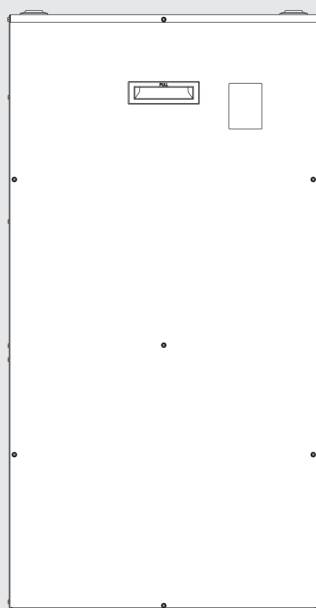


INDOOR MODELS:
CAH050E
CAH050CE



CAH Series - Hydronic Air Handler

Installation and Operation Manual

Rinnai®

Contents

1. Welcome.....	3
1.1 To The Consumer.....	3
1.2 To the Installer.....	3
2. Safety.....	4
2.1 Safety Symbols.....	4
2.2 Safety Precautions.....	4
3. About.....	5
3.1 Description.....	5
3.2 Codes and Standards.....	5
3.3 Transport.....	6
3.4 Storage.....	6
3.5 Model Number Nomenclature.....	6
3.6 Components.....	7
3.7 System Configurations.....	10
3.8 Specifications.....	12
3.9 Dimensions.....	13
3.10 Accessories.....	14
4. Installation Preparation.....	15
4.1 Inspect Shipment.....	15
4.2 Items Needed.....	15
4.3 Choose an Installation Location.....	15
4.4 Installation Requirements.....	17
4.5 Ductwork Requirements.....	18
4.6 Thermostat Requirements.....	18
4.7 Electrical Requirements.....	19
4.8 Plumbing Requirements.....	20
5. Installation.....	21
5.1 Position the Air Handler.....	21
5.2 Install Ductwork.....	21
5.3 Prohibited Configurations.....	22
5.4 Connect Electrical.....	22
5.5 Connect Pump.....	24
5.6 Connect Thermostat.....	24
5.7 Air Handler Wiring Connection.....	25
5.8 Post-Installation Checklist.....	28
5.9 Connect Water Lines.....	29
5.10 Post-Installation Checklist.....	31
6. Sequence of Operation.....	33
6.1 Cooling.....	33
6.2 Heating.....	33
6.3 Pump Timer.....	33
7. Service and Maintenance.....	34
8. Appendices.....	35
8.1 Wiring Diagram.....	35
8.2 Change Fan Motor Speed.....	36
8.3 Hydronic Air Handler System Sizing.....	37
8.4 Controller Input Options Defined.....	38
8.5 Parts List.....	40

1. Welcome

Thank you for purchasing Rinnai's Hydronic Air Handler.

Before installing and operating the air handler, be sure to read these instructions completely and carefully to familiarize yourself with the features and functionality.

This manual provides instructions for installing the air handler and is a supplement to the Rinnai Tankless Water Heater or Boiler Installation and Operations Manual supplied with the system.

The air handler must satisfy all the requirements in the Tankless Water Heater or Boiler Installation and Operations Manual, as well as the requirements in this manual.

1.1 To the Consumer

- You must read the entire manual to properly operate the air handler.
- It is recommended that a trained and qualified professional who has attended a Rinnai installation training class complete your installation.
- Keep this manual for future reference.

For Your Records

Dealer Name: _____

Dealer Phone: _____

Purchase Date: _____

Serial #: _____

Located on top of unit

1.2 To the Installer

- It is recommended that a trained and qualified professional who has attended a Rinnai installation training class install the air handler, inspect it, and leak test it before use. Improper installation may void the warranty.
- The trained and qualified professional should have skills such as:
 - Connecting water lines, valves, electricity
 - Knowledge of applicable national, state, and local codes
 - Installing ductwork and other HVAC equipment
 - Training in installation of air handlers. Training on Rinnai's hydronic air handler is accessible at www.rinnai-lms.com.
- Read all instructions in this manual before installing the hydronic air handler. The hydronic air handler must be installed according to the exact instructions in this manual.
- When installation is complete, leave this manual with the air handler or give the manual directly to the consumer.
- Proper installation is the responsibility of the installer.

2. Safety

2.1 Safety Symbols

This manual contains the following important safety symbols. Always read and obey all safety messages.



Safety alert symbol. Alerts you to potential hazards that can kill or hurt you and others.



DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in personal injury or death.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in personal injury or death.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

2.2 Safety Precautions

The following precautions apply to the installer and consumer. Read and follow all instructions in this section.

- Before any work is undertaken, it is imperative to observe all precautions as stated in this manual.
- Wear safety glasses and work gloves.

- Suitable fire extinguishing equipment should be immediately available in the work area and be maintained in a state of readiness for instant use.
- Do not use this air handler if any part has been under water. Immediately call a licensed professional to inspect the air handler and replace any part that has been under water.
- Do not use substitute materials. Use only parts certified for the air handler.
- Do not use an extension cord or adapter plug with this air handler.
- Any alteration to the air handler can be dangerous and will void the warranty.
- This air handler must be installed indoors.
- Improper installation, modification, service, maintenance or use of the air handler can cause electrical shock, burns or other conditions which may cause personal injury or property damage.
- It is recommended that a trained and qualified professional who has attended a Rinnai installation training class complete your installation.
- Read these installation instructions carefully and adhere to all warning and caution statements. Consult local building codes, Occupational Safety and Health Administration (OSHA), and National Electrical Code (NEC) for special requirements.



WARNING

Before installing or servicing the air handler, turn off the power to unit. There may be more than one disconnect switch. Electrical shock can cause personal injury or death.

3. About

3.1 Description

The hydronic air handler is designed to work with Rinnai tankless water heaters and boilers (models listed below) to deliver a wide variety of heating capacities for residential and light commercial applications.



NOTE

Refer to section “3.7 Specifications” for a complete list of product specifications.

3.1.1 Applicable Tankless Water Heaters and Boilers

The hydronic air handler works with the following Rinnai products:

- **Rinnai Tankless Water Heaters:**

- SENSEI™ SE+ Series
(RU Condensing Models)



NOTE

Tankless water heaters must have a minimum input rate of 160,000 Btu/hr. RUR condensing model water heaters are not approved for use with this air handler.

- **Rinnai Boilers:**

- I-Series (Condensing) Combi Models



NOTE

If utilizing a boiler, ensure the output of the boiler exceeds the capacity of the air handler in use (the boiler Btu/hr rating must be greater than the air handler Btu/hr rating).

3.2 Codes and Standards

It is the responsibility of the installer to follow all national codes, standards and local ordinances, in addition to the instructions in this manual. The installation must comply with regulations of the local building, heating, plumbing, and other codes. Where local codes are not applicable, the installation must comply with the national codes and all authorities having jurisdiction.

The following is a suggested list of codes and standards for the United States and Canada:

General Installation

- Installation of Air Conditioning and Ventilating Systems NFPA 91 (latest edition)
- CSA B214-01 Installation Code for Hydronic Heating Systems

Duct Systems

- Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
- 2001 Fundamentals Handbook Chapter 34 or 2000 HVAC Systems and Equipment Handbook Chapters 9 and 16
- US and CANADA: Air Conditioning Contractors Association (ACCA) Manual D

Acoustical Lining and Fibrous Glass Duct

- US and CANADA: Current edition of SMACNA; NFPA 90B as tested by UL Standard 181 for Class I Rigid Air Ducts

Electrical Connections

- US: National Electrical Code (NEC) ANSI/NFPA 70 (latest edition)
- CANADA: Canadian Electrical Code CSA C22.1 (latest edition)

Plumbing Systems

- US and CANADA: ICC International Plumbing Code (IPC); Uniform Mechanical Code (UMC); Uniform Plumbing Code (UPC), National Plumbing Code (NPC)

3.3 Transport

When transporting components of the hydronic air handler, follow the guidelines below:

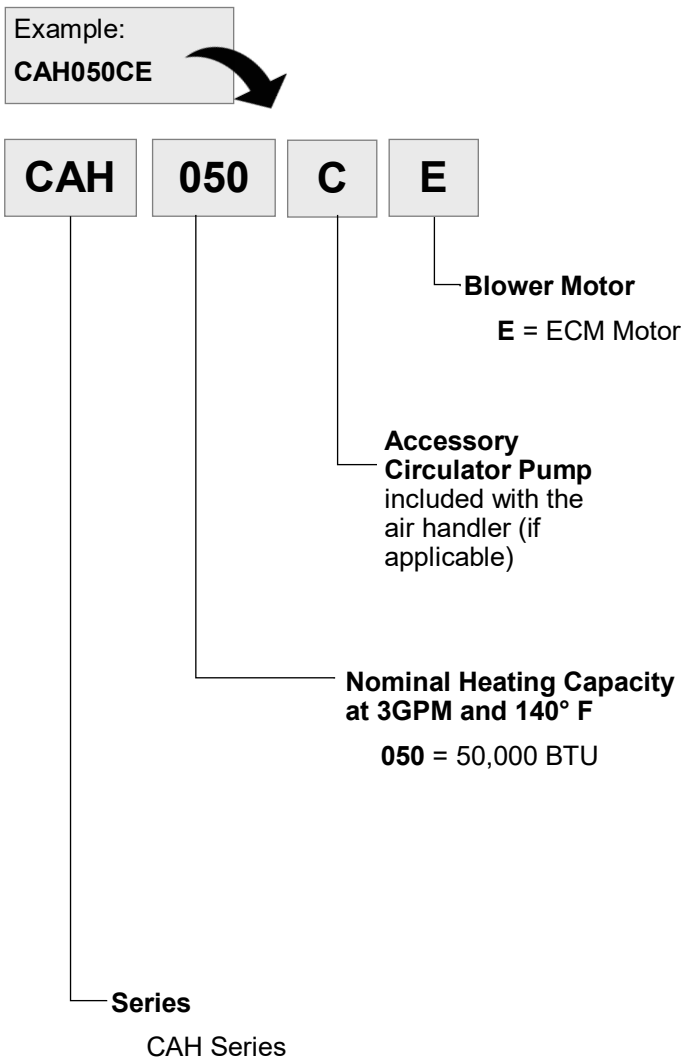
- Choose the correct hand truck to support the weight and size of the system components. Refer to section “3.7 Specifications” for specific weights and dimensions.
- Use safe lifting and material handling principles to prevent workplace accidents.
- Use proper lifting techniques to load the equipment onto a hand truck.
- Position the equipment onto the hand truck so the weight is evenly balanced.
- Use personal protective equipment, such as gloves and steel-toed boots.

3.4 Storage

If storing components of the hydronic air handler, follow the guidelines below:

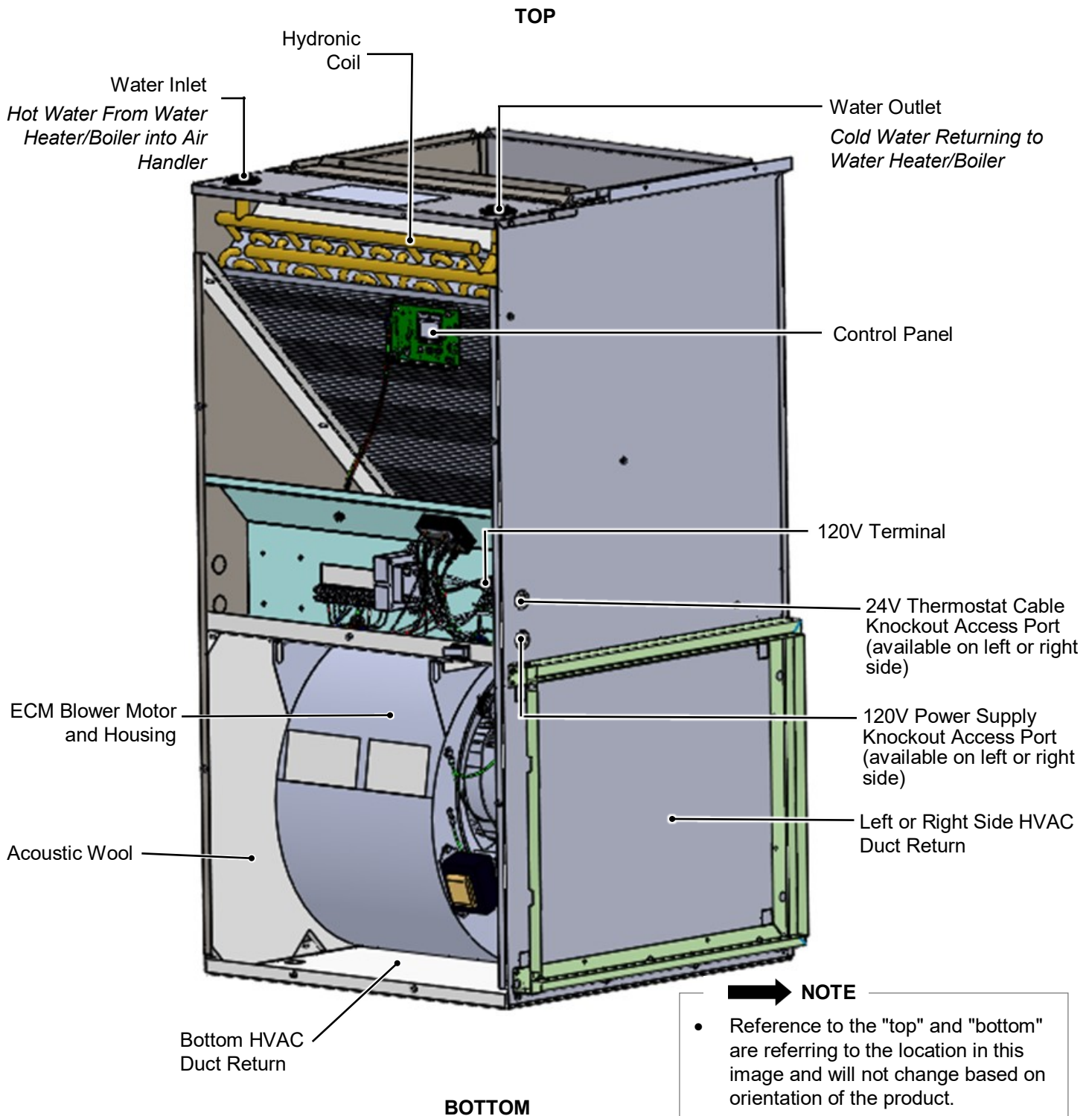
- Store system components in a clean, dry environment.
- Components must be protected from direct sunlight.
- Do not store components outdoors.
- If transported or stored at temperatures below 32°F (0°C), the components must be warmed up to 60°F (15°C) before the start of assembly.
- All components must be stored in the original packaging.

3.5 Model Number Nomenclature

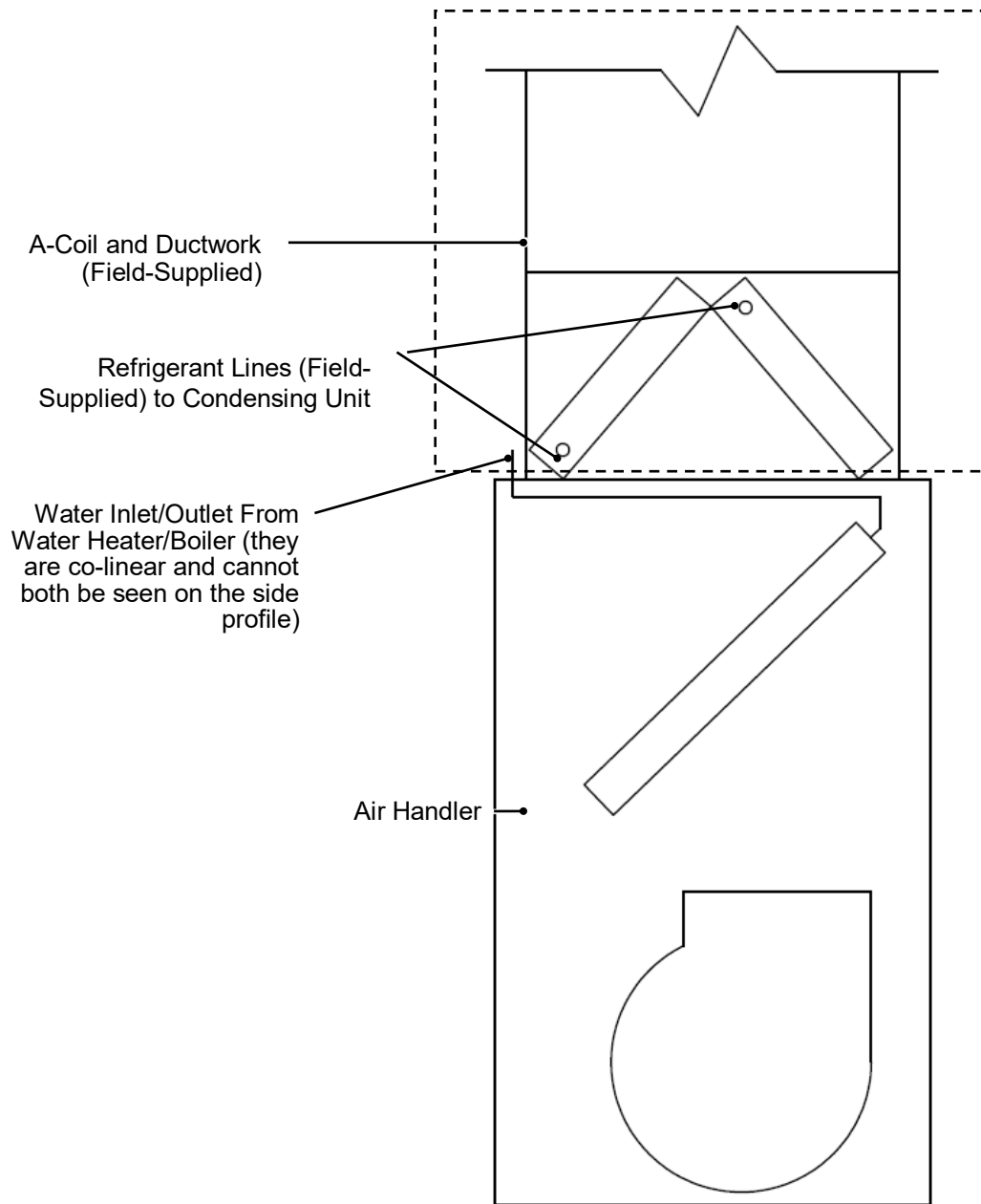


3.6 Components

3.6.1 Air Handler Components



3.6.2 Air Handler with A-Coil (Field-Supplied)



Example Vertical (Upflow with Side Return) Configuration



The above image is for representation purposes only; it is not a complete system. Please follow standard design protocols for installation.

3.7 Specifications

3.7.1 Hydronic Air Handler With Internal Circulation Pump

Used with Rinnai Tankless Water Heaters (Applicable Models)

	CAH050E	CAH050CE
Appliance Type	Hydronic Air Handler (Without Accessory Circulation Pump)	Hydronic Air Handler (With Accessory Circulation Pump)
Installation	Indoor	
Suitable for Potable Water Systems	Yes	
Configurations	Multi-position	
Circulation Pump Included	No, Accessory	Yes (to be field installed)
Product Weight - lb. (kg) (approximate)	100 (45.5), Shipped 120 (54.5)	105 (47.6), Shipped: 125 (56.7)
Construction	Cabinet: 22 Gauge powder coated steel Inner panels: 22 Gauge galvanized steel Insulation: 1/2" inside blower compartment and door	
Nominal CFM (Cubic Feet/Minute)	1600 up to 0.7 in. W.C. 1200 up to 1.2 in. W.C.	
Nominal Output Btu/hr at 140°F ¹	50,000	
Nominal Cooling Capacity	Up to 4 tons	
Rated Voltage	120 V, 60 Hz, 1 Ph Motor: - 9.6A FLA, Pump 3A max 15A MOA, 20A MOP	
Blower Motor Type	ECM fully variable	
Coil Material	Copper Coil, Aluminum Fins	
Blower Motor Horsepower (HP)	3/4	
Water Connection	1/2 in. Sweat	
Control Board	<ul style="list-style-type: none"> • Factory Installed • Thermostat connections • Adjustable time delay for blower activation for heating • Pump timer circulates water for one minute every 24 hours to prevent stagnation of water in the system (default) 	
P9-11 Energy Efficiency Rating (TPF)	0.88 with RU160i tankless water heater*	
Certifications	CSA 22.2 No 236, UL-1995, NSF 372 (hydronic coil)	

¹ Reference tables in sections 3.7.2 for specific BTU output.

* Refer to P9-11 listings for latest information and results.

Rinnai products are continually being updated and improved; therefore, specifications are subject to change without prior notice.

3.7.2 Water Heating Capacity

Values shown in following tables may vary depending on the static pressure of the duct system.

Engine	Entering Water Temperature (°F)	50% (800CFM)	75% (1200 CFM)	100% (1600 CFM)
SENSEI	120	26,600	34,700	41,400
I-Series		28,500	38,400	44,600
SENSEI	140	37,500	49,100	57,400
I-Series		39,100	54,900	64,100
SENSEI	160	47,600	61,600	72,400
I-Series		52,000	67,500	81,700

With 20ft or less equivalent piping

Coil Entering Water Temperature (°F)	Flow Rate (GPM)	Heat Fan Ratio (Air Flow)						Coil Pressure Drop (PSI)
		50% (800CFM)	Temperature Differential (°F)	75% (1200 CFM)	Temperature Differential (°F)	100% (1600 CFM)	Temperature Differential (°F)	
120	2	23,100	27	27,500	21	35,400	21	1.42
	3	26,000	30	33,600	26	40,300	23	2.36
	4	28,000	32	37,500	29	43,900	25	4.38
140	2	33,700	39	42,000	32	47,500	28	1.41
	3	37,300	43	48,300	37	56,500	33	2.34
	4	38,400	44	54,000	42	62,700	36	4.38
160	2	43,100	50	54,800	42	62,600	36	1.41
	3	48,000	56	62,100	48	73,100	42	2.34
	4	51,200	59	66,200	51	80,000	46	4.38

	Maximum Equivalent Piping Distance (ft)	
Flow (GPM)	Sensei	I-Series
2	200 ft	200 ft
3	150 ft	150 ft

3.8 Hydronic Air Handler System Sizing

3.8.1 Equivalent Feet of Pipe Per Fitting

Copper		
	Diameter	
Fitting	3/4 in.	1 in.
90 Degree Elbow	2	0.75
45 Degree Elbow	0.75	0.3
Straight Through Tee	0.4	0.135
Side Port Tee	3	1.35
Reducer Coupling	0.5	0.18
Gate Valve	0.25	0.09
Ball Valve	2.2	1.29
Swing Check Valve	3	1.35
Multiplier Per Linear Foot of Pipe	1	0.3
PEX		
Fitting	3/4 in.	1 in.
90 Degree Elbow	19.44	6.9
Straight Through Tee	2.7	0.78
Side Port Tee	28.08	7.62
Reducer Coupling	4.68	1.62
Ball Valve	5.94	2.58
PEX x NPT	4.86	2.28
Multiplier Per Linear Foot of Pipe	1.8	0.6
CPVC		
Fitting	3/4 in.	1 in.
90 Degree Elbow	2.2	1
45 Degree Elbow	1.21	0.56
Straight Through Tee	1.54	0.68
Side Port Tee	5.5	2.4
Male/Female Adapter	1.65	0.8
Multiplier Per Linear Foot of Pipe	1.1	0.4

NOTE

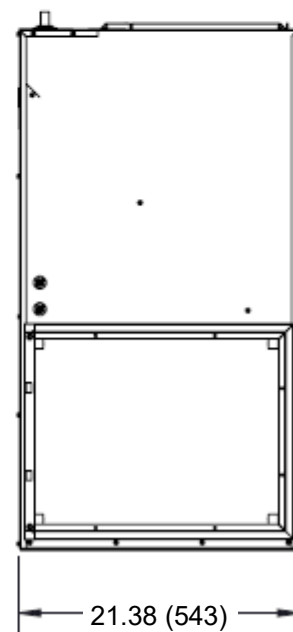
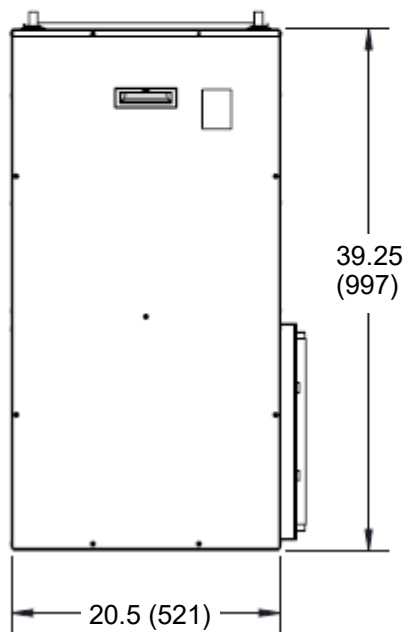
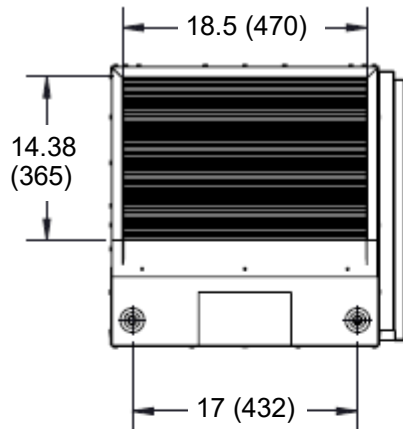
- All values have been normalized to 3/4 in. copper pipe as a baseline.
- It is not recommended to use 1/2 in. piping as the pressure drop is considerably larger than 3/4 in. piping.

System Sizing Example

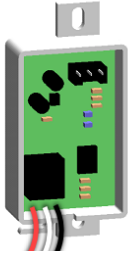
<ul style="list-style-type: none"> • 50 ft. of 3/4 in. CPVC pipe • Four (4) 90 degree elbows • Two (2) straight through tees 	} Total Equivalent Length	$= 50 \times 1.1$ (Total linear foot equivalency) $+ 4 \times 2.2$ (Total for 90 degree elbows) $+ 2 \times 1.54$ (Total for tees) Approximately 67 Equivalent Feet of Piping
---	---------------------------------	--

3.9 Dimensions

Measurements: in. (mm)



3.10 Accessories



Domestic Priority Switch	Part #
<p>Normally Closed (NC) switch that connects to the PC Board in the Rinnai tankless water heater or boiler.</p> <p>Allows the tankless water heater or boiler to give priority to domestic hot water by shutting off the air handler when necessary. When used with a hydronic air handler, the switch gives priority to domestic hot water. When domestic hot water demand exceeds a certain point, the air handler will turn off to ensure the demand is met.</p>	REU-OPU3

Product images are for illustrative purposes only.

4. Installation Preparation

4.1 Inspect Shipment

Carefully unpack the air handler. If the unit is damaged, contact your local dealer/distributor. Do not attempt to use the air handler if it appears damaged.

The blower section is factory assembled and all components are performance tested.

The air handler consists of a blower assembly and controls in an insulated, galvanized steel factory finished enclosure. Knockouts are provided for thermostat electrical wiring entrance. Inspect the following:

- Check the air handler rating plate to confirm specifications are as ordered.
- Upon receipt of air handler, thoroughly inspect the system for possible shipping damage. If the carton appears damaged, closely examine the air handler inside the carton.
- If the air handler appears to be damaged or is torn loose from its anchorage, the air handler must be immediately examined by the receiving party before removal. If damage is found, the receiving party must sign the driver's delivery receipt noting all damage (i.e. carton damage and/or product damage), as well as contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.
- To prevent loss or damage, leave all parts in original packages until installation.

4.2 Items Needed

Gather the required tools and parts before starting installation. Read and follow the instructions provided with any tools listed below.

- 1/4 in. nut driver
- Level
- Screwdriver
- Adjustable wrench
- Tape Measure
- Hammer
- AHRI Approved Duct Sealant
- UL listed wire nuts

4.3 Choose an Installation Location

When choosing an installation location, you must ensure proper clearances will be met; the installation environment; water quality; and the need for freeze protection.

4.3.1 Water Quality Guidelines

This section provides information on the importance of water quality to the air handler. The information is intended to serve as general guidelines only and is not a complete list of water quality guidelines.

Consideration of care for the air handler should include evaluation of water quality.

- The water must be potable, free of corrosive chemicals, sand, dirt, or other contaminants.
- It is up to the installer to ensure the water does not contain corrosive chemicals or elements that can affect or damage the boiler or tankless water heater.
- Water that contains chemicals exceeding the levels below can damage the boiler or tankless water heater.

Contaminant	Maximum Level
Total Hardness	Up to 200 mg/L
Aluminum *	Up to 0.2 mg/L
Chlorides *	Up to 250 mg/L
Copper *	Up to 1.0 mg/L
Dissolved Carbon Dioxide (CO ₂)	Up to 15.0 mg/L
Iron *	Up to 0.3 mg/L
Manganese *	Up to 0.05 mg/L
pH *	6.5 to 8.5
TDS (Total Dissolved Solids) *	Up to 500 mg/L
Zinc *	Up to 5 mg/L

* Source: Part 143 National Secondary Drinking Water Regulations

- Unsuitable heating system water can cause the formation of scale or sludge, which affects system efficiency. It can also cause corrosion and reduce life of the heat exchanger.
- Never use water that has been treated by a reverse osmosis, deionized, or distilled water to soften the water to fill the heating system.



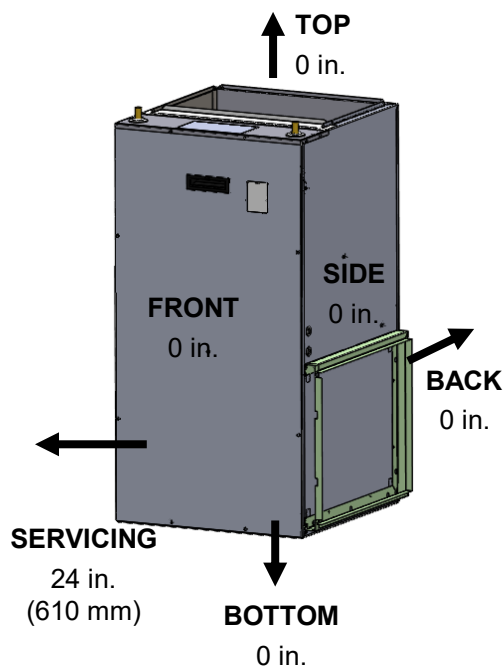
IMPORTANT

Replacement of components due to water quality damage is not covered by the warranty.

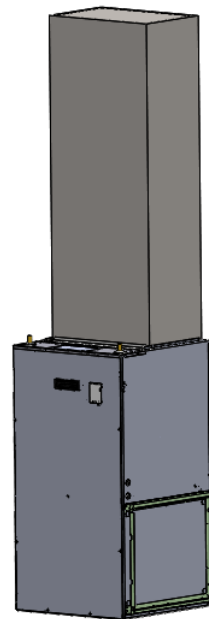
4.3.2 Clearances

Non-Ducted Return Closet Installation

- Clearances to combustible material is 0 in. from unit casing, and 0 in. to plenum and duct for first 36 in. (914 mm) and throughout the remaining ductwork system.
- Clearance for servicing is 24 in. (610 mm) in front of air handler.



Images are not to scale and are for illustration purposes only. Images do not show a complete system with plenums, duct pipes, etc.



Clearances to combustible material is 0 in. to plenum and duct for first 36 in. (914 mm) and throughout the remaining ductwork system.

- Louvers or return air grilles are field-supplied. Local codes may limit application of systems without a ducted return to single-story buildings.
- For a unit installed in a closet with a louvered return opening, the minimum open area for the louvers are:

Air Handler Models	Minimum Opening Area
<ul style="list-style-type: none"> • CAH050E • CAH050CE 	360 square inches (0.23 square meters)

- If the free area is not known, assume a 25% free area for wood or a 75% free area for metal louvers or grilles. Using the louver dimensions and the 25% or 75% assumption, determine if the louver open area meets the minimum open area listed above.
- If the return air plenum is used, the return air grille should be immediately in front of the opening in the plenum to allow for the free flow of return air.
- When not installed in front of the opening, there must be adequate clearance around the air handler to allow for the free flow of return air.

4.4 Installation Requirements

- This air handler is certified for installation in residential and light commercial applications and approved for the following configurations:
 - Vertical: Upflow with bottom or side (left or right side) return
 - Vertical: Downflow with bottom or side (left or right side) return
 - Horizontal (Upflow with bottom return)
- All models are designed for indoor installation only.
- These instructions are intended as a general guide only and do not supersede national or local codes. Compliance with all local, state, or national codes pertaining to this type of equipment should be determined prior to installation.
- Read this entire manual, as well as the instructions supplied in separate equipment, before starting installation.
- It is recommended that a trained and qualified professional who has attended a Rinnai installation training class complete your installation.
- Installation of the air handler, field wiring, warm air ducts, etc. must conform to the requirements of the Canadian Electrical Code CSA 22.1, National Electrical Code, ANSI/NFPA No. 70 (latest edition) in the United States, and any state laws, and local ordinances (including plumbing or wastewater codes). Local authorities having jurisdiction should be consulted before installation begins. Such applicable regulations or requirements take precedence over the general instructions in this manual.
- Install the conditioned air plenum, ducts and air filters (not provided) in accordance with NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems (latest edition). The blower section is provided with flanges for the connection of the plenum and ducts. Air filters must be listed as Class 2 furnace air filters. The blower section is shipped from the factory completely assembled.
- For ease in installation, it is best to make any necessary evaporator coil configuration changes before connecting the air handler to the evaporator coil.
- Do not remove the cabinet knockouts until it has been determined which knockouts need to be removed for the installation.
- Select the final installation position that best suits the site conditions. Consider required clearances, space, and routing requirements for refrigerant line, condensate disposal, filters, ductwork, wiring, and accessibility for service. Refer to the rating plate for specific information.
- When the unit is installed in a humid space and used in cooling applications, excessive sweating may occur on outside of unit. To prevent excessive sweating wrap unit with 1 in. (25 mm) fiberglass insulation. All openings should be sealed to prevent air leakage that could cause condensate to form inside the cabinet.
- Electrical wires should be sealed on the inside where they exit the conduit opening. Sealant is required to prevent air leakage and condensate from forming inside the blower, control box, and on the electrical controls.
- Glycol is permitted in installations with the I-Series boiler up to 50% concentration. Refer to the I-Series Condensing Boiler Installation and Operation Manual for approved glycol manufacturers.
- The air handler and its complementing cooling coil must be installed in such a way as to allow free access to the air handler/control compartment.



IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HFC's) as of July 1, 1992. Approved methods of reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.



WARNING



- Do not install this air handler if it is damaged.
 - Do not install this air handler if any part or all of the unit has been under water.
- Explosion Hazard:**
- Keep flammable materials and vapors, such as gasoline, away from this unit.
 - Failure to follow these instructions can result in death, explosion or fire.

4.5 Ductwork Requirements

- Install ductwork in accordance with NFPA 90B and any local codes.
- Install the conditioned air plenum, ducts and air filters (not provided) in accordance with NFPA 90B Standard for the installation of Warm Air Heating and Air-Conditioning Systems (latest edition).
- Isolation connectors (if utilized) must be nonflammable.
- A return air duct system is recommended. If the unit is installed in a confined space or closet, a return connection must be run, full size, to a location outside the closet.
- The air handler is provided with flanges for the connection of the plenum and ducts.
- Air filters must be listed as Class 2 furnace air filters.
- Supply and return ductwork must be adequately sized to meet the system's air requirements and static pressure capabilities. Ductwork should be insulated with a minimum of 1 in. (25 mm) thick insulation with a vapor barrier in conditioned areas or 2 in. (51 mm) minimum in unconditioned areas.
- Supply plenum should be the same size as the flanged opening provided around the blower outlet and should extend ideally at least 3 ft. (1 m) from the air handler before turning or branching off plenum into duct runs. The plenum forms an extension of the blower housing and minimizes air expansion losses from the blower.

4.6 Thermostat Requirements

WARNING

Before installing or servicing the air handler, turn off power to unit. There may be more than one disconnect switch. Electrical shock can cause personal injury or death.

- All wiring must conform to local and national electrical codes. Improper wiring or installation may damage thermostat.
- Air Conditioner Model: The Standard Model A/C thermostat may be wired with or without connecting a common wire between the indoor equipment and the thermostat. However, it is recommended to use a common wire whenever possible to prevent power stealing by the thermostat.
- Heat Pump Model: The standard model heat pump thermostat is not "power stealing" and must have both 'R' and 'C' wires connected to operate properly. The thermostat should have an indicator for when auxiliary heat is in use.
- The thermostat should NOT be mounted:
 - Close to a window, on an outside wall, or next to a door leading to the outside
 - Exposed to direct light and heat from a lamp, sun, fireplace, or other heat-radiating objects which may cause a false reading
 - Close to or in direct airflow from supply registers and return-air grilles
 - In areas with poor air circulation, such as behind a door or in an alcove

4.7 Electrical Requirements



WARNING



Electrical Shock:

- Disconnect power before servicing.
- Replace all parts and panels before operating.
- Electrically ground the air handler.
- Connect ground wire to the green ground wire in the air handler electrical panel.
- Failure to do so can result in death or electrical shock.
- Before installing or servicing the air handler, turn off power to unit. There may be more than one disconnect switch.
- If a disconnect switch is to be mounted on the unit, select a location where a drill or fastener will not contact electrical or hydronic components.
- Electrical shock can cause personal injury or death.



WARNING



Explosion Hazard:

- Keep flammable materials and vapors, such as gasoline, away from this unit.
- Failure to follow these instructions can result in death, explosion or fire.

Line-Voltage Connections:

- U.S. Installations: Make all electrical connections in accordance with National Electrical Code (NEC) ANSI/NFPA 70 and all local codes or ordinances having jurisdiction.
- Canadian Installations: Make all electrical connections in accordance with Canadian Electrical Code CSA C22.1 and all authorities having jurisdiction.
- Check all factory wiring per unit wiring diagram and inspect factory wiring connections to be sure none were loosened in transit.

- Use copper conductors only.
- All field wiring must be done in accordance with National Electrical Code, applicable requirements of UL and local codes, where applicable.
- Electrical wiring, disconnect means and over-current protection are to be supplied by the installer. Refer to the air handler rating plate for maximum over-current protection, minimum circuit ampacity, as well as operating voltage.
- The power supply must be sized and protected according to the specifications supplied on the product.
- This air handler is factory-configured for 120 Volts, single phase, 60 Hz.
- Prior to making any electrical connections, ensure that supply voltage, frequency, and phase are as specified on unit rating plate.
- Check to ensure that the existing electrical service is adequate to handle the additional load imposed by the Hydronic Furnace. Refer to unit wiring diagram for proper electrical connections.
- All electrical connections MUST comply with NEC or CEC and any other local codes or ordinances having jurisdiction. **USE COPPER WIRE ONLY.** Provide separate branch electric circuit with field supplied disconnect switch.
- Location of disconnect switch to be in clear site, accessible and in close proximity to the unit.
- Correct polarity MUST be maintained for 120 V wiring. If polarity is incorrect unit will NOT operate.

4.8 Plumbing Requirements

WARNING

Solder joints on domestic water lines must be made with NO-LEAD SOLDER.

IMPORTANT

Use only approved piping and fitting materials. If used in an open loop system with domestic hot water, potable, lead-free piping must be used.

Thermal Expansion of Piping

In all hydronic systems, piping undergoes temperature swings as the system operates. This causes changes in the length of the piping due to thermal expansion.

If the piping is rigidly mounted, this expansion can cause annoying popping or squeaking sounds and in extreme cases, the piping can even buckle.

To counter expansion movement, design piping circuits with sufficient elbows, tees or expansion loops (only used in large systems) or piping supports that allow the tubing to expand and contract freely.

Another alternative is to install an expansion compensator fitting capable of absorbing the movement.

Hydraulic Resistance of Fittings, Valves, and Other Devices

Before the total hydraulic resistance of a piping circuit can be found, the individual hydraulic resistances of all fittings, valves, or other such components must be determined. One approach is to consider each fitting, valve, or other device as an equivalent length of copper tube of the same pipe size.

By using the equivalent length of piping for all components in the circuit, the circuit can be treated as if it were a single piece of pipe having a length equal to the sum of the actual pipe length, the total equivalent lengths of all fittings, valves, or other devices.

Pipe Sizing Considerations

When selecting a pipe size for a given flow rate, the resulting average flow velocity should be between 2 ft. (0.61 m) and 4 ft. (1.22 m) per second.

At water flow velocities of approximately 2 ft. (0.61 m) per second, flowing water will carry air bubbles along a vertical pipe. Average flow velocities of 2 ft. (0.61 m) per second or higher can draw along air bubbles in a downward flow. At the above stated velocities air bubbles shall be routed to an air separator where they can be collected and discharged from the system.

Average flow velocities higher than 4 ft. (1.22 m) per second could cause flow noise and premature wear of piping and fittings and should be avoided.

Expansion Tanks

All liquids used in hydronic heating systems expand when heated. For all practical purposes, liquids are incompressible. Any container completely filled with a liquid and sealed from the atmosphere will experience a rapid increase in pressure as the liquid is heated. To prevent this from occurring, all hydronic systems **MUST** be equipped with an expansion tank. See the following sections for the expansion tank plumbing location:

- 5.9.1 Rinnai Tankless Water Heater and Air Handler Piping Diagram
- 5.9.2 Domestic Hot Water Recirculation Piping Diagram
- 5.9.3 Rinnai I-Series Boiler and Air Handler Piping Diagram
- 5.9.4 I-Series Boiler with Hydraulic Separation and Air Handler Piping Diagram

5. Installation

➡ IMPORTANT

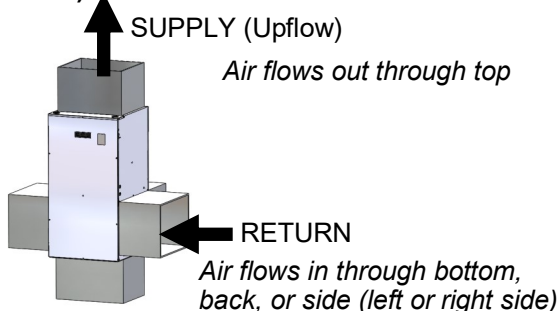
Read section “4. Installation Preparation” before starting installation steps.

5.1 Position the Air Handler

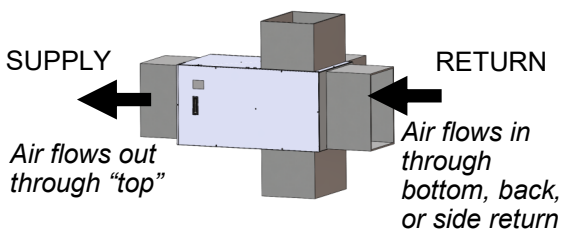
Refer to the previous section (section “4. Installation Preparation”) for more information on location and configuration requirements.

1. Place the air handler in the desired location and configuration. Approved configurations:
 - Vertical: Upflow with bottom, side (left or right side), or back return
 - Vertical: Downflow with bottom, side (left or right side), or back return
 - Horizontal: Upflow with bottom, side (left or right side), or back return

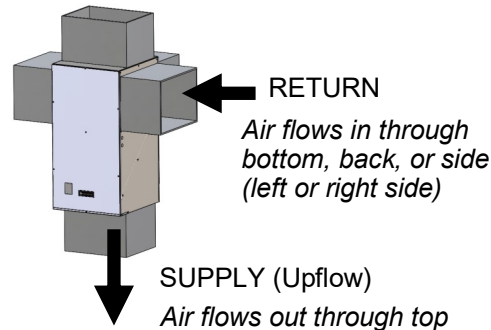
Vertical (Upflow with bottom, back, or side return)



Horizontal (Upflow with bottom, back, or side return)



Vertical (downflow with bottom, back, or side return)

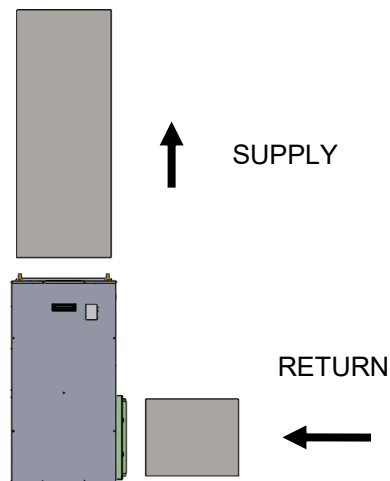


5.2 Install Ductwork

Refer to section “4.5 Ductwork Requirements” for complete ductwork installation requirements.

1. Connect the supply air duct to the flange on top of the blower section of the air handler.

Example Vertical Installation



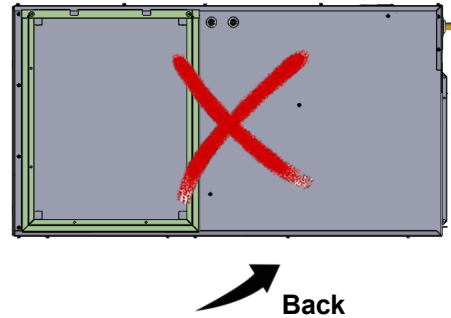
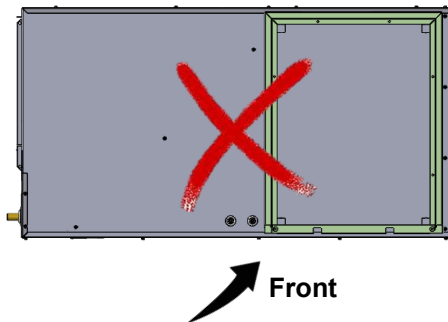
➡ IMPORTANT

- A return air duct system is recommended. If the unit is installed in a confined space or closet, a return connection must be run, full size, to a location outside the closet.
- The isolation connector (if used) must be nonflammable.

5.3 Prohibited Configurations

The air handler is not approved for the following configurations:

- Do not position the air handler on its front or back panel.



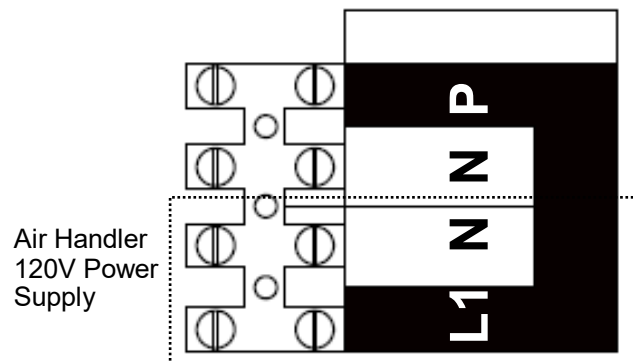
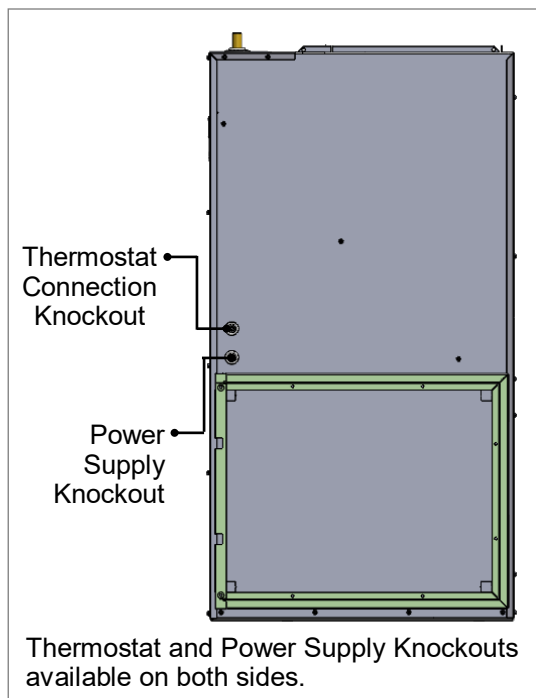
- Multiple air handlers configured for installation with a single Rinnai tankless water heater or boiler is prohibited.

5.4 Connect Electrical

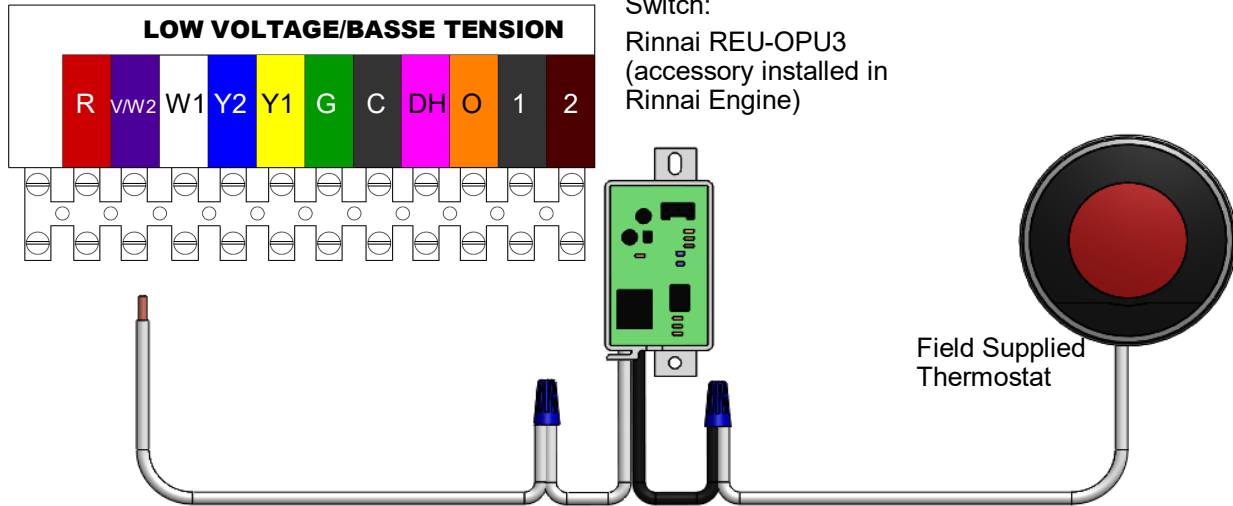
Refer to section “4.7 Electrical Requirements” for complete electrical requirements.

NOTE

Electrical cables go through the knockout holes on the left or right side of the cabinet. See the images below for specific locations.



Air Handler Thermostat Wiring Block



*Connections to the Air Handler PC Board.
Other thermostat wires removed for clarity.*

1. Disconnect all power supplies.
2. Remove the air handler front panel by removing the 6 screws that secure the top panel and the 9 screws that secure the front panel.
3. Route the 120V power supply cable (field-supplied) through the power supply connection knockout hole and connect to the air handler 120V Power Supply terminals.
4. Route the 24V thermostat cable (field-supplied) through the thermostat connection knockout hole and connect to the air handler PC Board.
5. If installing the Domestic Priority Switch, REU-OP3 (recommended optional accessory purchased separately), connect it to the air handler PC Board (see above image).
6. Connect the following:
 - A. Connect ground wire to the supplied green ground wire
 - B. Connect black to black and white to white power supply terminal
7. Replace the air handler access panel.

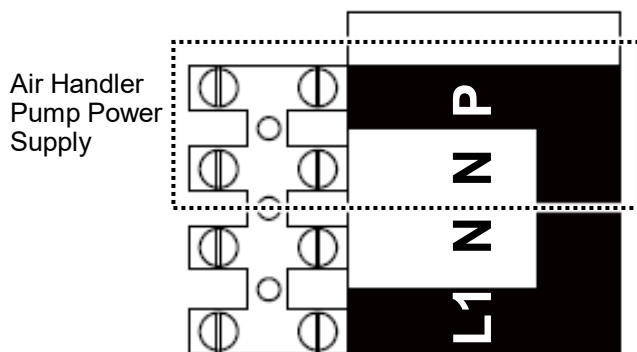
5.5 Connect Pump

The CAH050CE model air handler will have an included accessory Grundfos UPS 15-78 circulator pump. The CAH050E model air handler does not have an included circulator pump. If utilizing the air handler with a Rinnai I-Series combi boiler, the accessory pump is not necessary as the boiler already has a pump included inside the boiler. If desired to install a pump other than the Grundfos UPS 15-78, this would need to be a field-supplied component.

NOTE

All capacity and performance data is based on the Grundfos UPS 15-78. If other pumps are in use, results will vary. The pump does not have an integrated check valve. An external one should be field supplied and installed.

The pump is to be wired back to the air handler for power (see below image) and plumbed into the inlet side of the air handler piping (see plumbing diagram).



P = Pump Line Wire Terminal
 N = Pump Neutral Terminal
 N = Air Handler Neutral Terminal
 L1 = Air Handler Line Wire Terminal

5.6 Connect Thermostat

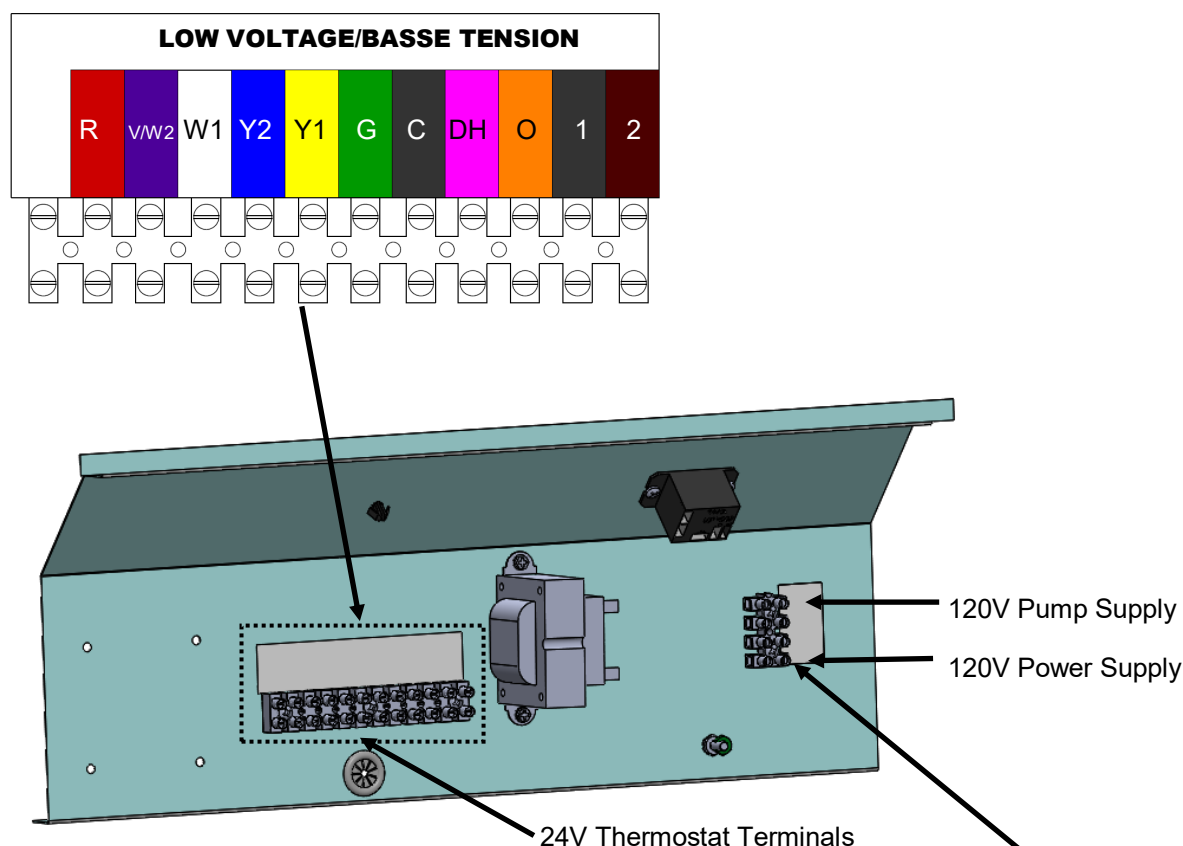
Refer to section “4.6 Thermostat Requirements” for thermostat installation requirements.

1. Mount the thermostat approximately 5 ft. (1.5 m) from the floor and close to, or in, a frequently used room, preferably on an inside partitioning wall or a section of wall without pipes or duct work.
2. Connect the thermostat to the air handler. Follow the wiring diagrams in the next section: “5.4.1 Thermostat Wiring Diagrams.”

NOTE

Connect common (C) wire only if required. See thermostat installation instructions for more information.

5.7 Air Handler Wiring Connection

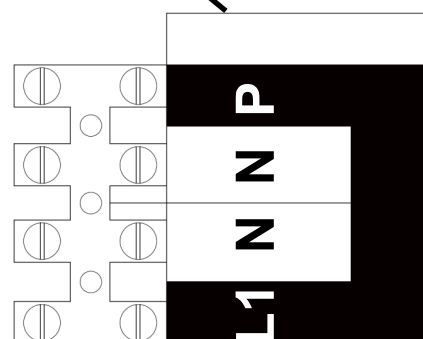


Wire leads removed for clarity.

A single stage or two stage thermostat must be installed with the air handler.

Thermostat Field Connections (use depends on the application)

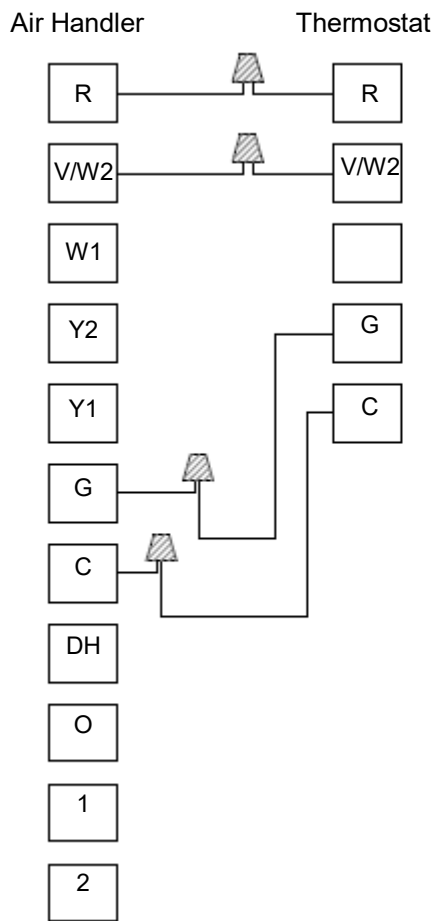
- Dh—Used for dehumidification contact.
- R—signal is 24V hot to thermostat.
- W1—signal controls first stage heat from the thermostat. If a single stage thermostat is used, connect W to W2.
- W2—signal from a two-stage thermostat.
- Y1—Connection for the low speed compressor operation.
- Y/Y2—Connection for the Y signal or high speed (Y2) signal from the thermostat.
- G—Connection for the G (fan) signal is energized from the thermostat.
- O—Not used with this model air handler.
- C—Connection for the C terminal to the thermostat (24V common).
- 1 and 2—not used for this product.



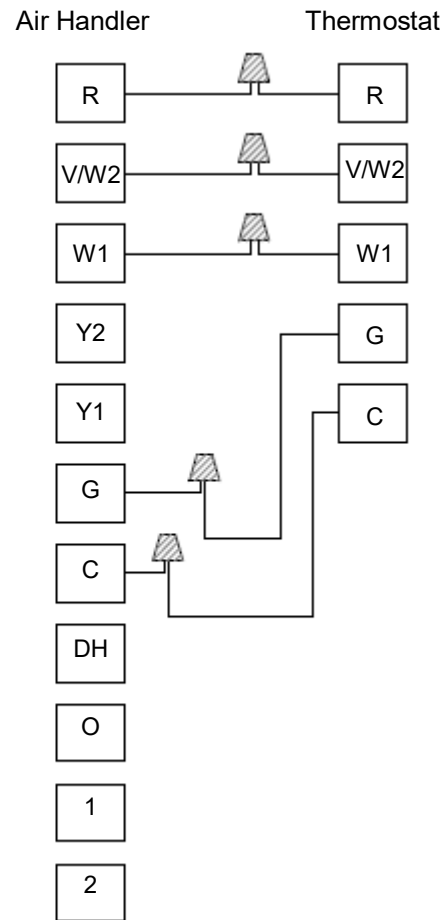
Power and external pump power terminals.

P = Pump Line Wire Terminal
N = Pump Neutral Terminal
N = Air Handler Neutral Terminal
L1 = Air Handler Line Wire Terminal

Single Stage Hot Water Heat Only Application



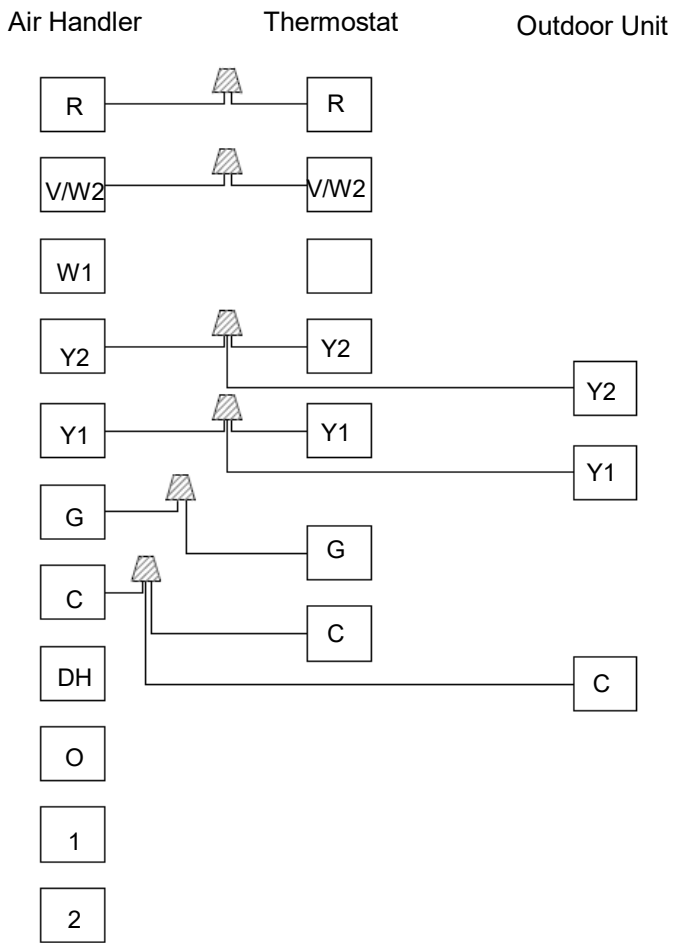
Two Stage Hot Water Heat Only Application



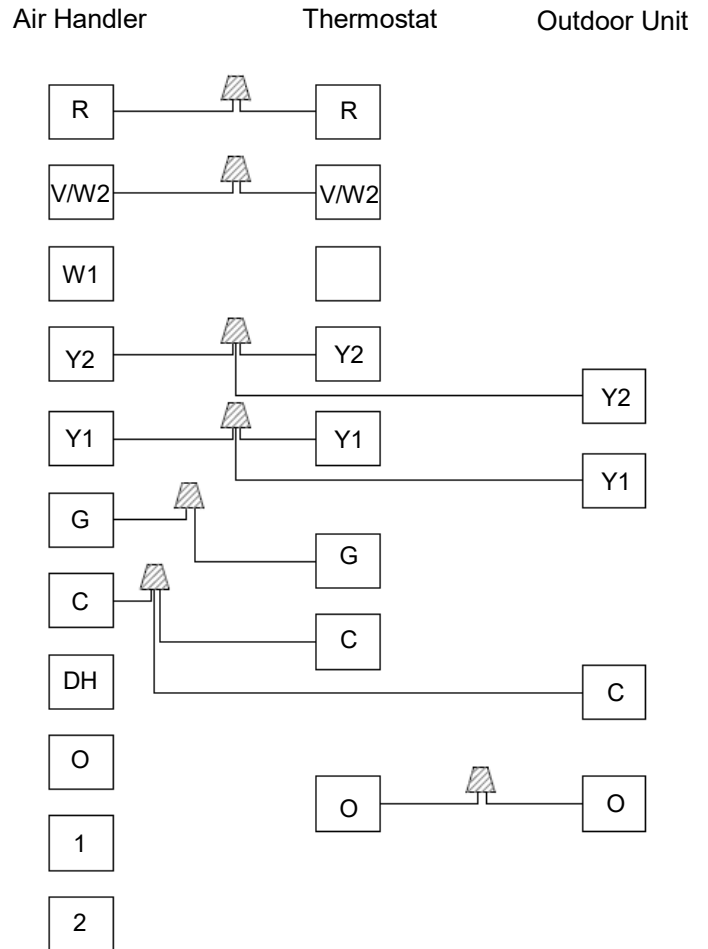
NOTE

Connect common (C) wire only if required. See thermostat installation instructions for more information.

Cooling Application with Hot Water Heat



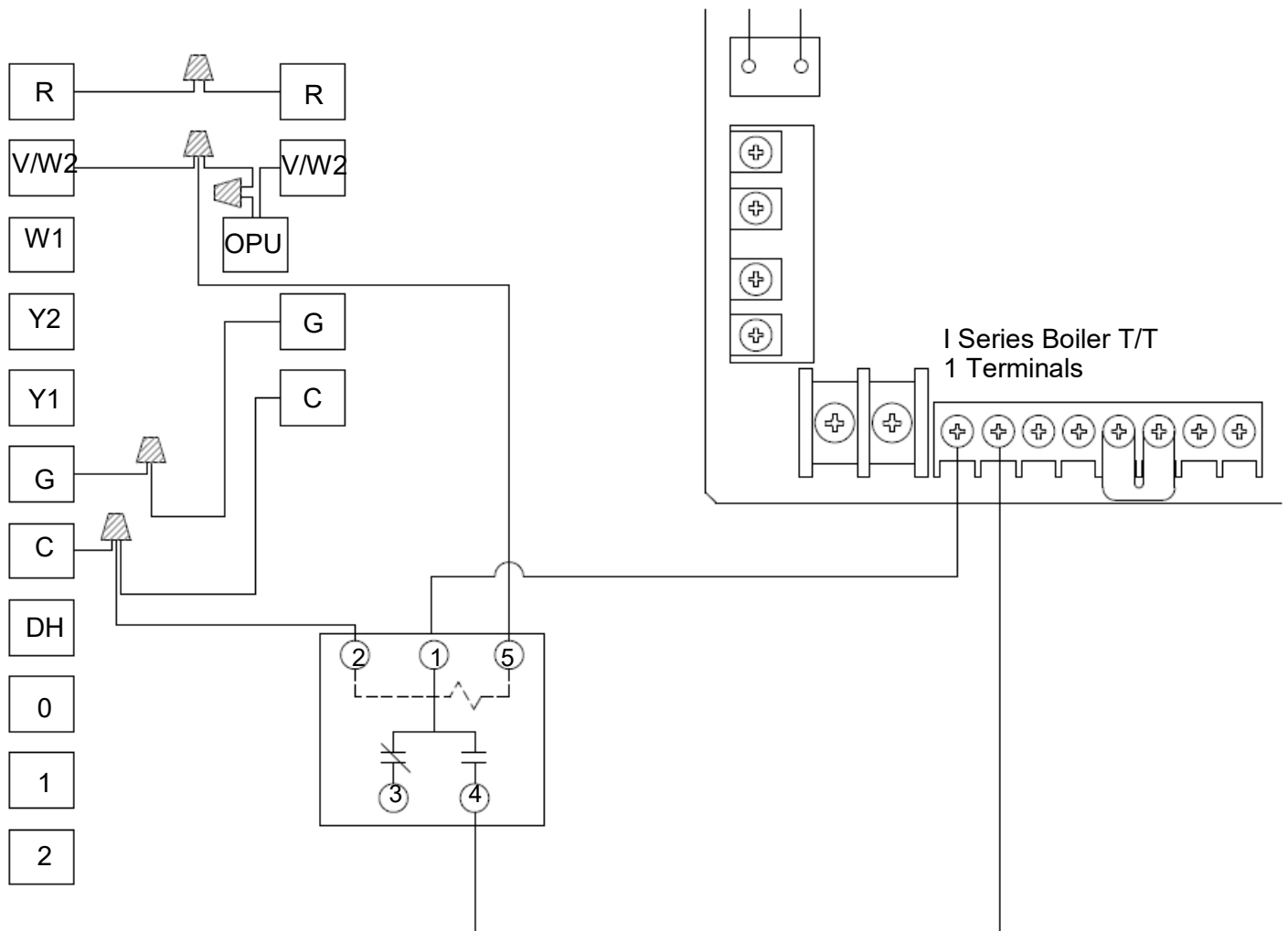
Heat Pump Application with Hot Water Heat



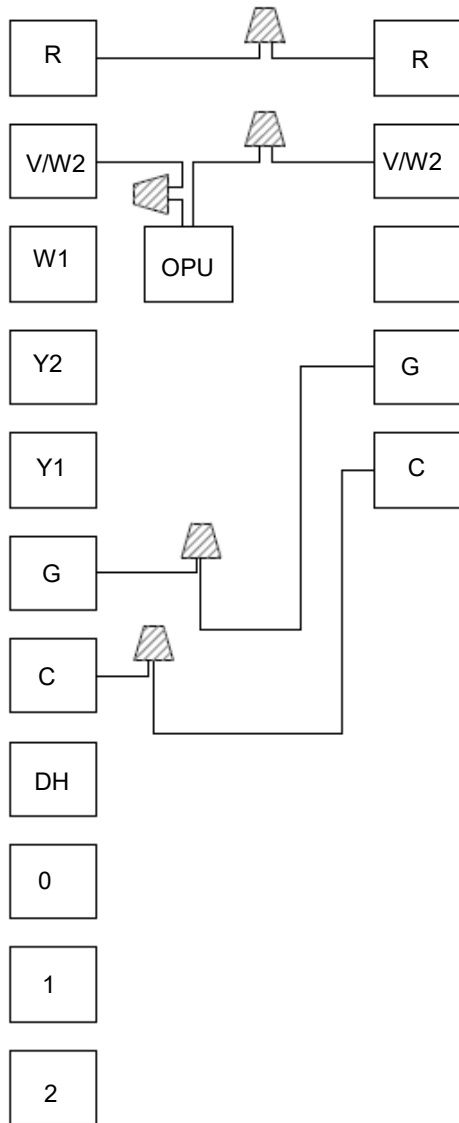
NOTE

Connect common (C) wire only if required. See thermostat installation instructions for more information.

Heating Application with I-Series Boiler



Hot Water Heat with Rinnai REU-OPU3



NOTE

Connect common (C) wire only if required. See thermostat installation instructions for more information. See REU-OPU3 instructions for more wiring configurations.

5.8 Install Tankless Water Heater or Boiler

Install the Rinnai Tankless Water Heater or Boiler by following the Installation and Operation Manual supplied with the unit.

Water Potability

This unit can be installed in hot water domestic loop.

The hot water coil is certified to NSF 372.

At install, make sure all components are certified and that all materials and solders are free of lead and contaminants.

To satisfy many jurisdictions regulations, the control allows to set a time of pump inactivity to initiate a pumping cycle and avoid stagnating water. Make sure to set this parameter according your local and codes.



WARNING

Biocontamination hazard.

When the unit is off for a long period of time, precautions to flush, clean and disinfect the hot water loop shall be made.

Failure to do so can result in sickness and death.

5.9 Connect Water Lines

➔ IMPORTANT

- Refer to section “4.8 Plumbing Requirements” for complete plumbing requirements.
- For standard installations, refer to the piping diagrams in sections 5.7.1 and 5.7.2.
- For more information on the tankless water heater or boiler plumbing connections, refer to the unit’s Installation and Operation Manual.
- Water connections to the air handler should follow all state and local plumbing codes.

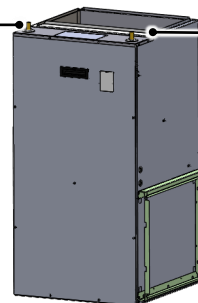
1. Plumb the water out/supply of the Rinnai tankless water heater or boiler to the inlet (top connection) of the air handler.
2. Plumb the air handler water outlet (bottom connection) to the water inlet/return of the Rinnai tankless water heater or boiler.

Water Inlet

Hot Water From Water Heater/Boiler into Air Handler

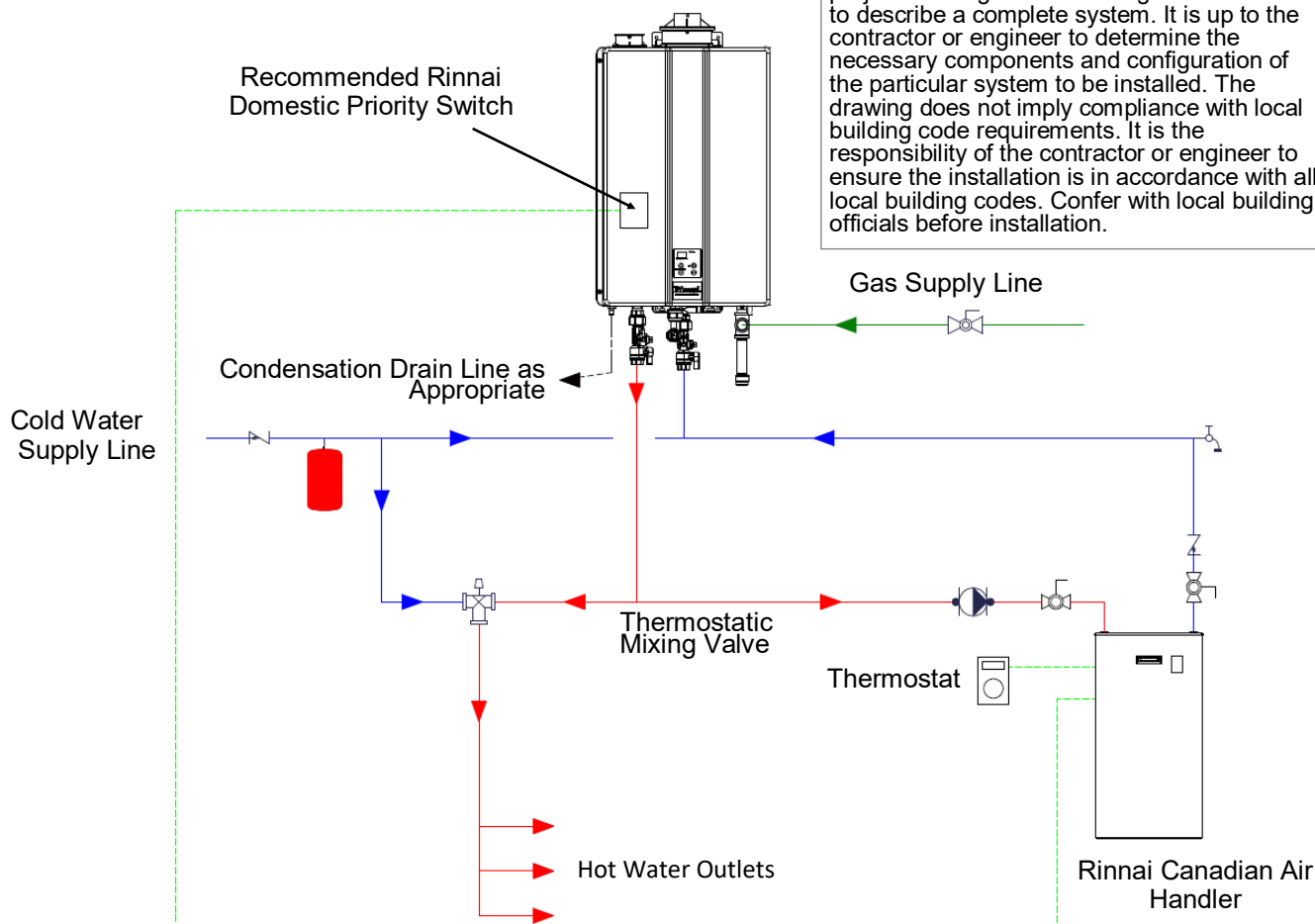
Water Outlet

Cold Water From Air Handler Returning to Water Heater/Boiler



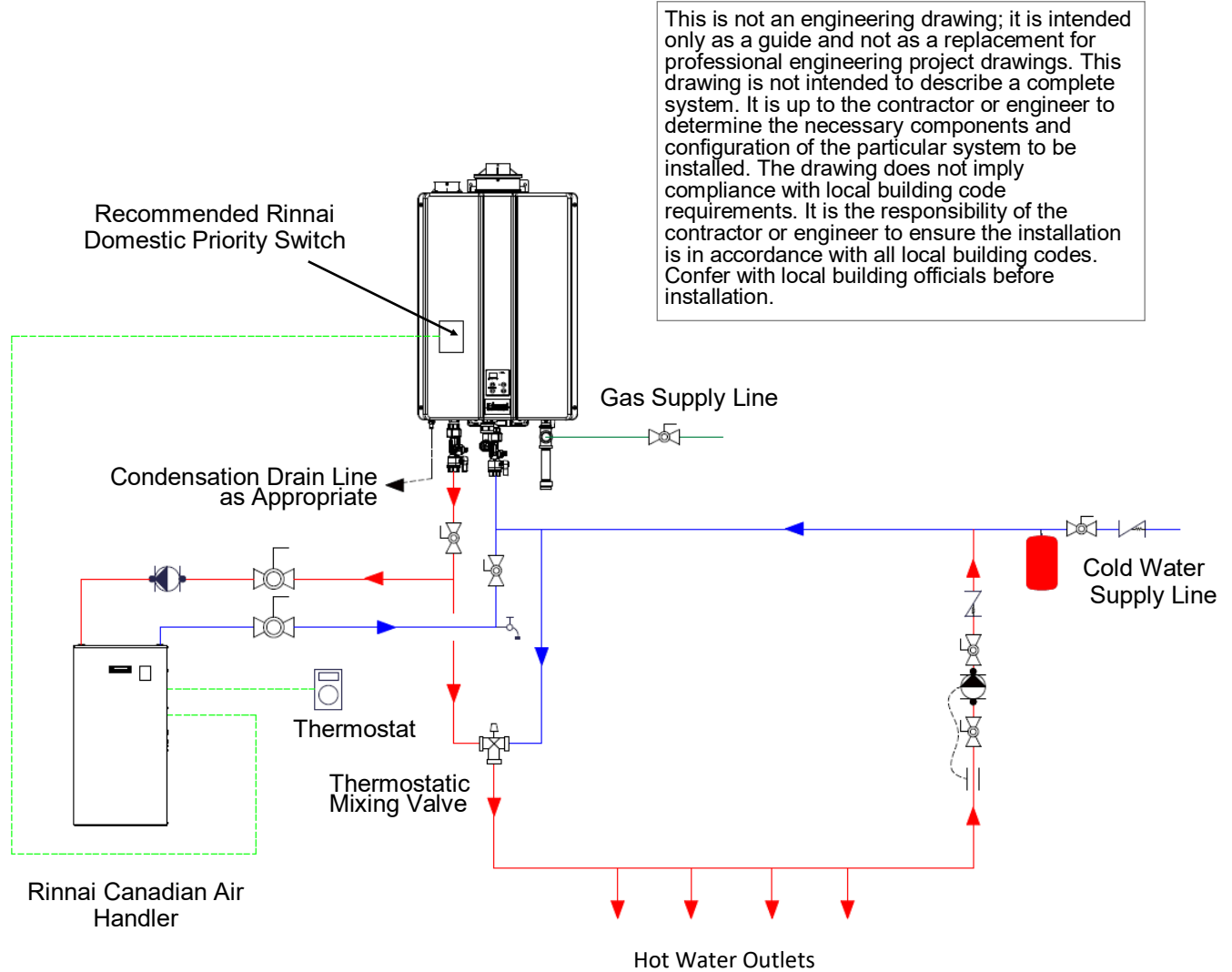
5.9.1 Rinnai Tankless Water Heater and Air Handler Piping Diagram

This is not an engineering drawing; it is intended only as a guide and not as a replacement for professional engineering project drawings. This drawing is not intended to describe a complete system. It is up to the contractor or engineer to determine the necessary components and configuration of the particular system to be installed. The drawing does not imply compliance with local building code requirements. It is the responsibility of the contractor or engineer to ensure the installation is in accordance with all local building codes. Confer with local building officials before installation.



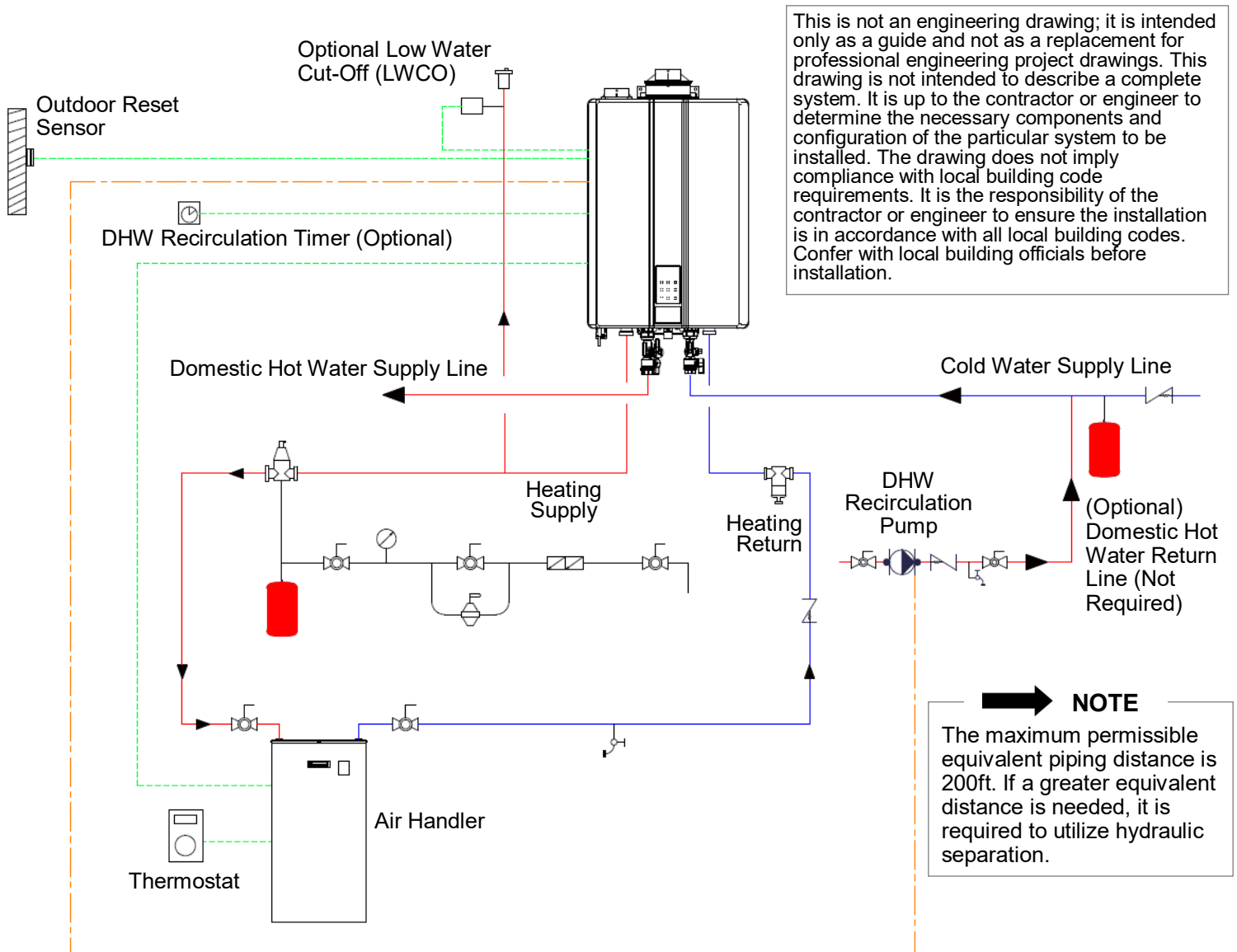
See page 31 for Legend

5.9.2 Domestic Hot Water Recirculation Piping Diagram

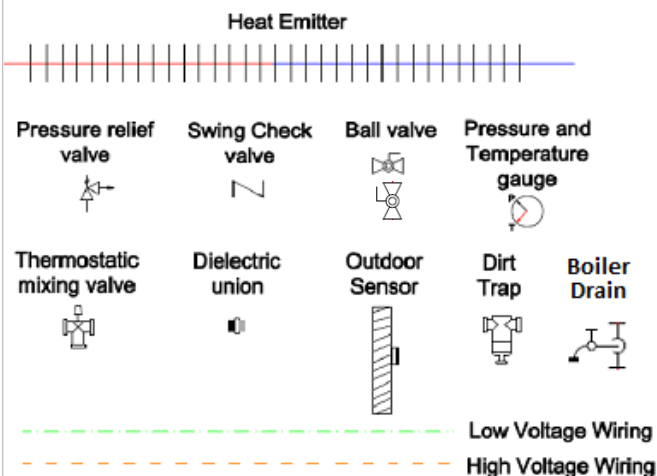


See next page for Legend

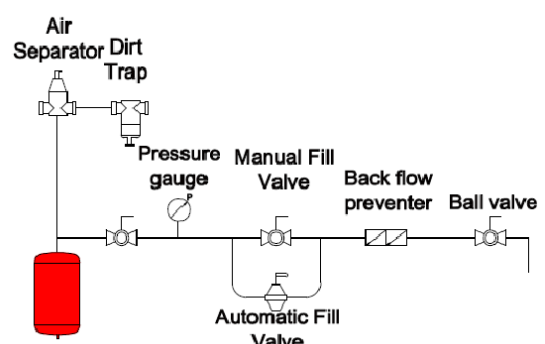
5.9.3 Rinnai I-Series Boiler and Air Handler Piping Diagram



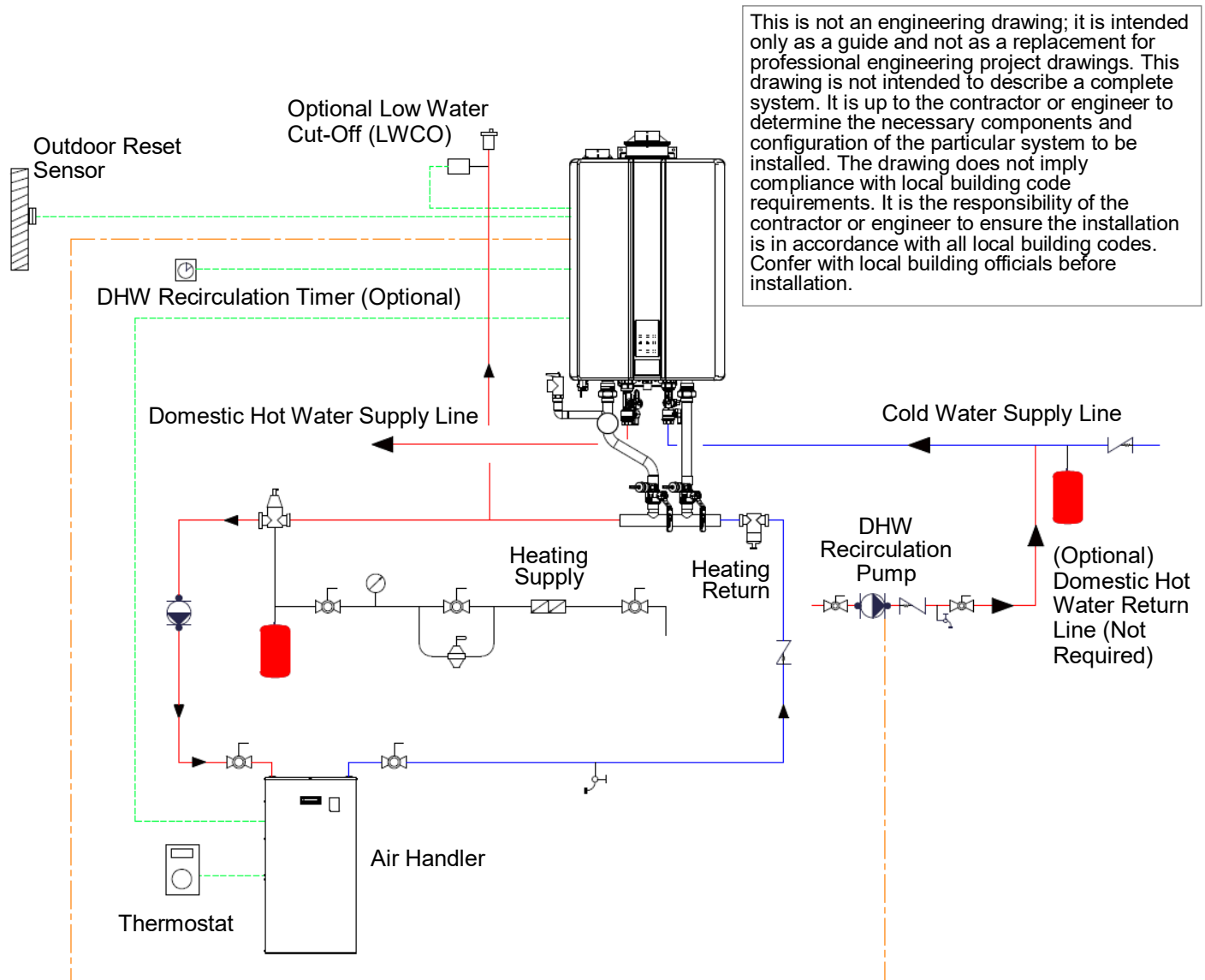
LEGEND



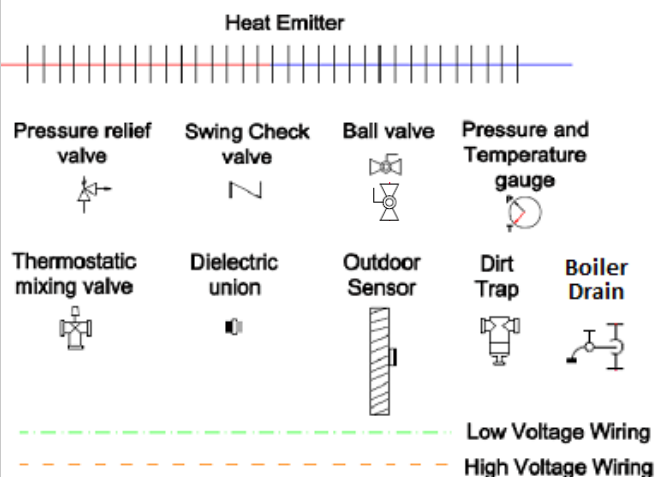
The image below illustrates a suggested arrangement. Some of the fittings are optional.



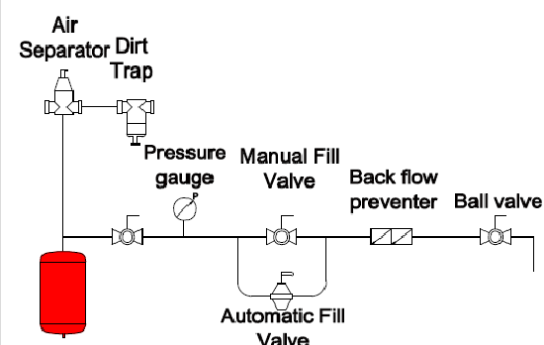
5.9.4 I-Series Boiler with Hydraulic Separation and Air Handler Piping Diagram



LEGEND



The image below illustrates a suggested arrangement. Some of the fittings are optional.



5.9.4 Flush Hot Water Coil

Flushing the hot water coil prior to start up is required to remove any residual material from the installation or manufacturing processes as well as remove any air from the system.

Use an external purge valve or other mechanism to flush hot water coil after installation. Take precautions while flushing the air handler to keep the multi-function control board and other electrical components from getting wet. Hot water is preferred for flushing.

Follow the flushing steps listed below. Use a bucket or hose to dispose of water from the bleed valve during flushing.

1. Flush the return line by closing the inlet valve (supply) and opening the purge valve (return). Open the purge valve. Close the bleed valve when flushing is complete.
2. Flush the supply line and coil by closing the outlet valve (return) and opening the inlet valve (supply). Open the purge valve. Close the purge valve when flushing complete.
3. Apply power to the air handler. Open inlet and outlet valves. Engage pump and open purge valve. Verify proper flow direction—inlet should become warm before outlet. Close the purge valve when flushing is complete.
4. Operate pump for five minutes immediately after flushing system to purge remaining air from the pump bearing chamber.

CAUTION

- Follow piping manufacturer's requirements for any additional required flushing or cleaning of coil and piping if using non-copper piping.
- Do not engage pump until the flushing process is completed. Running pump dry will cause damage.

5.10 Post-Installation Checklist

The following conditions must be met prior to starting the air handler. Refer to outdoor condensing unit installation instructions for system start-up instructions and refrigerant charging instructions.

<input type="checkbox"/>	Is unit properly located, secure, and serviceable?
<input type="checkbox"/>	Is the unit protected from vehicular or other physical damage?
<input type="checkbox"/>	Is the return air not obtained from areas where there may be objectionable odors, flammable vapors or products of combustion such as carbon monoxide (CO), which may cause serious personal injury or death?
<input type="checkbox"/>	Has an auxiliary pan been provided under the unit with separate drain for units installed above a finished ceiling or in any installation where condensate overflows could cause damage?
<input type="checkbox"/>	Auxiliary drain is installed when necessary and pitched to allow for draining?
<input type="checkbox"/>	Has the drain pan and drain tubing been leak checked?
<input type="checkbox"/>	Have all webs been removed from the drain connections that are being used? Have all drain pan plugs not used been properly plugged?
<input type="checkbox"/>	Ensure all air in the hot water loop is removed to ensure optimal efficiency and to prevent premature pump failure.
<input type="checkbox"/>	Is the ductwork correctly sized, run, taped, and insulated?
<input type="checkbox"/>	Have all cabinet openings and wiring been sealed?
<input type="checkbox"/>	Verify all coils, valves, and piping are leak free and insulated if required.
<input type="checkbox"/>	With main power disconnected, verify that the blower wheel is well fixed on the motor shaft and the wheel turns freely.
<input type="checkbox"/>	Is the filter clean, in place, properly oriented, and of adequate size?
<input type="checkbox"/>	Are all electrical connections properly sized and tightened?
<input type="checkbox"/>	Is the wiring neat, correct, and in accordance with the wiring diagram and rating plate?
<input type="checkbox"/>	Is the unit properly grounded and protected (fused)?
<input type="checkbox"/>	Is the thermostat correctly wired and in a good location?
<input type="checkbox"/>	Are all access panels in place and secure? A safety switch prevents the startup of the blower if the front panel is not installed.
<input type="checkbox"/>	Check Blower Operation: Set the thermostat to "FAN ON." Does the indoor blower turn on?

Continued on next page

**Air Flow Inspection:**

- For proper cooling operation, the airflow through the indoor coil should be between 350 and 450 CFM per ton of cooling capacity (or 350 – 450 CFM per 12,000 BTU/HR) based on the rating of the outdoor unit.
- If the outdoor unit is smaller than the maximum cooling capacity rating for the air handler, the cooling capacity may need to be changed. Refer to section “8.3 Controller Input Options” for more information.
- The proper cooling or heat pump tons is to be selected (see section “8.3 Controller Input Options”).

6. Sequence of Operation

The blower motor is a true variable speed motor designed to deliver constant CFM. Constant CFM is valid, up to 1600cfm, with total static pressure up to 0.7 in. w.c. Constant CFM is valid, up to 1200cfm, with total static pressure up to 1.2 in. w.c.

6.1 Cooling

Single Stage Thermostat

- When the thermostat calls for cooling, the thermostat circuit between R and G is completed.
- The normally open contacts close, causing the indoor blower motor to operate.
- The thermostat circuit between R and Y/Y2 is also completed; this circuit closes the contactor in the outdoor fan motor.
- For a heat pump, the thermostat circuits R and O energizes the reversing valve, switching it to the cooling position (depends on outdoor HVAC unit).
- The air handler blower will turn off 90 seconds (default) after the thermostat stops calling for cooling.

NOTE

For single stage systems, do not use the Y1 terminal.

2 Stage Thermostat

- First stage (low) cooling: Thermostat closes circuits R to G, R to O, and R to Y1.
- Unit delivers low stage cooling airflow.
- Second stage (high) cooling: Thermostat closes circuits R to G, R to O, R to Y1 and R to Y2.
- Unit delivers high stage cooling airflow.

IMPORTANT

- During installation, use caution to prevent the control board and other controls from getting wet.

6.2 Heating

Single Stage Thermostat

- When the thermostat calls for heat, the thermostat circuit between R and W2 is completed, activating the hot water circulating pump.
- A time delay (5 seconds default) follows after the thermostat circuit between R and G are complete, activating the blower motor.
- The air handler blower will turn off 120 seconds (default) after the thermostat stops calling for heating.

2 Stage Thermostat

- Thermostat closes circuit R to W1 or W2.
- Unit delivers the selected heat airflow.
- Unit delivers W1 or W2 heating airflow and pump is exercised.

Continuous Fan

- Thermostat closes circuit R to G.
- Blower runs at continuous fan airflow.

6.3 Pump Timer

The air handler has an included pump timer feature. The pump timer activates the circulating pump for one minute every twenty-four hours (default) by completing the thermostat circuit between R and W. The circulation frequency can be adjusted in the controls of the air handler.

7. Service and Maintenance

WARNING



Electrical Shock:

- Before servicing the air handler, turn off power to unit. There may be more than one disconnect switch.
- Improper installation, modification, service, maintenance or use of the air handler can cause electrical shock, burns or other conditions which may cause electrical shock, personal injury, property damage or death.

WARNING

- It is recommended that a trained and qualified professional who has attended a Rinnai installation training class perform service to the air handler.
- Do not use this air handler if any part has been under water. Immediately call a licensed professional to inspect the unit and replace any part that has been under water.
- Do not use substitute materials. Use only parts certified for the air handler.
- Any alteration to the air handler can be dangerous and will void the warranty.

Maintenance:

To maintain reliability and optimal performance of this unit, perform an annual complete verification of the system. Do not attempt to repair the unit or its controls. Call a qualified technician.

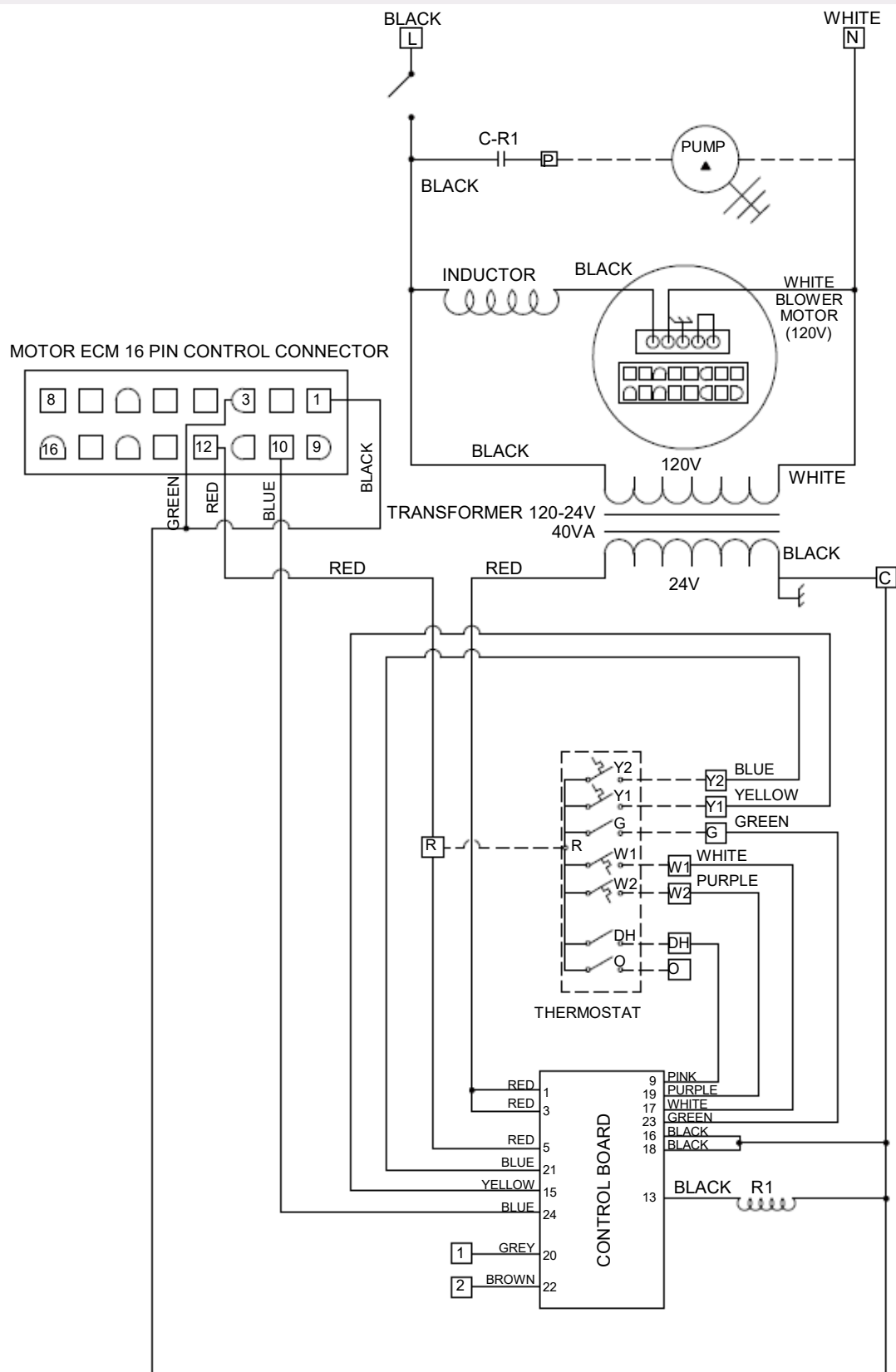
- At the beginning of each heating season, the air handler should be serviced by a qualified installer or servicing agency. Verify proper operation after servicing.
- It is important that compartments, filter, and circulating air passage ways of the appliance be kept clean. The air filter must be cleaned or replaced every month or more frequently in severe conditions. Always replace with same type of filter.
- The supply and return air ducts should be inspected at least annually for blockages or damage.
- Keep the motor free of dust and dirt by cleaning annually. Verify that the wheel turns freely. Verify the electrical connections on the motor.
- Inspect the heating and cooling (if applicable) coils annually or more frequently as necessary.
- Refer to the tankless water heater or boiler installation and operation manual for maintenance requirements.

To service the air handler, follow the steps below.

1. Turn off power to the unit.
2. Remove the air handler front panel by removing the 9 screws that secure the front panel.
3. Perform service or maintenance to the air handler, and then reinstall the screws to secure the front panel.

8. Appendices

8.1 Wiring Diagram



8.2 Controller Menu Screens



8.3 Controller Input Options

Menu	Parameter	Description	Min	Max	Default
Configuration	Language	Switch between English and French	-	-	English
Cooling/HP	AC/HP Tons	Set the cooling/heat pump capacity (Tons)	0	10	0
	CFM/TON	Airflow adjustment per ton of cooling (CFM)	300	500	400
	Dehum ON State	Set the active state of the DH signal	LOW	HIGH	HIGH
	Dehum Ratio ⁽¹⁾	Dehumidification cooling fan ratio	50%	100%	85%
	AC Y1 Ratio ⁽¹⁾	Fan ratio for 1st cooling stage	50%	90%	70%
Fan	Cont Fan Ratio ⁽¹⁾	Continuous Fan Ratio	15%	100%	50%
	Heat Fan Ratio ⁽¹⁾	Fan ratio in heating mode (W/W2)	35%	100%	75%
	Fan W1 Ratio ⁽²⁾	Fan ratio for 1st heating stage	45%	100%	50%
	Heat Off Ratio ⁽¹⁾	Fan ratio during off delay	0%	100%	40%
Pump	Recirculation	Time between recirculation (hours)	OFF	48	24
	W1 Ratio	Pump ratio for 1st heating stage	1%	100%	13%
	Purge Cycle	Time during the pump will operate after a call for heating	1 sec	240 sec	1 sec
	Purge Ratio ⁽⁵⁾	Pump activation frequency during purge cycle	1%	100%	6%
Delays	AC/HP On	Fan delay when heat pump starts	5	120	5
	AC/HP Off	Fan delay when heat pump stops	5	240	90
	Heat On	Fan delay when engine starts	5	120	5
	Heat Off	Fan delay when boiler stops	0	240	120

⁽¹⁾ Ratio in percentage of max airflow (Y2)

⁽²⁾ Ratio in percentage of max airflow of 1600 CFM

⁽³⁾ Ratio in percentage of max hydronic heating airflow (W/W2)

⁽⁴⁾ Ratio in percentage of heating airflow (W1 or W2)

⁽⁵⁾ Reduce the value if the water heater activates during the purge cycle

TROUBLESHOOTING:

Insufficient or no heat:

- Check filter, replace if dirty
- Verify the hydronic coil is not clogged.
- Verify there no air trapped in the heating loop. Purge the loop if air is present.
- Verify Rinnai Engine operation and water temperature. Clean inlet water filter on Rinnai engine.
- Verify there are no restrictions in the heating loop. Verify all valves are fully open and functional.

The pump does not run:

- Verify 120V power is present to the pump
- Hard water may cause the pump to seize. Recirculation mode will prevent pump seizing.

The pump is noisy at start-up:

- Purge the hot water loop of air.

Heating during the fan on mode:

- Verify the check valve in the heating circuit is present and is not stuck.

8.4 Controller Input Options Defined

SOFTWARE SETTINGS

Configuration and installer menus allow you to modify both display and operational parameters of the unit. Navigation within the menus can be achieved using the up, down and select buttons. The up and down buttons allow to change menu, line or to modify a value. The center button allows to select or validate a parameter.

CONFIGURATION MENU

The configuration menu allows only the modification of the display language and access to the “Troubleshoot” menu. Once the cursor is aligned with the “Language” line, press the center button to toggle from French to English.

TROUBLESHOOT MENU

This menu allows to see the various operating parameters of the appliance and is protected by a password. To enter the Troubleshoot menu, the following password must be entered: down arrow button, center button, up arrow button and center button.



Password sequence to be entered.

STATUS MENU

This menu displays the operating parameters associated with the air handler:

Parameter	Description
CMD	Command requested by the thermostat
CMDMOT	The airflow requested in CFM
RELAYS	State of the pump relay

INSTALLER MENU

The installer menu allows to modify the various operating parameters of the air handler. This menu is password-protected because only a qualified installer should change the following settings. The password to access the installer menu is down arrow button, center button, up arrow button and center button.



Password sequence to be entered.

FAN MENU

The fan menu allows to modify the options related to the comfort fan of the appliance:

Parameter	Description
CONT FAN RATIO	Allows you to modify the airflow in continuous fan mode.
HEAT FAN RATIO	Allows you to modify the airflow in heating mode
FAN W1 RATIO	Allows you to modify the airflow on the first stage of heating.
HEAT OFF RATIO	Allows you to modify the airflow during the heat off delay.

PUMP MENU

The pump menu allows to modify the options related to the external pump of the system:

Parameter	Description
Recirculation	Allows you to set the time before the unit will recirculate the water for one minute.
W1 RATIO	Allows you to modify the pump ratio (speed) on the first stage of heating.
Purge Cycle	Time during which the pump will operate after a call for heat to recuperate the residual heat from the water heater heat exchanger.
Purge Ratio	Fraction of the time the pump is activated during the purge cycle. This parameter allows the water heater to operate during the purge cycle when it is set low enough

COOLING / HP MENU

The Cooling / HP menu allows to modify the options regarding the behavior with an outdoor unit.

Parameter	Description
AC/HP TONS	Allows you to specify the tonnage of the outdoor unit.
CFM/TON	Allows you to set a precise CFM per TON ratio.
DEHUM ON STATE	Defines if the dehumidification will be active-high or active-low.
DEHUM RATIO	Allows you to modify the percentage of the cooling CFM that will be delivered when dehumidification is active.
AC Y1 RATIO	Allows you to modify the percentage of the cooling CFM that will be delivered when only a first stage call for cooling (Y1) is active.

DELAYS MENU

This menu allows to adjust timing parameters of the unit.

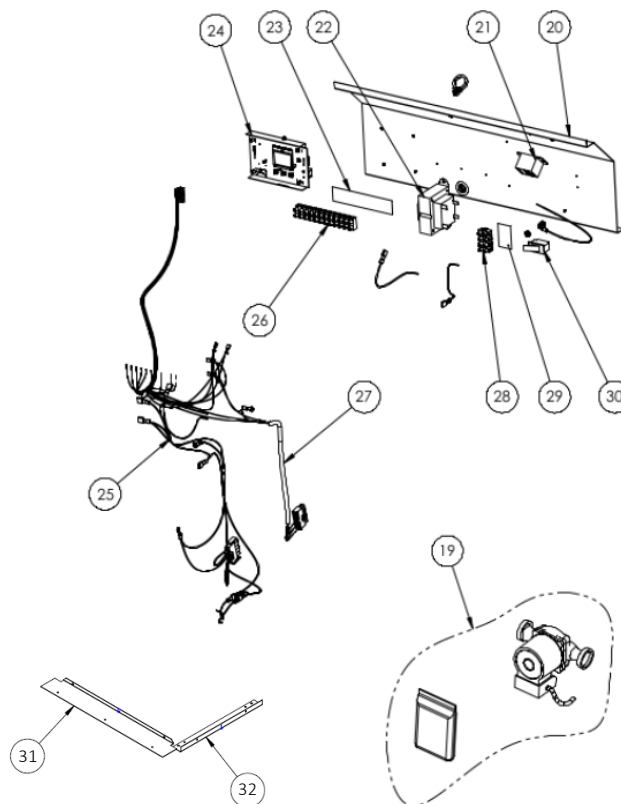
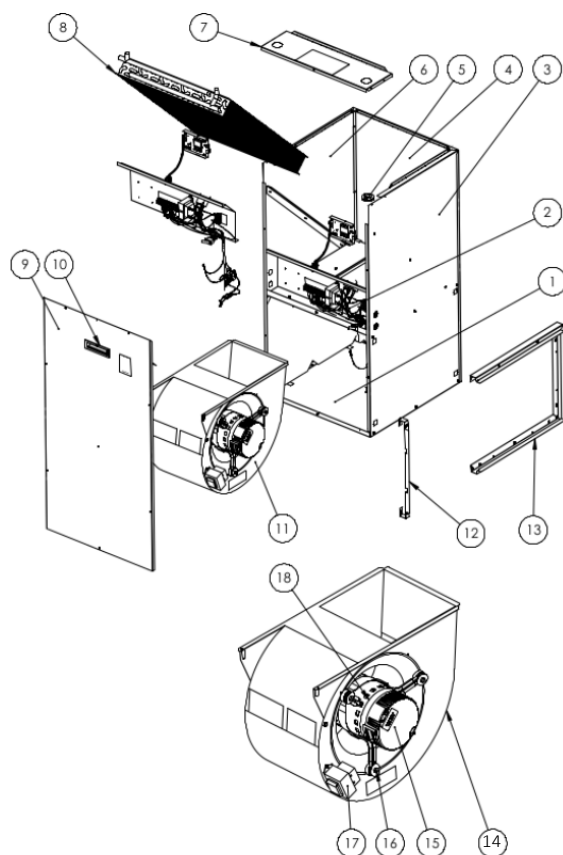
Parameter	Description
AC/HP ON	This parameter allows to set the wait time before the fan starts when a call is made on Y1 or Y2.
AC/HP OFF	This parameter allows to set the time the fan will keep running after the end of a call on Y1 or Y2.
HEAT ON	This parameter allows to set the wait time before the fan starts when a heating call is made on W1 or W2.
HEAT OFF	This parameter allows to set the time the fan will keep running after the end of a call on W1 or W2.

SYSTEM MENU

The system menu allows to modify the following parameters:

Parameter	Description
FURNACE MODEL	This parameter allows to manually select the model of the unit. This parameter must be used when the control board is replaced. This is to be set as CAH050E.
RESET SYSTEM	Reinitialize all the user modifiable parameters to their factory default.

8.5 Parts List



Item #	Part Number	Description
1	609000064	FLOOR PANEL
2	609000065	BLOWER SEPARATOR ASSEMBLY
3	609000066	RIGHT PANEL ASSEMBLY
4	609000067	BACK PANEL ASSEMBLY
5	609000068	THRU PIPE GROMMET
6	609000069	LEFT PANEL ASSEMBLY
7	609000070	TOP PANEL
8	607000034	HEATING COIL
9	609000071	DOOR PANEL ASSEMBLY
10	609000072	BLACK RECESSED HANDLE
11	608000032	BLOWER ASSEMBLY (including blower, motor and support)
12	609000073	FILTER RACK END
13	609000074	FILTER RACK FRAME
14	608000033	BLOWER
15	605000045	MOTOR 3/4 HP

Item #	Part Number	Description
16	609000075	SCREW TEKS WSH #8-18 X 1/2
17	605000046	CAPACITANCE
18	609000076	LEG AND BELLY BAND ASSEMBLY
19	607000035	PUMP KIT
20	605000047	CONTROL PANEL
21	605000048	24V RELAY
22	605000049	TRANSFORMER
23	609000077	CONTROL TERMINAL LABEL
24	605000050	REPLACEMENT CONTROL LABEL
25	605000051	ELECTRICAL POWER HARNESS
26	605000052	CONTROL HARNESS
27	605000053	CONTROL TERMINAL
28	605000054	POWER TERMINAL
29	609000078	POWER TERMINAL LABEL
30	609000079	DOOR SWITCH
31	607000036	COIL ADAPTER
32	607000037	REAR COIL ADAPTER

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