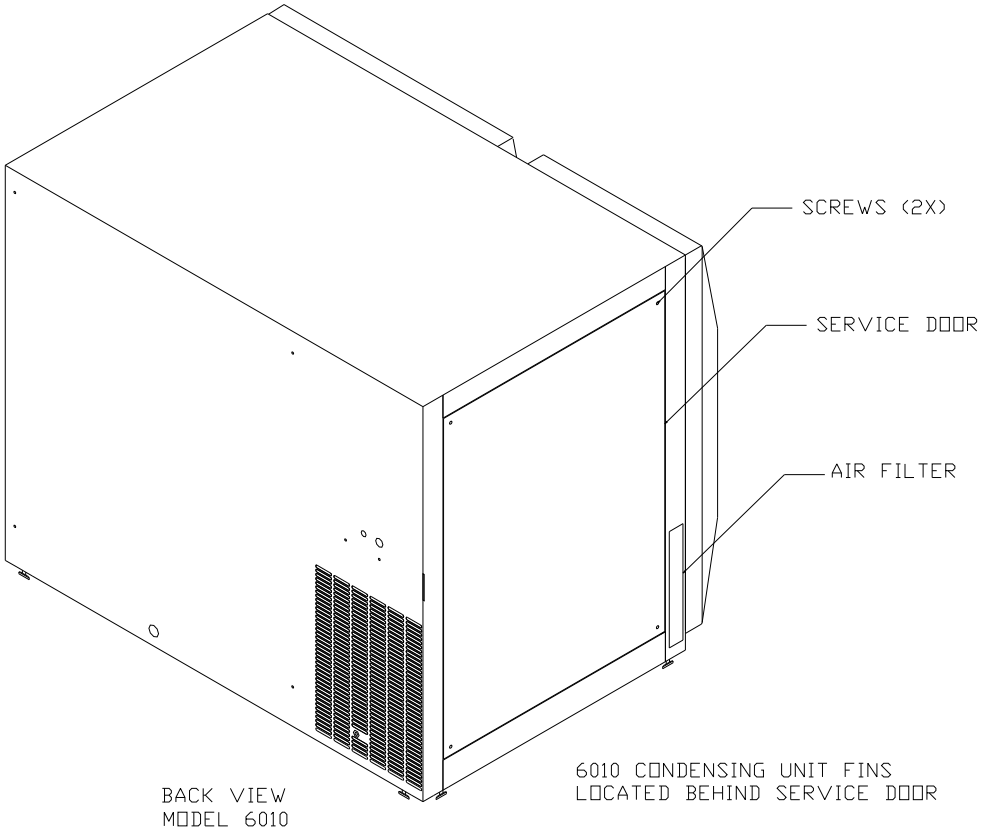
FACTORY SETTINGS
EVERY 6 HOURS
FOR 16 MIN CYCLE

TROUBLESHOOTING

GENERAL

To access the electrical, refrigeration and control panel components:

1. Remove two (2) screws located at the top of the service door.
2. Pull the service door towards you to access the electronics and refrigeration components.



Problem: Will not turn on

1. Verify supply power is connected & energized (115 VAC, 60 Hz).

2. Check for continuity across main internal fuse (1FU, 20A see figure 1b). Replace if necessary.

Problem: Will not cool

1. Verify refrigeration switch is on.

2. Determine if temperature controller is calling for cooling. Set temperature set point ***below*** temperature process value on controller. Verify Output 2 on temperature controller lights up (it may pulse), see figure 5. If it does not light up, see controller manual.

3. Determine if cooling solenoid is functioning. A clicking noise should be heard when Output 2 (see previous step) on temperature controller turns on or off (not while it stays on). Or, place a screwdriver tip near the main liquid solenoid valve (figure 3) and see if it is magnetized. See also troubleshooting solenoid valves.

4. Determine if air is circulating properly inside the chamber. Air should be drawn into the plenum (located on the left side of the chamber interior) and out the right side diffuser. A piece of paper or plastic bag should cling to the left diffuser plate. If air is not circulating,
   A. Check for continuity across blower motor fuse (4 FU, 5A see figure 1a). Replace if necessary.
   B. See troubleshooting blower motor.

5. Check for continuity across compressor fuse (5 FU, 10A see figure 1a). Replace if necessary.

6. The condenser fan should run continuously with refrigeration switch on. See troubleshooting condenser fan if it is not.

7. The compressor should run continuously with refrigeration switch on. See troubleshooting compressor if it is not.

8. See Troubleshooting Refrigeration

Problem: Will not heat

1. Determine if temperature controller is calling for heating. Set temperature set point ***above*** temperature process value on controller. Verify Output 1 on temperature controller lights up, see figure 5. If it does not light up, see controller manual.

2. Determine if air is circulating properly inside the chamber. Air should be drawn into the plenum (located on the left side of the chamber interior) and out the right diffuser. A piece of paper or plastic bag should cling to the left diffuser plate. If air is not circulating,
   A. Check for continuity across blower motor fuse (4 FU, 5A see figure 1a). Replace if necessary.
   B. See troubleshooting blower motor.

3. Check amperage draw through conductor #9 (between solid state relay (1 SSR) & heater fuse, 3 FU see figure 1c). The amperage draw should be around 5 Amps. If there is no current, check for continuity across
   A. Heater fuse (3 FU, 5A see figure 1c). Replace if necessary.
   B. Replace Solid State Relay.
   C. Thermal fuse (16 FU, 90°C see figure 2) accessible through interior left side only. Replace if necessary.
   D. Thermal snap-disk (1 TST, 65°C see figure 2) accessible through interior left side ceiling only. Replace if necessary.

4. See troubleshooting heaters.

Problem: Will not maintain temperature

1. Close the air vent port & access port on right side of chamber.

2. Ensure complete seal between the glass door & unit. Use a paper to feel around door for unsealed locations.

3. Check temperature sensor (RTD) located inside the chamber (figure 3) and make sure it is away from the chamber wall, lights and other sources of heat. Note: If the optional chart recorder is installed, there will be two RTDs.

4. Verify glass door is out of direct sunlight & other sources of radiant heat, and exterior door is closed.

5. Air pattern throughout chamber flows from right to left.
   A. Verify interior chamber holes in metal left & right diffusers aren't covered.
   B. Verify shelves have 30% area open for airflow to chamber left side.

6. Temperature droop & overshoot maybe caused by poor values for PID & other settings. See Controller Manual for PID, dead band & temperature offset settings.

7. Determine if air is circulating properly inside the chamber. Air should be drawn into the plenum (located on the left side of the chamber interior) and out the right side diffuser. A piece of paper or plastic bag should cling to the left side diffuser. If air is not circulating,
   A. Check for continuity across blower motor fuse (4 FU, 5A see figure 1a).
   B. See troubleshooting blower motor.

8. The condenser fan should run continuously with refrigeration switch on. See troubleshooting condenser fan if it is not.

9. If the temperature is set below 7°C for an extended time, the evaporator may be frozen. Set temperature to 20°C for 1 hour and then see if unit will maintain temperature.

10. See Troubleshooting Refrigeration

Problem: Will not humidify

1. Verify humidity switch is on.

2. Verify supply water is connected to unit with no restrictions.

3. Clean humidity injection water filter (figure 4). Unscrewing clear lid & wash screen under hot water. Replace if necessary.

4. Determine if air is circulating properly inside the chamber. Air should be drawn into the plenum (located behind the diffuser plate in left side of the chamber interior) and out the right side diffuser. A piece of paper or plastic bag should cling to the left side diffuser plate. If air is not circulating,
   A. Check continuity across blower motor fuse (4 FU, 5A see figure 1a).
   B. See troubleshooting blower motor.

5. Determine if humidity controller is calling for humidity. Set humidity set point ***above*** humidity process value on controller. Verify Output 1 on humidity controller lights up (it may pulse), see figure 5. If it does not light up, see controller manual.

6. Determine if humidity solenoid is functioning. With Output 1 on (see previous step), place a screwdriver tip near the humidity injection solenoid coil (figure 4) and see if it is magnetized. (A clicking noise could be the contact relay switching.) See troubleshooting solenoid valves.

7. Check continuity across humidity injection pump fuse (2 FU, 2A see figure 1c).

8. Check continuity across humidity transformer fuse (6 FU, 5A see figure 1c).

9. Check continuity across humidity sensor fuse (7 FU, 0.5A see figure 1c).
   A. Verify transformer (1 T, on main electrical chassis, figure 1c) is working properly
   B. Verify relay (3 CR, on main electrical chassis, figure 1c) works properly.

10. Atomizer maybe plugged & need replaced. Refer to replace atomizer.

11. See troubleshooting humidity injection pump.

Problem: Will not dehumidify

1. Water present in the chamber will hinder the dehumidification process.
   A. Check drains for proper draining.
   B. Verify water is not setting in bottom of chamber.

2. Ensure access tubes are sealed with permigum (see figure 1a).

3. Humidity specifications are based on a 4°C dew point (20°C ambient). The chart below illustrates the lowest humidity level specified for a given temperature. High ambient air temperatures will affect humidity set points above 75%.

Temperature, °C	Relative Humidity, %
8	80
12	60
16	48
20	37
24	29
28	24
32	17
36	15
40	13
48	9
52	8
56	5
60	5
64	4

4. Determine if air is circulating properly inside the chamber. Air should be drawn into the plenum (located on the left side of the chamber interior) and out the right side diffuser. A piece of paper or plastic bag should cling to the top diffuser plate. If air is not circulating,
   A. Check continuity across blower motor fuse (4 FU, 5A see figure 1a).
   B. See troubleshooting blower motor.

5. Determine if humidity controller is calling for dehumidification. Set humidity set point ***below*** humidity process value on controller. Verify Output 2 on humidity controller lights up (it may pulse), see figure 5. If it does not light up, see controller manual.

6. Determine if dehumidification solenoid is functioning. A clicking noise should be heard when Output 2 (see previous step) on humidity controller turns on or off (not while it stays on). Or, place a screwdriver tip near the wet coil solenoid valve (figure 6) and see if it is magnetized. See troubleshooting solenoid valves.

7. See troubleshooting condenser fan.

8. See troubleshooting refrigeration.

Problem: Will not maintain humidity

1. Humidity specifications are based on a 4°C dew point (20°C ambient). The chart (previous page) illustrates the lowest humidity level specified for a given temperature. High ambient air temperatures will affect humidity set points above 75%.

2. Clean humidity injection water filter (figure 4). Unscrewing clear lid & wash screen under hot water. Replace if necessary.

3. Water present in the chamber will hinder the dehumidification process.
   A. Check drains for proper draining.
   B. Verify water not setting in bottom of chamber.

4. Close the air vent port & access port on right side of chamber.

5. Ensure access tubes are sealed with permagum (located behind service door figure 1a).

6. Ensure complete seal between the glass door & unit. Use a paper to feel around door for unsealed locations.

7. Humidity droop & overshoot maybe caused by poor values for PID & other settings. See Controller Manual for PID, dead band & humidity offset settings.

8. The humidity sensor maybe saturated. Dry out chamber (with humidity off) at 40°C for 6 hours.

9. Determine if air is circulating properly inside the chamber. Air should be drawn into the plenum (located on the left side of the chamber interior) and out the right side diffuser. A piece of paper or plastic bag should cling to the left side diffuser plate. If air is not circulating,
   A. Check continuity across blower motor fuse (4 FU, 5A see figure 1a)

B. See troubleshooting blower motor.

10. Atomizer maybe plugged and need replaced. Refer to replace atomizer.

11. See troubleshooting refrigeration.

TROUBLESHOOTING - COMPONENTS

Humidity Injection Pump

1. Check to see if voltage is applied to pump (16 V).
   If voltage is not present, verify that the control system is operating properly.

2. Measure current flow (<1 amp).
   If current flow is not present, replace pump. Refer to replacing pump.

Compressor

1. Check to see if voltage is applied to compressor. (≥ 110 V)
   If voltage is not present, verify that the control system is operating properly.
   Check compressor fuse. (5 FU, 10A see figure 1a).

2. Measure current flow. (≈ 4.3 amp).
   If current flow is not present,
   The compressor's thermal overload may have tripped. Be sure nothing is blocking the flow of air into the condenser. Clean if necessary with compressed air or a vacuum. Wait until compressor temperature is below 90°F or warm to touch. If still no current flow, replace compressor (see replacing compressor).
   If current flow is present,
   A. And compressor is hot to the touch, replace start-up capacitor.
   B. And is in excess of rated load amps (4.7 amps), refer to refrigeration troubleshooting.

Solenoid valves

1. Check to see if voltage is applied to coil. (≥ 110V) (figure 6).
   If voltage is not present, verify that the control system is operating properly.

2. Measure current flow (<0.1 amp).
   A. If current flow is not present, replace solenoid valve coil.
   B. If current flow is present and valves do not operate, replace solenoid valve. Refer to replacing solenoid valve.

Heaters

1. Check to see if voltage is applied to heaters. (≥ 110V)
   If voltage is not present, verify that the control system is operating properly.

2. Measure current flow.
   A. If current flow is present ≈ 4.9 Amps then heaters are good.
   B. If current is below the above range, replace heaters (see replacing heaters).

Blower Motor

1. Check to see if voltage is applied to blower motor. (≥ 110V) (see figure 1a).
   If voltage is not present, verify that the control system is operating properly.

2. Measure current flow. (4 FU, 5A see figure 1a).
   A. If current flow is present, check for obstruction of blower wheel. If not obstructed, replace blower motor. Refer to replacing blower motor.
   B. If current is not present, let motor cool down until it is touchable (the thermal overload may have tripped). If motor still doesn't draw current, replace blower motor. Refer to replacing blower motor section.

Condenser fan

1. Check for obstruction of condenser fan. If not obstructed, replace condenser fan (see replacing condenser fan).

Troubleshooting – Refrigeration

Gauge Readings

Attach gauges to suction and discharge access fittings and read pressures while unit is operating. Normal operating pressures depend on ambient conditions. Pressures increase as ambient temperatures increase and decrease as ambient temperatures decrease. Normal operating pressures at 70° F are 24 psi on the suction side and 120 to 140 psi on the discharge side with no load. Pressures with load are 24 psi on suction and 135 to 160 on discharge. Static pressure is 60 to 70 psi.

This system controls evaporator temperature by introducing hot gas into the evaporator. The above pressures are based on the system operating in the liquid cycle and will differ with the introduction of hot gas.

Low suction pressure, Low discharge pressure – system Leak

1. Turn off & leak check system (see troubleshooting a leak)

Low suction pressure, High discharge pressure – flow is blocked

1. Check copper lines to see if they are pinched
2. Check both liquid line solenoid valves & verify they are operating. See troubleshooting solenoids.
3. Replace filter dryer (see replacing filter dryer)

High suction pressure, Low discharge pressure – bypassing too much gas

1. Adjust hot gas bypass valve counterclockwise until pressures become acceptable.
2. If it won't adjust, replace hot gas bypass valve (see replacing bypass valve).

High suction pressure, High discharge pressure – condenser not cooling

1. Assure that the condenser fan is operational (see troubleshooting condenser fan).
2. Assure that system has proper air clearance on all sides for adequate airflow.
3. Assure that ambient conditions are not excessively high.

Suction and discharge pressures are balanced – compressor not running

1. Assure ambient temperature less than 90°F (thermal overload may trip).
2. Check compressor startup capacitor.
3. Make sure the compressor is operational (see troubleshooting compressor).
4. Check compressor fuse. (5 FU, 10A see figure 1a).

Troubleshooting - Refrigeration Leak

Leak check refrigeration system.

1. Remove chamber service door so refrigeration parts are visible (refer to figure 6 for component layout). System must not be running while leak checking.

2. Visually inspect all solder and mechanical refrigeration connections (use retractable mirror if necessary). Look for pinholes in solder joints and other connection imperfections. If a joint still has flux on it, remove flux deposit. Traces of oil around a connection may indicate a leak. If a suspect area is found use a bubble check solution to pinpoint leak. If a leak is detected**,** repair refrigeration leak.

3. If no leaks can be detected visually it will be necessary to leak check the system with an electronic leak detector. It is necessary to have a leak detector which will detect HFC's (R-134a).

4. Using a leak detector, sniff all exposed solder and mechanical connections. If a suspect area is found use bubble check to pinpoint leak. It may be necessary to split insulation on the suction side in the area of solder connections. If a leak is found, repair refrigeration leak.

5. If no leaks can be found using the static pressure of the system it may be necessary to boost the pressure of the system, pressurize system with nitrogen.

Pressurize system with nitrogen.

1. Recover the refrigerant (R-134a) from the system. Do not combine the recovery system with refrigerants containing chlorine. This would contaminate the refrigeration system. This system is classified as a small appliance by the EPA and must be recovered to a level of 10 mm Hg.

2. Connect yellow hose (center) of manifold gauges to R-134a cylinder. Open cylinder valve and purge yellow hose. Once hose is purged, open suction side manifold (blue hose) and pressurize system to 40 psi. Close suction side manifold, close cylinder valve and remove yellow hose from cylinder. Only use R-134a to leak check system. Failure to do so will contaminate system with chlorine and ruin the life expectancy.

3. Connect yellow hose to dry nitrogen bottle (with regulator) and purge yellow hose. Failure to use a regulated flow of nitrogen could cause internal valve damage to compressor. Once hose is purged, open suction manifold valve and pressurize to 100 psi. Close suction manifold valve and remove hoses and leak check system.

4. Use bubble check to leak check king valves. If a leak is detected, refer to repairing a refrigeration leak.

REPAIR / REPLACE

REPAIR REFRIGERATION LEAK

1. Recover refrigerant to level as explained in previous section (10 mm Hg).

2. Pressurize system with dry nitrogen to 10 psi (see previous page). This will avoid drawing any ambient moisture into system since the unit is under a vacuum.

3. Open suction side manifold valve and vent nitrogen charge to atmosphere.

4. Using an acetylene torch set, repair solder connection as quickly as possible. System should not be exposed to atmosphere for more than ten minutes. If repair cannot be made in this length of time cap all open areas of refrigeration system.

5. Visually inspect solder connection and leak check system (see previous page).

6. Evacuate refrigeration system (see evacuate system).

7. Charge refrigeration system (see recharge system).

Note: If during initial troubleshooting the suction pressure was in a vacuum the system filter drier must be replaced. See replacing filter drier.

Repairing a king valve leak

1. Pressurize system with R-134A and dry nitrogen up to 100 psi.

2. Back service valve all the way out and remove hose.

3. Using bubble check, leak check king valve.

4. If leak is detected where the hose was, verify service valve is backed all the way out. If so, replace king valve (see appropriate section).

5. If leak is detected around service valve, tighten packing if possible. If leak persists, replace king valve (see appropriate section).

6. Evacuate refrigeration system (see evacuate system).

7. Charge refrigeration system (see evacuate system).

REPLACING REFRIGERATION COMPONENTS.

Note: System should not be exposed to atmosphere for more than ten minutes. If repairs cannot be made in this length of time cap all open areas of refrigeration system.

Replace filter drier.

1. Recover refrigerant (to 10 mm Hg as explained in previous section).

2. Pressurize system with dry nitrogen above 10 psi (see corresponding section). This will avoid drawing ambient moisture into system while unit is under a vacuum.

3. Open suction side manifold valve and vent nitrogen charge to atmosphere.

4. Using an acetylene torch, unsweat drier at solder connections and remove drier from system. It may be necessary to gently pull on drier to get it loose. Make sure solder is liquefied before pulling or a tearing of the copper line could occur.

5. Replace filter drier back into system. Use a brazing rod that is suited for copper to copper brazing.

6. Visually inspect solder connection and leak check system (see section).

7. Evacuate refrigeration system (see evacuate system).

8. Charge refrigeration system (see recharge system).

Replace solenoid valve

1. Recover refrigerant (to 10 mm Hg as explained in previous section).

2. Pressurize system with dry nitrogen above 10 psi (see corresponding section). This will avoid drawing ambient moisture into system while unit is under a vacuum.

3. Open suction side manifold valve and vent nitrogen charge to atmosphere.

4. Remove coil from liquid line solenoid and place out of way.

5. Visually inspect solder connection and leak check system (see leak check).

6. Evacuate refrigeration system (see evacuate system).

7. Charge refrigeration system (see recharge system).

Replace hot gas bypass valve.

1. Recover refrigerant (to 10 mm Hg as explained in previous section).

2. Pressurize system with dry nitrogen to 10 psi (see corresponding section). This will avoid drawing ambient moisture into system since the unit is under a vacuum.

3. Open suction side manifold valve and vent nitrogen charge to atmosphere.

4. Unsweat connection between discharge bypass entrance and hot gas line.

5. Replace discharge bypass valve back into system. Use a brazing rod that is suited for copper to copper brazing.

6. Visually inspect solder connection and leak check system (see leak check).

7. Evacuate refrigeration system (see evacuate system).

8. Charge refrigeration system (see recharge system).

Replace thermostatic expansion valve.

1. Recover refrigerant (to 10 mm Hg as explained in previous section).

2. Pressurize system with dry nitrogen to 10 psi (see corresponding section). This will avoid drawing ambient moisture into system since the unit is under a vacuum.

3. Open suction side manifold valve and vent nitrogen charge to atmosphere.

4. Loosen both flare nuts on valve and remove bulb clamp in suction line.

5. Replace with new expansion valve using pipe thread sealant (for refrigeration systems).

6. Evacuate refrigeration system (see evacuate system).

7. Charge refrigeration system (see recharging).

Replace compressor

1. Recover refrigerant (to 10 mm Hg as explained in previous section).

2. Pressurize system with dry nitrogen to 10 psi (see corresponding section). This will avoid drawing any ambient moisture into system since the unit is under a vacuum.

3. Disconnect wiring from compressor. Take note as to how it was wired so that you may rewire the new compressor.

4. Remove the bolts securing the condensing unit.

5. Take suction and discharge line flare nuts off of king valves.

6. Using acetylene torch, unsweat hot gas line from tee and discharge line.

7. Remove condensing unit and replace with new one.

8. Bolt condensing unit down with bolts.

9. Rewire compressor.

10. Braze hot gas line onto discharge line.

11. Reconnect discharge to receiver and suction line to king valve using leak lock thread sealant and refrigeration oil on threads.

12. Visually inspect solder connection and leak check system (see leak check).

13. Evacuate refrigeration system (see evacuate system).

14. Charge refrigeration system (see recharging system).

EVACUATE SYSTEM

Note: Vacuum pump must be dedicated for the use of R-134a only. Failure to do so can contaminate system with chlorine and ruin the life expectancy of the refrigeration system. We recommend a 6 CFM model such as the Robinair 15600.

Once the leak or refrigeration component has been replaced, it is necessary to evacuate and recharge the refrigeration system. Leak checking gas must be vented before hooking up to pump.

1. Attach manifold gauge set to refrigeration. Blue hose goes on the suction access fitting and the red hose on discharge access fitting.

2. Attach yellow hose to intake port of vacuum pump.

3. If your vacuum pump has an isolation valve, make sure the valve is open.

4. Turn power on to vacuum pump.

5. With vacuum pump running, open suction & discharge side manifold gauges. We recommend an evacuation of at least 6 hours.

6. Vacuum level before turning pump off should be at least **29.9 mm Hg**.

7. Close suction and discharge side manifold gauges.

8. Turn power off on vacuum pump.

9. Disconnect yellow hose from intake port of vacuum pump.

10. Allow system to sit for a minimum of 1 hour after evacuation to see vacuum holds. If it does not leak check system (see leak check) and re-evacuate.

11. Charge refrigeration system (see recharging system).

RECHARGE SYSTEM

1. Connect hose from cylinder of R-134a to lower access fitting of charging cylinder.

2. Turn R-134a cylinder upside down and open valve.

3. Loosen hose fitting on charging cylinder and purge gas in charging hose.

4. Open hand valve located on bottom of charging cylinder.

5. Always fill graduated charging cylinder with at least 4 oz. more than required charge. Required charge for this system is 24 oz. Hand valve on top charging cylinder will need to be open slightly while filling.

6. Once cylinder reaches required level shut hand valve.

7. Close valve on R-134a cylinder.

8. Remove hose from charging cylinder and R-134a cylinder.

9. Connect yellow hose from refrigeration system to be charged to graduated charging cylinders lower valve.

10. Making sure manifold valves on equipment are closed, open lower valve on graduated charging cylinder.

11. Purge yellow charging hose by loosening hose fitting at manifold gauge set.

12. Once hose is purged check pressure on gauge at the top of charging cylinder.

13. If pressure is less than 70 psi, plug in heater and heat until pressure reaches at least 70 psi.

14. If pressure is higher than 70 psi, rotate plastic shroud to match corresponding pressure of refrigerant in the cylinder.

15. Once the shroud matches the refrigerant pressure, record the volume of refrigerant in the charging cylinder.

16. Take the volume (recorded in previous step) and subtract 24 oz. This will give you the ending volume of refrigerant left in the cylinder after charging. ***For Example: The pressure in the charging cylinder is 70 psi. With the pressure shroud rotated to 70 psi, the volume of refrigerant is 34.5 oz. We know that the charge is 24 oz. Therefore we take the difference of 34.5 oz. and 24 oz. and come up with a difference of 10.5 oz. This is the volume of refrigerant that should be left in the charging cylinder after charging the refrigeration system.***

17. Once the remaining volume has been calculated, use a piece of tape or something similar to mark the cylinder at the point of calculated remaining volume.

18. Open suction side of manifold gauge and bleed refrigerant into system. Once volume of refrigerant reaches point of calculated remaining volume, close suction manifold gauge.

REPLACE COMPONENTS

Disconnect power before replacing any component!!

Replace humidity injection pump

1. Turn water supply off.
2. Disconnect both wires that connect pump to harness.
3. Disconnect inlet & outlet tubes from pump head.
4. Remove pump mounting screws.
5. Remove old pump and replace with new pump.
6. Fasten pump to unit with mounting screws.
7. Reconnect inlet & outlet tubing to pump head.
8. Connect both wires from pump to harness.
9. Turn on water supply.
10. Set humidity control setpoint to 98%.
11. Leak check pump fittings for leaks.

Condensor Fan

1. Disconnect wiring from condensor fan motor. Take notice how fan motor is wired as you will have to rewire replacement motor.
2. Remove four screws from condensor fan mounting bracket and lift fan assembly up and out of system.
3. Using a wrench, loosen fan blade retaining nut. Take precautions not to bend fan blade as this will cause poor cooling efficiency and shorten the bearing life of new motor.
4. Remove fan blade from old motor. Take notice to direction of the pitch of the fan blade as it will be attached to new motor.
5. Remove four screws attaching fan motor to fan assembly mounting bracket.

6. Attach new motor to fan assembly mounting bracket using screws removed.

7. Using the fan blade-retaining nut, attach fan blade onto replacement motor.

8. Using the four screws removed earlier, install new condensor fan assembly.

9. Rewire fan motor.

Replace solenoid valves (wet and cooling coil valves)

1. Evacuate system and purge with nitrogen (see corresponding section).

2. Remove solenoid coil.

3. Unsweat solenoid and remove.

4. Place new solenoid in place. Clean both inlet line and outlet line of solenoid before reinstalling new solenoid.

5. Wrap wet cloth around new solenoid and sweat both joints. Visually inspect connections.

6. Perform leak check procedure (see leak check).

Replace solenoid valve (humidity valve)

1. Turn water supply off.

2. Disconnect both wires that connect solenoid to harness.

3. Remove the inlet nut and tube and unscrew the solenoid.

4. Remove valve and replace with new valve.

5. Thread the new solenoid onto the pipe nipple, reconnect the inlet nut and tube .

6. Reconnect both wires to harness.

7. Turn water supply on.

8. Set humidity set point to 95% on the humidity controller.

9. Verify there are no leaks in the system (see leak check).

Solenoid Valve Coils

1. Disconnect three wires that attach coil to harness.
2. Remove nut on top of coil.
3. Pull up on solenoid coil to remove and replace with new coil.
4. Replace nut and information plate on top of coil and tighten.
5. Reconnect both coil wires back to harness.

Replace heaters

1. Turn power off and unplug unit.
2. Remove all screws from ceiling, and remove left side diffuser (see figure 2).
3. Remove wires & screws securing bad heater. Replace with new heater. Make sure ring lugs do not ground to support bracket.
4. Reinstall left side diffuser, and install screws into ceiling.

Replace Blower motor

1. Disconnect power from chamber.
2. Remove all screws from ceiling, false floor and remove left side diffuser (see figure 2).
3. Using an Allen wrench, loosen set screw on blower wheel. Slide blower wheel off of shaft.
4. Located behind the service door, remove screws that hold the blower motor plate (see figure 1a).
5. Disconnect wires from harness to blower motor.
6. Remove motor from mounting plate, and replace with new motor.
7. Reinstall motor assembly into side panel. Slide blower wheel back onto shaft and tighten blower wheel set screw.
8. Reconnect wires from motor to harness.
9. Reinstall left side diffuser, false floor and install screws into ceiling.

Replace atomizers

1. Turn power off and unplug unit.

2. Remove all screws from ceiling, false floor and remove left side diffuser (see figure 2).

3. Unscrew atomizer head. Apply teflon tape to threads and install new atomizer.

4. Reinstall left side diffuser, false floor and install screws into ceiling.

Figures

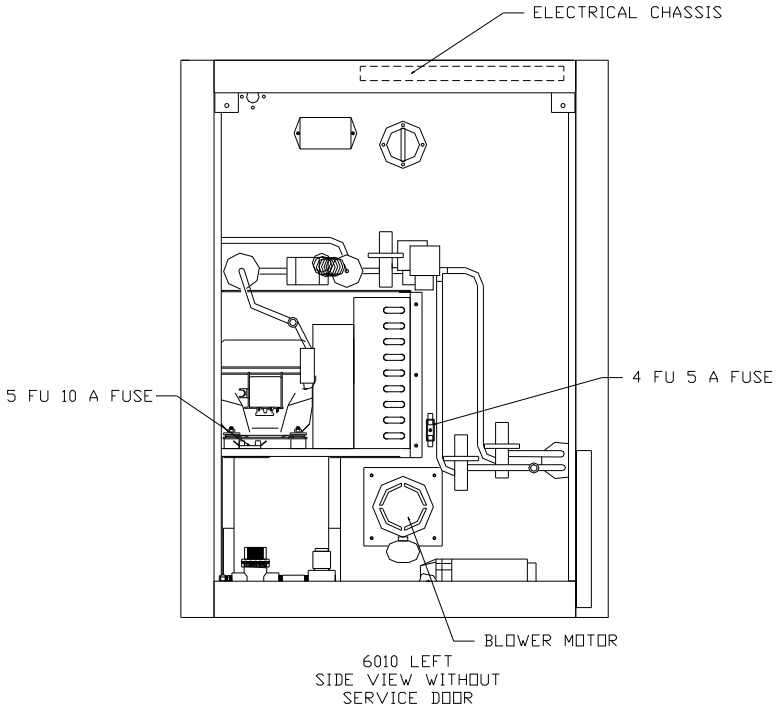


Figure 1a – Electrical Component Layout

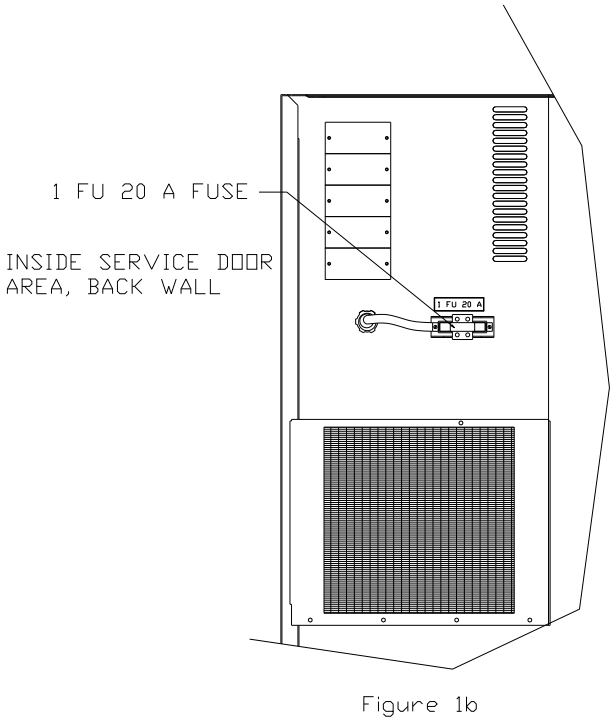


Figure 1b – Electrical Component Layout

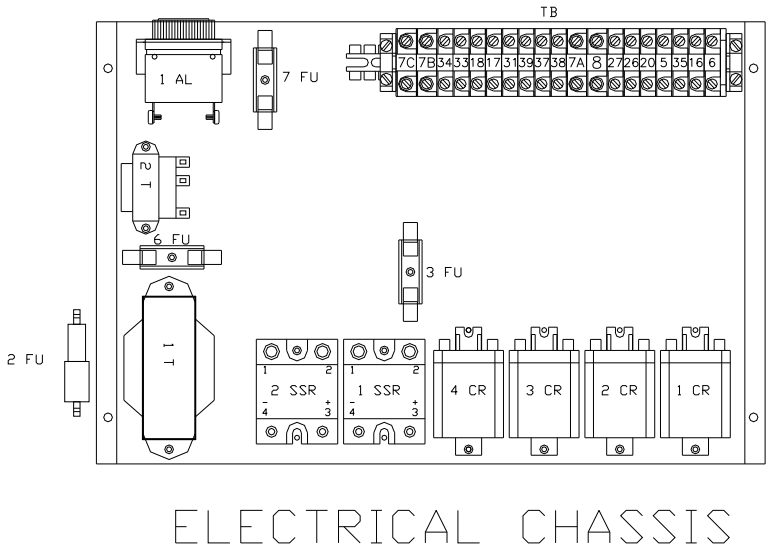


Figure 1c – Electrical Component Layout

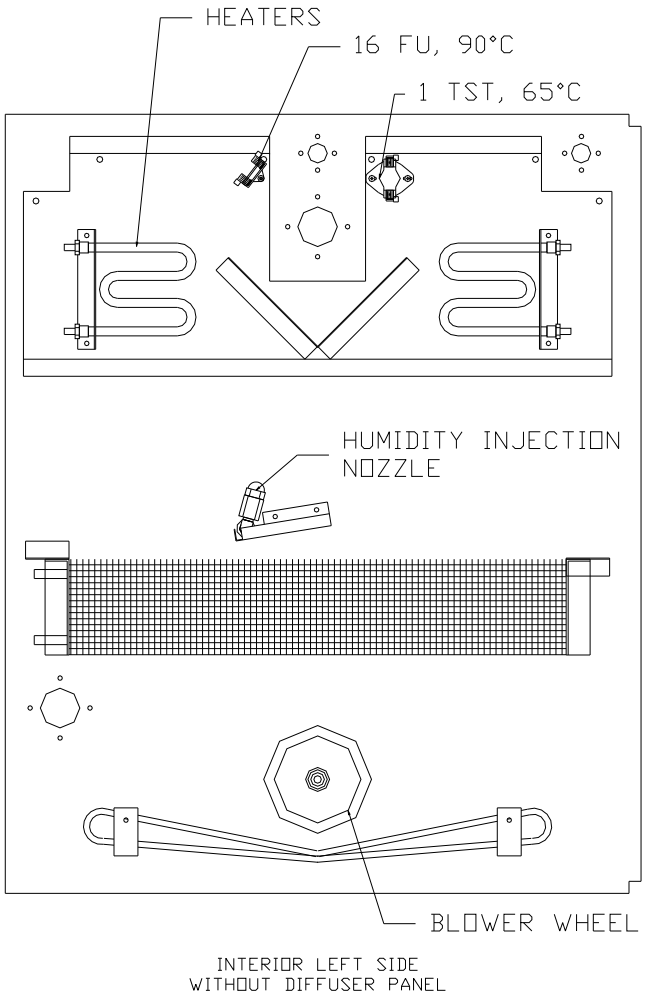


Figure 2 – Internal Component Layout

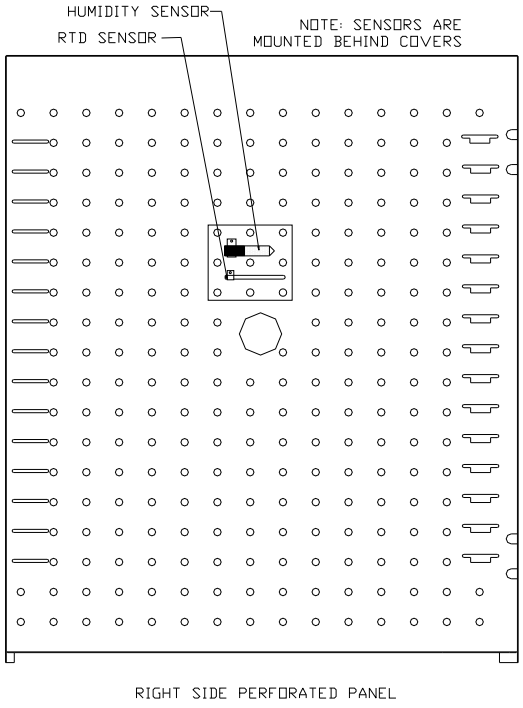


Figure 3 – Temperature & Humidity Sensor Location

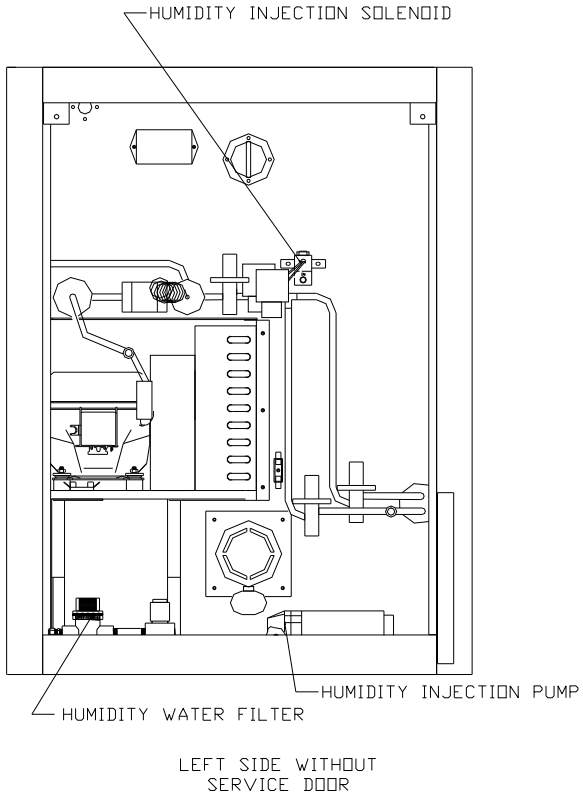
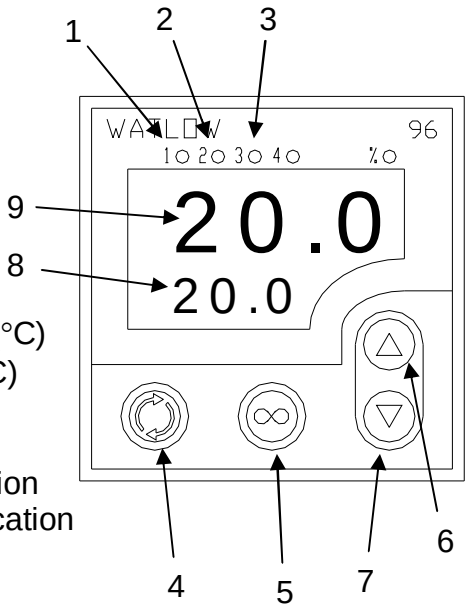


Figure 4 – Humidity Component Layout

Controller Layout

Temperature

1 - Output 1, indicates heating system
2 - Output 2, indicates cooling system
3 - Output 3, indicates temperature alarm
4 - “Advance” key
5 - “Infinity/Home” key
6 - “Up” key
7 - “Down” key
8 - Lower display, Setpoint Temperature (°C)
9 - Upper display, Actual Temperature (°C)



Humidity

1 - Output 1, indicates system humidification
2 - Output 2, indicates system dehumidification
3 - Output 3, Not used
4 - “Advance” key
5 - “Infinity/Home” key
6 - “Up” key
7 - “Down” key
8 - Lower display, Setpoint Relative Humidity (%RH)
9 - Upper display, Actual Relative Humidity (%RH)

Figure 5 – Controller Layout

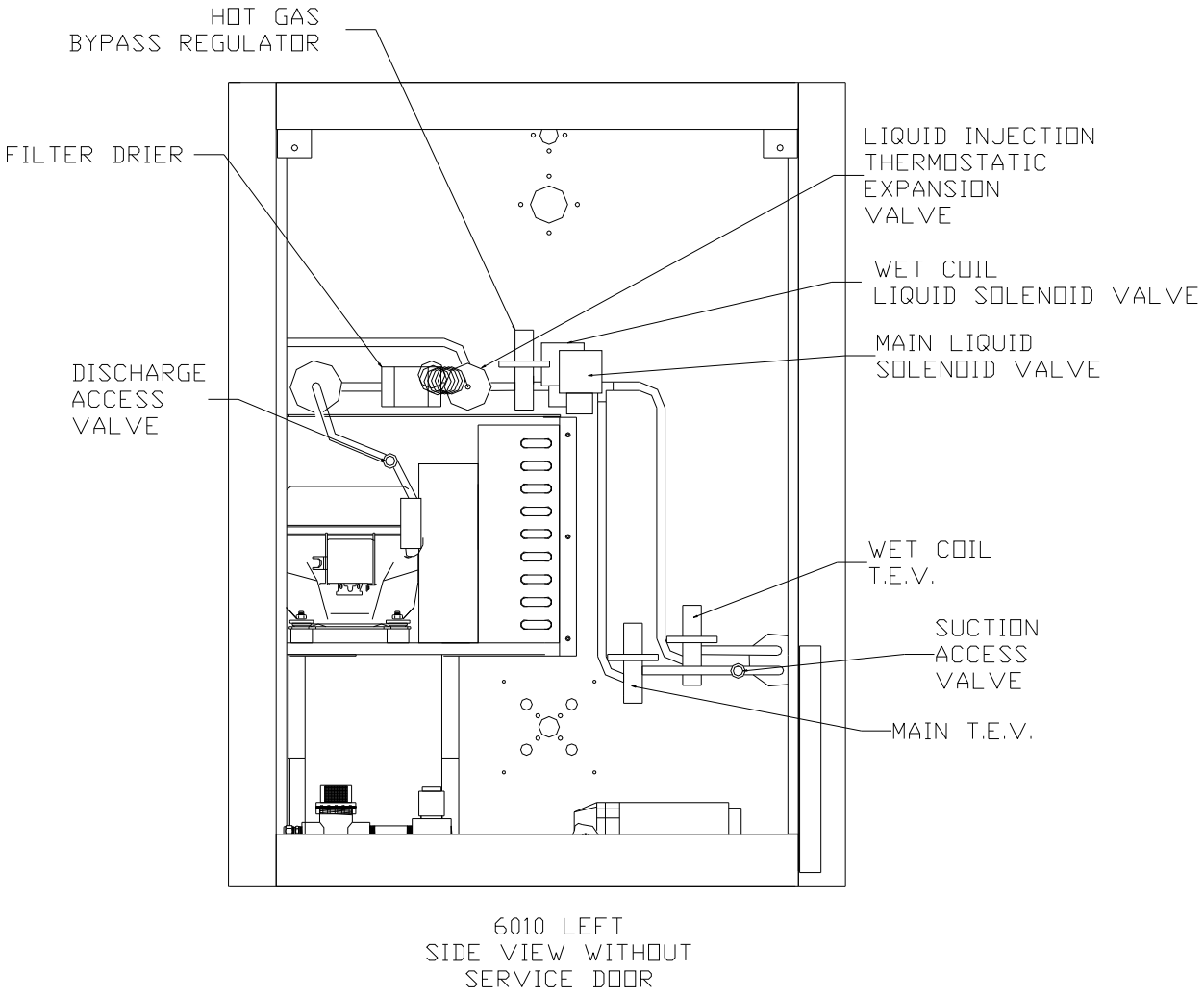


Figure 6 – Refrigeration Component Layout

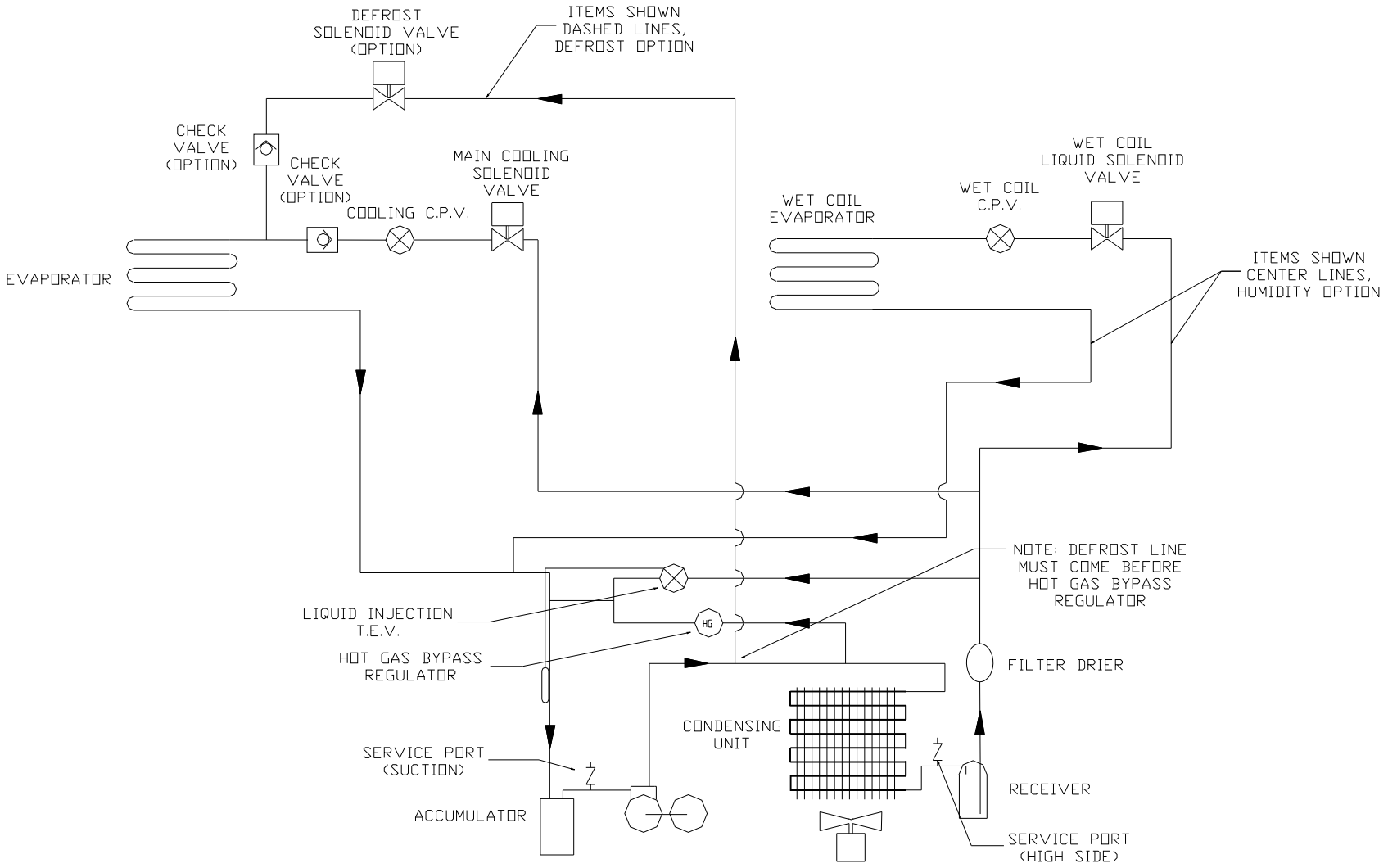


Figure 7 – Refrigeration Schematic

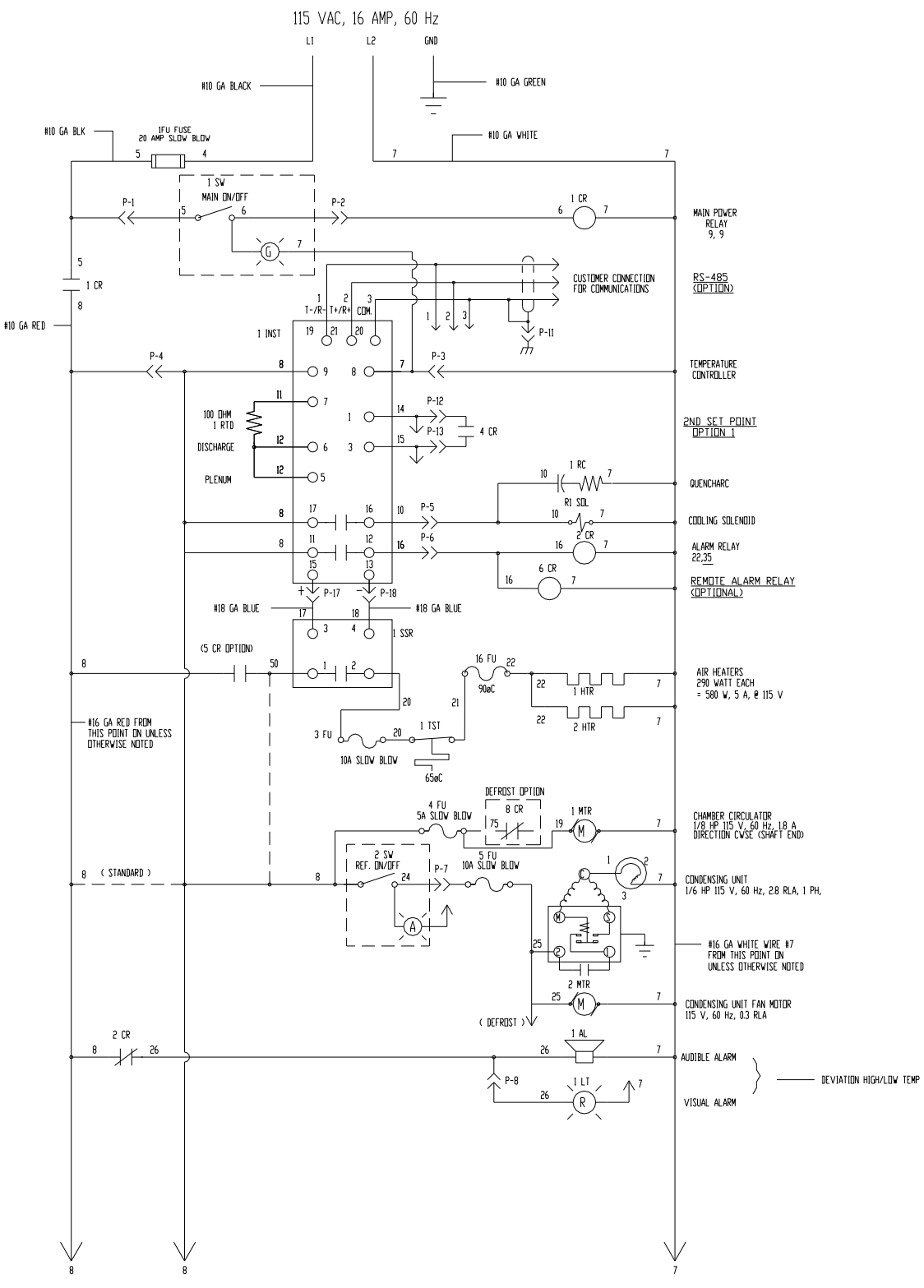


Figure 8 – Electrical Schematic

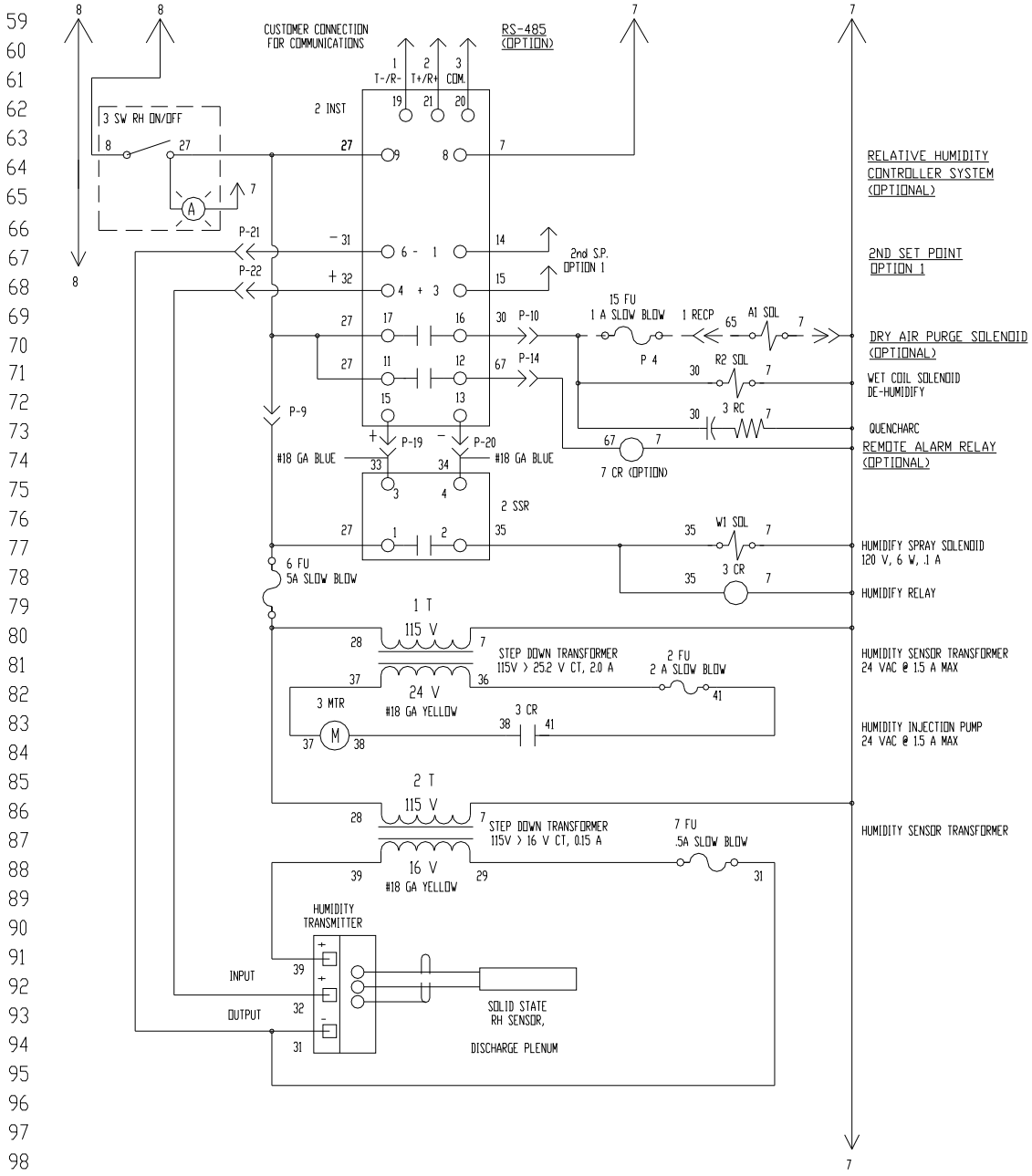


Figure 8 – Electrical Schematic cont.

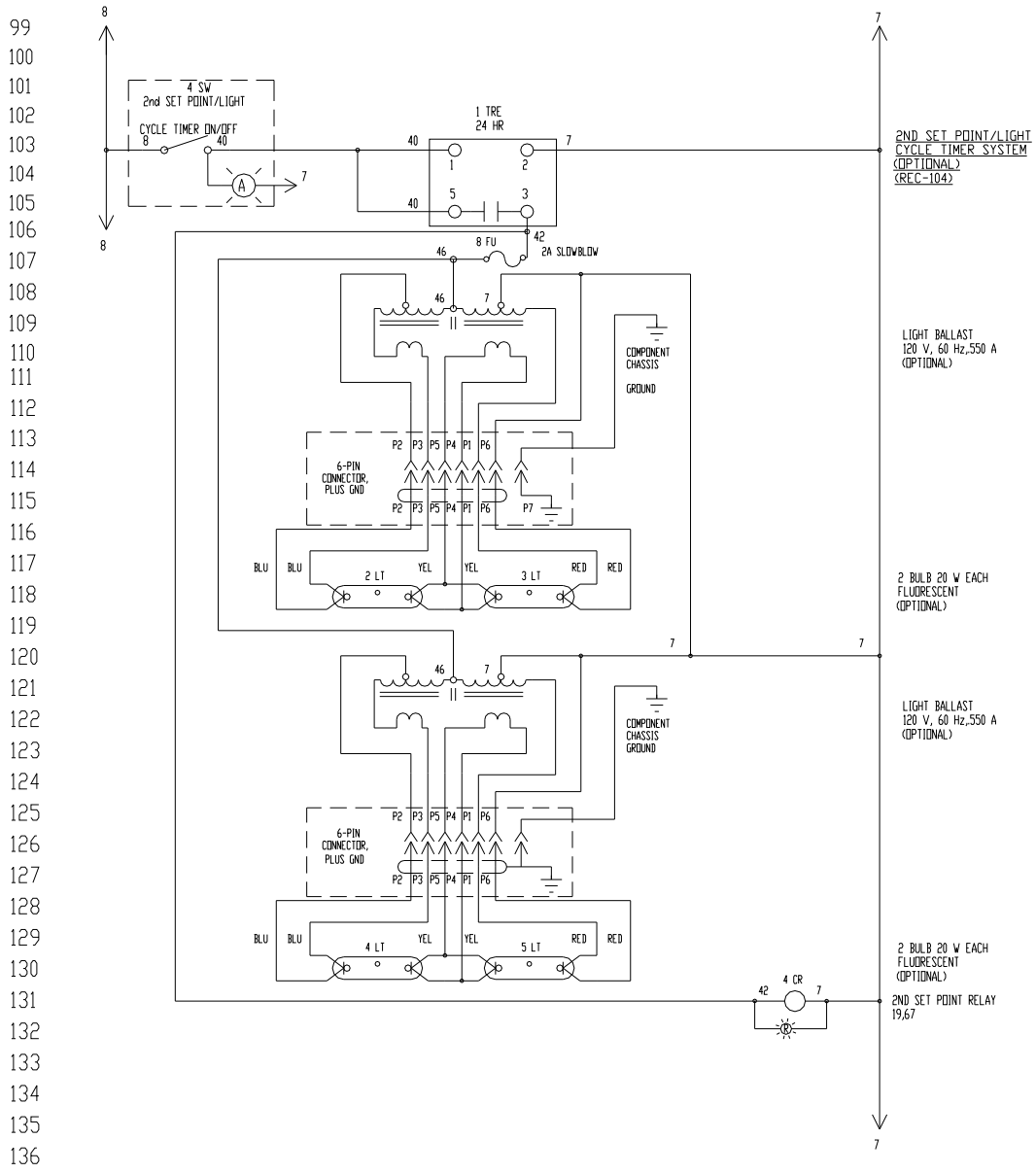


Figure 8 – Electrical Schematic cont.

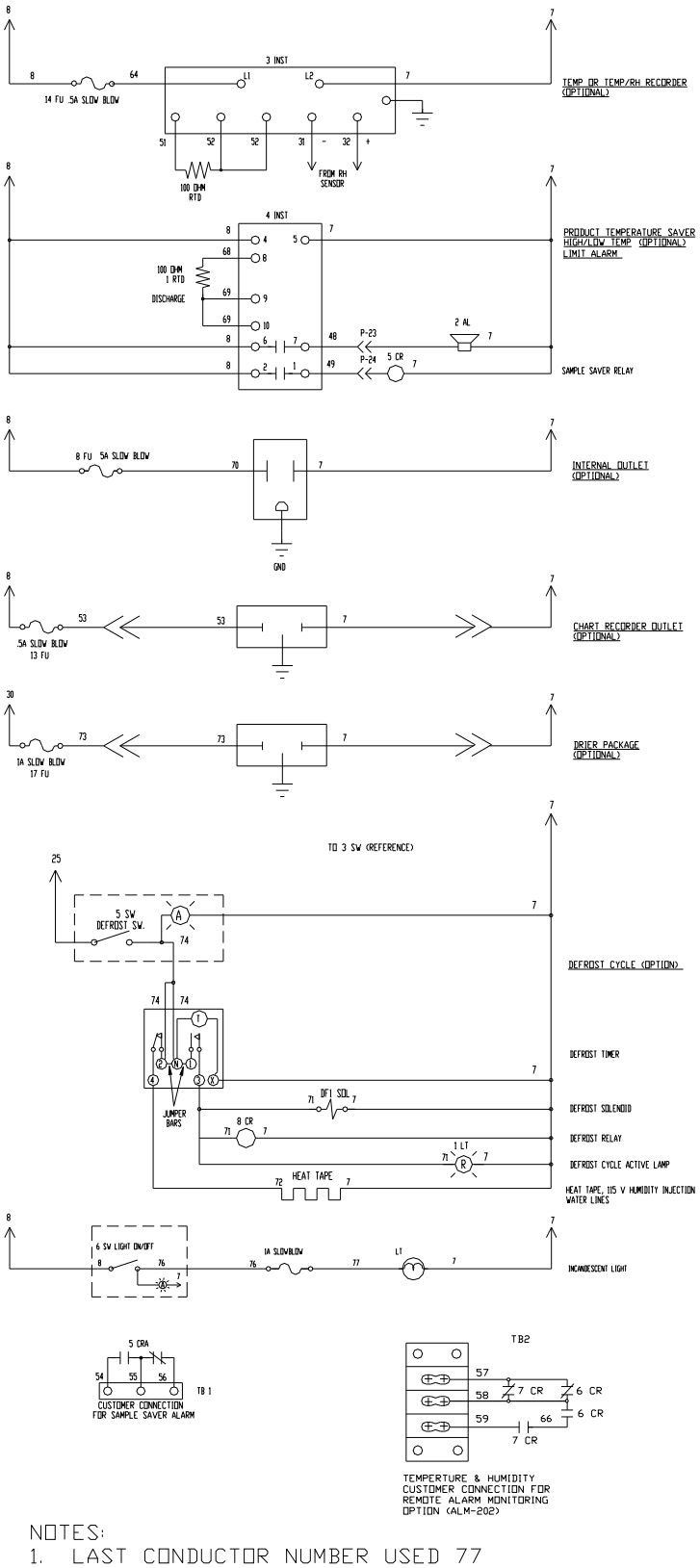


Figure 8 – Electrical Schematic cont.

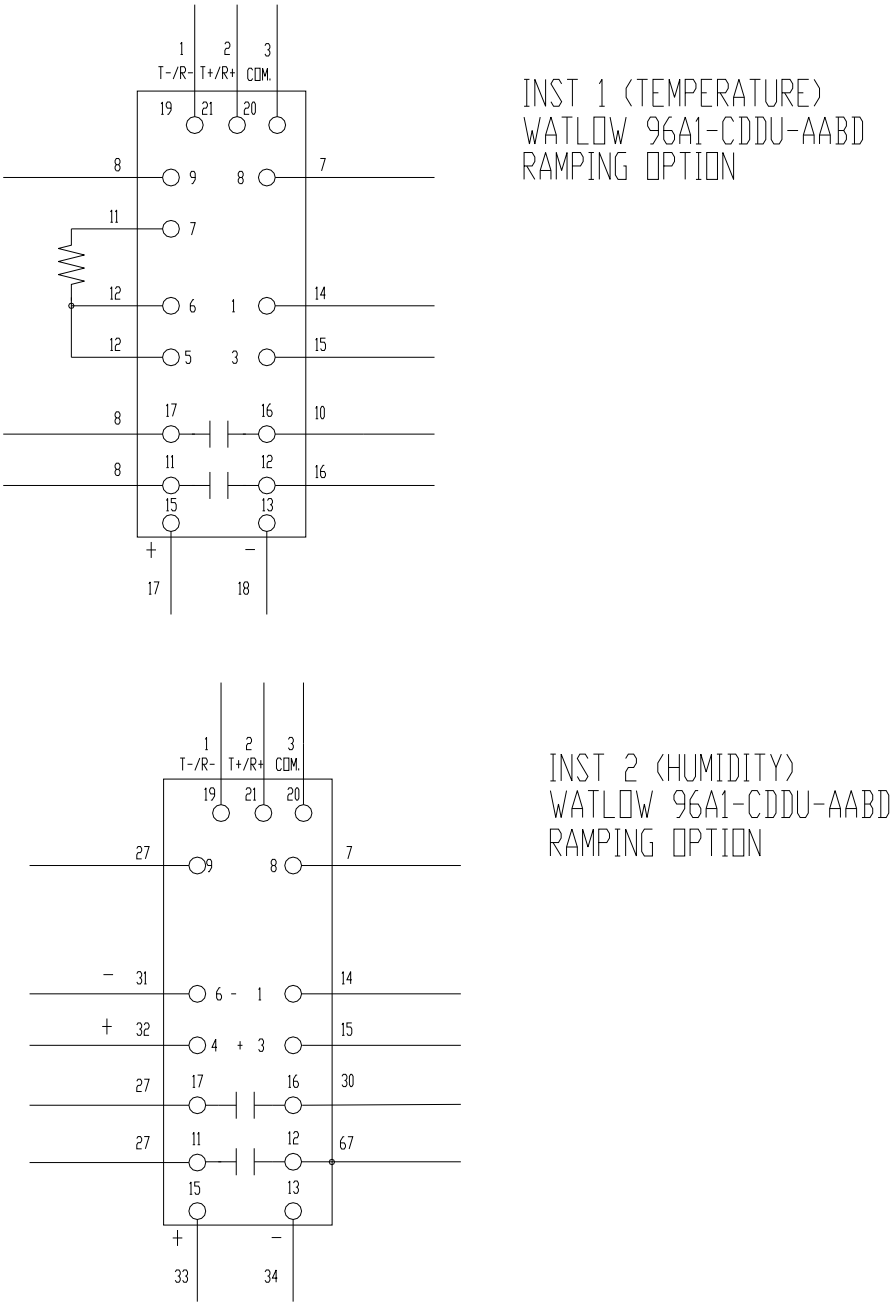


Figure 8 – Electrical Schematic