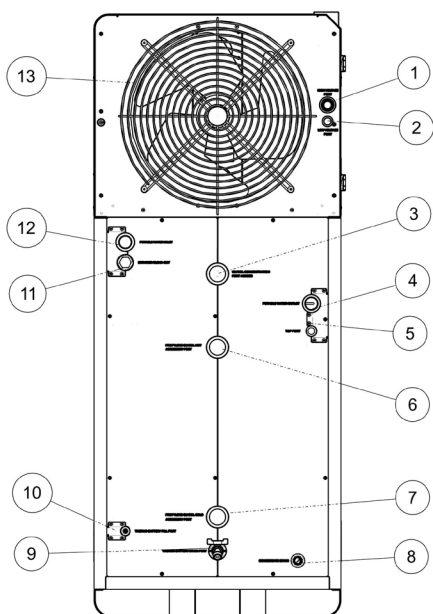


3. Technical Specifications

3.1 Specifications Chart

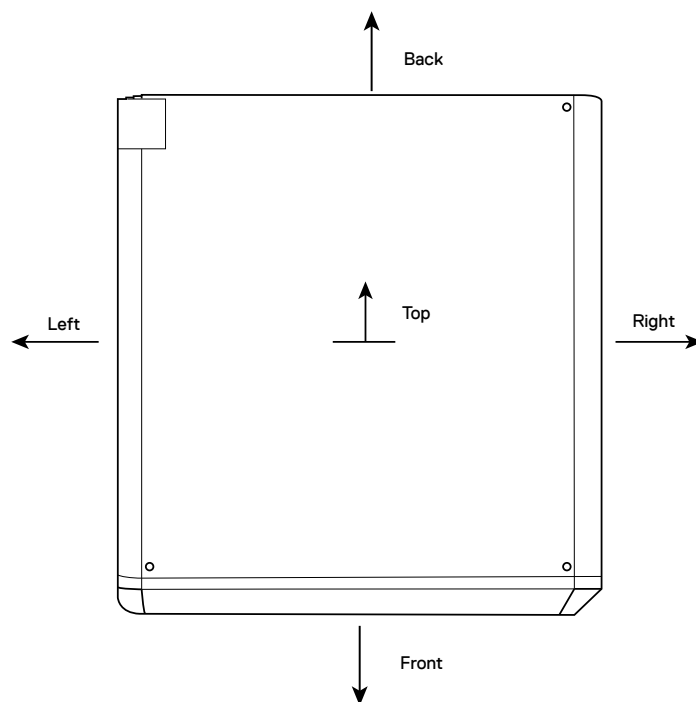
Technical Data	iE1 Std	iE1 Mid	iE1 Max
Type	Indoor / Outdoor, Floor Mounted		
Power Source	Electric		
Supply Input Voltage	208 V AC, 60 Hz, 1Ph	208 V AC, 60 Hz, 3Ph	
Number of Wires	4 Wires (L1, L2, N and G)	5 Wires (L1, L2, L3, N and G)	
Electric Input, kW	3.4	9.4	15.4
Heating Output (BTU/Hr)	Up to 57,000	Up to 77,000	Up to 97,000
Current, FLA (Amps)	16.6	45.4	49.8
Minimum Circuit Ampacity, MCA (Amps)	20.8	49.6	54.1
Minimum Recommended Circuit Breaker (Amps)	25	50	60
Maximum Overcurrent Protection, MOP (Amps)	35	70	90
Resistive Heating Elements	0	1 (6 kW)	2 (2 x 6 kW)
COP	Up to 4.9 (without Heating Elements)		
Compressor Type	Rotary		
Safety Devices	Pressure Switch, and Overheat Protection		
Ambient Installation Temperature	-10° to 110°F		
Air Flow Requirement	2500 CFM		
Outlet Water Temperature Range	100°F to 170°F		
Temperature Stability	+/- 4°F		
First Hour Rating†	154 Gallons	199 Gallons	244 Gallons
Connectivity	Cellular and Bluetooth		
Operational Modes	Efficiency, Hybrid, Electric, Self-learning		
Grid Connectivity	Via CTA-2045 module (customer supplied)		
Refrigerant	R744, CO2 refrigerant		
Refrigerant Charge Quantity	3.96lbs (1.8 kg) Max		
Refrigerant Max Allowable Pressure	2175 PSI (15 MPa)		
Cascading Protocol	Masterless, Up to 6 units		
Noise Level	Up to 55 dBA		
Domestic Water Heat Exchanger	Stainless Steel, 316L		
Energy Storage	Water-Propylene-Glycol based Thermal Battery		
Water Inlet & Outlet Connections	1-1/2” NPT Female		
Unit Dimensions H X W X D	72 in X 30 in X 30 in		
Shipping Weight	880 lbs		
Unit Weight	758 lbs (with 5 gallons glycol), 1150 lbs (thermal battery full)		
Water Pressure Min / Max	30 PSI (0.21 MPa) / 150 PSI (1.03 MPa)		
CLEARANCES			
Back	24”		
Front	30”		
Top	30”		
Sides	12”		
Certifications	Energy Star, NSF 372, UL 60335-2-40, CSA C22.2 and CTA-2045		
Warranty	1 Year on Parts and Compressor, 3 Years on Thermal Battery		
Note: Due to Intellihot’s policy of continuous product improvements the design and technical specifications are subjected to change without notice.			

3.2 Nomenclature



Item No.	Nomenclature	Comments
1	High voltage Port	Power lines are routed from here to the terminal block. Refer to section 7
2	BMS, low voltage port	Low voltage BMS signal connection.
3	Glycol Concentration Sensor	Access point for Glycol concentration sensor also used to refill glycol.
4	Hot water outlet Port	Refer to section 6.0 for Hot water pipe installation
5	Pressure Relief valve port	Refer to section 6.0 for Pressure Relief valve installation
6	Glycol Hot Accessory Port	This port used with new unit glycol filling. Refer to section 6.0
7	Propylene Glycol Cold Accessory Port	
8	Condensate Drain	Refer to section 6.0 for Condensate Drain installation
9	Thermal Battery drain valve	
10	Thermal Battery Fill Port	This port is connected to water inlet with a dual check valve. Refer to section 6.0
11	Water Inlet strainer clean out port	Refer to maintenance section 10 for strainer clean out procedure
12	Cold Water inlet port	Refer to section 6.0 for Cold water pipe installation
13	Fan	Refer to maintenance section 10 for fan maintenance

3.3 Service Clearance Requirements

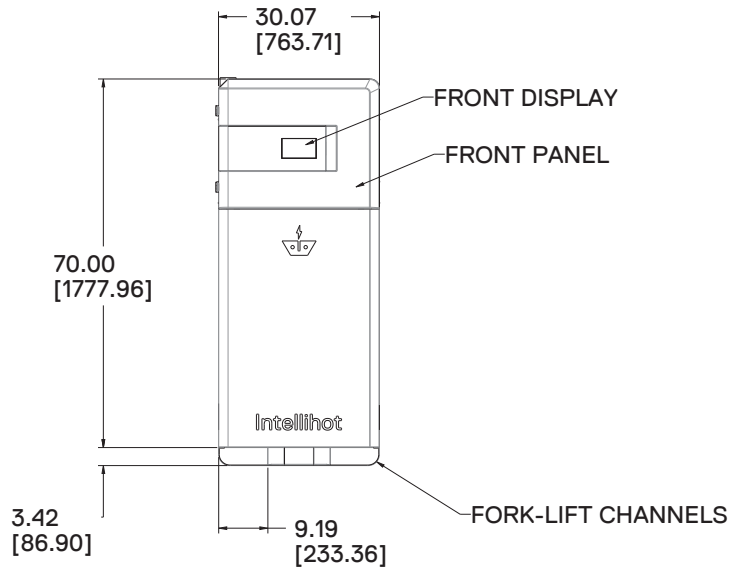
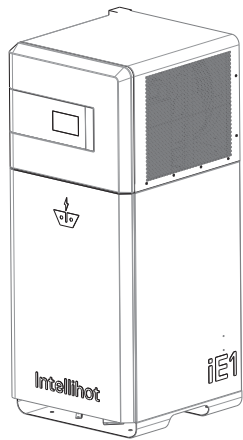


Location	Required Service Clearance
Top	30" (76.2 cm)
Back	30" (76.2 cm)
Sides	30" (76.2 cm)
Front	30" (76.2 cm)
Bottom	0" (0 mm)

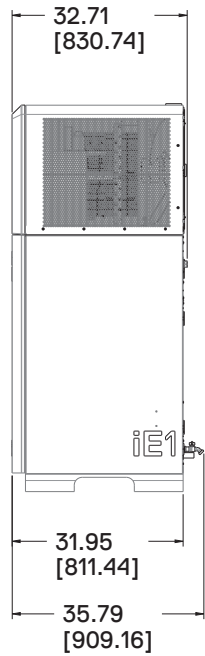
3.4 Connection Specifications

Description	Specification
Water Inlet Connection	1-1/2" NPT Female
Water Outlet Connection	1-1/2" NPT Female
Condensate Drain	3/4"
Power Supply	iE1 Std = 208 V AC, 60 Hz, 1Ph iE1 Mid = 208 V AC, 60 Hz, 3Ph iE1 Max = 208 V AC, 60 Hz, 3Ph

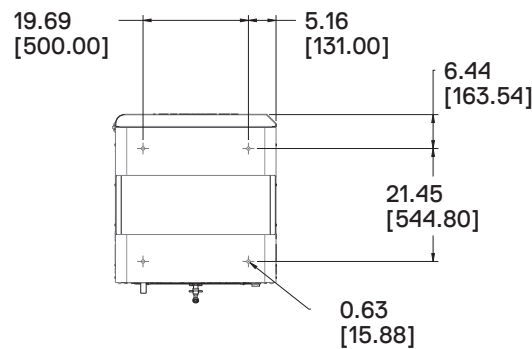
3.5 Overall Dimensions



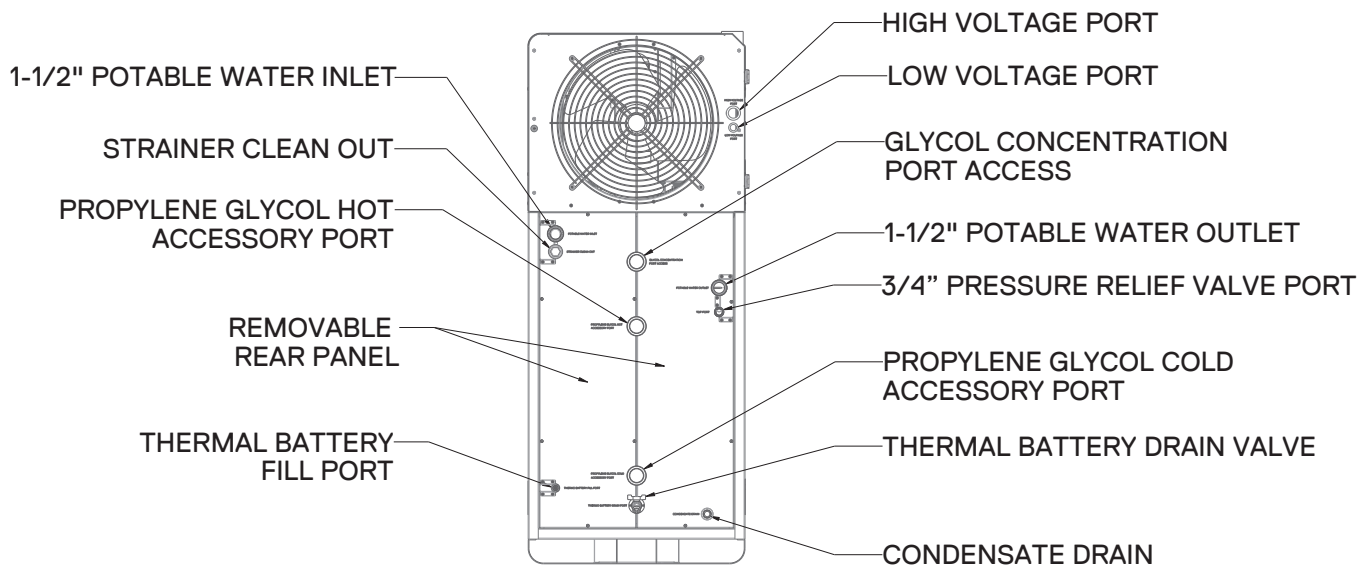
FRONT VIEW



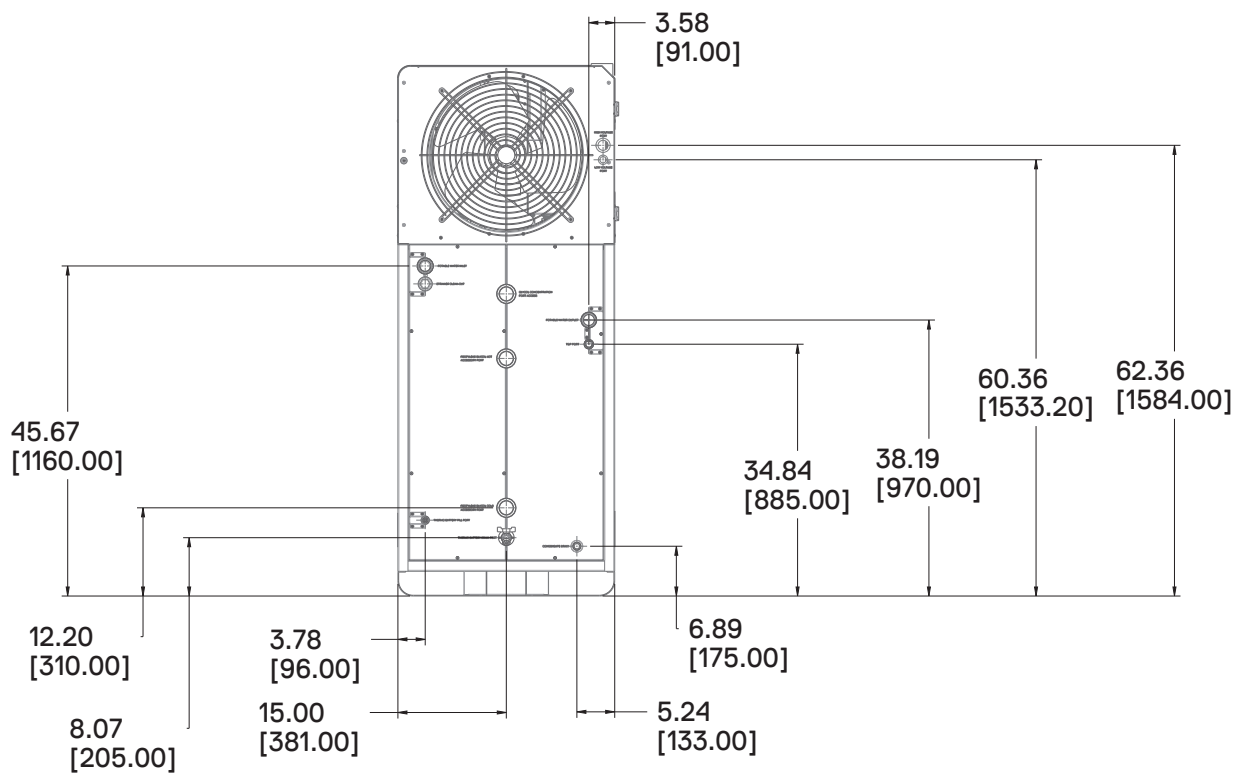
SIDE VIEW



BOTTOM VIEW



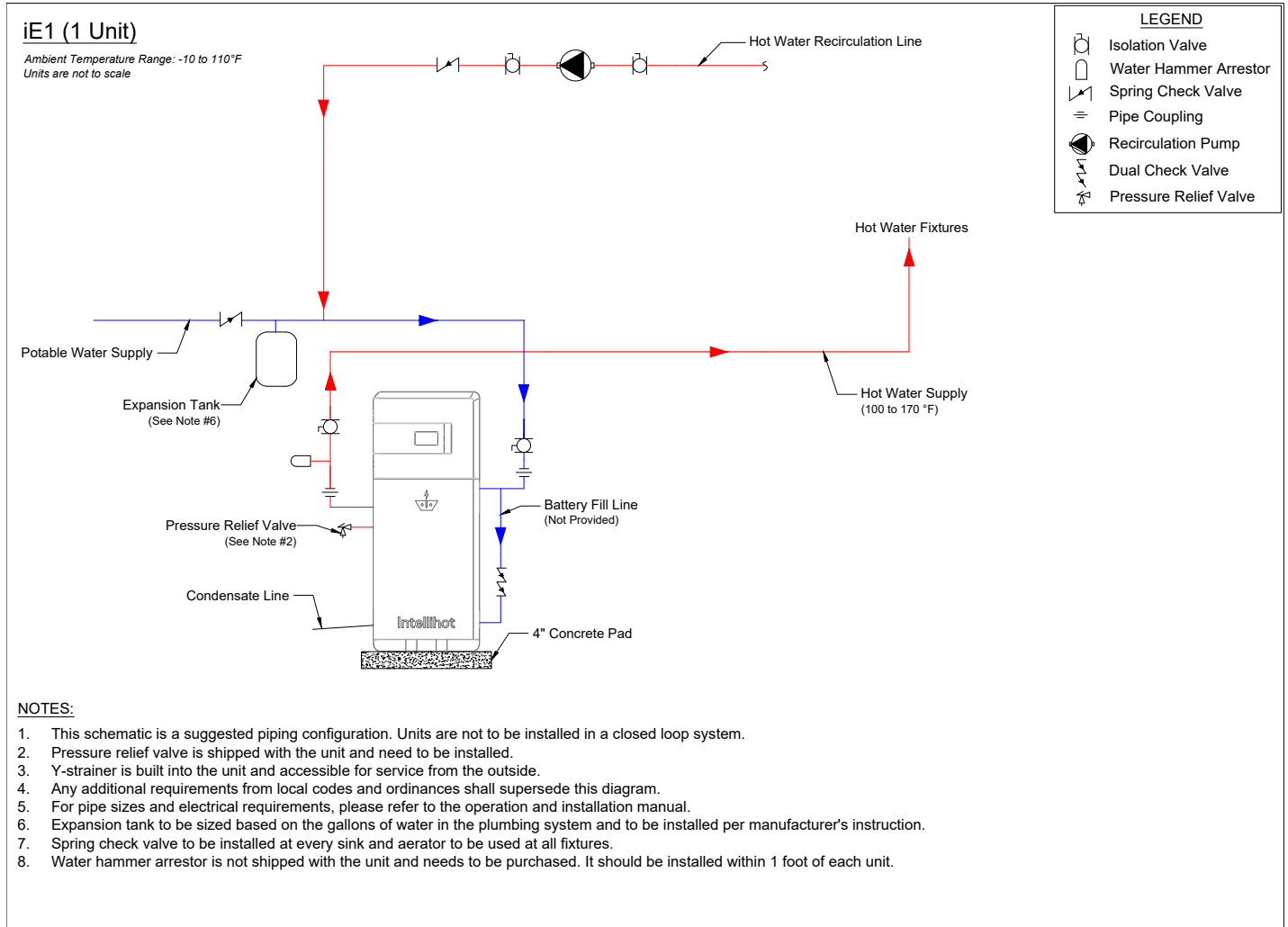
REAR VIEW



REAR VIEW

3.6 Configuration Options

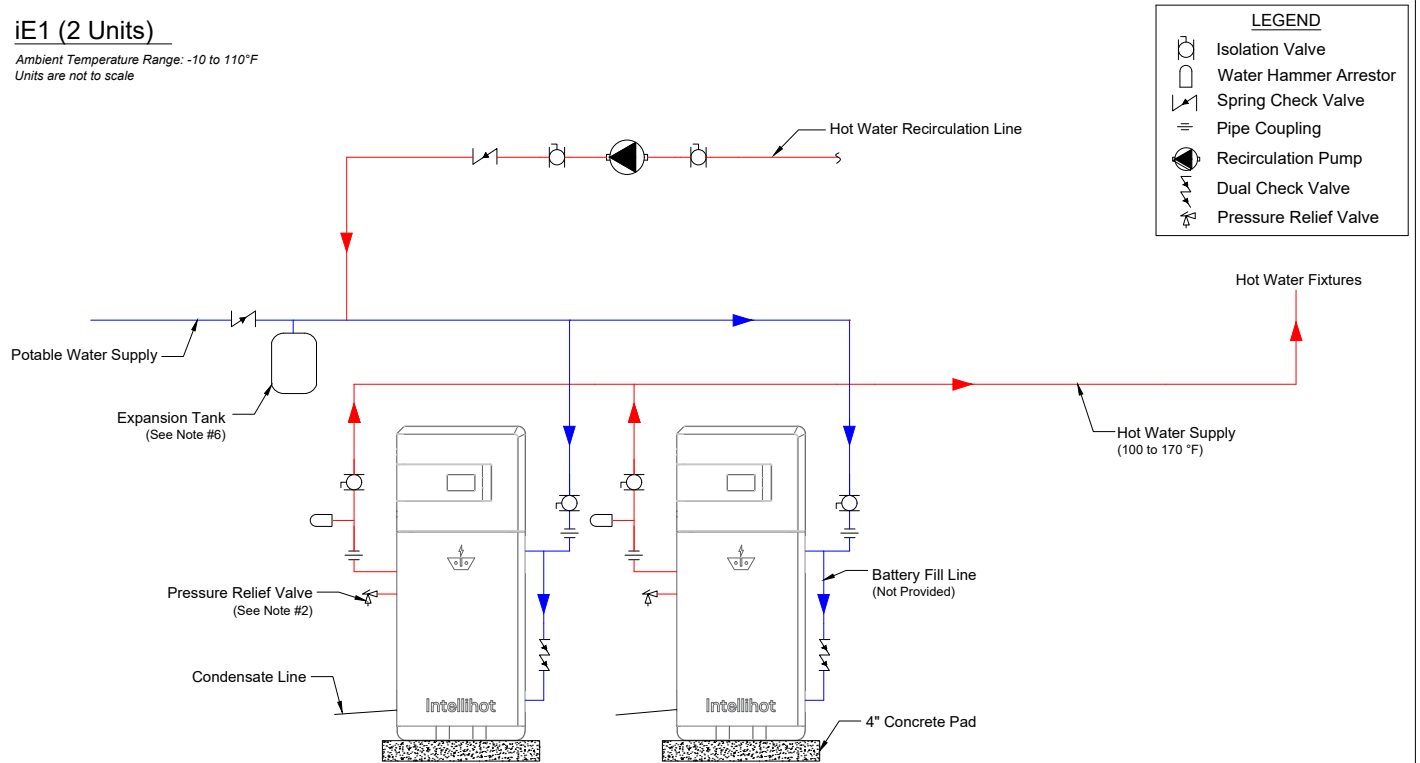
3.6.1 iE1 1 Unit Configuration



3.6.2 iE1 2 Units Configuration

iE1 (2 Units)

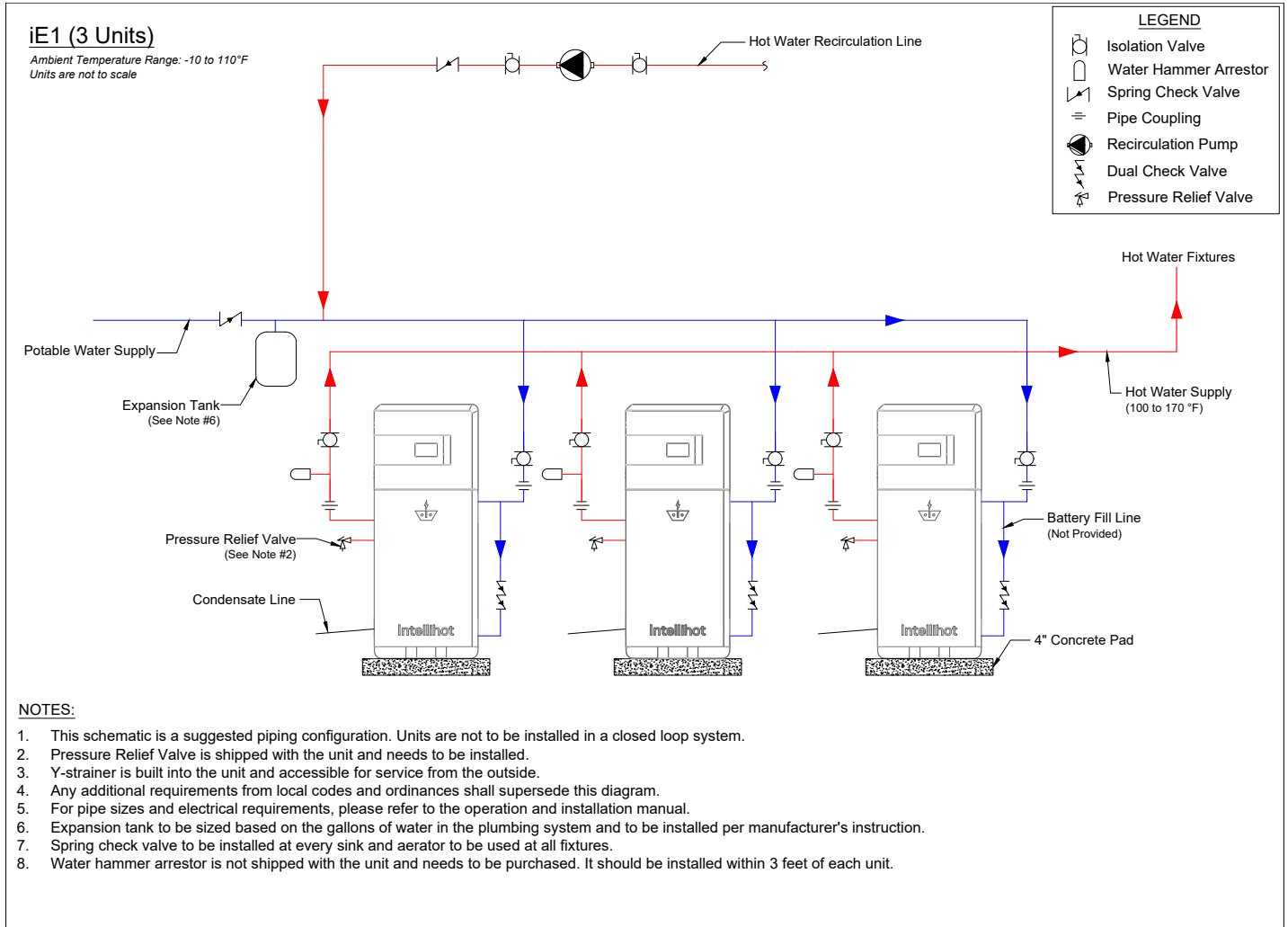
Ambient Temperature Range: -10 to 110°F
Units are not to scale



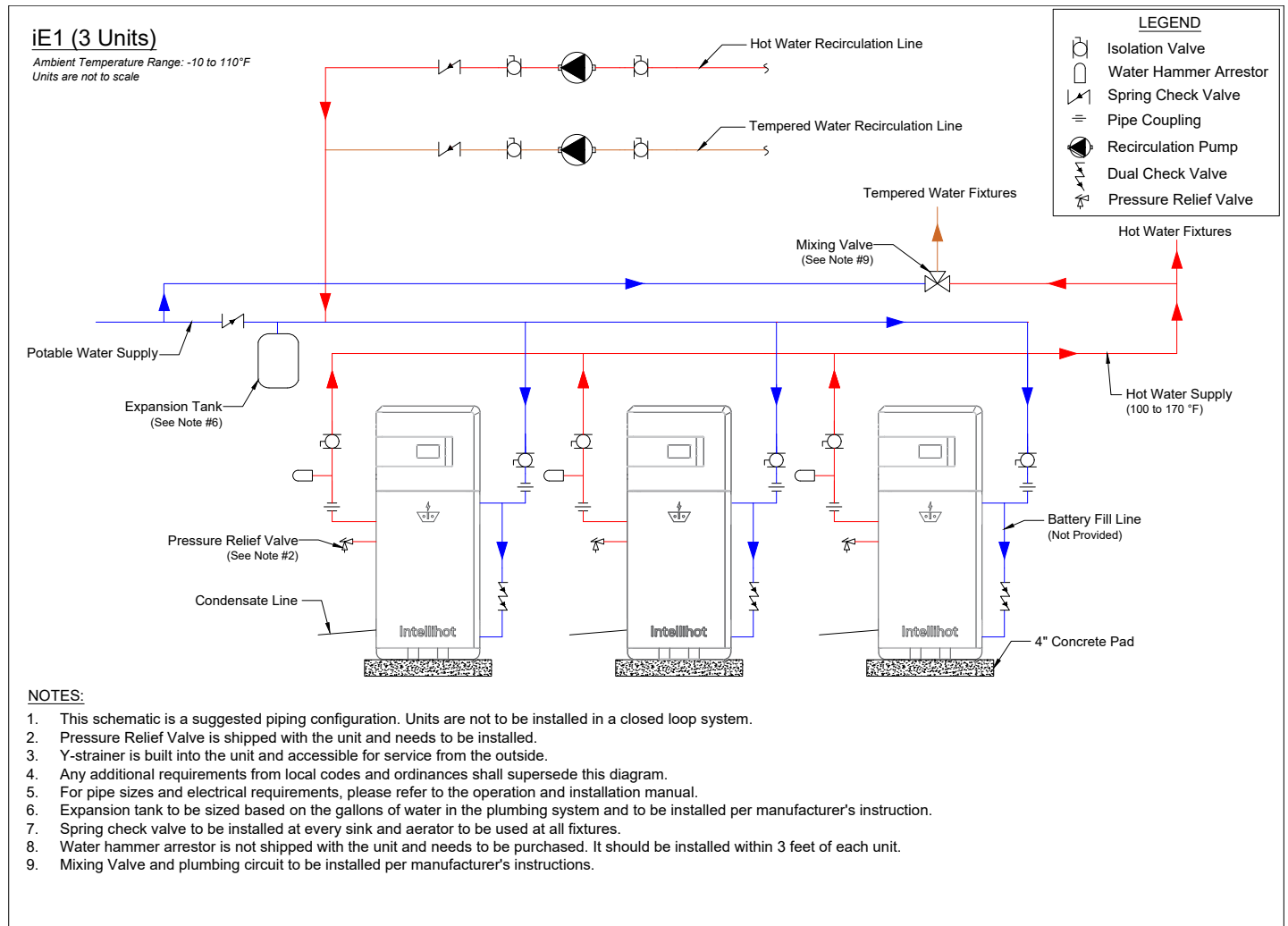
NOTES:

1. This schematic is a suggested piping configuration. Units are not to be installed in a closed loop system.
2. Pressure relief valve is shipped with the unit and need to be installed.
3. Y-strainer is built into the unit and accessible for service from the outside.
4. Any additional requirements from local codes and ordinances shall supersede this diagram.
5. For pipe sizes and electrical requirements, please refer to the operation and installation manual.
6. Expansion tank to be sized based on the gallons of water in the plumbing system and to be installed per manufacturer's instruction.
7. Spring check valve to be installed at every sink and aerator to be used at all fixtures.
8. Water hammer arrestor is not shipped with the unit and needs to be purchased. It should be installed within 1 foot of each unit.

3.6.3 iE1 3 Units Configuration



3.6.4 iE1 3 Units Configuration with Mixing Valve



4. Quick Reference Installation Guide

4.1 Install the Water Heater

1. The installation must conform with these instructions and the local code authority having jurisdiction and the requirements of the power company. In the absence of local codes, the installation must comply with the latest editions of the National Electrical Code, NFPA 70 or the Canadian Electrical Code CSA C22.1.
2. This installation requires Plumbing and electrical work. A qualified service provider is required.
3. In California, this water heater must be braced or anchored to avoid falling or moving during an earthquake.
4. Massachusetts Code requires this water heater to be installed in accordance with Massachusetts 248-CMR 3.00:
5. If after reading this manual you have any questions or do not understand any portion of the instructions, call the number listed on the back cover of this manual for technical assistance.
6. This unit shall be brought into the installation room, with the unit standing up. Please refer to section 5.1 Unit transportation for additional details.
7. Select an installation location, for an interior or exterior location refer to section “5. Preparation Before Installation” on page 17.
8. Please make sure the clearance around the unit is met or exceeded as per section “3.3 Clearance Requirements” on page 9
9. Check the quality of the water to determine if additional water treatment would be beneficial to the function and efficiency of the water heater. For additional information refer to section “5. Preparation Before Installation” on page 17.
10. Make all necessary water connections. For additional information refer to section “6. Water Connections” on page 20. Make sure shut-off valves are included on the water inlet and water outlet.
11. Make all necessary electrical connections as per section “7. Electrical Power” on page 23
12. If connecting multiple units together, refer to “9. Multi-unit Setup” on page 36.
13. Fill out the Warranty Card and return it to Intellihot.
14. For a copy of the card go to “13. Warranty” on page 55.

4.2 Startup Instructions

NOTICE

Before the initial startup operation of the iE1 Electric Water Heater, make sure to bleed all the air that is present in the water lines. Please see “6. Water Connections” on page 20.

CAUTION

Do not startup the water heater if there is no supply of water to the water heater.

- The inlet water shut-off valve and the outlet water shut-off valve must be in fully open position to release any air trapped inside the water lines of the water heater.
- Make sure to gradually supply water through the water inlet. Rapid supply of water through the water inlet may cause damage to the water heater

1. If the unit is brought into the room laying down, it must sit idle standing up for 48 hours before turning it ON. Please refer to section 5.1

2. Please refer to “3.2 Nomenclature” on page 9 to identify and locate the items mentioned in the below instructions.
3. Open the outlet water shut-off valve fully.
4. Gradually open the inlet water shut-off valve to allow the water to slowly flow through the water lines of the water heater. Please see Section 6.0 “Water Connections” on page 16.
5. Gently lift the lever of the T&P valve and push it all the way up to release any air present in the water lines of the water heater.
6. Close the outlet water shut-off valve
7. Turn ON the water heater.

NOTICE

The display screen will switch on and display the progress of charging the thermal battery and the water filling through the thermal battery fill port. The charging time may vary between 45 minutes to 2 hours.

CAUTION

Make sure the outlet water shut-off valve is closed until the thermal battery is fully charged and the water in the thermal battery of the water heater is filled.

8. Gradually open the outlet water shut-off valve to allow hot water to flow out from the water lines of the water heater. Please see “6. Water Connections” on page 20
9. The water heater is ready for use.
10. If any error code appears on the display screen, please refer to “11.3 Troubleshooting Guide” on page 46.

5. Preparation Before Installation

Before the installation of the water heater, please read the manual carefully to take all the necessary precautions.

5.1 Unit transportation

1. This unit has a compressor with compressor oil pre-filled. Also, it is shipped with 5 gallons of glycol pre-filled.
2. Please stop and reject the shipment if the unit is received with the Tip N Tell filled with blue.



Caution: Unit is not Tipped



Caution: The unit is Tipped

3. It is required bring the unit to the installation room with the unit standing up. This will allow the compressor oil and the glycol to stay intact

5.2 Selecting an Installation Site

4. Select an applicable indoor or outdoor location for the installation. Each installation is unique; therefore, take the time to find the best location for your water heater.
5. In case of outdoor installation, please refer to section "5.2 Outdoor Installation" on page 18

NOTICE

If there is not outside air circulation in the room, the heat pump will emit cold air and may cause the room temperature to become colder.

Important: The water heater must have unrestricted airflow.

! WARNING

The water heater should be in an area where leakage of the connections will not result in damage to the area adjacent to the heater or to lower floors of the structure.

6. Install the water heater close to water inlet, water drain outlet and other water connections. Please refer to section "6. Water Connections" on page 20.
7. To minimize the length of water pipes used in plumbing connections, install the water heater near locations that use hot water, such as bathroom, kitchen, or laundry room faucets. Please refer to section "6. Water Connections" on page 20
8. Make sure to select the location of the unit that minimizes the length of electrical connections. Please refer to section "7. Electrical Power" on page 23.
9. If the distances are long or if the faucet or appliance requires "instant" hot water, we recommend running a recirculation line back to the water heater from the farthest fixture.
10. Make sure the unit is not located in a busy location and is located away from foot traffic.

NOTICE

Make sure the installation location must be free from any corrosive elements in the atmosphere such as sulfur, fluorine, and chlorine. In addition, excessive dust and lint affect the operation of the unit.

⚠ WARNING

Water heaters are heat producing appliances. To avoid damage or injury, there shall be no materials such as dust, debris, chemical agents, or other flammable materials like gasoline or paint stored or kept around the water heater unit location.

11. Allow sufficient clearances for the service and maintenance access to water inlet, water outlet and the drain connections of the water heater. Please refer to the “6. Water Connections” on page 20 for allowable clearances
12. The water heater produces non-acidic condensate water similar to an air conditioner’s condenser water. This condensate water is safe to drain without using any neutralizer. Please check with local plumbing code for the proper drainage of this condensate water.
13. If the water heater will be installed where the ambient temperature could fall below freezing temperature it is recommended to insulate all the piping connection to protect the water inlet, water outlet, condensate and all other water connections from freezing.

⚠ WARNING

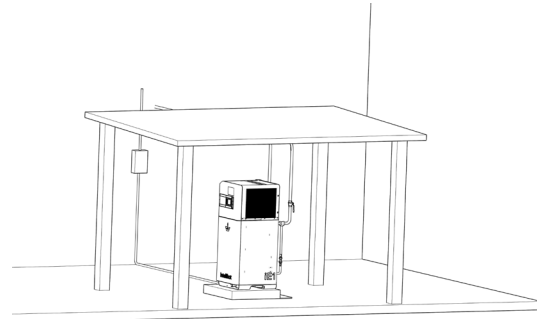
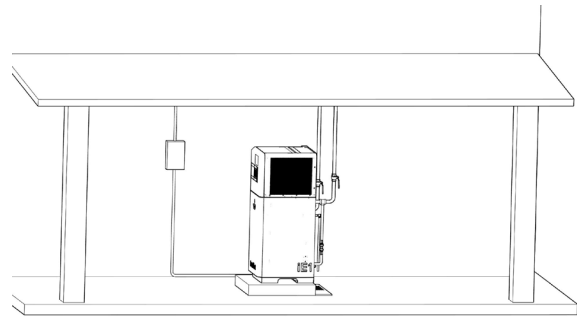
During extremely cold weather conditions and if there is a power failure, make sure to:

- Turn OFF the water heater
- Close the water inlet and outlet shut-off valves and drain the unit completely.
- Drain the thermal battery by using the thermal battery drain valve

During extremely cold weather conditions and in case of a power failure, the water inside the water heater may freeze and cause damage to the water heater. Damage caused by freezing water will not be covered under the warranty of this unit..

14. Check the water quality.
 - a. Proper maintenance of the water heater is required to ensure that the water meets EPA quality standards. Refer to section “13. Warranty” on page 55 for quality standard requirements and additional information.
 - b. If you suspect that your water is contaminated in any way, discontinue use of the water heater, and contact an authorized technician or licensed professional.
 - c. If the incoming water is known to have a high mineral content or “hardness” (see table below and refer to “13. Warranty” on page 55 for additional details), water treatment is recommended upstream from the water heater.

Maximum Allowable Hardness (grains per gallon, gpg)



Unit Setpoint (°F)	Incoming Water Pressure (PSI)					
	30	40	50	60	80	100
100-119°	8	15	20	25	30	30
120-139°	5	11	15	20	27	30
140-159°	4	5	11	13	18	20
160-170°	3	4	10	12	15	17

15. Make sure the location meets all building code

⚠ DANGER

requirements.

5.3 Outdoor Installation requirements

Select a suitable exterior/outdoor location to install the water heater. Please refer to “5.1 Selecting an Installation Site”

1. When installing the water heater outdoors, please follow all local plumbing and electric codes.
2. Water heater must be installed under a roof or other protective covering to protect the unit from prolonged periods of heavy precipitation
3. **Insulate:** If the water heater will be installed where the ambient temperature could fall below freezing, it is required to insulate all the piping connections to protect the water inlet, water outlet, condensate, and all other water connections from freezing. Install heat trace to protect the pipes from freezing.
4. **Air Ventilation:** The water heater must be installed in an area with sufficient atmospheric air ventilation in all directions.
5. **Snow Clearances:** Allow sufficient ground clearances to accommodate winter-time snow buildup around the unit.

6. **Maintenance Clearances:** Allow sufficient clearances for the service and maintenance access to the water inlet, water outlet, and drain connections of the water heater. Please refer to the section “3.3 Clearance Requirements”.
7. **Plumbing Connections:** Make sure to perform all the necessary plumbing connections as shown in Section “6. Water Connections”
8. **Electrical and Grounding Connections:** Make sure to perform all the necessary electrical and grounding connections as per Section “7. Electrical Power”
9. Except for maintenance, the iE1 door must always be closed and locked. Failure to do so could cause water leaks, electric shock, and damage to the internal components. The warranty does not cover this.
10. **Maintenance:** Outdoor installations are more prone to debris buildup on the fan guard. An appropriate maintenance schedule is required..
11. Two example outdoor installations are shown below.

CAUTION

Grounding Requirement

This water heater must be grounded in accordance with the National Electrical Code and/or local codes. These must be followed in all cases. Failure to ground this water heater properly may also cause erratic control system operations, and incorrect water temperatures..

Except for maintenance, the iE1 door must always be closed and locked. Failure to do so could cause water leaks, electric shock, and damage to the internal components. The warranty does not cover this.

WARNING

This unit should not be operated by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction. Children should be supervised and should not to play with the unit.

5.4 Room Size Requirements

This is an air source heat pump water heater and uses heat from the surrounding air. During peak operation, the heat pump will move ~60,000 BTU/h of heat from the room to the thermal battery (2500 CFM). The room must be sized appropriately with sufficient make up air.

If the ambient air temperature in the installed location drops more than 10°F (5°C) in one hour, the air circulation is insufficient and could result in reduced water heater efficiency and performance.

6. Water Connections

⚠ CAUTION

A licensed plumber or professional service technician must install this water heater. Installation by unqualified person(s) voids the warranty

NOTICE

Since each installation is different, it is up to the installer to route the water lines efficiently. The drawings shown here are suggestions indicating the items needed for the installation only.

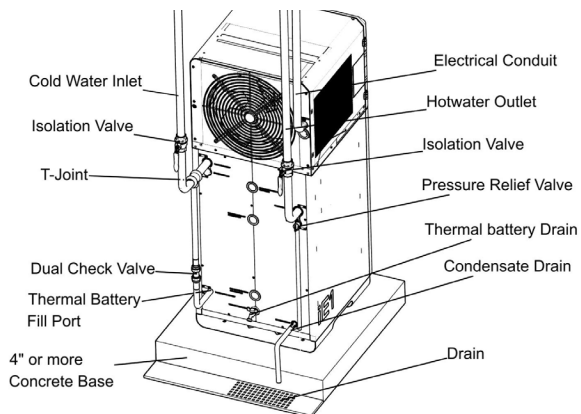
A water-hammer arrestor shall be installed where quick-closing valves are utilized. The Water-hammer arrestors shall be installed per the water-hammer arrestor manufacturer's instructions.

⚠ CAUTION

Do not over tighten any fittings or connections as damage may occur, and may cause internal or external leakage. Follow the instructions given in this manual carefully to avoid any damage to the water heater, fittings, or connections.

6.1 Quick Reference Installation

Instructions



Install the water heater on a concrete base with a minimum height of 4 inches from the floor and connect various connections as shown in the above figure.

Fill Glycol

1. Place the water heater at the selected installation location.
2. The thermal battery is pre-filled with 5 gallons of glycol. If additional glycol is included with the shipment, please follow section 6.5 to fill the glycol to the thermal battery.

Hot Water Outlet Connection

3. Connect the hot-water outlet.
4. Install an isolation valve to the hot-water outlet

Cold Water Inlet Connection

5. Connect the cold-water inlet.
6. Install one end of a T-joint to the cold-water inlet pipe.
7. Connect a pipe and install a dual check valve between the other end of the T-joint and the thermal battery fill port.
8. Connect a pipe and install an isolation valve to the last end of the T-joint.

Pressure Relief Valve Installation

9. Install the pressure relief valve (included with the water heater) to the Pressure Relief valve port.
10. Follow the local plumbing code to route the Pressure relief valve discharge line.

Drain Pipe Connections

11. A drain valve is already pre-installed with the water heater.
12. The drain valve accepts the garden hose connection. An additional drain connection could be added to the drain valve to route it to the floor drain.

⚠ CAUTION

Any air trapped inside the water lines cause damage to the water heater. Make sure the isolation valves at the hot-water outlet pipe and cold-water inlet pipe are in fully open position to release any air trapped inside the pipes lines or the water heater.

Make sure to gradually supply water through the cold-water inlet. Rapid supply of water can cause damage to the water heater.

13. After the installation is completed, open the hot water outlet isolation valve fully. Then, open the isolation valve at the cold-water inlet to gradually fill water in the water heater..

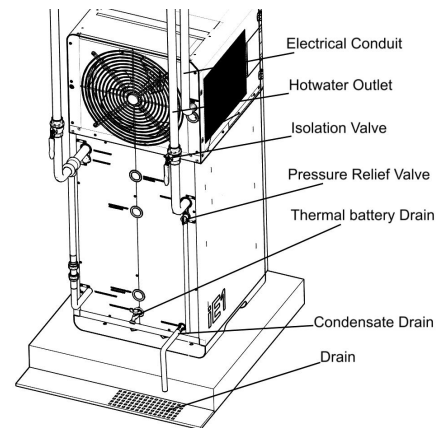
NOTICE

Make sure there is continuous water flow in the connections of all the water pipelines connected to the water heater.

Make sure there are no leakages found in the joints and connections of all the water pipe lines connected to the water heater.

14. Open the nearest faucet or sink connected to the water heater and continue to drain the water until there is no air trapped inside the water pipelines connected to the water heater.

6.2 Hot Water Connection



1. Install and connect the hot water pipe lines as shown in the above figure.

NOTICE

The hot water pipes should be as short as possible to reduce heat loss and supply hot water to the fixtures quickly.

⚠ WARNING

Only materials such as pipes, fittings, valves, solder, etc., that are approved for use in potable water systems must be used to prevent adverse health issues.

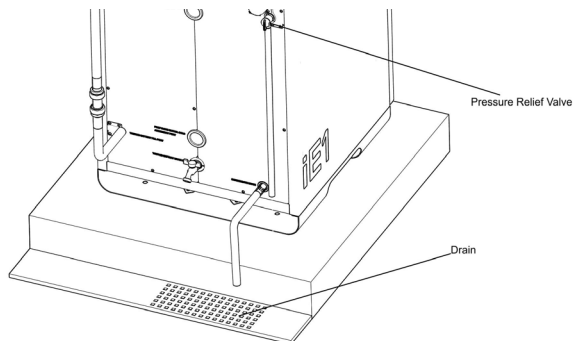
2. Connect a 1-1/2" NPT coupler to the water heater's hot-water outlet port.
3. Install and connect the hot water outlet pipe to the 1-1/2" NPT coupler.
4. Install a T-joint and connect one end of the T to the thermal battery fill port with a double check valve in the middle (as shown).
5. Install a 1-1/2" union connection.
6. Install a 1-1/2" manual shut- off valve with 1-1/2" NPT fittings.

⚠ WARNING

Please don't install any shut-off device between the water heater and the pressure relief valve to prevent serious personal injury. This valve is designed to release abnormally high pressure within the water heater in case of a system problem.

The supplied pressure relief valve must be used and installed. Please don't install any restrictions or other valves before the pressure relief valve.

7. Install the supplied 3/4" 150 PSI maximum pressure relief valve in the designated pressure relief valve port.
8. Please follow the local plumbing code to route the discharge pipe. The picture below shows discharge pipe routed within six inches of the floor and directed away from walkways or other appliances.



CAUTION

Do not use any reducers in the outlet pipe. Do not install any valves, restrictions, elbows, or other blockages in the outlet pipe.

NOTICE

If multiple water heaters are being installed, the diameter of both the main cold-water pipes and the main hot water pipes need to be sized by an engineering professional.

9. For multiple unit installations only: The pressure relief valve discharge pipes must not be connected together with another unit's pressure relief valve discharge pipe. Each discharge pipe must be routed separately.

10. Follow the local building codes to connect the water heater pipelines to the building's hot water pipe connections as required.
11. If this is an outdoor installation, install heat trace around the exposed pipes to prevent freezing.

NOTICE

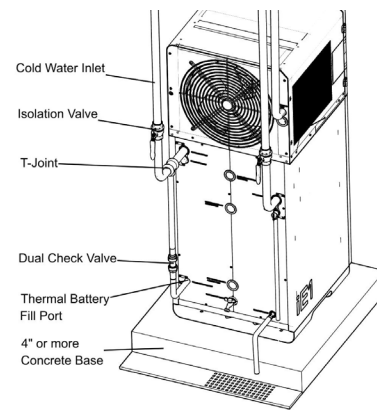
To conserve energy, insulate all hot water pipes and recirculation pipes.

SAFETY INSTRUCTIONS

Do not insulate the pressure relief valve.

12. Make sure to purge all the air from the water lines.
13. Test the water pipes for any leakage. Repair any leaks immediately.

6.3 Cold Water Connection



WARNING

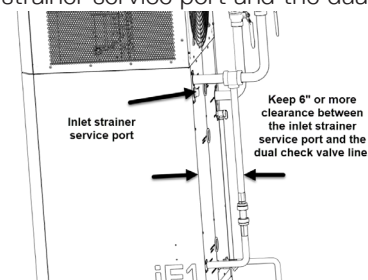
Only materials such as pipes, fittings, valves, solder, etc., that are approved for use in potable water systems must be used to prevent adverse health issues.

SAFETY INSTRUCTIONS

If the incoming water is known to have a high mineral content or "hardness" (See "13. Warranty"), hardness treatment is required upstream from the water heater.

When the water heater is installed in a closed loop recirculation system, and if the cold water supply pipe has a backflow preventer, an expansion tank should be installed to allow for water expansion. The expansion tank should be sized to match the application.

1. Install and connect the hot water pipe lines as shown in the above given figure.
2. Connect a 1-1/2" NPT coupler to the water heater's cold water connection.
3. Install a T and connect one end of the T to the Thermal Battery fill port with a dual check valve in the middle. Please keep 6" or more clearance between the inlet strainer service port and the dual check valve line.



4. Install a 1-1/2" union connection.
5. Following local building codes, install a 1-1/2" manual shut-off valve with 1-1/2" NPT fittings.

NOTICE

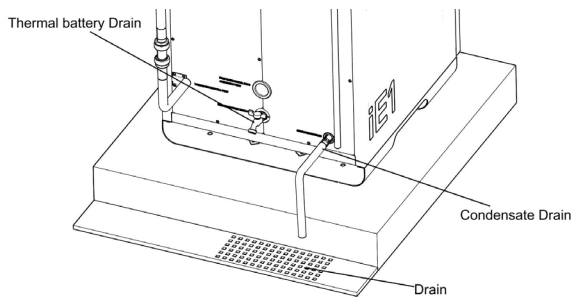
Isolation valve kits can be used if incoming water treatment is anticipated (such as a water softener) due to hardness levels or heavy usage of the unit.

- If this is an outdoor installation, install heat trace around the exposed pipes to prevent freezing.
- Make sure the water heater is turned OFF and release the water to drain until there is no air trapped inside the water pipe lines of the water heater.
- Test the water pipes for any leakage. Repair any leaks immediately.

6.4 Condensate Drain Connection

SAFETY INSTRUCTIONS

Do not drink the condensate water. The condenser of the water heater produces condensate (water) as a normal by-product of heating the water. It is advised to send this water to the drain.



- Connect and Install a 3/4" hose to the hose connection on the water heater as show in the above figure and route it to the drain.
- If this is an outdoor installation, install heat trace around the condensate drain pipe to prevent freezing. As a reminder, all external pipes must be protected by heat trace to prevent cold weather freezing.
- If required connect discharge pipe from the thermal battery drain valve to the floor drain. The thermal battery drain valve accepts garden hose thread connection. If this is an outdoor installation, install heat trace around the drain pipe to prevent freezing.

NOTICE

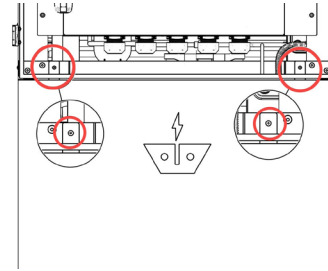
It is recommended to have a drain of sufficient size to accommodate accidental pipe breaks and other various leaks that could occur due to normal wear and tear. The manufacturer will not be responsible for any damage resulting from leaking if adequate drainage is not provided.

6.5 Glycol Fill procedure

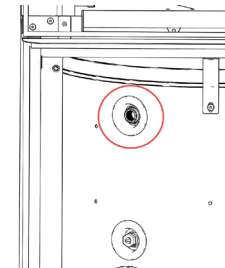
SAFETY INSTRUCTIONS

This process requires two persons. Five gallons glycol weighs about 45 lbs.

- If unit is powered ON, power OFF the unit at the breaker.
- If the unit was previously running, then drain the tank by using the drain valve at the back of unit. Drain only the amount equal to glycol that we will refill in.
- Open the front door.
- Remove two screws for the bottom front panel shown below.



- Lift up and remove the panel
- Open the Glycol fill port as shown below



- Attach the funnel and pour the glycol slowly into the thermal battery. Please exercise caution as two persons may be needed to lift up 5 gallons.



- Pour all the glycols included with the shipment; do not leave anything aside.
- Attach the plug and tighten it
- Install the front bottom panel. Close the front door.
- When the unit starts for the first time, observe and any leaks that may appear due to loose connection.

7. Electrical Power

7.1 Electrical Requirements

WARNING



Electrical Shock Hazard - Do Not Touch

- Turn OFF power to the water heater at the connected branch circuit before the installation and servicing to avoid any personal injury caused due to electric shock.
- Make sure to label all the wires before installation of the water heater. Wiring errors may cause improper and dangerous operation to the water heater and may cause personal injury or death due to electric shock.
- To avoid serious injury or death, follow all applicable local, state, and national regulations, mandates, and building codes for guidelines to install the electrical power supply. Electrical wirings are installed according with national wiring regulations.

CAUTION

- Do not supply power or charge to the water heater before the installation or servicing is completed and make sure the thermal battery is filled with water.
- After installation and servicing make sure to operate the water heater as given in “4. Quick Reference Installation Guide”

WARNING

Make sure the water heater is connected to a grounded permanent wiring system to avoid electric shock and fire.

NOTICE

Electrical code requirements are different in the USA and Canada. Refer to and follow the local building codes, the latest edition of the National Electrical Code (NFPA 70) in the USA, or the CSA C22.1 Canadian Electrical Code - Part 1.

7.2 Power Supply

CAUTION

Using the wrong voltage and/or phase may cause permanent damage to water heater components. The warranty does not cover damage from applying the wrong power supply voltage or phase.

1. iE1 is an electrically operated water heater.
2. The electrical power requirement varies between the models. Please refer to the table below.

Model	iE1 Std	iE1 Mid	iE1 Max
Power Requirements	208V, 1 Phase, 60 Hz	208V, 3 Phase, 60 Hz	

3. The voltage fluctuations should not vary more than +10% to -10%.
4. Lightning protection is necessary if the water heater is installed where it would be easily subjected to lightning strikes.

7.3 Wire Size Selection

1. Based on the iE1 model, the wire size required varies.
2. First locate the MCA value of the model that you are installing.

Model	iE1 Std	iE1 Mid	iE1 Max
MCA	20.8 A	49.6 A	54.1 A

3. The power wires of iE1 is rated for 75°C.
4. Use the **Temperature Rating Of Conductor** table to select the appropriate wire size. We recommend using the latest temperature rating of the conductor from the latest NFPA 70 or the CSA C22.1.
5. Apply temperature correction factor based on the **Ambient Temperature Correction Factor** table. We recommend using the latest Ambient Temperature Correction Factor from the latest NFPA 70 or the CSA C22.1.
6. As per NEC/CSA code, not more than three conductors in raceway, cable, or earth (directly buried), based on ambient temperature of 30°C (86°F). If more than three conductors, please apply adjustment factor as per the **Adjustment Factor** table. We recommend using the latest Adjustment Factor from the latest NFPA 70 or the CSA C22.1.

Size	Temperature Rating Of Conductor						Size
AWG	TYPES TW, UF	TYPES RHW, THHW, THW, THWN, XHHW, USE, ZW	TYPES TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	TYPES TW, UF	TYPES RHW, THHW, THW, THWN, XHHW, USE	TYPES TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	AWG
COPPER				ALUMINUM OR COPPER-CLAD ALUMINUM			
14	15	20	25				
12	20	25	30	15	15	25	12
10	30	35	40	25	30	35	10
8	40	50	55	35	40	45	8
6	55	65	75	40	50	55	6
4	70	85	95	55	65	75	4
3	85	100	115	65	75	85	3
2	95	115	130	75	90	100	2

Ambient Temperature Correction Factor				
For Ambient temperatures over 30°C, multiply the allowable ampacities specified in the ampacity tables by the appropriate correction factor shown below				
Ambient Temp (°C)	Temperature Rating of Conductor			Ambient Temp (°F)
	60°C	75°C	90°C	
31-35	0.91	0.94	0.96	87-95
36-40	0.82	0.88	0.91	96-104
41-45	0.71	0.82	0.87	105-113
46-50	0.58	0.75	0.82	114-122
51-55	0.41	0.67	0.76	123-131
56-60	-	0.58	0.71	132-140
61-65	-	0.47	0.65	141-149
66-70	-	0.33	0.58	150-158
71-75	-	-	0.50	159-167

Adjustment Factor	
For more than three current carrying conductors	
Number of Conductors	Percent of Values as adjusted for Ambient Temperature
4~6	80
7~9	70
10~20	50
21~30	45
31~40	40
41 and Above	35

7.4 Example Wire Size calculation(s)

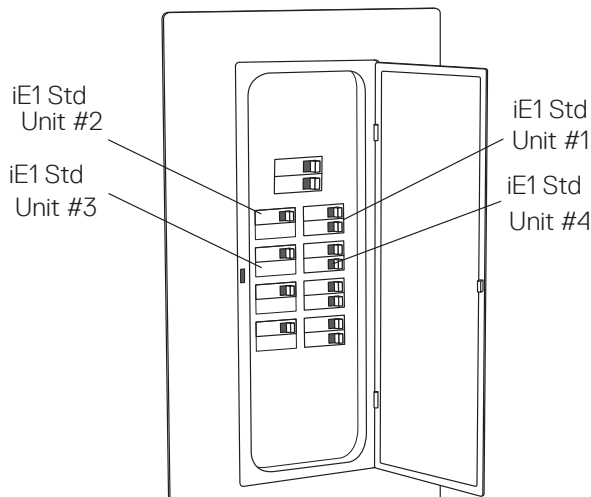
iE1 Std	iE1 Mid	iE1 Max
What size USE (copper) wire is needed to feed a 20.8 A iE1 Std? The iE1 Std will be fed through a conduit with 4 conductors and run through a room that could reach a max ambient temperature of 40C .	What size USE (copper) wire is needed to feed a 49.6 A iE1 Mid? The iE1 Mid will be fed through a conduit with 5 conductors and run through a room that could reach a max ambient temperature of 40C .	What size USE (copper) wire is needed to feed a 54.1 A iE1 Max? The iE1 Max will be fed through a conduit with 5 conductors and run through a room that could reach a max ambient temperature of 40C .
Explore the latest NEC Wire size table with Four conductors and an ambient temperature of up to 30C. We get #12AWG wire for USE Insulation type --> 25A	Explore the latest NEC Wire size table with Five conductors and an ambient temperature of up to 30C. We get #8AWG wire for USE Insulation type --> 50A	Explore the latest NEC Wire size table with Five conductors and an ambient temperature of up to 30C. We get #6AWG wire for USE Insulation type --> 65A
The customer wanted a conduit with 4 conductors, so explore the Adjustment Factor Table with 4 conductor. It gives us 80 percent of values as adjusted for Ambient Temperature.	The customer wanted a conduit with 5 conductors, so explore the Adjustment Factor Table with 5 conductor. It gives us 80 percent of values as adjusted for Ambient Temperature.	The customer wanted a conduit with 5 conductors, so explore the Adjustment Factor Table with 5 conductor. It gives us 80 percent of values as adjusted for Ambient Temperature.
#12 AWG USE wire --> $25A \times 0.8 = 20A$ This value doesn't satisfy iE1 Std requirements, so we need to look for a higher wire size to conduct a higher current. Next size is #10AWG wire for USE insulation type --> 35A #10 AWG USE wire --> $35A \times 0.8 = 24.5A$ This fulfills iE Std requirement. But we need to add a correction factor since the customer's room ambient for iE1 Std Installation is 40C.	#8 AWG USE wire --> $50A \times 0.8 = 40A$ This value doesn't satisfy iE1 Mid requirements, so we must look for a higher wire size to conduct a higher current. Next size is #4AWG wire for USE insulation type --> 85A #4 AWG USE wire --> $85A \times 0.8 = 68A$. This fulfills the iE1 Mid requirement. But we need to add a correction factor since the customer's room ambient for iE1 Std Installation is 40C.	#6 AWG USE wire --> $65A \times 0.8 = 52A$ This value doesn't satisfy iE1 Max requirements, so we need to look for a higher wire size to conduct a higher current. The next size is #4 AWG wire for USE insulation type --> 85AA #3 AWG USE wire --> $85A \times 0.8 = 68A$. This fulfills the iE1 Max requirement. But we need to add a correction factor since the customer's room ambient for iE1 Max Installation is 40C.
Explore the "Ambient Temperature Correction Factor" table. For 40C, the temp rating of the conductor at 75C gives us a correction factor of "0.88".	Explore the "Ambient Temperature Correction Factor" table. For 40C, the temp rating of the conductor at 75C gives us a correction factor of "0.88".	Explore the "Ambient Temperature Correction Factor" table. For 40C, the temp rating of the conductor at 75C gives us a correction factor of "0.88".
#10 AWG USE wire --> $35A \times 0.8 = 28A \times 0.88 = 24.64A$ This fulfills the iE1 Std requirements along with customer's ambient & higher conductor conditions.	#4 AWG USE wire --> $85A \times 0.8 = 68A \times 0.88 = 59.84A$ This fulfills the iE1 Mid requirements along with customer's ambient & higher conductor conditions.	#3 AWG USE wire --> $85AA \times 0.8 = 68A \times 0.88 = 59.84AA$ This fulfills the iE1 Max requirements along with customer's ambient & higher conductor conditions.
#10 AWG USE Insulation wire for iE1 Std will satisfy this particular customer's conditions.	#4 AWG USE Insulation wire for iE1 Mid will satisfy this particular customer's conditions.	#4 AWG USE Insulation wire for iE1 Max will satisfy this particular customer's conditions.

7.5 Circuit Breaker/Fuse Selection

1. After a wire size is selected, please follow this section to calculate the circuit breaker/fuse.
2. First locate the MOP value of the model that you are installing.

Model	iE1 Std	iE1 Mid	iE1 Max
MOP	35 A	70 A	90 A
MCA	20.8 A	49.6 A	54.1 A

3. Based on the wire size and the amp carrying capacity of the wire size, please select a break/fuse. The size must be higher than the MCA, but smaller than the MOP.
4. If multiple units are installed, each unit must have it's own breaker. A four unit iE1 Std installation breaker setup is shown below, where each unit has it's own breaker.



7.5.1 Electrical Emergency Shut-off

⚠ WARNING

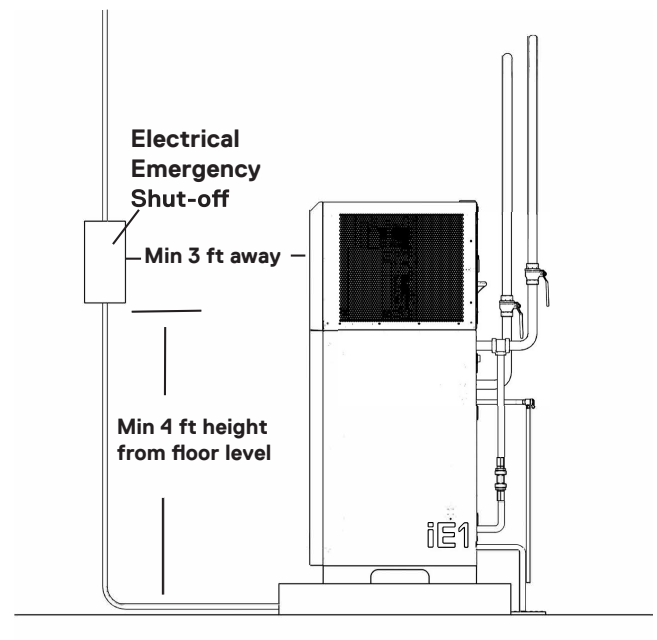
To avoid serious injury or even death from electrical hazards, an additional Breaker electrical emergency shut-off should be installed near the water heater. This will allow power to be disconnected from the water heater prior to servicing the unit or in the case of an emergency.

NOTICE

- An additional electrical shut-off is required for maintenance and at the time of an emergency.
- The electrical shut-off switch must be installed near the water heater, easily accessible in case of an emergency as shown above.
- Follow OSHA regulations or the local electrical code for proper height and distance. Otherwise, the distance of the electrical shut-off switch must be minimum three feet away from the water heater and four feet from the floor.
- Make sure the electrical shut-off switch is installed within the visibility of the water heater unit and follow your building regulation before the installation of an additional circuit breaker.
- If multiple water heaters are installed near the same location, each water heater must have its own electrical emergency shut-off switch.

⚠ CAUTION

Do not connect an electrical shut-off switch, with other iE1 water heaters or any other appliances to avoid damage to the water heater.

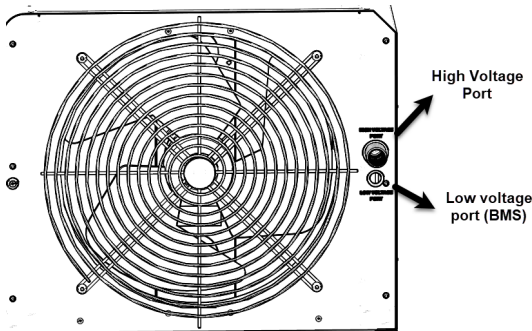


7.6 Wire Routing

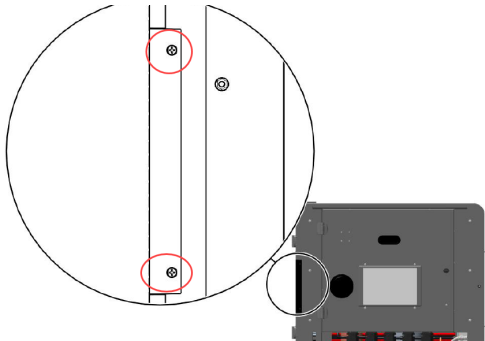
⚠ DANGER

Please do not drill holes or modify the unit in any manner. Doing so voids the warranty and may cause electric shocks, water leaks, damage to property, bodily injury, and even death.

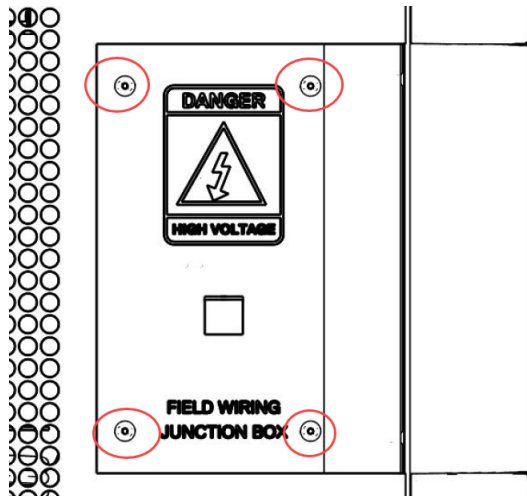
- 1. The top channel is reserved for main power cable routing and the bottom channel is reserved for BMS power cable routing. The high voltage port is a 1" NPSM Female straight connector.



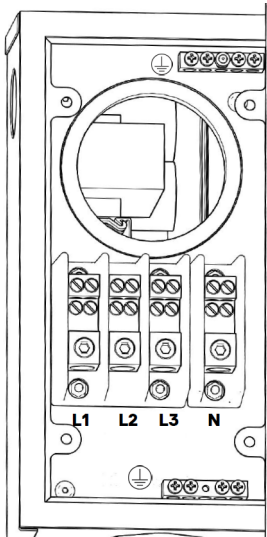
- 2. Open the front door and remove the two screws at the left hand inside.



- 3. Once the side panel is removed, go to the left hand side of the unit.



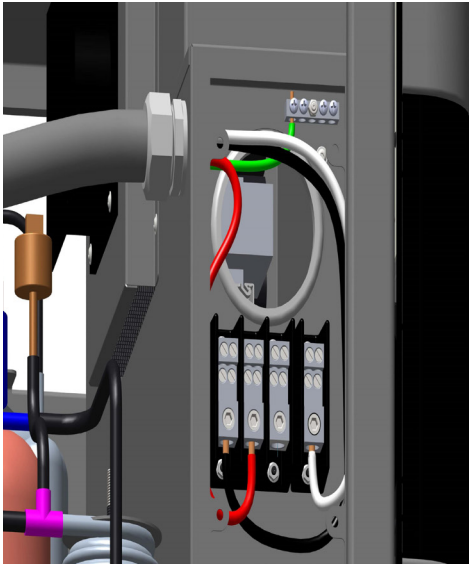
- 4. Inside the terminal box, at the bottom, the wiring phases, such as L1, L2, L3, and N, are clearly marked. At the top of the box, the ground location is clearly marked with a ground symbol.



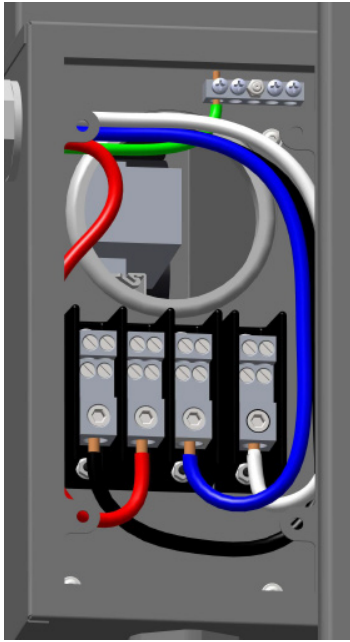
- 5. Please refer to the local electrical code for the wiring colors to use. We recommend the following colors, however, local electrical codes take priority.

Phase	L1	L2	L3	N	G
Color	Black	Red	Blue	White	Green

- 6. For iE1 Std, wire only L1, L2, N, and G as shown below



7. For iE1 Mid/Max, wire all connections (L1, L2, L3, N, and G) as shown below.



8. Make sure no connections are loose, install the side cover panel and tighten with four screws.
9. Install the front side panel and tighten it with two screws.

⚠ CAUTION

Grounding Requirement

This water heater must be grounded in accordance with the National Electrical Code and/or local codes. These must be followed for all the iE1 water heaters. Failure to ground this water heater properly may also cause erratic control system operations, and incorrect water temperatures.

This water heater must be connected to a grounded metal, permanent wiring system; or an equipment grounding conductor must be run with the circuit conductors and connected to the equipment grounding terminal or lead on the water heater.
