Operator Manual

2100-0400 V2

DRYAIR Manufacturing Corp
Box 126, 400 Service Road
St. Brieux, SK, Canada
S0K 3V0
Tel: (306) 275-4848 1-888-750-1700
Fax: (306) 275-4664

Effective S.N. 22784 -

023-904695
Sept 2019
Version 3.0

Table of Contents

1.Warranty Policies & Claim Procedures

DRYAIR MANUFACTURING CORP. (referred to within as DRYAIR) warranties its new, unused equipment to be free of defects in material and workmanship at the time of delivery to the original retail purchaser.

Warranty Policies

Basic warranty policy

- DRYAIR will repair or replace, at its option without charge, any defective part of the equipment for a period of twelve (12) months from delivery to the first retail purchaser, F.O.B St. Brieux, SK., Canada.
- Any parts that are covered by an extended warranty published by DRYAIR are an exception to the Basic Warranty policy and are to be warrantied as per the details of the Extended Warranty Policy.
- Labour is covered as per DRYAIR flat labour rate.
- The Warranty Policy, terms and conditions, may change from time to time without prior notice.
- Warranty terms and conditions are transferable in the event of the sale to a second owner.
- Replacement parts will be warrantied for 90 days from the repair date. Bill of sale must accompany the warranty claim.
- The terms of this Warranty Policy are subject to provincial and state legislation. DRYAIR reserves the right to make modifications in accordance with provincial and state legislation without prior notice or obligation.

Extended warranty policy

- An extended warranty is available on the heat exchanger unit of the water heater assembly. The available warranty for a part, under the extended warranty policy, is prorated by 20% per year.
- Shipment date is the date to be used for the commencement of the warranty period.
- Coverage schedule

Year 1 - 100%
Year 2 - 80%
Year 3 - 60%
Year 4 - 40%
Year 5 - 20%

Exceptions to the warranty policies

- Under no circumstance shall the owner be entitled to recover costs for incidental, special or consequential damages such as, but not limited to: loss of profit or revenue, other commercial losses, inconvenience and/or replacement equipment rental cost.
- Maintenance, repair or service items not related to warrantable defects
- Loss or damage during shipping
- Failure resulting from lack of or improper maintenance
- Damage caused by operator abuse, negligence or improper operation
- Damage resulting from improper voltage supply
- Damage from improper installation (Installation done by someone other than the manufacturer)
- Non-defective items replaced at the request of the customer
- Damage due to accidents
- Damage resulting from improper fuel supply (i.e. pressure or contamination)
- Damage resulting from cracked or broken lines occurring during transport
- Damage resulting from use of inadequate or improper fluids (i.e. glycol or oil)
- Mileage is not covered
- Glycol is considered a consumable and will not be covered under warranty policy
- Generators carry their own warranty coverage through their own manufactures. Please refer generator issues to the OEM. Contact information may be found in the Service & Operator Manual under Optional Equipment.

Owner obligations

- It is the responsibility of the owner, at the owner's expense, to transport the equipment to the service facility of an authorized DRYAIR distributor/dealer or alternately to reimburse the distributor/dealer for any traveling expenses incurred in fulfilling this warranty.
- It is the responsibility of the owner to read, understand, and implement the maintenance, safety, and operational guidelines as laid out in the Operation and Maintenance Guide.
- All parts are to be tagged with a warranty claim number and shipped prepaid to DRYAIR within 30 days.

Manufacturer Obligations

- DRYAIR reserves the right to continually improve the product’s parts or specifications at any time without notice or obligation.

Warranty Claim Procedure

- All warranty credits must be processed with the DRYAIR Warranty Claim Form.
- All warranty parts, unless otherwise specified, are to be returned to DRYAIR along with a completed Warranty Claim Form.

Note: Prior to returning warranty parts, please call for an authorization number and shipping instructions from the Warranty department in Canada.

Location of Warranty Depot:

DRYAIR Manufacturing Corp.
400 Service Road
Box 126
St. Brieux, SK, Canada
S0K 3V0
Ph. 1 (888) 750-1700

- Each warranty claim should only refer to one Serial or Production Schedule numbered unit.
- Warranty parts are to be tagged with a warranty claim number.
- When claiming for warranty labour, the allowable warranty labour rate will be $85.00/hour. The factory reserves the right to adjust the number of hours claimed where deemed necessary.
- The factory may at times specify allowable labour for certain warranty procedures.
- Mileage and travel time, to and from the customer are not eligible for warranty credit.
- Freight charges for warranty parts are not eligible for warranty credit.
- Labour flat rates for component changes:
    - Electrical Components - 0.5hr
        - Relays
        - Switches
        - Thermostats
        - Breakers
    - Electric Motor Changes - 1hr
        - Hose Reel
    - Plumbing Components - 1hr
        - Flow Reverser
        - Flow Switch
        - Valves
    - Glycol Pump Changes - 2hrs

Note: Other labour charges will be at the discretion of DRYAIR

2.Safety Concerns

General Safety Guidelines

- Make certain that the operator reads and understands all the information in this manual.
- All unauthorized people must be kept away from the equipment when in operation.
- All doors and covers must be in place when the equipment is in operation**.**
- Maintain instructional and safety decals. Replace damaged decals (Figure 2-1 & 2-2).

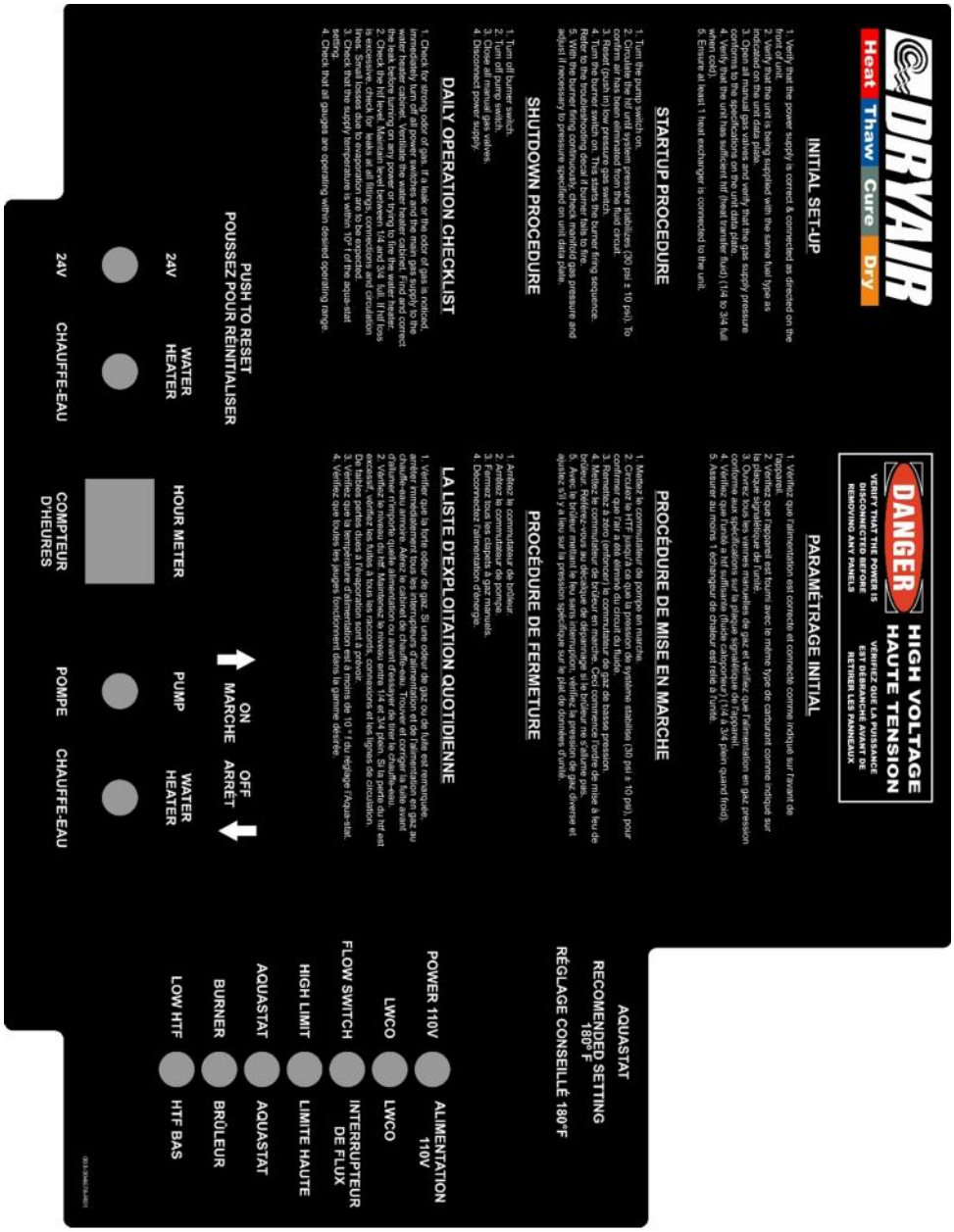


Figure 2-1: Safety Decals

Figure 2-2: Safety Decals

Water Heater Module

**CAUTION! The water heater is a heating appliance. **
When dealing with any heating appliance, observe all posted warnings and cautions.
Keep children and pets away from all piping and fuel accessories.
The water heater housing panels must be kept closed when the system is operating. This prevents drafts from affecting water heater operation.

Heat Transfer Fluid (HTF)

**CAUTION! Whenever coupling or uncoupling the Camlock couplers, make sure that the isolation valves are closed and the pump is turned off. Failure to do so may put you at risk of injury from eye or skin exposure to hot glycol.* For MSDS information regarding Propylene Glycol please see the appendix.*

Fuel System Safety

CAUTION! Propane and Natural Gas DRYAIR systems are designed to be connected and permitted by a licensed supplier or gas fitter only. Propane systems operate on Propane vapour only! Provide your local Propane supplier with BTUH input requirements to ensure an adequate volume of vaporized propane even in the coldest ambient conditions. Improper hook-up can lead to an extreme fire or explosive situation!

Diesel fuel must be supplied from an external fuel tank. A 2-line connection with a return line is needed. The water heater will not work properly if a return line is not installed.

3.Introduction

Water Heater Module

Figure 3-1: 2100-0400 CHU

- A compact, portable and light weight design.
- Forklift pockets on all four sides allow for easy positioning on the work site.
- Automatic water heater temperature control and fuel usage which responds to work site demands.
- Low pressure atmospherically vented circulation system ... no special boiler certification is required to operate the system.
- Circulation system integral air vent to quickly eliminate air from the fluid circulation system for quick setup-and-go operation.
- A water heater module control center which monitors and controls system operations.
- A multi-light system operation feature for easy system troubleshooting.

Accessories

Extension Reservoir Assembly (Figure 3-2)

The Extended Reservoir Tank is required in scenarios when “portable heat exchangers” are higher than the top level of the central heating unit glycol reservoir tank. If the Extended Reservoir tank is not used, the following can occur:

Figure 3-2
Extended Reservoir

- Insufficient Fluid in the System

  Fluid can drain back to the heat transfer reservoir tank from the over-elevated fluid lines when the pump is shut off. The heat transfer reservoir tank will show adequate fluid, but when the pump is started, extra fluid will be required to recharge the over-elevated fluid lines and portable heat exchangers and the system will then have insufficient fluid in the reservoir.

- Fluid Overflow

  If fluid is added to maintain proper fluid levels while the pump is running, overflow at the reservoir tank may occur when the pump is shut off. This would occur because of the drain back from the over-elevated fluid lines.

Fluid Circulation Lines

Fluid circulation lines are designed to endure the toughest work site environment. Portable distribution manifolds connected to the primary circulation system redistribute the heat transfer fluid through secondary lines. All fluid circulation components come with isolation valves and quick couplers, ensuring quick set up and start up, and quick disassembly when the job is done. DRYAIR provides a full range of hoses, adapters, and manifolds for handling and distributing HTF.

Remote Manifold (Figure 3-3)

- Allows for distribution and/or separation between the central heating unit and the portable heat exchangers.

Figure 3-3 Remote Manifold

Insulated Line Jackets

- Insulated circulation line jackets are also available. These insulated jackets will prevent exposed circulation line heat loss in extreme subzero conditions.

Portable Heat Exchangers (Figure 3-4)

Portable heat exchangers are the ideal way to heat and/or dry enclosed structures. Their compact and mobile design allows them to be positioned where required on the job site. The efficient fan/coil design provides a high rate of heat transfer. High volume fans then deliver this heat evenly throughout a large area. The clean, low relative humidity heat delivery minimizes energy costs by eliminating the need to draw in fresh outside air. With the DRYAIR system, you just reheat warm internal air, rather than heating cold external air.

Figure 3-4 Portable Heat Exchangers

Circulation line heat exchangers

The circulation line heat exchangers are the perfect solution for:

- Heating and/or thawing cold or frozen ground.
- Frost prevention.
- Concrete curing and heating in subzero environments.

The DRYAIR system can be applied to all types of concrete applications. Circulation line heat exchangers can be secured directly against the surface of the concrete or concrete forms. Alternately, an expendable circulation line can be incorporated into the concrete structure during the pour. Thus the slab floor can continue being heated, to provide radiant floor heat during construction.

Mixing/Booster Pump (Figure 3-5)

The multifunctional mixing/booster ensures maximum flexibility in the use of this system.

Figure 3-5 Mixing/Booster Unit

- Tempering mode supplies lower temperature fluid for concrete cure and radiant floor heat applications eliminating the need to reduce the water heater operating temperatures below safe operating ranges.
- When operating in booster mode, the system can increase flow rates or function as a pumping station to increase pumping distances by over 300 feet per station.

- The system also allows for dual-temperature control. High temperature fluid can be provided to portable heat exchangers, along with a lower temperature fluid for concrete cure and radiant floor heat applications.
- The multifunctional mixing/booster ensures maximum flexibility in the use of this system.

Plate Heat Exchanger (Figure 3-6)

The plate heat exchanger module creates two separate fluid loops. It can extend the range of the HTF distribution and eliminate the need for extended reservoirs in elevated applications. The plate heat exchanger, combined with a central heating module can be used to:

- Extend the effective range and lengths of the primary distribution lines.
- Be used in a multi-story application to extend the vertical distance that a portable heat exchanger can be used from the heating module.

Figure 3-6 Plate Heat Exchanger Unit

How the System Works (Figure 3-7)

The system uses a low-pressure, open fluid loop distribution system with an atmospherically vented fluid reservoir. A central heating module warms the heat transfer fluid. This heated fluid is pumped through a distribution system loop, passing through heat exchangers in remote locations.

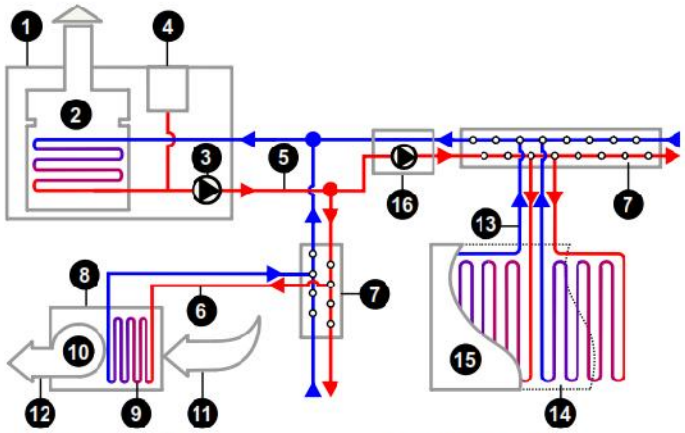


Figure 3-7 How the System Works

Two types of exchangers are available:

- Fan/Coil portable heat exchangers include a heat transfer coil, fan and thermostatic temperature control. The heat transfer fluid flows through the transfer coil, where heat is transferred to the air being drawn through the coil by the fan. The coil is specially designed for optimum heat transfer, without adding any moisture or combustion by-products to the air.
- Passive heat exchangers such as Circulation line flexible hose, submersible stainless steel plates and insert type tank heaters use Camlock or hydraulic-style quick-couplers for ease in hookup. Heat transfer occurs by direct contact heat transfer and radiant heat conduction.

4.Setup

The positioning of all the system components on the site will be influenced by a number of factors. Please read all of the “Setup” section before beginning.

- Be sure to observe all local electrical codes, gas codes and fire regulations when setting up the DRYAIR system.
- The cabinet must be leveled and not set on any type of combustible material.
- Consider cabinet positioning in relation to gas supply, power supply and portable heat exchanger positioning.

Required Safety Clearances

The central heating unit is a heating appliance, therefore safe heat and exhaust clearances must be observed from combustible materials and for service access. See Figure 4-1 and Figure 4-2 for graphical representation of clearances.

- Maintain 24" (61 cm) of clearance on all sides of the unit.
- Maintain 36" (91 cm) of clearance on all sides of the flue pipe and chimney cap.

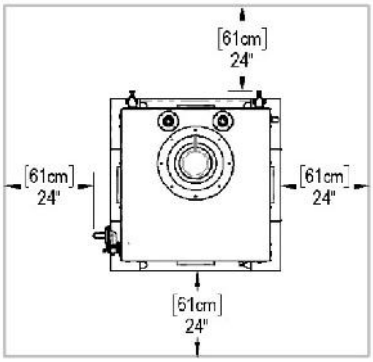


Figure 4-1 Top View Clearances

Elevation Concerns

Do not place any "portable heat exchangers" or "circulation line heat exchangers" higher than the top of the integral heat transfer fluid tank without using a reservoir extension kit. If this is not observed, the following can occur:

- Insufficient Fluid in the System

  Fluid can drain back to the heat transfer reservoir tank from the over-elevated fluid lines when the pump is shut off. The heat transfer reservoir tank will show adequate fluid, but when the pump is started, extra fluid will be required to recharge the over-elevated fluid lines and portable heat exchangers and the system will then have insufficient fluid in the reservoir.
- Fluid Overflow

  If fluid is added to maintain proper fluid levels while the pump is running, overflow at the reservoir tank may occur when the pump is shut off. This would occur because of the drain back from the over-elevated fluid lines.

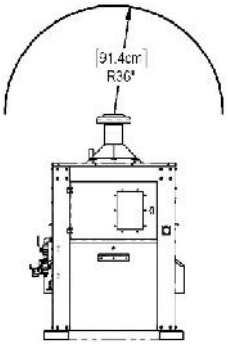


Figure 4-2 Side View Clearance

Electrical Requirements & Connection

When determining the "Central Heating Unit" location on site, consider setting up within close proximity to the electrical power supply.

- The central heating unit's main feed wiring must be adequately sized to carry the minimum ampacity shown on the water heater cabinet's rating label. All electrical connections, connectors and wire must be CSA/UL compliant and installed according to local laws and codes.
- Before making any electrical connections, be sure that the power supply is "Off".
- The 2100-0400 must be run on 120VAC.
- The 120VAC power is input through a standard NEMA 5-15 plug (Figure 4-3).
- Plug cord (not supplied) into 2100-0400 Electrical Connection (Figure 4-4):

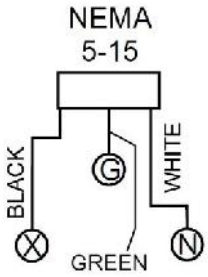


Figure 4-3
NEMA 5-15 Wiring

Figure 4-4 Power connection

Heat Transfer Fluid Circuit

- If possible, position the primary circulation lines out of high traffic areas.
- Connect the primary circulation lines to the “supply” and “return” Camlock couplers (Figure 4-5) on the unit. Isolation valves and Camlock couplers are attached at both ends of the primary circulation lines to enable quick coupling. This also allows the isolation of the primary lines while retaining the heat transfer fluid (HTF) in the lines. Plus ... setup and dismantling of the circulation system is much quicker.
- Connect primary circulation lines direct to heat exchangers or to distribution manifold if required.
- Connect secondary circulation lines to heat exchangers as required.
- Purge air from the fluid circuit (see “5.Operation – Purging air from the “HTF” circulation system).

Figure 4-5
Supply & Return Isolation valves

Heat Transfer Fluid (HTF)

CAUTION! At no time should you use automobile antifreeze in your DRYAIR system. The use of automobile antifreeze WILL VOID YOUR DRYAIR WARRANTY.

The HTF level (cold fluid) should show no more than ½ on the gauge (Figure 5-1) at startup. As the HTF warms to the operating temperature, fluid expansion will raise the level on the gauge (depending on the total volume of fluid in the circulation system including number, size and length of hoses, number and type of heat exchangers, etc.).

HTF Specifications

- DRYAIR pre-mixed "HTF" fluid is made up of 50% "Dowfrost ® HTF" or "Boss Chill PG" and 50% water, by weight - freeze protection down to -28°F (-33°C).
- The "glycol/water mixture chart" (Table 4-1) will provide you with more information on the proper mixture for your area.
- Soft water with a neutral pH level (#7) must be used.

Table 4-1 Glycol Mixing Guide

Percent Propylene Glycol		Freezing Point	
By Mass	By Volume	ºF	ºC
0.0	0.0	32.0	0.0
10.0	9.6	26.1	-3.2
20.0	19.4	17.9	-7.8
30.0	29.4	6.7	-14.0
40.0	39.6	-8.1	-22.3
50.0	49.9	-28.9	-33.8
60.0	60.0	-54.9	-48.3

CAUTION! Whenever coupling or uncoupling the Camlock couplers, make sure that the isolation valves (Figure 4-5) are closed and the pump is turned off. Failure to do so may put you at risk of injury from eye or skin exposure to hot glycol.

Fuel

NOTE: 2100-0400 V2 CHU can be equipped with either a Natural Gas, Propane Gas, or Diesel burner. If burner type is unknown, verify burner type by removing burner assembly and checking nozzle number (4-6). Natural Gas burners will have a "1.5" nozzle. Propane burners will have a "2.2" nozzle. Diesel burners will have 2x fuel connection couplers.

Figure 4-6
Burner nozzle number

Gas Connection and Start-up for Natural Gas Burner

NOTE: This sequence must be performed by "Qualified Personnel" only. All permit processes and codes must be followed as administered by the local authority having jurisdiction. Provide your local Natural Gas Utility Company with BTUH input and pressure requirements, to insure an adequate volume of gas at the required pressure.

Figure 4-7
Gas supply valve

- If the water heater was previously equipped for propane, it may have a secondary regulator (Figure 4-13) installed on the manual gas supply valve, outside of the cabinet as indicated, which **must be removed.** Close the manual gas supply valve (Figure 4-7).
- Natural gas supply should be connected to the manual gas supply valve (Figure 4-7) at a pressure of 6 – 7" W.C. Use only CGA/AGA approved thread sealant when making gas piping connections. Turn on the gas at the supply meter, and soap test all piping joints to ensure no leaks are present. Bleed air from the supply line as far as the manual gas supply valve (Figure 4-7). Allow 5 minutes for purged gas to dissipate from the area.
- Open internal gas valve (Figure 4-8).
- CSD-1 code gas trains have a low-gas pressure switch (Figure 4-9). Verify switch is set 3.0" W.C.
- Connect the electrical supply to the burner by coupling the 4 blade Molex connector (Figure 4-17) with the hanging 4 blade Molex connector. Connect the gas train to the burner by coupling the 6 blade Molex connector to the 6 blade Molex connector on the gas train. Note that the 6

Figure 4-8
Internal gas valve

Figure 4-9
Low gas pressure switch reset

blade Molex connector is only present on Natural Gas and Propane burners, and isn't present on Diesel burners.

- Open the manual gas supply valve (Figure 4-7) and internal gas valve (Figure 4-8), adjust the metered gas supply pressure until a static reading of 6 - 7" W.C. is achieved at the gas supply pressure gauge (Figure 4-10).
- Open Supply & Return isolation valves (Figure 4-5). Connect power supply to the water heater and establish flow of heat-transfer-fluid by turning on the pump toggle switch (Figure 5-2), located on the control panel.
- Reset low-gas pressure switch (Figure 4-9) by pressing the reset button on the top of the switch. Initiate ignition by turning on the water heater toggle switch (Figure 5-2) located on the control panel. The burner will go through a pre-purge cycle (approximately 30 seconds) before trying for ignition. Due to air in the gas train, you may have to re-initiate the ignition cycle multiple times, by pressing and holding the burner reset button (Figure 4-14) for at least 10 seconds. Once all air is eliminated, the burner should light and remain running.
- Soap test all gas line connections to be certain there are no leaks present.
- Set the supply gas pressure (Figure 4-10) to 7" W.C., while the burner is firing. Adjust the manifold gas pressure (Figure 4-11) if necessary to achieve a reading of 3.5" W.C. by adjusting the main gas valve pressure regulator (Figure 4-12).

Figure 4-10
Gas supply pressure gauge

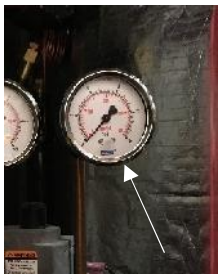


Figure 4-11
Gas manifold pressure gauge

Figure 4-12
Main gas valve

Gas Connection and Start-up for Propane Burner:

NOTE: The following steps must be performed by "Qualified Personnel" only. All permit processes and codes must be followed as administered by the local authority having jurisdiction. Provide your local propane supplier with BTUH input requirements to ensure an adequate volume of vaporized propane even in the coldest ambient conditions.

Figure 4-13
Secondary Regulator

- If the water heater was already equipped for propane, it should have a secondary regulator (Figure 4-13) installed on the outside of the cabinet as indicated. If the propane burner was purchased as an alternate, the secondary regulator (Figure 4-13) will be shipped loose with the burner and **must be installed**. Use only CGA/AGA approved thread sealant when

making gas piping connections. The manual gas supply valve (Figure 4-7) should be closed.

- A supply of **"Propane Vapor"** should be connected to the inlet of the secondary regulator (Figure 4-13) at a pressure of 10-12 PSI. Turn on the gas at the supply tank, and soap test all piping joints to ensure no leaks are present. Bleed air from the supply line as far as the secondary regulator (Figure 4-13). Allow 5 minutes for purged gas to dissipate from the area.
- Open manual gas supply valve (Figure 4-7).
- CSD-1 code gas trains have a low-gas pressure switch (Figure 4-9). Verify switch is set 3.0" W.C.
- Connect the electrical supply to the burner by coupling the 4 blade Molex connector (Figure 4-17) with the hanging 4 blade Molex connector. Connect the gas train to the burner by coupling the 6 blade Molex connector to the 6 blade Molex connector on the gas train. Note that the 6 blade Molex connector is only present on Natural Gas and Propane burners, and isn't present on Diesel burners.
- Open the internal gas valve (Figure 4-8) and adjust the secondary regulator (Figure 4-13) until a static reading of 6-7" W.C. is achieved at the gas supply pressure gauge (Figure 4-10).
- Open Supply & Return isolation valves (Figure 4-5). Connect power supply to the water heater and establish flow of heat-transfer-fluid by turning on the pump toggle switch (Figure 5-2), located on the control panel.
- Reset low-gas pressure switch (Figure 4-9) by pressing reset button on the top of the switch. Initiate ignition by turning on the water heater toggle switch (Figure 5-2) located on the control panel. The burner will go through a pre-purge cycle (approximately 30 seconds) before trying for ignition. Due to air in the gas train, you may have to re-initiate the ignition cycle multiple times, by pressing and holding the burner reset button (Figure 4-14) for at least 10 seconds. Once all air is eliminated, the burner should light and remain running.
- Soap test all gas line connections to be certain there are no leaks present.
- Set the supply gas pressure (Figure 4-10) to 7" W.C., while the burner is firing. Adjust the manifold gas pressure (Figure 4-11) if necessary by adjusting the main gas valve pressure regulator (Figure 4-12) to achieve a reading of 5.0" W.C.

Figure 4-14
Burner reset button

Purging Air from the Gas System

If the burner does not fire, the burner control will “lock out”. If the burner is in “lock out” the burner reset button (Figure 4-14) will be illuminated red. The fuel system may have to be purged of air.

- Confirm that there is an adequate fuel supply.
- Confirm that the pump switch (Figure 5-2) is in the "On"(up) position.
- Confirm that the water heater switch (Figure 5-2) in the "On" (up) position.
- Depress the reset button (Figure 4-14) on the burner. This will reset the burner and activate the firing sequence.

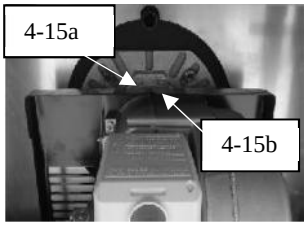


Figure 4-15
Burner attachment

Fuel Connection and Start-up for Diesel/Light Oil Burner:

- Insert the burner into the mounting bracket (Figure 4-15b).
- Install 2 bolts (Figure 4-15a) at top of burner tube bracket.
- Connect the oil supply hose (Figure 4-16a) and oil return hose (Figure 4-16b) by coupling them to the quick connections on the side of the burner. Ensure hoses are attached to the correct connectors.
- Couple the Supply and Return connectors on the outside of the water heater cabinet to a customer supplied external fuel source. Note that the Return line must be installed for the unit to work properly.
- Connect the electrical supply to the burner by coupling the 4 blade Molex connector (Figure 4-17) with the hanging 4 blade Molex connector. Note that the 6 blade Molex connector is only present on Natural Gas and Propane burners, and isn’t present on Diesel burners.
- Energize the burner by turning on the burner switch. The burner reset button (Figure 4-14) may need to be pressed several times to ensure the burner is primed.

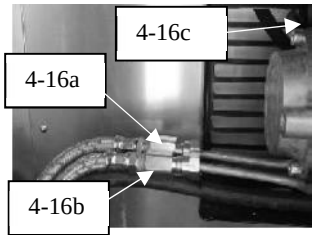


Figure 4-16
Burner Diesel Connection

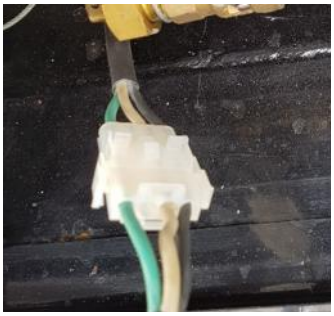


Figure 4-17
Burner Power Connection

Supply Connection

Return Connection

Figure 4-18
External Diesel Connections

FOR ADDITIONAL ASSISTANCE, CALL 1(888) 750 1700

5.Operation

Purging Air from the "HTF" Circulation System

- Verify that the heat transfer fluid level is ¼ to ½ on the level gauge. (Figure 5-1).
- Complete the connection for at least one "portable heat exchanger" or heat exchanger loop" and open isolation valves (Figure 4-5). This will complete the circulation loop and allow circulation.
- Toggle the pump switch (Figure 5-2) to the "On"(up) position and run the pump. This will release the air from the system.
- Air is vented directly through the integral expansion/reservoir tank.
- Monitor the "heat transfer fluid level gauge" and make sure that the heat transfer fluid level stays ¼ to ½ range throughout this entire process.

Figure 5-2 Control Panel Switches

Note that there may be a certain amount of air in the system. “HTF" levels may change as air is displaced from the system. Add "HTF" fluid to maintain level ¼ to ½ range when the fluid is cold. When the air is eliminated, the "System Pressure" gauge (Figure 5-3) will hold at a steady reading of between 10 to 40 PSI.

Figure 5-3 System Pressure Gauge

Before operating the water heater:

- Verify that the power supply is correct and that the electrical hook up is as specified in "Setup".
- Verify that the water heater is being supplied with the correct fuel type as indicated on the Burner data plate.
- Verify that the heat transfer fluid level gauge shows ¼ to ½ range.
- Verify the manual gas supply valve is open (handle in line with flow) (Figure 4-7).
- Verify the internal gas valve is open (handle in line with flow) (Figure 4-8).

6.Start Procedure

Initiate Firing

Figure 5-8 Control Panel Gauges

- Verify that the Pump Switch (Figure 5-2) is in the "On" (up) position.
- Toggle the Water heater switch (Figure 5-2) to the "On" (up) position.
- The burner will proceed through its firing sequence.
- Once the burner is operating smoothly and the system pressure is steady (air has been eliminated from the system), monitor the "supply temperature" (Figure 6-8). Supply temperature should be rising.
- Verify that only one "circulation line heat exchanger loop" or one "portable heat exchanger" is connected to the primary lines or through the distribution manifold.
- Monitor the "Return Temperature" gauge (Figure 6-8).
- Before fully connecting more "circulation line heat exchanger loops" or "portable heat exchangers", this gauge must show a noticeable rise in temperature indicating the heat transfer fluid has made a full circuit. With "circulation line heat exchanger loops", this may take 20 minutes or more.

Repeat the previous step until all "portable heat exchangers "or" heat exchanger loops" are connected and circulating.

Extreme cold Start Procedure

Note: In extreme cold 0° F (-18° C), the HTF becomes very viscous (resistant to flow) and can cause overloading of the pump causing circuit breakers to trip. In extreme cold conditions, closing the pump isolation valve (Figure 6-9) on the supply side of the pump reduces the pump load allowing the pump to start without overloading the electrical circuit. Once the pump is running, pump isolation valve (Figure 6-9) can be gradually opened to the full open position allowing normal operation.

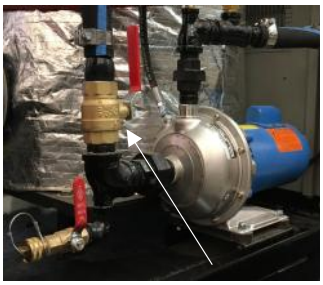


Figure 6-9 Pump Isolation Valve

This procedure will not harm the pump. In extreme cold, pump seal leakage is normal and will subside once HTF temperature rises.

Shut down procedure

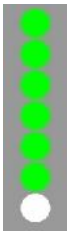
- Toggle burner switch (Figure 5-2) to the “off” position.
- Toggle pump switch (Figure 5-2) to the “off” position.
- Close the internal gas valve (Figure 6-10).
- Close manual gas supply valve (Figurer 6-11).
- Disconnect power from unit.

**Note: Always keep the manual gas supply valve and internal gas valve shut off if the burner is shut down for an extended period of time.*

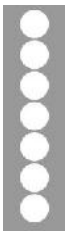
Figure 6-10
Internal gas valve (closed)

Figure 6-11
Manual gas valve (closed).

7.Troubleshooting



- There are 6 green lights on the control panel, which indicate the status of a sequence of functions while the unit is running.
- When the burner is on, all green lights should be on. With the burner on, any of the six green lights which is not on should be considered burned out.
- Aqua-stat and burner light go off and on as the burner cycles.
- Pump and Burner switches in the ON position for troubleshooting.
- The terminal strips, located behind the control panel, must be accessed to initiate troubleshooting procedures.
- Use electrical schematic decal assist in locating components.



No power

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

a) Check that the water heater circuit breaker has been reset (pushed in).

b) Check for power in and out of the circuit breaker.

c) Check that correct power supply has been connected to the unit. Investigate power source and be certain that the power characteristics are correct. (120 VAC,15 A, single phase, 3-conductor, 0'-100' - 12 AWG, over 100' - 10 AWG)

No power at Terminal#6 (low water cut-off)

Check for 120 VAC power between letter N and #6 on the terminal strips. If there is no power, check the following:

a) Low water situation. Check fluid level in tank and add if necessary.

b) 24 VAC power. Check that the 24V circuit breaker has been reset (pushed in). Check for 24 VAC power between #1 and #3 on the terminal strip. Replace transformer if 24 VAC is not present.

c) Ensure pump is running. If not, turn burner switch off and recheck for pump operation. If pump is running with burner switch off but stops running when burner is switched on, the lower float switch in glycol tank or circuit is faulty.

d) If pump is running with burner switched on, check for 120 VAC power on right-hand C and N/O contacts of relay #1. If power is present on only 1 contact, replace relay #1 (120V). If power is present on both contacts, check for 120 VAC power on right-hand C and N/O contacts on relay #3. If power is present on only 1 contact, replace relay #3 (24V).

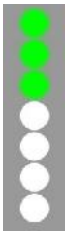
e) If pump is not running with burner switch off, check for 120 VAC power on both terminals of the pump switch. If power is present on only 1 terminal, replace the switch. If power is present on both terminals, check for 120 VAC power on left-hand C and N/O contacts of relay #1. If power is present on only 1 contact, replace relay #1 (120V). If power is present on both contacts, check for 120 VAC power on left-hand C and N/O of relay #3. If power is present on only 1 contact, replace relay #3 (24V). If power is present on both contacts, replace pump.

No power at terminal #7 (flow switch)
Check for 120 VAC power between letter N and #7 on the terminal strips. If there is no power, check the following:
a) Pump not running. Check for 120 VAC power on both terminals of the pump switch. If power is present on only 1 terminal, replace the switch. If power is present on both terminals, check for 120 VAC power on left-hand C and N/O contacts of relay #1. If power is present on only 1 contact, replace relay #1 (120V.) If power is present on both contacts, check for 120 VAC power on left-hand C and N/O of relay #3. If power is present on only 1 contact, replace relay #3 (24V). If power is present on both contacts, replace pump.
b) Inadequate flow.

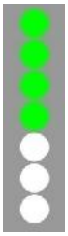
- Check that at least 1 heat exchanger or hose loop is connected allowing flow.
- Check that all valves are open in the fluid-circulation loop.
- Check that hose quick couplers are fully seated and allowing flow.
- Check that pressure bypass valve is open, if fluid-receiving units are closed off.
- Air present in the circulation system. Air in the system can cause cavitation in the pump and pressure loss. Refer to "Operation, Purging air from the system" for air purging instructions.
- Supply temperature overrun causing vaporization (steam) & pump pressure to be lost. Cavitation will occur in the "water heater heat exchanger" causing a noticeable bubbling, popping sound. Check the "overflow outlet" to confirm presence of fluid vapor. If vaporization is occurring, the "Aqua-stat" setting is set too high. Reset the "Aqua-stat" to a lower temperature (10°F increments) and allow cool-down. When the "heat transfer fluid" cools down, the system will regain pump pressure. Allow the burner to cycle back on and observe to ensure that the vaporization situation does not reoccur. If it does reoccur, reset the "Aqua-stat" to a lower temperature until the problem is rectified.

  Note: This situation will occur most often in a "low flow and/or low heat requirement" situation.

c) Defective flow switch. If a) and b) check out, the flow switch will need to be re-calibrated or replaced.



No power at terminal #8 (High Limit).
Check for 120 VAC power between letter N and #8 on the terminal strip. If there is no power, check the following:
a) Check control settings. The automatic reset high limit should be set 10°F higher than the set point of the aqua-stat.
b) With control setting 10°F above aqua-stat setting and above current supply temperature, check for 120 VAC power on both terminals of high limit control. If power is present on only 1 terminal, replace high limit control.



No power at terminal #9 (Aqua-stat and Burner)
Check for 120 VAC power between letter N and #9 on the terminal strip. If there is no power, check the following:
a) Check that aqua-stat set point is above current supply temperature.
b) Check aqua-stat sensor and verify that it is positioned properly in its well.
c) If a) and b) check out, replace both aqua-stat and well sensor.

FOR ADDITIONAL ASSISTANCE, CALL 1(888) 750 1700

8.Maintenance

The DRYAIR system is designed to be a low maintenance system. All system equipment is assembled using extensively tested and certified components. Following these maintenance procedures will ensure the maximum benefit and minimal downtime for the system. The daily maintenance schedule is designed to be a quick system check and ensures a low risk of operating interruptions. Additional supplemental information provided by component manufactures such as the Burner is included with each unit. Use the supplemental information for maintenance procedures and frequency as directed.

Daily Checklist

A daily inspection of the water heater cabinet should be performed with attention paid to the following:

Check for strong odor of gas

- If a leak or the odor of gas is noticed, immediately tum off all power switches and the main fuel supply to the water heater cabinet.
- Ventilate the water heater cabinet.
- Find and correct the leak before turning on any power or trying to relight the water heater.

Check heat transfer fluid "HTF" level every day

- Maintain HTF level at ½ or more when the fluid is hot
- Top up as necessary
- For "HTF" specifications, see "Setup, Heat Transfer Fluid "HTF", Fluid Specifications.
- For "HTF" handling precautions, refer to the "Safety Concerns, Material Safety Data Sheet".
- If loss of fluid is excessive, check for leaks at all fittings and connections in the water heater cabinet as well as the fluid circulation system.

Check the supply temperature gauge

- Verify that the supply temperature gauge is within 10°F of the Aqua-stat setting.

Seasonal checklist

Hoses

- Periodically check all hoses for damage due to aging, elevated temperatures, over-torqued hose clamps, abrasion and weathering.
- Replace damaged hoses as required.
- Seasonally check hose clamp torque and adjust accordingly.

Fuel (water block / particulate) Filter

- The water block/particulate filter should be changed every heating season or as required.

Water Heater Heat Exchanger

- Keep the flues in the water heater clean. Because soot is a non-conductor of heat, a dirty water heater requires more fuel to heat a structure than a clean one. Water heaters can corrode on the fireside. This results from corrosive substances in the fuel and can be difficult to control. Some fuel oils contain substances, which cause fireside corrosion. Sulphur, vanadium and sodium are among the materials that may contribute to this problem. The probability of trouble from this source depends to a large degree on the amount of Sulphur in the fuel and on the care used in cleaning the fireside heating surfaces. This is particularly true when preparing a boiler for a period of idleness. Preventing this problem also depends on keeping the boiler heating surfaces dry when a boiler is out of service.
- The person responsible for water heater maintenance should be certain that the fireside surfaces of the water heaters in his care are thoroughly cleaned at the end of the firing season. He should also observe the fireside surfaces during the firing season and if signs of corrosion are discovered, a reputable consultant should be contacted.
- The flue pipe and chimney cap should be taken off once a year and thoroughly cleaned of all soot.

Note: Check the gauge panel at regular intervals for any irregular gauge readings

Heat Transfer Fluid "HTF"

- A clean, properly maintained hot water system should not be drained unless: there is possibility of freezing, the water heater has accumulated a considerable amount of sludge or dirt on the water side, or draining is necessary to permit repairs. Very little sludge should accumulate in a water heater where little make-up water is added and where an appropriate water heater water treatment is maintained at proper strength.
- The Heat transfer fluid should be tested from year to year for freeze protection and should be strong enough for your area. The heat transfer fluid should be checked with a refractometer. Check the glycol/water mixture chart (see "Setup, Heat transfer fluid HTF) for mixing ratios.
- The pH level of the heat transfer fluid requires an annual check to see if the pH level is neutral. The pH level should be at #7. This should be checked with a pH instrument.

Note: See "Setup, Heat transfer fluid HTF, Heat transfer fluid specifications" for complete heat transfer fluid specifications

Burner

- For burner seasonal maintenance, see the "Service Manual".

Burner Removal

To remove an existing **Riello Model 40-G400 Gas Burner**, use the following sequence:

1. Make certain that the power supply to the central heat module is disconnected.
2. Make certain external and internal gas valves are closed (handle of valve 90 degrees to the gas line).
3. Mark wires for reconnection and disconnect the electrical connections (Figure 8-1) to the burner. Remove the retaining nut from the strain relief connection located in the back of the burner assembly.
3. Disconnect gas line at coupling (Figure 8-2).
4. Remove 4 bolts (Figure 8-3) from burner flange.
5. Pull burner toward you and away from the heat exchanger.

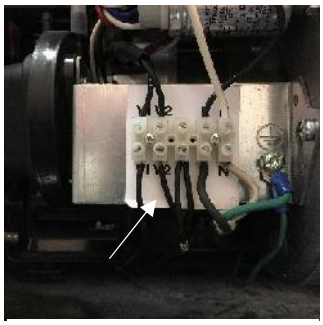


Figure 8-1 Burner Electrical Connections

Figure 8-2 Burner Gas Line Connection

Burner Installation

To install a **Riello Model 40-G400 Gas Burner**:

1. Insert burner into the heat exchanger.
2. Install 4 bolts (Figure 8-3) through burner flange, gasket and heat exchanger.
3. Connect gas line at coupling (Figure 8-2).
4. Install strain relief connection into the burner chassis, located in the back of the burner assembly. Secure strain relief with retaining nut. Connect the electrical connections to the burner (Figure 8-1).
4. Open gas valves and soap test gas line connections.

Figure 8-3 Burner flange

9.Converting gas types

NOTE: This sequence must be performed by "Qualified Personnel" only. All permit processes and codes must be followed as administered by the local authority having jurisdiction.

To convert a **Riello Model 40-G400 Gas Burner**:

1. Remove retaining nut (Figure 9-1).
2. Pull burner straight back to clear electrodes, un plug ignitor wire (Figure 9-2) and swing burner out of the way (Figure 9-3).
3. Note where combustion head depth is set at for reinstallation. Remove hex bolt (Figure 9-4).
4. Remove combustion head (Figure 9-5).
5. Mark electrode positions (depth and rotation) for reinstallation (Figure 9-6).
6. Loosen electrode clamp screw and remove electrodes (Figure 9-7).
7. Remove nozzle from center of combustion head (Figure 9-8) and remove diffuser (Figure 9-9). Natural gas is marked "2.2". Propane gas is marked "1.5"
8. Remove screws from distributor head (Figure 9-10) and remove distributor head (Figure 9-11).
9. Remove seal (Figure 9-12) and diaphragm (orifice) (Figure 9-13). Natural gas orifice is marked "C5". Propane orifice is marked "C15".
10. Install required orifice (Figure 9-13).
11. Install seal and distributor head (Figure 9-12 and 9-10).
12. Install diffuser (Figure 9-9) and required nozzle (Figure 9-8).
13. Install electrodes and position carefully (Figure 9-6). Verify proper alignment of electrodes (Figure 9-14).
14. Tighten electrode clamp.
15. Install combustion head into burner tube and position as noted in step 3 (Figure 9-4). (Factory setting is #4).
16. Swing burner carefully back into position ensuring electrodes are aligned.
17. Plug ignitor wire on to ignitor electrode (Figure 9-2).
18. Push burner forward into position and secure in place with retaining nut (Figure 9-1).
19. Remove burner cover and adjust air damper to initial setting of:
    - Natural gas 3.4
    - Propane gas 3.9
20. Install burner cover.
21. Switch gas line tag (Figure 9-15) to the appropriate gas type. Retain gas line tag and conversion parts removed for future conversions.
22. Install or remove secondary regulator assembly (Figure 9-16). Secondary regulator is required for Propane Gas but **must be removed** for Natural gas operation.
23. Fire burner and adjust manifold pressure to 3.5" W.C. for Natural Gas or 5" W.C. for Propane Gas.
24. Preform a combustion check. Adjust air damper as necessary to achieve 10% ± 0.5% CO^2 for Natural Gas or 12% +/- 0.5% CO^2 for Propane Gas. CO should be less than 50ppm (must not exceed 200ppm).

Figure 9-1 Burner Retaining Nut

Figure 9-2 Unplug Ignitor Wire

Figure 9-3 Burner Separation

Figure 9-4 Hex Bolt

Figure 9-5 Combustion Head Removal

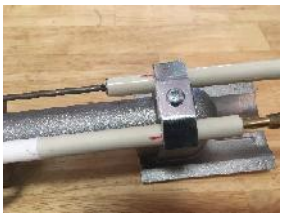


Figure 9-6 Mark Electrode Positions

Figure 9-7 Electrodes Removed

Figure 9-8 Gas Nozzle

Figure 9-9 Diffuser Removed

Figure 9-10 Distributor Head Screws

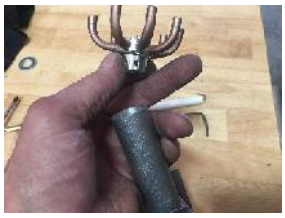


Figure 9-11 Distributor Head Removed

Figure 9-12 Diaphragm Seal

Figure 9-13 Diaphragm (Orifice)

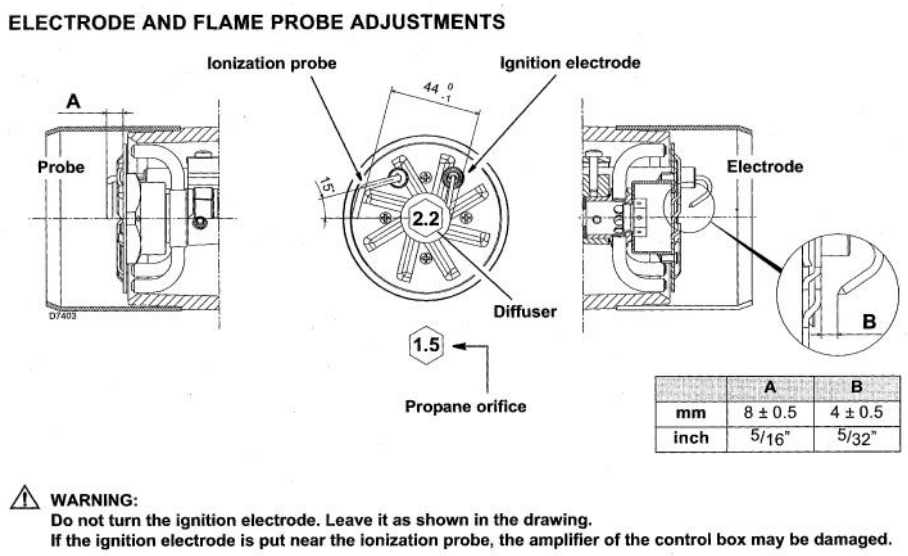


Figure 9-14 Electrode adjustment

Figure 9-15 Gas Line Tag

Figure 9-16 Secondary Regulator

10. Appendix

Electrical Schematic (Figure 10-1)

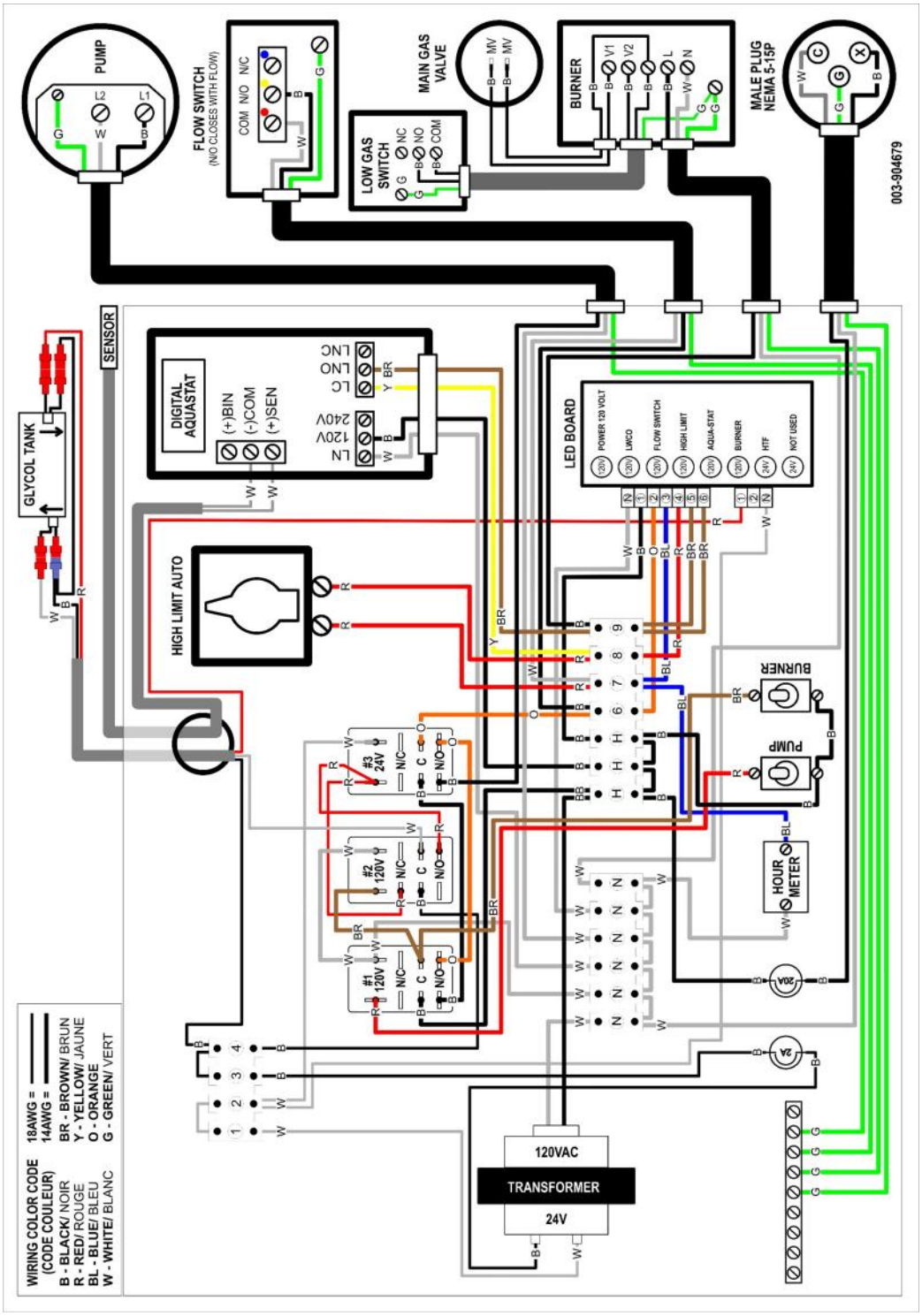


Figure 10-1: 2100-0400 Electrical Schematic

Material Safety Data Sheets

The Material Safety Data Sheets (MSDS) included with this manual have been provided by Dryair's suppliers.