



DryAir manufactures a full line of modular components,
ensuring that you have the right tools for the widest range of applications

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WELCOME

The DryAir Service/ Set-Up Training Program





- **Introduction of Key Personnel**
- **To become familiar with the DryAir line of Hydronic heaters and accessories**
- **Gain an understanding of a basic set-up**
- **Electronic controls, gas valves and plumbing components**
- **DryAir's unique features**
- **Basic equipment test tools**
- **Troubleshoot problems as they arise**
- **Mechanical systems and how they work**
- **Q & A**



KEY PERSONNEL

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DRYAIR PRODUCT LINE

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PRE-SET UP & LEGAL INFORMATION

- Always follow local regulations and codes in regards to heating devices.
- Natural Gas, Propane, and Electrical connections should always be performed by a licensed trades person.
- Be familiar with all the Safety, Caution, and Danger decals on the machines.
- Read and understand the operators manual and the included MSDS sheets for the heat transfer fluid.

GLYCOL

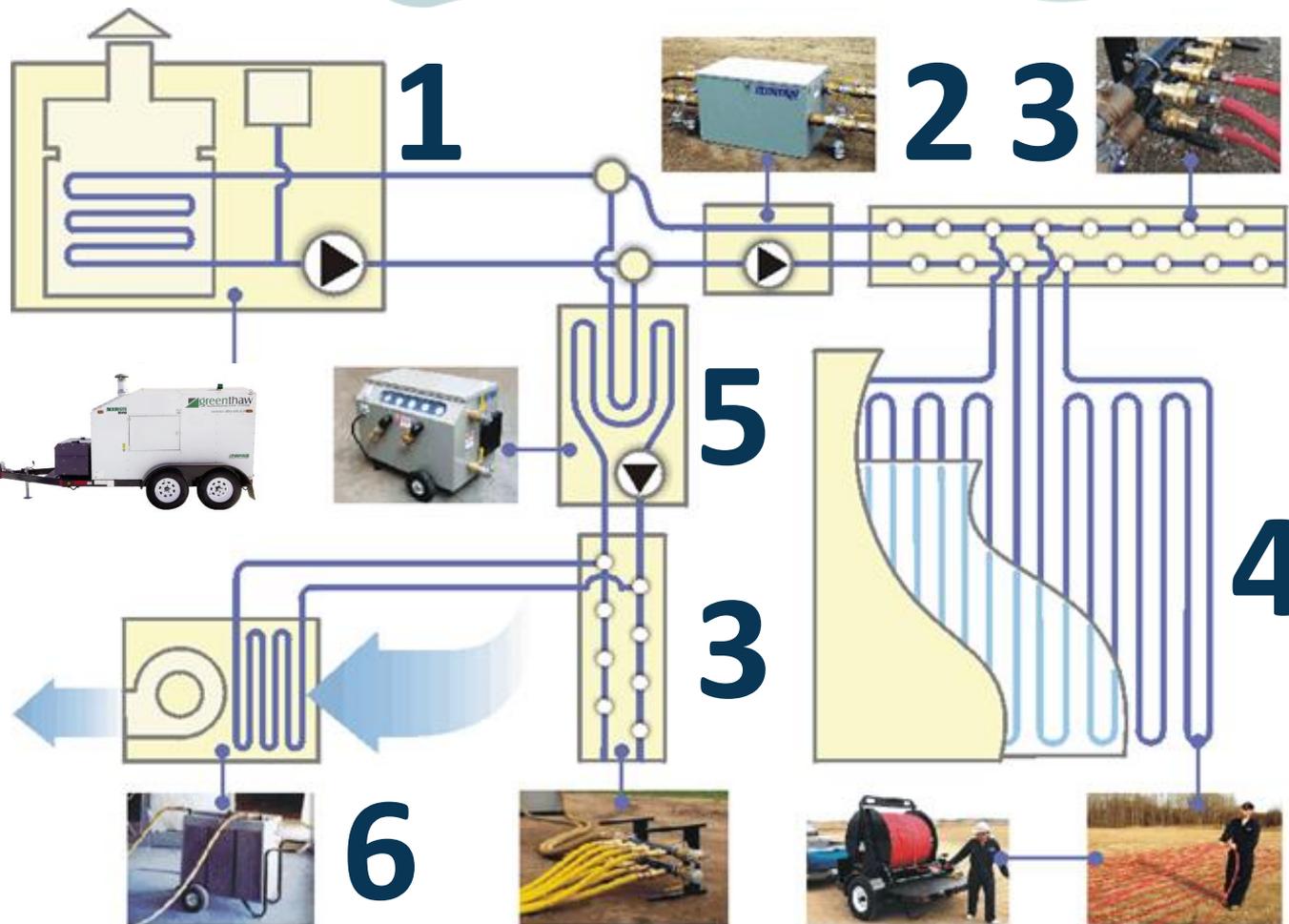
- DryAir uses a 50/50 propylene glycol and water mixture within our water heater system.
- This mixture is used for freeze point
- MSDS sheets are included from BOSS and Dow-frost in the operator manual.
- DryAir uses a purple dye in the glycol as it can be easier to identify.



Filling the Unit

- Attached to the inlet of the pump is a ball valved hose with a garden hose fitting on the end.
- Close the ball valve on the main inlet of the pump and attach the fill hose to the glycol source.
- Turn on the pump and allow the pump to draw glycol into the system.





- HEAT SOURCE
- MIXING BOOSTER
- REMOTE MANIFOLD
- CIRCULATION LINE HEAT EXCHANGER
- PLATE HEAT EXCHANGER
- FAN COIL



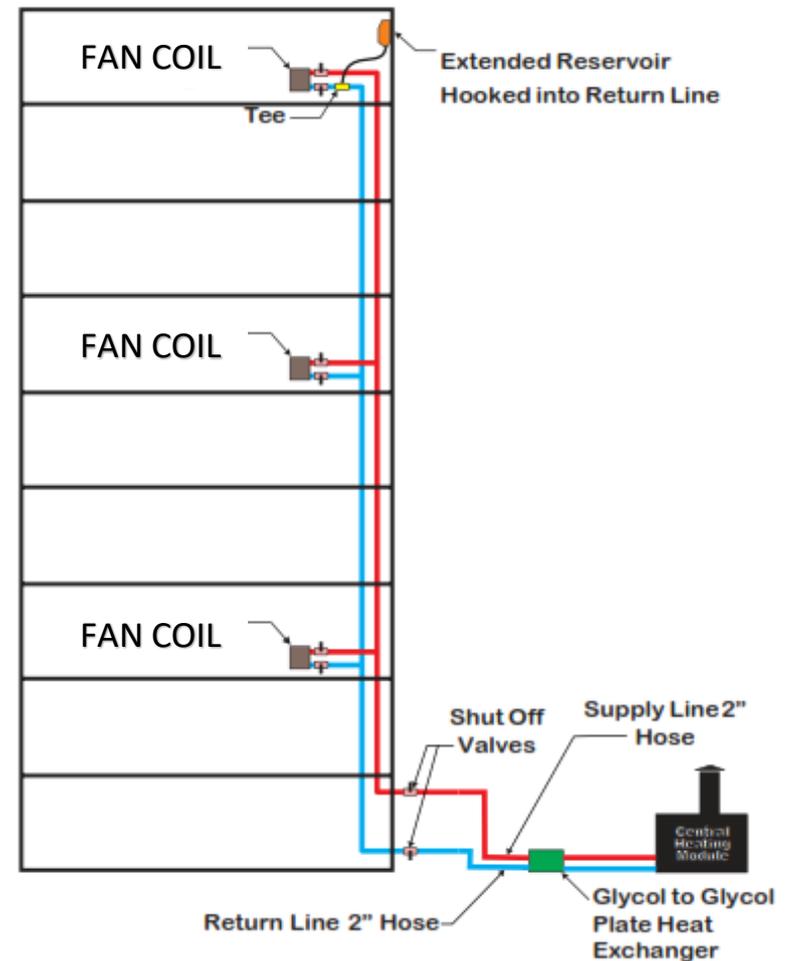
SET-UP

Site Plan

- All hoses should be out of the way to prevent any tripping hazards or avoid damage by moving equipment.
- Pay attention to prevailing winds that may cause down drafting in the chimney of the heater.
- Pay attention to your fuel supply. Position the DryAir unit so that it can be as close as possible to the fuel supply.
- Any hose exposed to the outside weather should be wrapped or insulated to minimize heat loss to rain, snow, or colder temperatures.
- Ensure hoses are not laying in water. This will minimize heat loss.
- Avoid sharp corners when running hose that may cause a kinks and prevent the flow of glycol in the system.

EXAMPLE

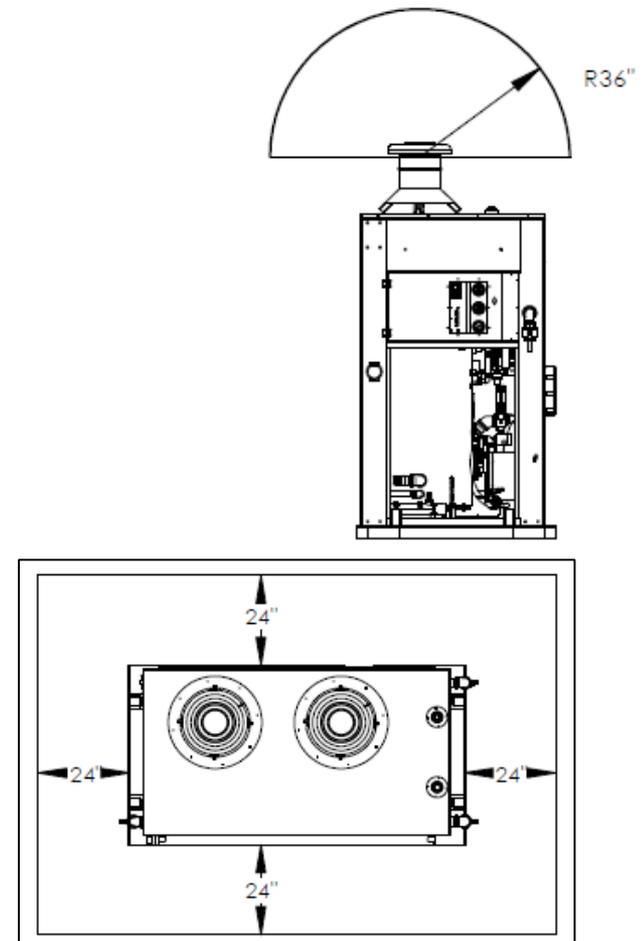
EXAMPLE OF A MULTI-STORY SET-UP WITH PLATE HEAT EXCHANGERS, FAN COILS, AND A REMOTE RESERVOIR.



- Avoid sharp corners to prevent hose kinking
- Try to add support for the hose to bend around a corner smoothly to prevent collapse.

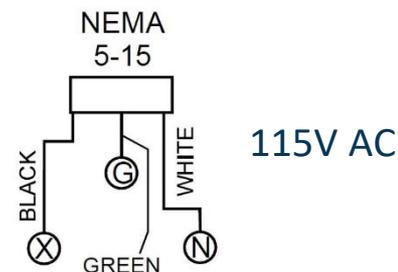
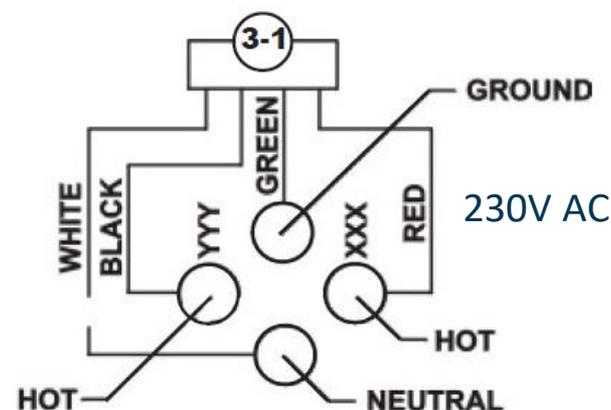


- Keep a 3' radius unobstructed around the chimney of your unit.
- Keep a 2' perimeter around your unit clear at all times.
- Do not place any "portable heat exchangers" or "circulation line heat exchangers" higher than the top level of the heat transfer fluid fill tank without using a reservoir extension kit. Fluid can overflow and drain back to system if pump is shut off.



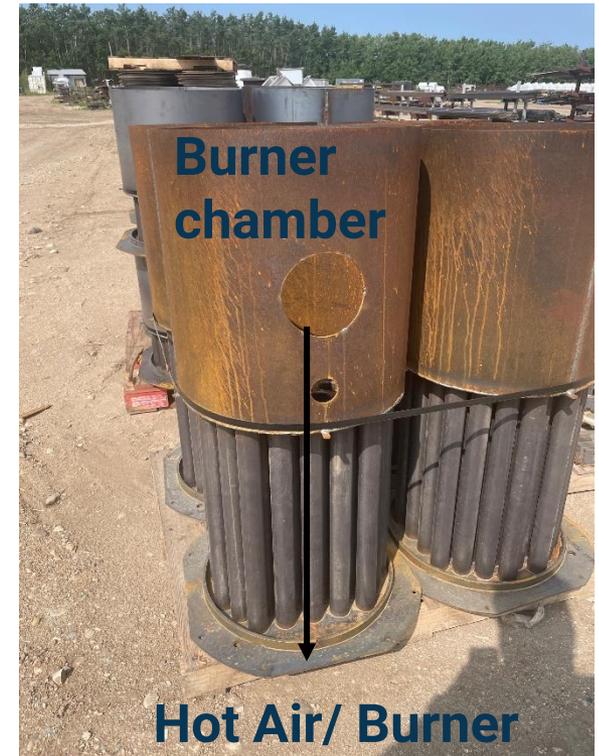
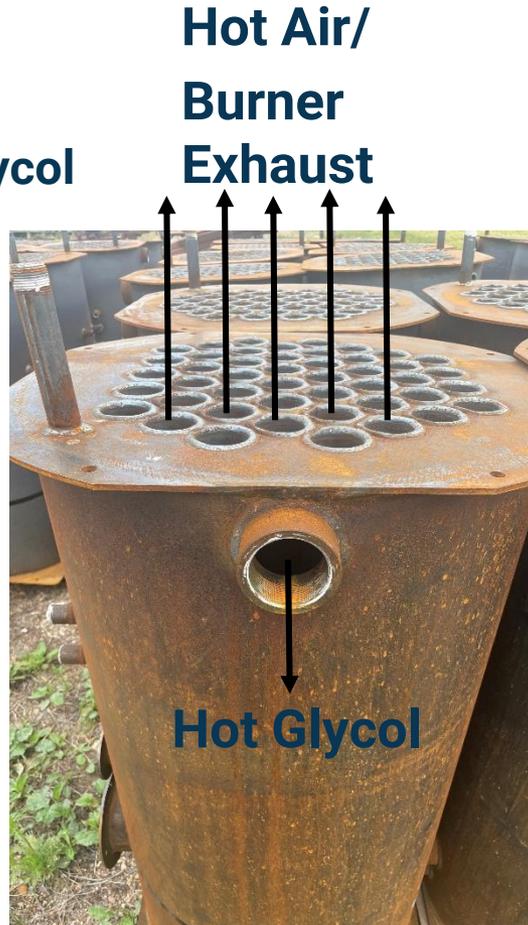
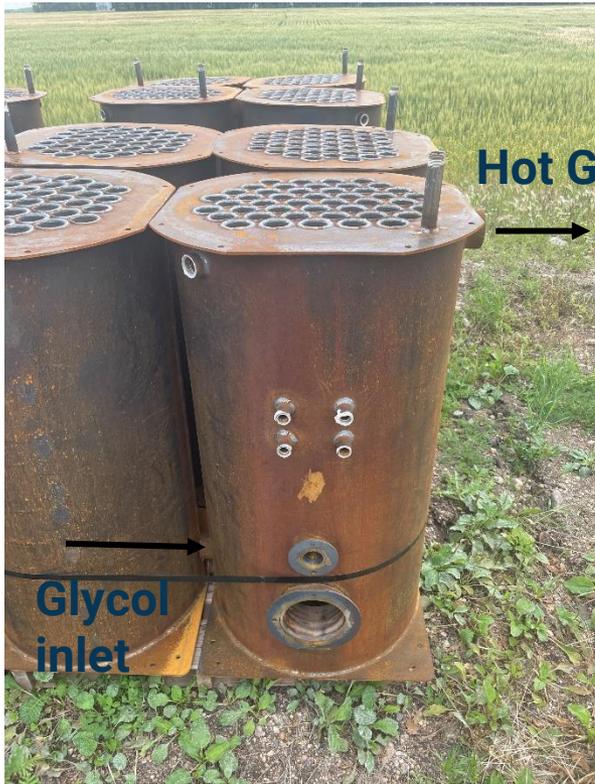
Unit Care

- The **650GTS/900GTS** require 230V AC Power. The module is factory wired so that the only connection to be made is a 230V AC service outlet. **All** Central Heating Units require 230V AC.
- A “Voltage Selector” switch on the **400GTS** Control Panel sets which electrical receptacles will supply power to the unit: 1x or 2x 115V AC plugs, or 1x 230V AC plug.
- The **200GTS** can be run on 115V AC.
- Only clean #1 or #2 diesel fuel or light heating oil is suitable for use in the system.
- A supply of “Propane Vapor” should be connected to the inlet of the secondary regulator at a pressure of 10 PSI MAX.
- A supply of “Natural Gas” should be connected to the manual gas train supply valve at a pressure of approximately 12-14” W.C.





DRYAIR'S WATER/GLYCOL HEATERS



Hot Air/ Burner Exhaust runs upward through tubes



DRYAIR'S WATER/GLYCOL HEATERS

Baffles absorb heat from burner to help radiate heat into the glycol.



Water Heaters are painted with a high heat paint.



WHAT SEPERATES US FROM THE REST?

GLYCOL PRE-HEATER

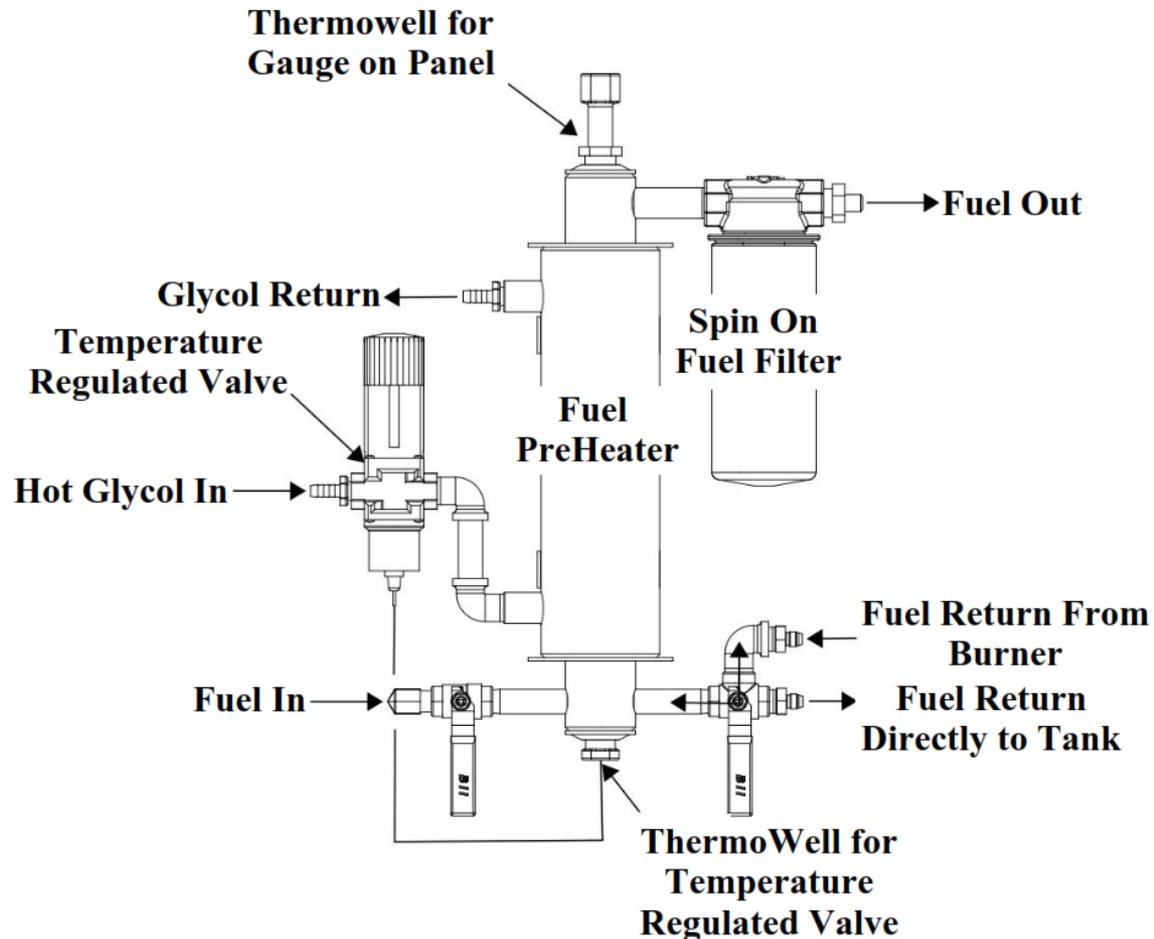
This device heats the glycol in the DryAir system before initial start-up to aid in the circulation of glycol through the pump and to supply hot glycol to the air and fuel preheat systems. This ensures the Riello burner starts smoothly.



Available on all GTS & CHU
products except the 1200CHU

DIESEL PRE-HEATER

This device provides a controlled constant fuel temperature to the Riello burner which will aid in smooth operation in start up and normal operating operations.





WHAT SEPERATES US FROM THE REST?

AIR PRE-HEATER

These devices provide a controlled constant air temperature to the Riello burner which will aid in preventing premature fowling of the burner and boiler during start-up and normal operating conditions.

The air pre-heater uses glycol running through a rad to heat air being sucked through the bottom of the preheater.



GLYCOL TANK

- $\frac{1}{2}$ full cold is the optimal glycol level for operation of the unit as it accounts for the expansion of the glycol as it heats.
- Use **propylene glycol**
- Ethylene glycol **cannot** be used as it can damage the unit



LWCO (LOW WATER CUT OFF)

- A float is used for Low HTF light which signifies low fluid. The sensor will not shut off the pump but serves as a notice to add glycol to unit.
- A float is used to ensure sufficient fluid in the reservoir. When fluid level drops below the low water cut off sensor the pump and water heater will shut down.

Low HTF float
direction
installed

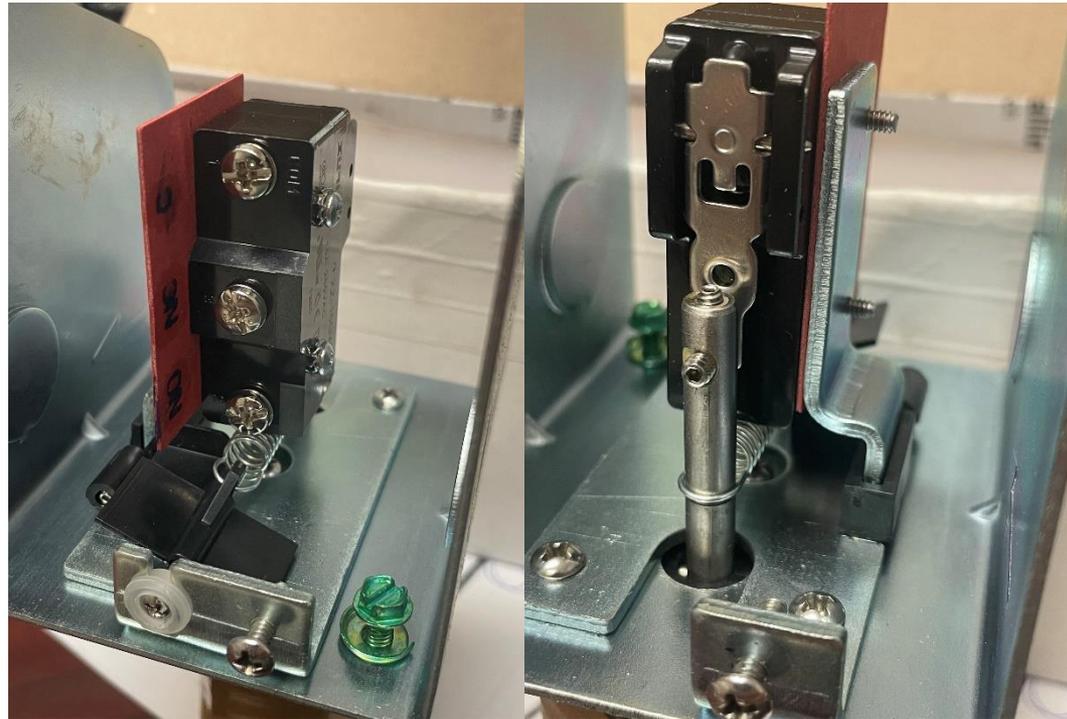


LWCO float
direction
installed



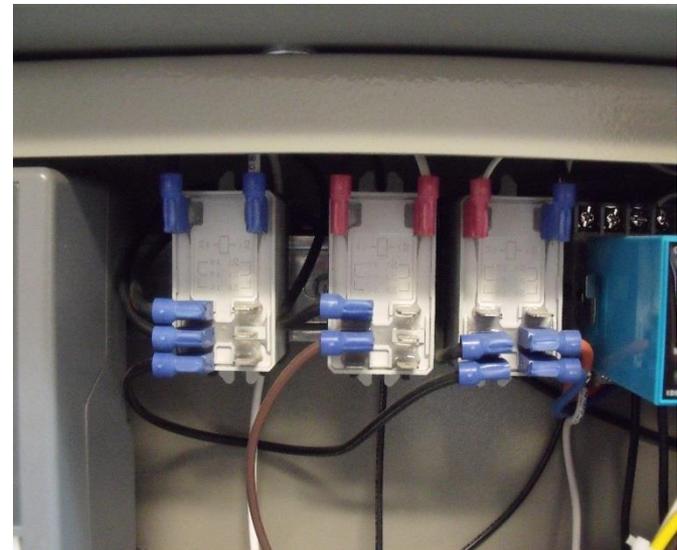
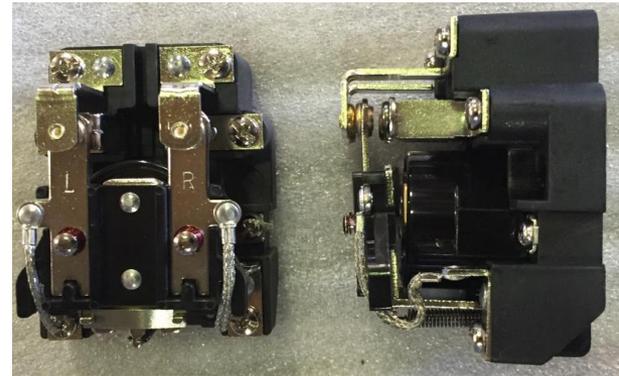
FLOW SWITCH

- The function of the flow switch is to ensure fluid flow.
- The water heater and pump will shut down when insufficient fluid flow is present.



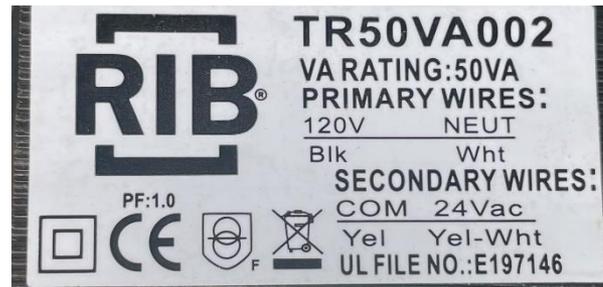
RELAYS

Controls power going through the unit. Typically controls power going to the pump and glycol preheater, but also can supply power to the low water cut off.



TRANSFORMER

- The transformer converts 120V AC volt power to 24V AC power.
- The LWCO relay and sensors along with the low HTF sensors run off of 24v power.



AQUASTAT A421

- Used to control temp on the internal glycol heating of the unit
- Used to control the supply temperature of the water heater. Set from factory, set upper limit at 180, resets to 80 when exceeding 180.
- Temperature set from 80-180 and indicates current fluid temp at all times.
- To adjust, the cover is taken off and a supplied jumper is used to access internal settings. These are set by DryAir at the factory.

Internal Jump



AUTOMATIC HI-LIMIT

The automatic high limit is used to shut down the unit if excessive temperatures are reached. The switch will automatically reset itself to re-fire the water heater after a certain temperature has dropped.



MANUAL HI-LIMIT

The manual high limit is used to shut down the unit if excessive temperatures are reached. The switch will need to be manually reset to re-fire the water heater.



PUMPS

Pumps are used to move hot glycol through the system and to the appropriate device. When operating correctly the pump should run at 30PSI +/- 10PSI.



PRESSURE RELIEF

Pressure relief valves protect the water heater from high pressure. Valve will open when max pressure of the valve is reached.

CAUTION! Hot glycol can burn you if the relief valve opens due to high pressure.



PRESSURE BYPASS

The pressure bypass valve ensures flow within the heat exchanger at all times. It maintains a minimum fluid flow through the water heater and protects the pump from a “No Flow” situation.



THERMOSTAT CONTROLLED VALVE

The thermostat controlled valve controls the temperature going into the fuel preheater, air preheater, and the temperature return bypass. Maintains 70°F glycol temperature in the preheaters. Limits the internal temperature of the bypass at 140°F.



- The units that can operate on different fuels can be converted usually in less than an hour with available quick change gas trains.



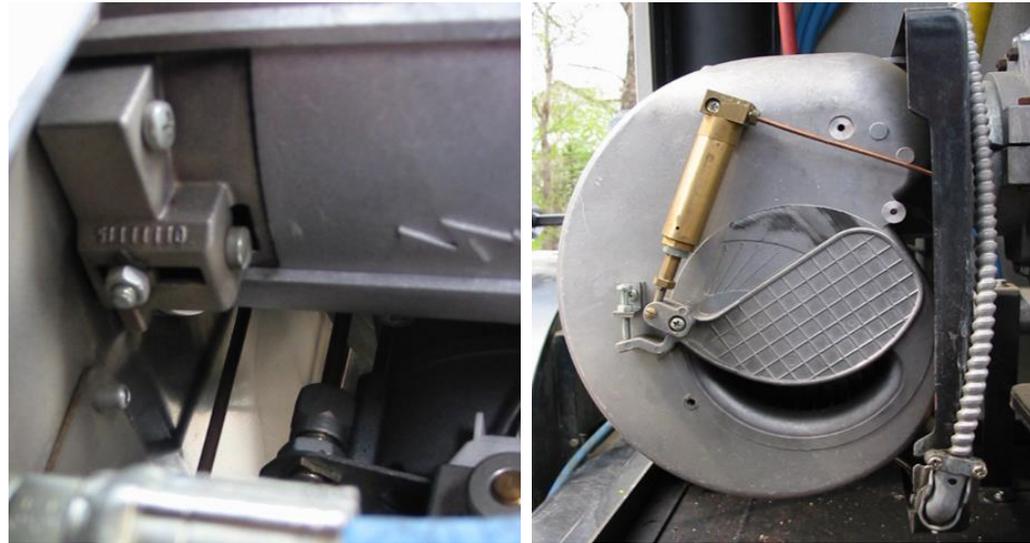
- Fuel hookups will need to be unhooked from the burner you are removing
- Electrical to the control panel as well as to the gas train will have to be removed
- Diesel burners do not have power to the gas train so they only have 1 electrical connection

10mm nuts to remove burner



SMOKE TEST

- Burners to be tested upon unit being brought on site
- Use a smoke tester
- Drill a 3/16 hole into the stack
- Turn unit on and run on diesel
- Place nozzle of smoke tester in chimney stack
- (Top of stack can make a false reading)
- Using the test paper installed in the smoke tester, plunge the smoke tester 10 times
- Compare the test paper to the smoke analysis chart
- A clean burner is testing at a 0 or a 1



AIRGATE

- Diesel air gate should be set from factory for 0-2000ft and may need to be adjusted for higher altitudes.
- Natural gas and propane burners have a servo motor powered air gate which is set by the factory.
- Adjustment to air gate may also be needed when dropping nozzle size.

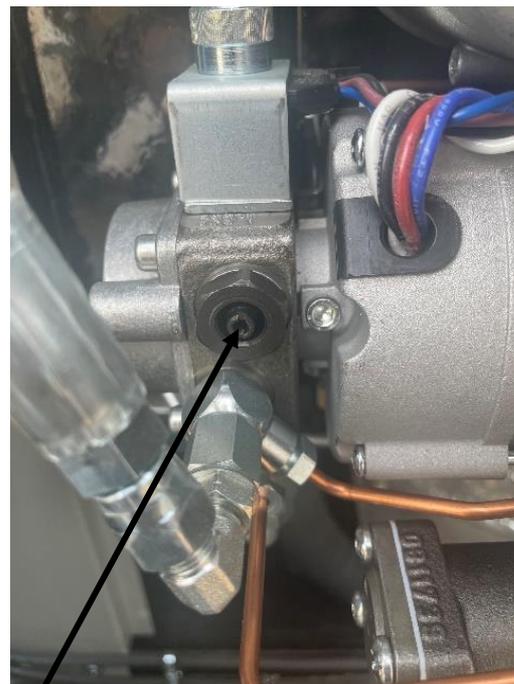
DIESEL



NG / LP

Fuel adjustment

- The diesel Riello burner has a fitting to adjust fuel pressure. This is set at 145 psi at factory and may need to be lowered for higher elevation.
- Always test with a smoke tester.
- Unit must be running to see fuel pressure.
- Adjust in 5 psi increments between tests
- Turn the center of the fitting with a flat heat screwdriver
- Do not operate at lower than 120 psi
- If smoke test still not passing, drop nozzle size
- Nozzle used : **Delavan 5.0 60° Type B**



Fuel adjustment fitting diesel

Fuel adjustment

- The natural Gas and propane burners fuel pressure is adjusted via the internal regulators.
- DryAir uses a combustion analysis for these fuel types to test the exhaust.
- The testing can be done in the same chimney hole as the diesel.
- Unit must be running to see gas pressure in the gas train.
- Take cap off of top of internal regulator and adjust internal screw.
- NG Nozzle used : **Riello 40-G900 3.7 Orifice**
- LP Nozzle used : **Riello 40-G900 2.0 Orifice**
- NG gas pressure to burner : 4.8" W.C.
- LP gas pressure to burner : 5.2" W.C.
- The listed pressures can be used as a starting point and adjusted as seen fit by the combustion analysis.



HIGH PRESSURE SWITCH

- The switch will trip if the gas pressure is too high.
- Switch must be manually reset if tripped. This is done by pressing the red reset button on the set dial.



LOW PRESSURE SWITCH

- The switch will trip if the gas pressure is too low.
- Switch must be manually reset if tripped. This is done by pressing the red reset button on the set dial.
- It is good practice to reset the low gas pressure switch at every setup as the gas line will not have any gas in it.



Power Gas Actuator Valve

- Used to avoid flow of gas entering the burner when the conditions aren't met to allow gas flow.
- 13 second opening time
- 1 second max closing time
- Sight glass to see valve opening



Solenoid Valve

- Used to avoid flow of gas entering the burner when the water heater is not calling for heat.
- The switch will close when there is no power running through the low and high gas pressure switches.



Nozzle adjustment

- The diesel Riello burner has a fitting to adjust fuel pressure. This is set at 145psi at factory and may need to be lowered for higher elevation.
- DryAir always tests with a smoke tester
- The natural Gas and propane burners fuel pressure is adjusted via the internal regulators.
- We use a combustion analysis for these fuel types to test the exhaust.

	Natural Gas	Propane
FT (Flue Temp)	550°F to 650°F	550°F to 650°F
O2	3% ± 0.5%	3.3% ± 0.5%
CO	Less than 50 ppm	Less than 50 ppm
EFF	Greater than 80%	Greater than 80%
EX/A	17% ± 2%	17% ± 2%
CO2	Less than 10.1%	Less than 12.1%



DIESEL



- Diesel filtering is done with a Cim-Tek 70062 260HS-10 which absorbs any small amounts of water as well as removes common contaminants in the fuel.
- Recommended to be changed every 1000 hrs or if any fuel pressure issues are noticed.
- (If burner fuel pressure is bouncing, fuel filter may be getting clogged.)
- When changing filter, fill filter with diesel so it does not sit empty



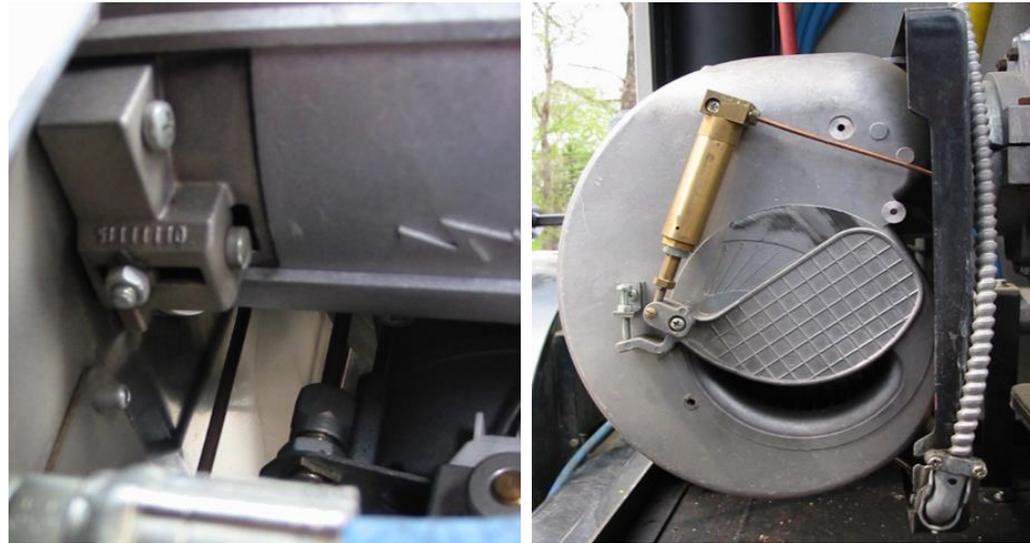
MULTI-METER

The multi-meter takes numerous electrical tests.



SMOKE TESTER

The smoke tester is a basic tool used to test the flue gas that exits the top of the water heater. If any smoke is detected on the test of the flue gas, this is an indication of improper air/turbulence setting, incorrect fuel pressure, or faulty nozzle on the Riello burner. If there is smoke found, the water heater can soot. Elevation changes require adjustment and a smoke test.



REFRACTOMETER

The refractometer is used to test the freezing point of propylene glycol. Maintaining a proper freeze point will prevent any chance of a unit freeze up.



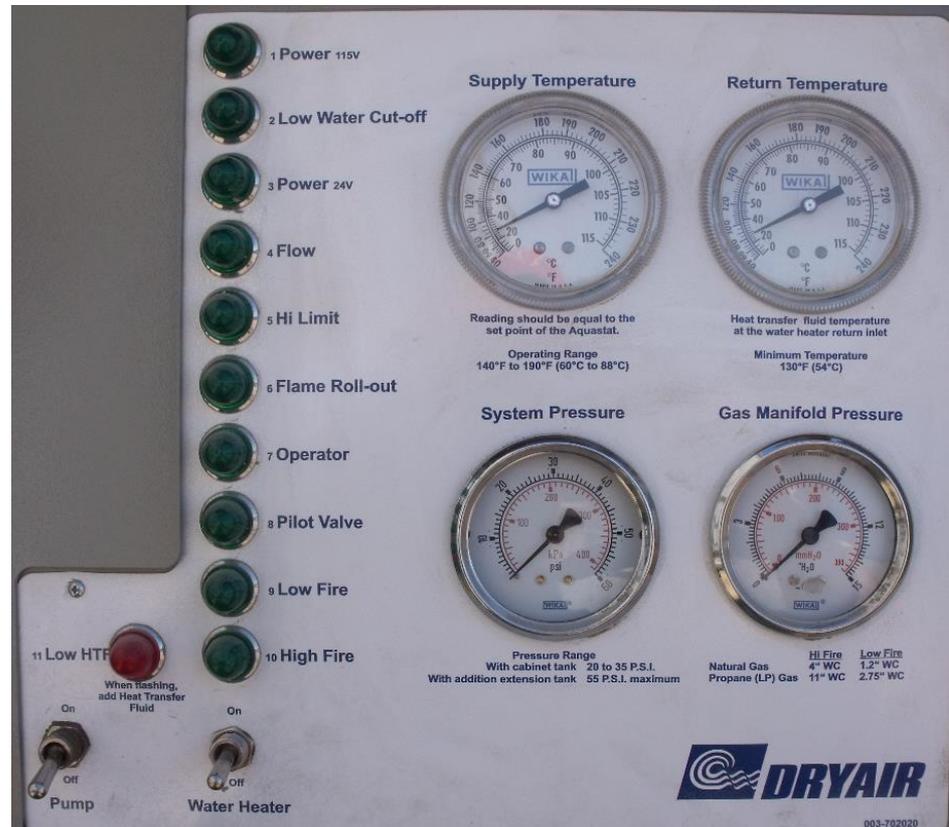
pH TESTER

The pH tester tests the pH level of the propylene glycol. Testing your glycol will prolong the life of your heat exchanger.



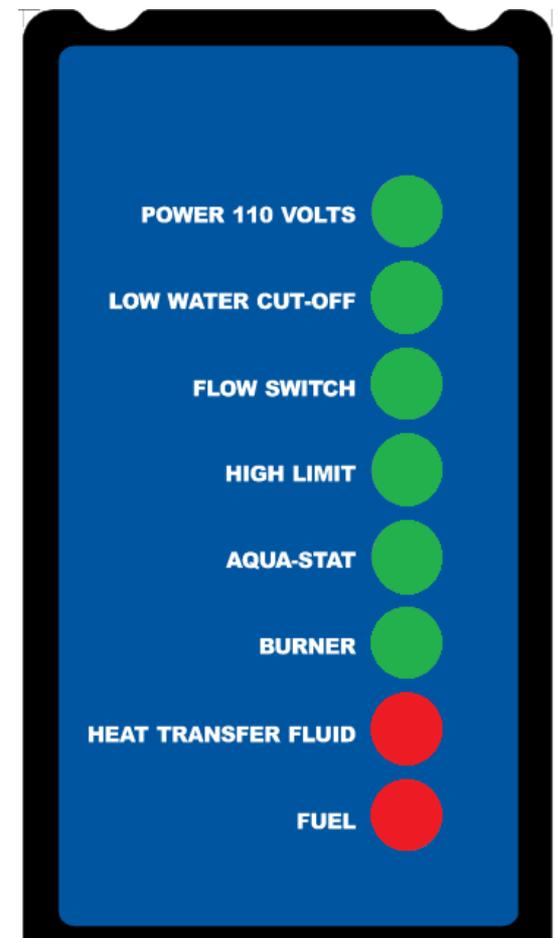
INDICATOR LIGHTS CHU-1200

- POWER
- LWCO
- POWER
- FLOW
- HIGH LIMIT
- FLAME ROLLOUT
- AQUASTAT/OPERATOR
- PILOT VALVE
- LOW FIRE
- HIGH FIRE
- LOW HTF

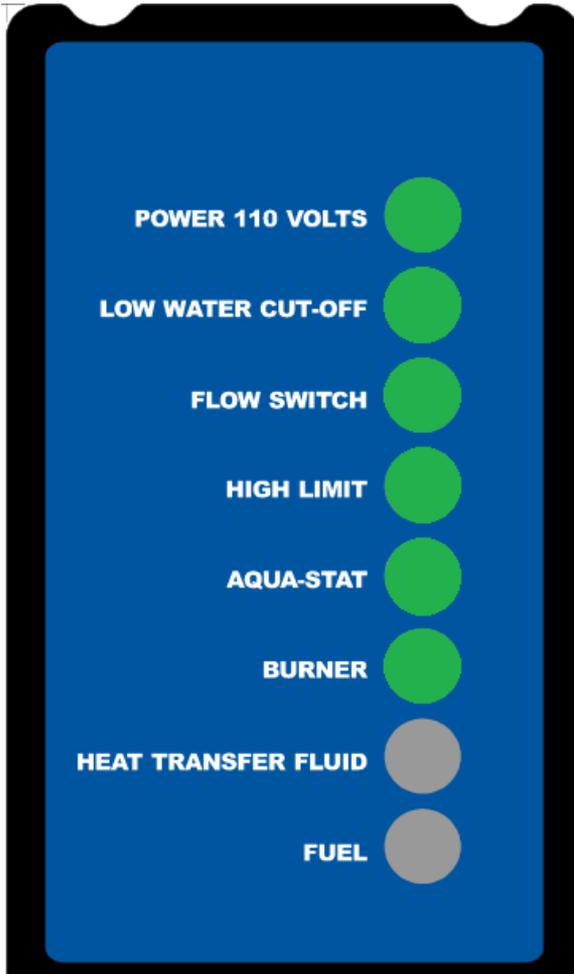


INDICATOR LIGHTS

- POWER
- LWCO
- FLOW
- HIGH LIMIT
- AQUASTAT
- BURNER
- LOW HTF
- FUEL



NORMAL OPERATION



TROUBLESHOOTING

INDICATOR LIGHTS

- * There are 6 green lights on the control panel, which indicate the status of a sequence of functions while the unit is running.
- * When burner is on, all green lights should be on as well. Any light, which is not on should be considered burned out.
- * Aqua-stat and burner light go off and on as the burner cycles.
- * The terminal strip, located behind the control panel, must be accessed to initiate troubleshooting procedures.

No power at out-going side of water heater toggle switch
Check for 120 volt power between letter N and #1 on the terminal strip. If there is no power, check the following:

- a) Check that the circuit breaker has not been switched off.
- b) Check that the water heater toggle switch has not been turned off.
- c) Check for power in and out of breaker and toggle switch.
- d) Check that correct power supply has been connected to the unit. Investigate power source and be certain that the power characteristics are correct. (115 volt, 15 amp, single phase, 3-conductor, 0-100' - 12 AWG, over 100' - 10 AWG.)

No power at terminal #4 on low water cut-off
Check for 120 volt power between letter N and #2 on the terminal strip. If there is no power, check the following:

- a) Low water situation. Check fluid level in tank and add if necessary.
- b) Check fuse in low water cut off. Replace if required.

No power at flow switch
Check for 120 volt power between letter N and #3 on the terminal strip. If there is no power, check the following:

- a) Pump not running. - Check pump breaker and toggle switch on control panel. - Check for volts at pump motor. If correct power is confirmed at motor, but pump won't run, replace pump.
- b) Inadequate flow. - Check that all valves are open in the fluid-transfer loop. - If filter screen may be plugged. Use flush hose/valve attachment into a bucket, while pump is running, for a quick flush. Essentially the system may have to be drained and the filter screen removed and cleaned by hand. - If fluid-moving units are closed off, check that the pressure by-pass valve is open.
- c) Defective flow switch. - If a) and b) check out, the flow switch will need to be re-calibrated or replaced.

No power at out-going side of high limit switches.
Check for 120 volt power between letter N and #5 on the terminal strip. If there is no power, check the following:

- a) Manual reset high limit - Check and reset if it has tripped.
- b) Check switch settings. The auto-matic high limit should be set 10°F higher than the set point of the aqua-stat, and the manual reset high limit should be set 10°F higher than the auto-matic high limit switch.
- c) Determine which high limit switch is defective and replace.

No power at aqua-stat
Check for 120 volt power between letter N and #6 on terminal strip. If there is no power, check the following:

- a) Check that setting on aqua-stat is at desired operating temperature.
- b) Check well sensor (electronic), and verify that it is intact and positioned properly in its well.
- c) If a) and b) check out, replace both aqua-stat and well sensor.

No power at burner
Check for 120 volt power between letter N and #7 on the terminal strip. If there is power, check the following:

- a) Check for 120 volt power at the burner. If power is present, there is a fault in the burner. See manual to trouble shoot burner system.

NO POWER

POWER 110 VOLTS

LOW WATER CUT-OFF

FLOW SWITCH

HIGH LIMIT

AQUA-STAT

BURNER

HEAT TRANSFER FLUID

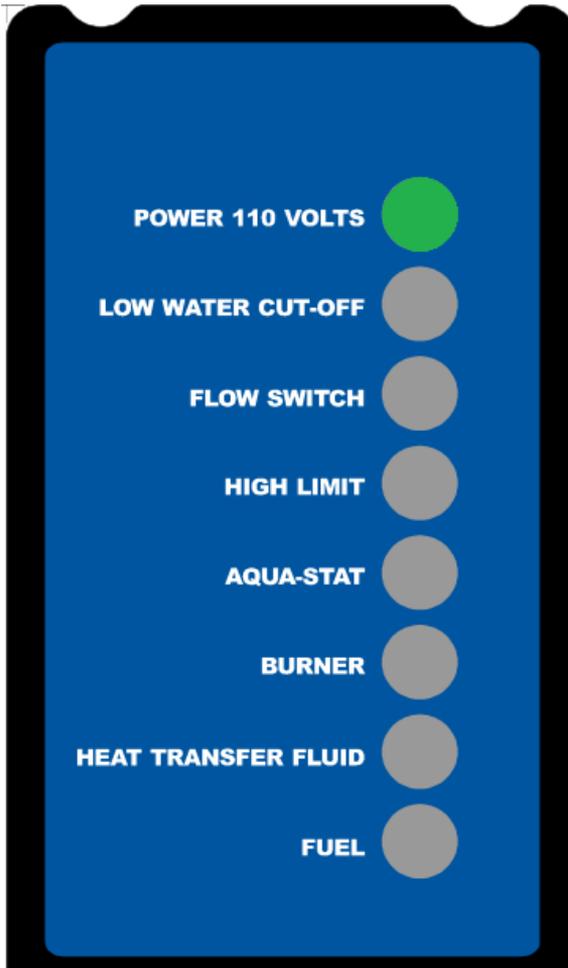
FUEL

No power at out-going side of water heater toggle switch

Check for 120 volt power between letter N and #1 on the terminal strip. If there is no power, check the following:

- Check that the **circuit breaker** has not been switched off.
- Check that the **burner** toggle switch has not been turned off.
- Check for power in and out of breaker and toggle switch.
- Check that correct power supply has been connected to the unit. Investigate power source and be certain that the power characteristics are correct. (115 volt, 15 amp, single phase, 3-conductor, 0'-100' - 12 AWG, over 100' - 10 AWG)

LOW WATER CUT OFF



No power at terminal #2 on low water cut-off

Check for 120 volt power between letter N and #2 on the terminal strip. If there is no power, check the following:

- Low water situation. Check fluid level in tank and add if necessary.
- Check float switch in low water cut off. Replace if required.

FLOW SWITCH

POWER 110 VOLTS



LOW WATER CUT-OFF



FLOW SWITCH



HIGH LIMIT



AQUA-STAT



BURNER



HEAT TRANSFER FLUID



FUEL

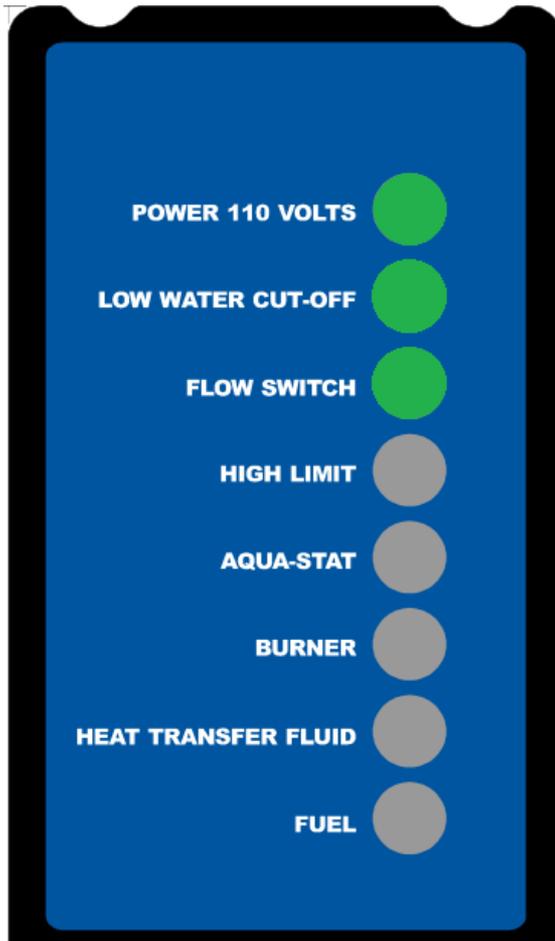


No power at flow switch

Check for 120 volt power between letter N and #3 on the terminal strip. If there is no power, check the following:

- Pump not running. - Check pump breaker and toggle switch on control panel. - Check for volts at pump motor. If correct power is confirmed at motor, but pump won't run, replace pump.
- Inadequate flow. - Check that all valves are open in the fluid-transfer loop. - Filter screen may be plugged. Use flush hose/valve attachment into a bucket, while pump is running, for a quick flush. Eventually the system may have to be drained and the filter screen removed and cleaned by hand. - If fluid-receiving units are closed off, check that the pressure by-pass valve is open,
- Defective flow switch. - If a) and b) check out, the flow switch will need to be re-calibrated or replaced.

HIGH LIMIT

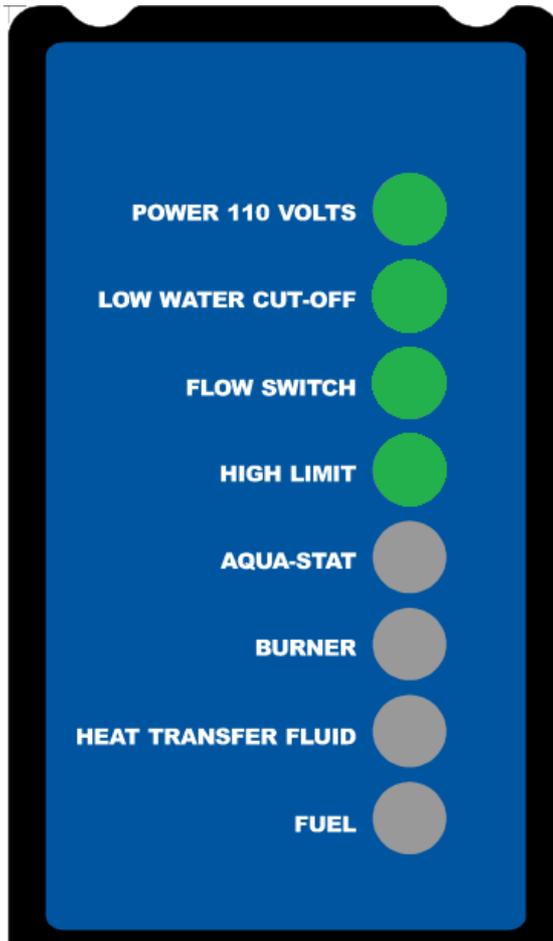


No power at out-going side of high limit switches.

Check for 120 volt power between letter N and #4 on the terminal strip. If there is no power, check the following:

- Manual reset high limit - Check and reset if it has tripped.
- Check switch settings. The auto-matic high limit should be set 10°F higher than the set point of the aqua-stat, and the manual reset high limit should be set 10°F higher than the auto-matic high limit switch.
- Determine which high limit switch is defective and replace.

AQUASTAT

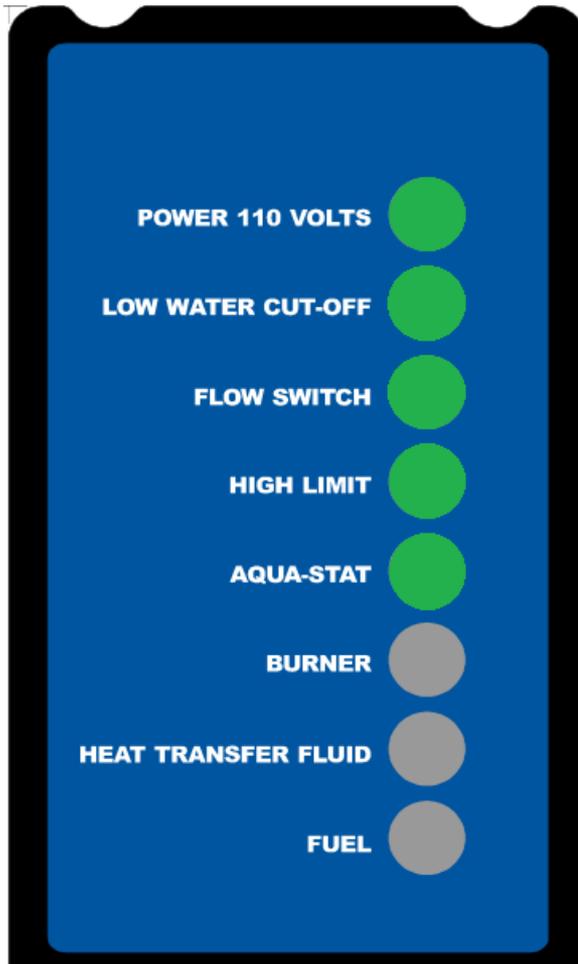


No power at aqua-stat

Check for 120 volt power between letter N and #5 on terminal strip. If there is no power, check the following:

- Check that setting on aqua-stat is at desired operating temperature.
- Check well sensor (electronic), and verify that it is intact and positioned properly in its well.
- If a) and b) check out, replace both aqua-stat and well sensor.

BURNER



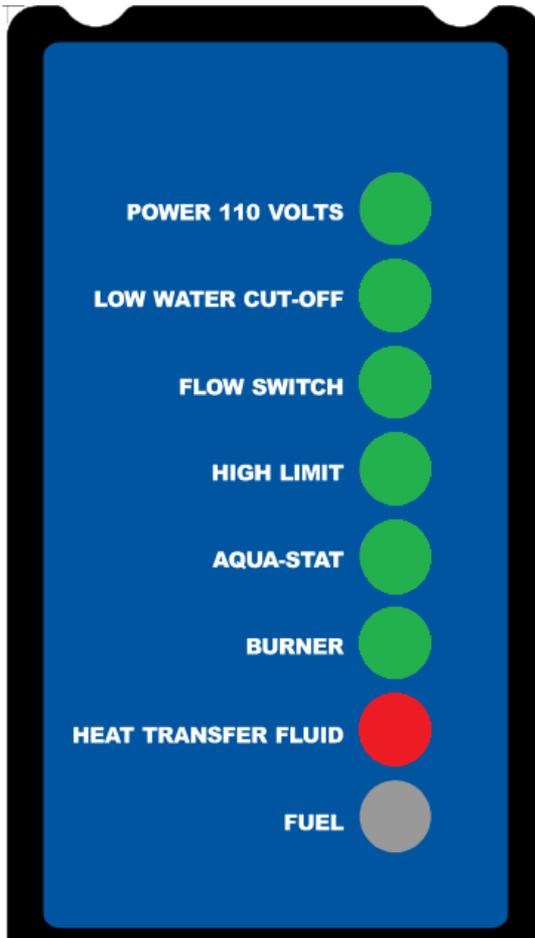
No power at burner

Check for 120 volt power between letter N and #5 on the terminal strip. If there is power, check the following:

- Check for 120 volt power at the burner. If power is present, there is a fault in the burner. See manual to trouble shoot burner system.

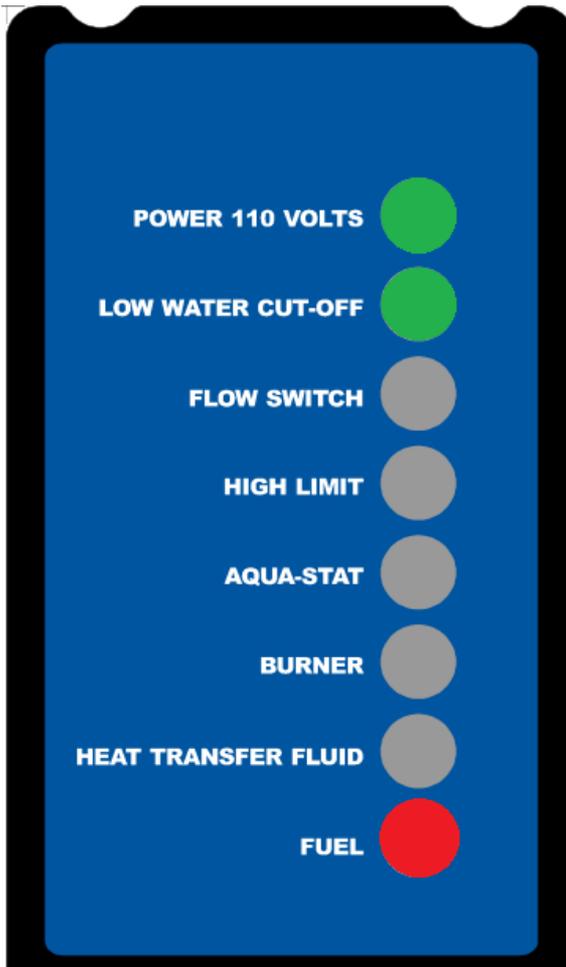
LOW HTF (HEAT TRANSFER FLUID)

Indication of low fluid in the system.
Will not shut down but if fluid continues to lower, the LWCO will shut down the machine.



LOW FUEL

When the machine is low of fuel it will shut down at flow. This will shut down the pump and the burner.





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Questions?



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