

H₂O

GLASS LINED Indirect-Fired Water Heaters

**FOR SINGLE WATER HEATER
INSTALLATIONS**

INSTALLATION, OPERATION & MAINTENANCE MANUAL

MODELS

H2O 40 GL

H2O 50 GL

H2O 80 GL

H2O 105 GL

*Certified to UL STD 174 and NSF/ANSI 372
Conforms to CAN/CSA STD C22.2 No. 110-94*



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All specifications subject to change without notice.

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SAVE THESE INSTRUCTIONS

Hazard Definitions

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels.

DANGER

Indicates a hazardous situation which, if not avoided, **WILL** result in death or serious injury.

WARNING

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

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates information which should be followed to ensure proper installation and operation.

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I. GENERAL INFORMATION

1. Important Safety Information - Read carefully

Installation shall conform to requirements of authority having jurisdiction.

All wiring on water heaters shall conform to requirements of authority having jurisdiction or in absence of such requirements National Electrical Code.

WARNING

Burn, scald, and electrical shock hazard. Improper installation adjustment, alteration, service or maintenance could result in death or serious injury. Read this manual and understand all requirements before beginning installation.

Installation and service shall be performed by a professional installer or service agency.

This water heater contains very hot water under high pressure. Do not unscrew any pipe fittings or attempt to disconnect any components of this water heater without assuring the water is cool and has no pressure.

Always wear protective clothing and equipment when installing, starting up or servicing this water heater to prevent scalding injuries. Do not rely on the pressure and temperature gauges to determine the temperature and pressure of the water heater. This water heater contains components that become very hot when the connected hot water boiler is operating. Do not touch any components unless temperature is confirmed to be cool.

Failure to follow all instructions in the order given could result in death or serious injury.

To reduce the risk of excessive pressures and temperatures in this water heater, install temperature and pressure protective equipment that meet the requirements for Relief Valves and Automatic Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22, latest edition. This valve must be marked with a maximum set pressure not to exceed the marked working pressure of the water heater. Install the valve following the instructions from the relief valve manufacturer and the guidance presented in this document. A drain tube must be installed and oriented so that any discharge from the pressure temperature relief valve will exit within 6 inches above, or at any distance below, the structural floor, and cannot contact any live electrical part. The discharge opening must not be blocked or reduced in size under any circumstances.

These glass lined water heaters with single-wall heat exchangers meet the Uniform Plumbing Code for installation in potable water systems provided that:

- The boiler water, including additives, is practically non-toxic, having a toxicity rating of class 1 as listed in Clinical Toxicology of Commercial Products, latest edition.
- The boiler water pressure is limited to a maximum 116 psig by an approved safety or relief valve.
- The heat transfer medium is potable water or contains only substances that are recognized as safe by the U.S. Food and Drug Administration (FDA).
- The pressure of the heat transfer medium is maintained less than the normal maximum operating pressure of the potable water system.

Maximum boiler water supply temperature to the indirect heat exchanger shall not exceed 240 °F (115 °C).

Improper water quality will reduce the life of the water heater. Avoid hard water, sediment, high or low PH and high levels of chlorides in the domestic water. Be sure PH levels fall between 6 and 8 and dissolved chlorides are less than 100 ppm. A filter must be used where sediment is greater than 5 microns in size in the water supplied to the unit. A water softening system is recommended for areas with hard water. In cases where water quality is unknown, a qualified water treatment expert should be consulted.

DO NOT store or use gasoline or any other flammable vapors or liquids in the vicinity of this appliance. If you smell gas vapors, immediately, call the gas supplier from a remote located phone. Follow the gas supplier's instructions or if the supplier is unavailable, contact the fire department.

 **CAUTION**

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

 **WARNING**

Fire, explosion hazard. Hydrogen gas can be produced in a hot water system served by this water heater that has not been used for a long period of time (two weeks or more).

Hydrogen gas is extremely flammable. To reduce the risk of injury under these conditions, it is recommended that a hot water faucet be opened for several minutes at the kitchen sink before using any electrical appliance connected to the hot water system.

If hydrogen is present, there will probably be an unusual sound such as air escaping through the pipe as the water begins to flow. There should be no smoking or open flame near the faucet at the time it is open. Failure to follow all instructions in the order given could result in death or serious injury.

When installing or during the normal operation of this water heater, basic safety precautions, to reduce the risk of fire, electric shock, or injury, should be followed. Such precautions include but not limited to the following.

- Read all instructions of the water heater, the hot water boiler, and all the components in the heating system.
- Install or locate this water heater in accordance with the provided installation instructions.
- Use this water heater for its intended use as described in this manual.
- As with any appliance, close supervision is necessary when used by children.
- Do not operate this water heater if it is not working properly or if it has been damaged or dropped.
- This water heater should be serviced only by qualified personnel. Contact nearest authorized service facility for examination, repair, or adjustment.

II. PRE-INSTALLATION CONSIDERATIONS

Inspect shipment carefully for signs of damage. . Any claims, for damage or shortage, must be filed immediately against the carrier by the consignee. No claims for variances or shortages will be accepted by the Manufacturer, unless they are presented within sixty days after receipt of the equipment.

Installation shall conform to requirements of authority having jurisdiction or in absence of such requirements to the National Electrical Code ANSI/NFPA No. 70, latest edition.

1. Water Heater Sizing

Choose the water heater model based on the expected water usage for the installation site. The average residence with one shower will require an indirect water heater capacity of 40 gallons or larger. Factors that increase water demand dramatically include high flow shower heads, hot tubs, and the use of more than one shower at a time. Increase the tank size if these factors are present. **Consult ASHRAE sizing guides for references.**

The capacities of the indirect water heater, together with dimensions, weights, and ratings are given in Tables 1-3.

2. Boiler Sizing

The water heater will provide the rated performance if it is paired with a boiler that has the same or higher heating capacity given in Tables 3. If the boiler has less heating capacity, the performance of the indirect water heater will be reduced.

From cold start the hot water boiler will take longer to heat itself and the indirect water heater. During such heating process hot water shortage may occur.

The supplied pressure temperature relief valve limits the potable water temperature to maximum 210° F. Nominal water containing capacity is below 120 gallons for all models. Check with local codes with applicability.

Figure 1. Front View

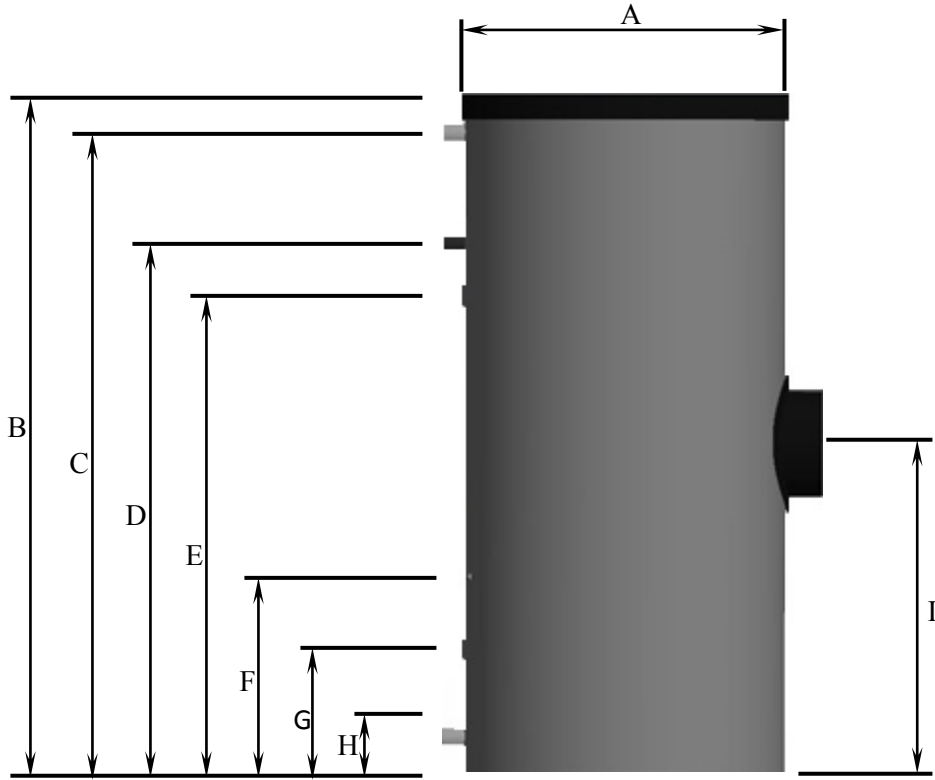


Table 1. Indirect Water Heater Dimensions

Dimensions		H2O 40 GL	H2O 50 GL	H2O 80 GL	H2O 105 GL
A	Insulated Diameter	24	24	30	30
B	Height	45	51	48	62
C	DHW Outlet	42	48	45	59
D	Coil Inlet	35	35	37	40
E	Service Circulation Outlet	31	37	35	48
F	Aquastat Well	15	21	22	24
G	Coil Outlet	10	10	11	11
H	DHW Inlet	3	3	3.5	3.5
I	Front Hatch	26	27	29	34
Threaded Connections	DHW Water Inlet, Outlet	1"	1"	1"	1"
	Service Circulation Outlet	¾"	¾"	¾"	¾"
	Boiler Coil Inlet, Outlet	1"	1"	1"	1"
Weight, lbs.		180	200	243	393

Table 2. Parameters And Working Pressure Rating

Model	Storage Volume	Coil Heating Surface	Maximum Working Pressure (psi)	
	Gallon	ft ²	DHW Water	Boiler Water
H2O 40 GL	42	14	150	116
H2O 50 GL	53	14	150	116
H2O 80 GL	79	20.7	150	116
H2O 105 GL	106	26	150	116

Table 3. Performance Rating

Model	First Hour Draw GPH		Continuous Draw GPH		Boiler Output Required	Boiler Water Flow	ΔP Through Coil
	140° F	115° F	140° F	115° F	MBH	GPM	FT Water
H2O 40 GL	175	198	138	162	105	14	10.7
H2O 50 GL	187	212	144	169	110	14	10.7
H2O 80 GL	204	228	140	164	110	14	15.9
H2O 105 GL	244	270	149	175	115	14	19.7

Note: All ratings are based on 50° F cold DHW water inlet.

3. DHW Pump Sizing

Refer to Table 3 for minimum flow through the water heater coil and pressure drop at the required boiler water flow rate. Calculate the pressure drop across all pipes and fittings connecting the indirect water heater and hot water boiler. Be sure to include all ball valves, check valves, etc. It is manufacturer recommended that the indirect water heater loop be piped with 1" pipe around the entire loop on typical residential sites.

4. System Zone Control

The water heater shall be installed as a separate zone from the space heating zones. If the indirect water heater pump and space heating pump run at the same time (non-priority), the water heater zone's piping and circulator must be sized for the minimum flow rate with all the zones in use and maximum flow with only the water heater in use. The three most common systems are:

- Central heating zone circulators and indirect tank circulator. Space heating zones use a circulator for each zone. The water heater is controlled with additional circulator (DHW pump).
- Central heating system circulator and indirect tank circulator. One heating system pump is used for all space heating zones. Each heating zone has one zone valve. The indirect water heater is controlled with additional indirect tank circulator.
- Central heating zone Valves and indirect tank zone valve. Space heating zones use zone valves for each zone. The water heater is controlled with an additional zone valve. In such system, indirect tank shall use a low pressure drop zone valve. Adequate boiler water flow through the indirect tank coil must be assured.

5. Priority or Non-Priority for Hot Water

Priority. The demand for space heating is interrupted until the hot water demand is satisfied or priority time is reached. This option provides the reliable delivery of hot water. Priority is recommended when:

- The boiler output is less than 100,000 Btu per hour.
- Heating capacity required by the indirect tank is more than 50% of the heating capacity needed for space heating demand.
- When an interruption in space heating can be tolerated during long domestic hot water draws.

In most cases the delay in space heating will not be noticed because of the rapid recovery of the indirect water heater. It must be recognized however that certain water heater malfunctions, such as a failed thermostat or circulator, could delay space heating indefinitely, if priority time is not established.

Non-Priority. The boiler output is divided between space heating and the indirect water heater. Heating of domestic hot water can be reduced during simultaneous space and water heating demands. The amount of reduction depends on boiler output, number of space heating zones calling, and amount of boiler water flow split between space heating zones and water heater zone.

6. Locating the Indirect Water Heater

NOTICE

All water heaters will eventually leak, which can cause property damage. Do not install indirect water heater in a location that does not have adequate drainage.

- Locate water heater in an area not subject to freezing temperatures.
- Locate water heater in an area where water leakage from the tank or connections will not result in damage to areas adjacent to the water heater or to lower floors of the structure. When such a location cannot be avoided, a suitable drain pan must be installed under the water heater, and the drain pan must be connected to a drain.
- The drain pan should be at least 2" deep with a length and width at least 2" greater than the total diameter of the unit and should be piped to an adequate drain.
- Drain pans are available from your wholesale distributor.
- The life span of an indirect water heater depends on water quality, water pressure, and the environment in which the water heater is installed.
- Water heaters are sometimes in locations where leakage may result in property damage, even when a drain pan is installed and piped to a drain. Such property damage can be reduced or prevented by a leak detector or water shut-off device used in conjunction with a piped drain pan. These devices, available from some plumbing supply wholesalers and retailers, detect and react to leaks in various ways.
 - a. Sensors mounted in the drain pan that trigger an alarm or turn off the incoming water to the water heater when leakage is detected.
 - b. Sensors mounted in the drain pan that turn off the water supply to the entire home when water is detected in the drain pan.
 - c. Water supply shut-off devices that activate based on the water pressure differential between the cold water and hot water pipes connected to the water heater.

7. Minimum Clearance from Combustibles

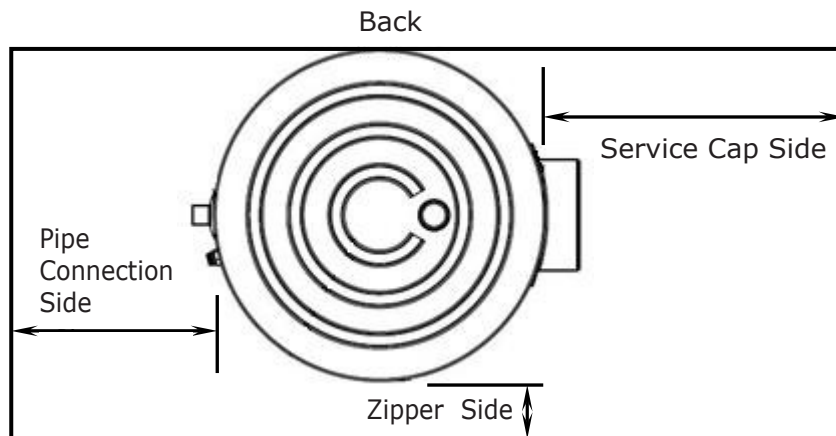
0 inches on all Sides.

8. Minimum Service Clearance

Table 4. Minimum service clearance

Model	H2O 40 GL	H2O 50 GL	H2O 80 GL	H2O 105 GL
Pipe Connection Side		18"		
Service cap Side		20"		
Zipper Side		4"		
Back Side		0"		
Top	22"		43"	

Figure 2. Top view



9. Additional Components

- **Shut-off valves:** Allows isolation of the water heater from boiler system during service.
- **Unions:** Allows for easy location and removal. Use dielectric unions or couplings to protect hot and cold water fittings from corrosion when connecting dissimilar materials such as copper and galvanized pipe.
- **Vacuum Breaker:** Protects the water heater from collapse if a hot tank is shut off to service other components in the system. Required for Commonwealth of Massachusetts.
- **Thermal Expansion Tank:** If the water heater is installed in a closed water supply system, such as a system having a back flow preventer in the cold water supply line, installation of a thermal expansion tank is required.
- **Water Hammer Arrester:** Dishwashers, clothes washers, and fast-closing positive shutoff valves incorporated in the system all contribute to creating water hammer. Install a water hammer arrester to prevent damage to pipes and appliances. See water hammer arrester manufacturer's instructions for application and installation.
- **Backflow Preventer:** Protects potable water supplies from contamination due to backflow. Requirements for Commonwealth of Massachusetts. Boiler installation shall conform to the Commonwealth of Massachusetts code 248 CMR which includes but is not limited to: Installation by licensed plumber or gas fitter.

10. Removing the Existing Domestic Water Heating System

- **External Tankless Heaters** - Disconnect all lines to the boiler and plug the boiler fittings. Disconnect the external heater from the boiler piping and the domestic piping systems.
- **Internal Tankless Heaters** - Disconnect the domestic piping. Do not plug the cold water or the hot water fittings in the internal tankless coil. Leave the coil in the boiler with cold and hot water fittings open to prevent pressure build-up in the coil.

NOTICE

For California installation this water heater must be braced, anchored, or strapped to avoid falling or moving during an earthquake. See instructions for correct installation procedures. Instructions may be obtained from California Office of the State Architect.

11. Water Quality

Improper water quality will reduce the expected life of the water heater. Hard water, sediment, high or low PH value, and high levels of chlorides in the domestic water should be avoided. Sediment and hard water will eventually coat the heating coil inside the water heater and reduce the rate of hot water production and may, eventually, cause a failure. High or low PH and/or chloride concentrations will cause corrosion and eventually failure. A filter is strongly manufacturer recommended where sediment is present in the water. A water softening system is recommended for areas with hard water. In an area where the water quality is unknown, a water quality test should be performed.

III. PIPING

1. Piping diagram

All the piping instructions and Figures, presented in this document, are for schematic illustration purposes and focus on how boiler water and DHW flow. Not all components are shown for the heating system, such as air remover, check valve, automatic feeder, etc.

Pipe lengths (except explicitly stated) and orientation of the elbows and tees do not have to be exactly the same as show in the Figures. They should be determined by the actual conditions, layout, and space limitation of the installation. In all piping Figures, the connections and components are labeled as shown in Table 5.

Table 5. Labels Of Connections And Components

1	DHW cold water Inlet
2	DHW hot water Outlet
3	Boiler water Inlet
4	Boiler water Outlet
5	DHW service circulation connection
6	DHW service circulator
7	Pressure temperature relief valve
8	Mixing valve
9	Drain valve
10	Central heating zone pumps
11	Central heating Zone valves
12	DHW pump
13	Central heating primary pump
14	Location of boiler expansion tank, air eliminator, and automatic feeder
15	Location of faucets or shower heads

Figure 3 shows the connection diagram of the DHW hot water recirculation loop. Such recirculation of DHW hot water can reduce the waiting time of how water at faucets or shower heads. All models have the DHW service recirculation connection. DHW service recirculation pump, such as Taco SmartPlus[®] recirculation pumps, has to be field sourced and installed. In all other piping Figures, such recirculation loop is not fully shown for simplicity.

To accurately sense the water temperature, the pressure temperature relief valve shall a maximum of 8" away from the water heater, as shown in Figure 3.

Figure 3. Tank Connections And DHW Service Recirculation Pump



Figure 4 - shows piping connections for boilers having no internal primary loop and no internal pump. Applicable boilers include Cast Iron hot water boilers, Cast Aluminum hot water boilers, boilers not requiring primary secondary piping.

For boilers that do not have an internal primary loop but have an internal pump, the primary loop pump may not be needed. This depends on the size of the internal pump and the total length of the external primary loop. Refer to boiler Installation, Operation and Maintenance Manual (IOM) for detailed instructions. Such boilers include MAH-165, DCB-165, UCS, and DMG families.

Figure 5 - piping connection of the tank with boilers that have external primary loop and internal pump. This boiler category includes the SSC and VLT family. The internal ball valve on the internal primary loop should be in an open position, so that the internal primary loop is established. This piping diagram also works for boilers that do not require primary secondary piping, such as cast iron hot water boilers.

Figure 6 - piping diagram of the indirect tank with boilers with an internal pump and a three-way valve. With boiler working in central heating mode, the three-way valve will send hot boiler water to CH supply. In DHW mode, the three-way valve diverts all boiler water to an indirect tank supply. Such type of boilers include CHB family, MAH-125 and DCB-125.

Figure 4. Piping Diagram Of The Tank For Boilers That Do Not Require Primary Secondary Piping Or Built In Primary Loop/Pump

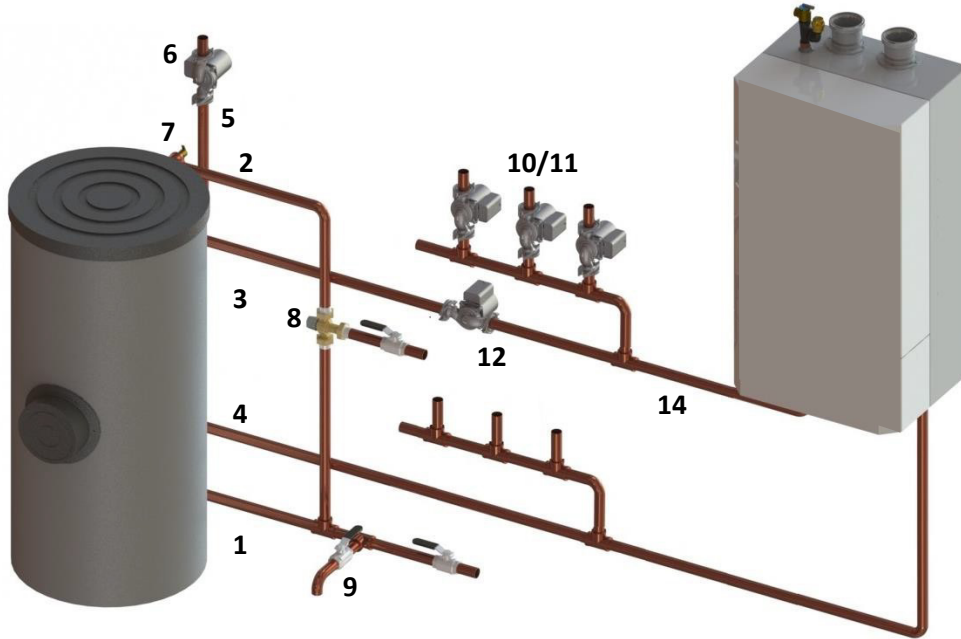


Figure 5. Piping Diagram Of The Tank For Boilers Piped With External Primary Loop

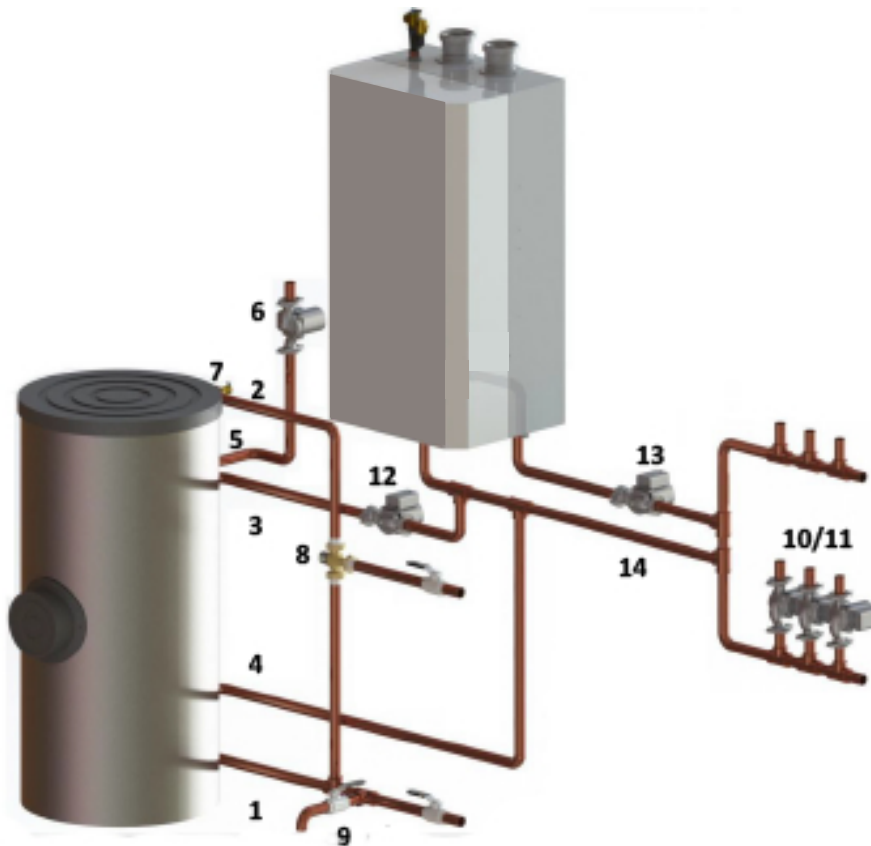
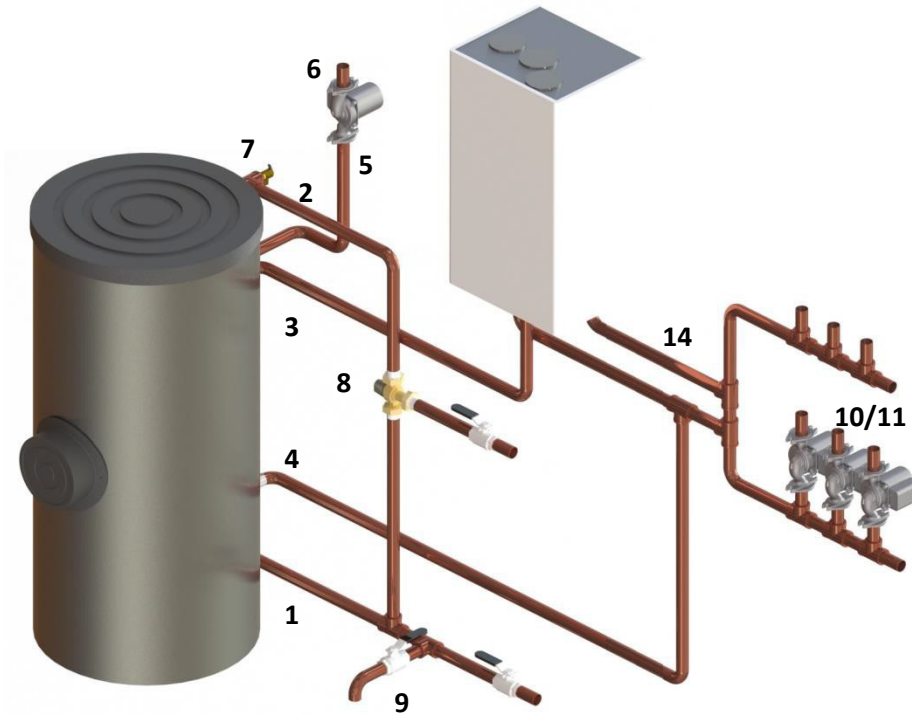


Figure 6. Piping Diagram Of The Tank For Boilers With Internal Pump And Three-Way Valve



In all piping diagrams shown in Figures 4 through 6, only the zone pump configuration for the central heating is shown. They can also have a CH system pump and zone valve configuration, with one CH system pump on the supply header. Zone valve opens or shuts off the boiler water flow for each of the central heating zones.

2. Install Pipes And Components

Piping installation shall follow the instructions presented in this document and also follow the piping guidance in the hot water boiler Installation Operation and Maintenance manual (IOM).

High quality installation and leak free connections ,threaded or soldered, are the responsibility of the professional installer who carries out the work.

For all threaded connections, it is manufacturer recommended to apply Teflon tape and quality pipe dope. Teflon tape must be applied following the direction of the thread. The edge of the Teflon tape shall not go beyond the end of the thread. The pipe dope shall not go beyond the edge of the Teflon tape.

3. DHW Water Pipe Installation

Install the DHW water piping and components per the following procedure:

- Shut off the cold water supply at the main shutoff valve.
- Open one or more faucets to relieve the pressure. Open the system drain, leave faucets open.
- Drain the domestic water system.
- Install piping and fittings, connecting the tank cold water inlet and cold water supply of the residence, using a union, heat trap, shut-off valve, vacuum breaker, expansion tank (where required), and filter (manufacturer recommended to prevent sediment buildup).
- Connect the tank DHW hot water supply piping. Install piping to hot DHW hot water supply connection using a union, heat trap, vacuum breaker, and shut-off valve.
- Install Pressure Temperature Relief Valve. Pipe the relief valve discharge so the discharge from the valve exits only within 6 inches above, or at any distance below, the structural floor. Any discharged water for the indirect water heater shall not contact any live electrical part. The discharge opening must not be blocked or reduced in size under any circumstances.
- The Pressure and Temperature Relief Valve shall be installed a maximum of 8" away from the tank on the DHW Outlet connection. Placing Pressure Temperature Relief Valve too close to the tank during installation could cause damage to the tank due to soldering. See Figure 3.
- Fill the water heater tank. Open all faucets to allow air to purge from the tank and piping. Remove screens on faucets. Open domestic hot water shut-off valve. Open cold water inlet shut-off valve. Purge all air from the domestic water system. Allow water to run so the tank is completely purged of any debris. Run the water long enough to change at least five tank volume changes. Close all faucets. Reinstall all of the screens in the faucets. Check the system for leaks. Repair as required.

NOTICE

If installing on a city supply, a properly sized thermal expansion tank is required and installed in accordance with the product manufacturer's installation manual. If a water heater is installed in a closed water supply system, such as one having a backflow preventer in the cold water supply, a check valve in the cold water supply, or a pressure reducing valve in the cold water supply provide a means to control thermal expansion. The appliance, when installed, must be grounded in accordance with the local codes, or in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70.

If this product is connected to a cold water supply line that has a check valve, a backflow preventer, a pressure reducing valve, or a water meter with a built in check valve, it is a requirement that a properly sized thermal expansion tank be installed in the cold water inlet line.

WARNING

Burn and scald hazard. Temperature pressure relief valve could discharge steam or hot water during operation. Install discharge piping per the instructions given below.

Temperature Pressure Relief Valve Installation:

- Install discharge line so water discharged from the temperature and pressure relief valve exits within 6" six inches above, or any distance below, the structural floor.
- Install temperature Pressure valve so discharge shall not contact any live electrical part.
- Install temperature pressure valve with spindle in vertical position.
- Do not install a valve or shutoff device between tank and temperature pressure valve.
- Install discharge line to allow for complete drainage of both temperature pressure relief valve and the discharge line.
- Discharge opening must not be subjected to blockage or freezing.
- Size and arrange discharge piping to avoid reducing Temperature Pressure Valve relieving capacity below minimum relief valve capacity.
- Run pipe as short and straight as possible to location protecting user from scalding and properly drain piping.
- Terminate pipe with plain end (not threaded).
- do not thread, plug, or cap discharge line.
- Maintain minimum clearance of four (4) inches on side of water heater for servicing and maintenance of temperature pressure valve

4. Boiler Water Pipe Installation

Installation procedure for pipes and components for boiler water flow :

1. Determine where the boiler, space heating, and water heater connections should be made based on the type of piping system that is either in place, or is to be installed for a new hydronic system installation.
2. It is manufacturer recommended that 1", or larger, pipe be installed for boiler between indirect tank and the hot water boiler. If boiler water through the indirect tank coil is controlled by a zone valve, a 1" zone valve is recommended.
3. **Central Heating Zone Pump System.** For a system using central heating zone pumps, the water heater connection labeled "BOILER SUPPLY" should be piped to the boiler supply piping after the air eliminator and before the space heating takeoffs. Mount the water heater circulator as close as possible to the water heater, and make sure the flow arrow points toward the water heater. The use of shut-off valves is recommended for future service convenience. The water heater connection labeled "BOILER RETURN" should be piped to the boiler return piping as close to the boiler possible and after any flow control or check valves in the space heating return piping. The use of a union and a shut-off valve is manufacturer recommended. Use of a check valve is required to prevent back flow through the water heater during operation of the space heating system.
4. **Central Heating Zone Pump System.** For a space heating system that uses Zone Valves, refer to Figure 4. Replace zone circulators with valves. The water heater connection labeled "BOILER SUPPLY" should be piped to the boiler supply piping after the air eliminator and before the Central Heating system pump. Mount the water heater circulator as close as possible to the water heater, and make sure the flow arrow points toward the water heater. The use of a shut-off valve is recommended for future service convenience. The water heater connection labeled "BOILER RETURN" should be piped to the boiler return piping as close to the boiler as possible and after any flow control or check valves in the space heating return piping. The use of a union and a shut-off valve is recommended. The use of a check valve is required to prevent back flow through the indirect water heater during operation of the space heating.

NOTICE

When installing pipes and fittings on the threaded connections on the indirect water heater, all soldered joints shall be a minimum of four inches away from the indirect water heater to provide enough room for the soldering process. Any damages on the tank cover and insulation material are not covered by warranty.

IV. ELECTRICAL WIRING

If a heating system is small and the installed boiler offers a terminal to power a central heating system pump and DHW pump, the complete heating system can be controlled by the integrated boiler control built inside the boiler. When using this type of wiring configuration, the power draws of the central heating pump and DHW pump must not exceed the amp draw allowed by the boiler integrated control. Refer to the boiler Installation, Operation and Maintenance Manual for detailed information.

For heating systems that need zone control device(s), Argo Controls offer a broad line of control devices for hot water heating systems. More information is available at <http://argointerprises.com>.

Figure 7. Wiring Diagram For Boilers That Do Not Differentiate Call For CH And Call For DHW

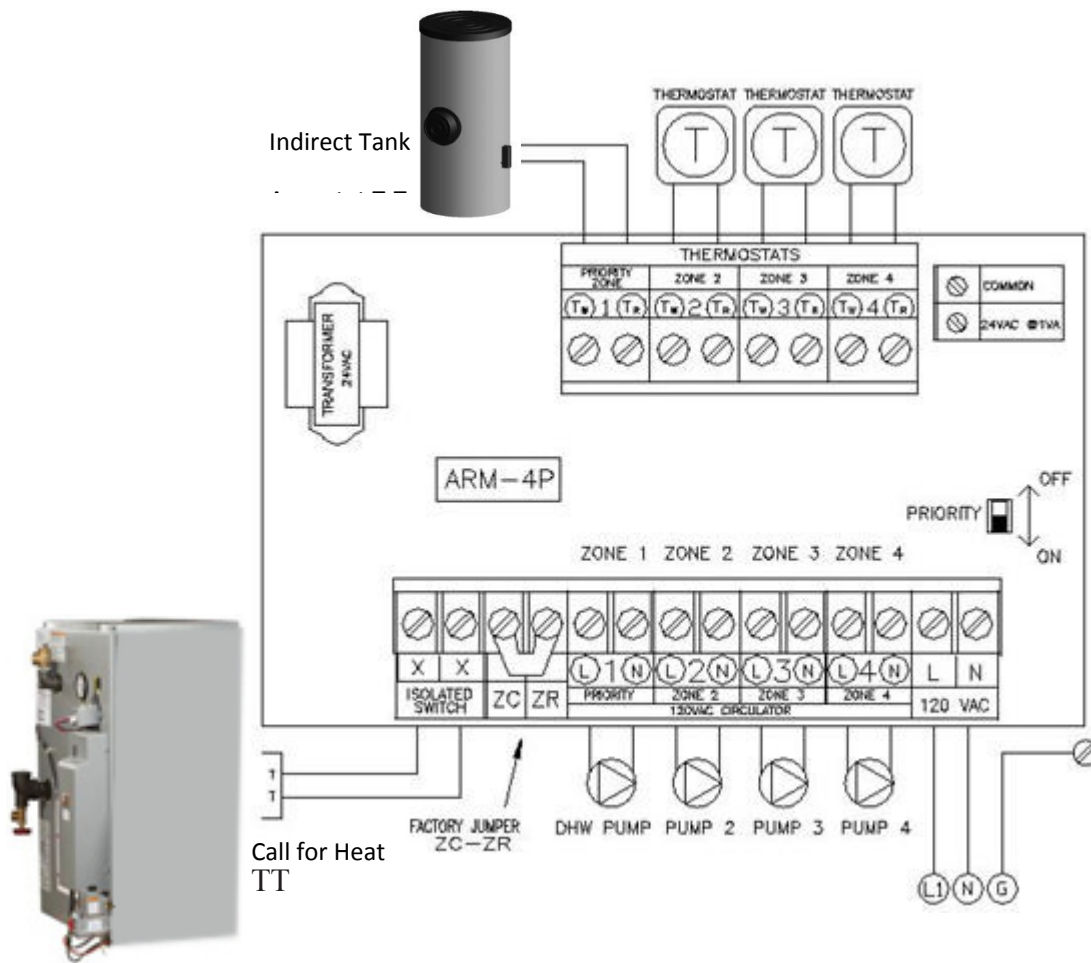


Figure 8. Wiring Diagram For Boilers Do Not Require Primary/Secondary Piping Or Boilers With Internal Primary Loop And Pump

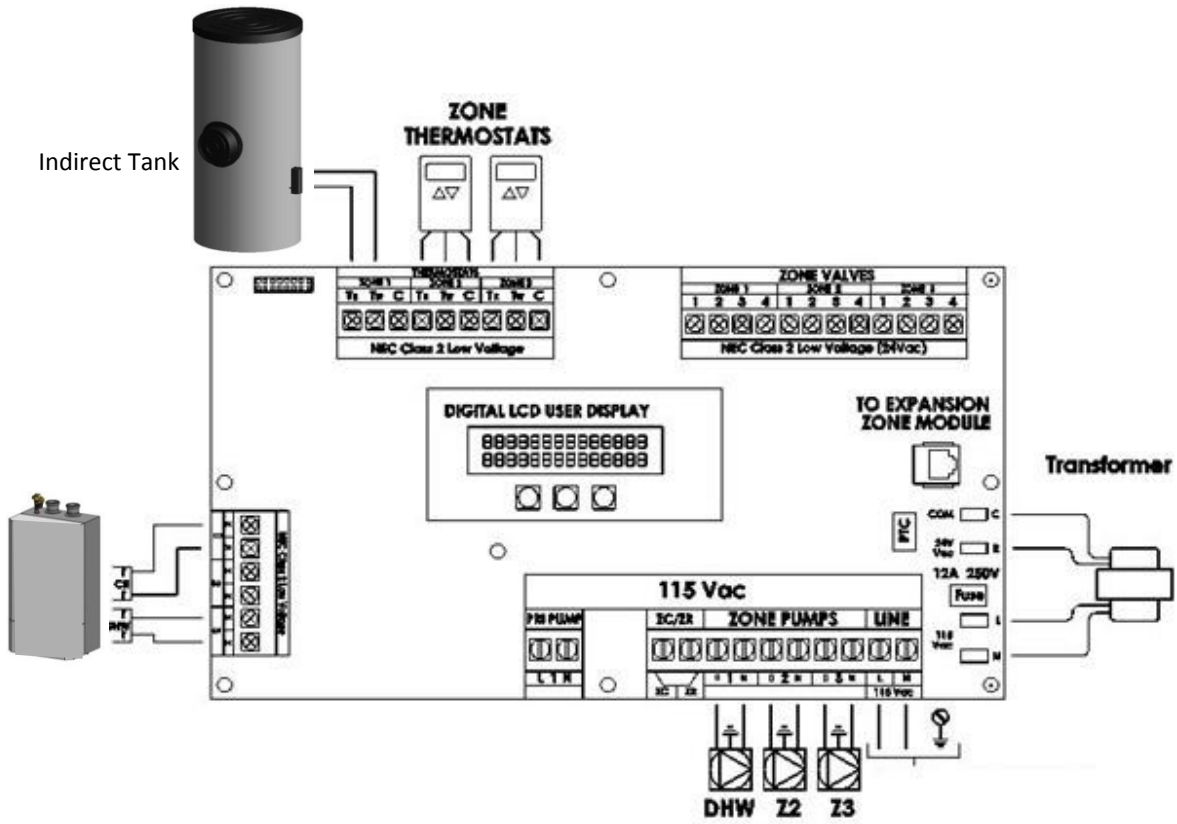


Figure 9. Wiring Diagram For Boilers Piped With External Primary Loop

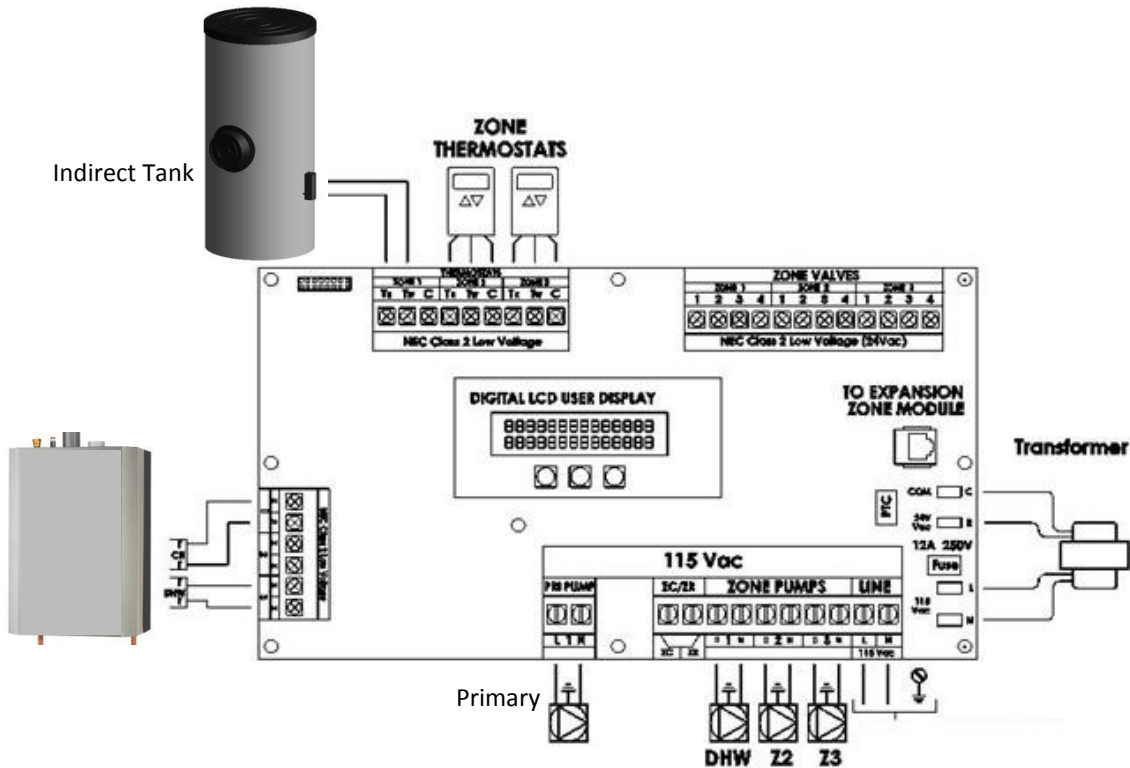


Figure 10. Wiring Diagram For Boilers With Internal Pump And A Three-Way Valve

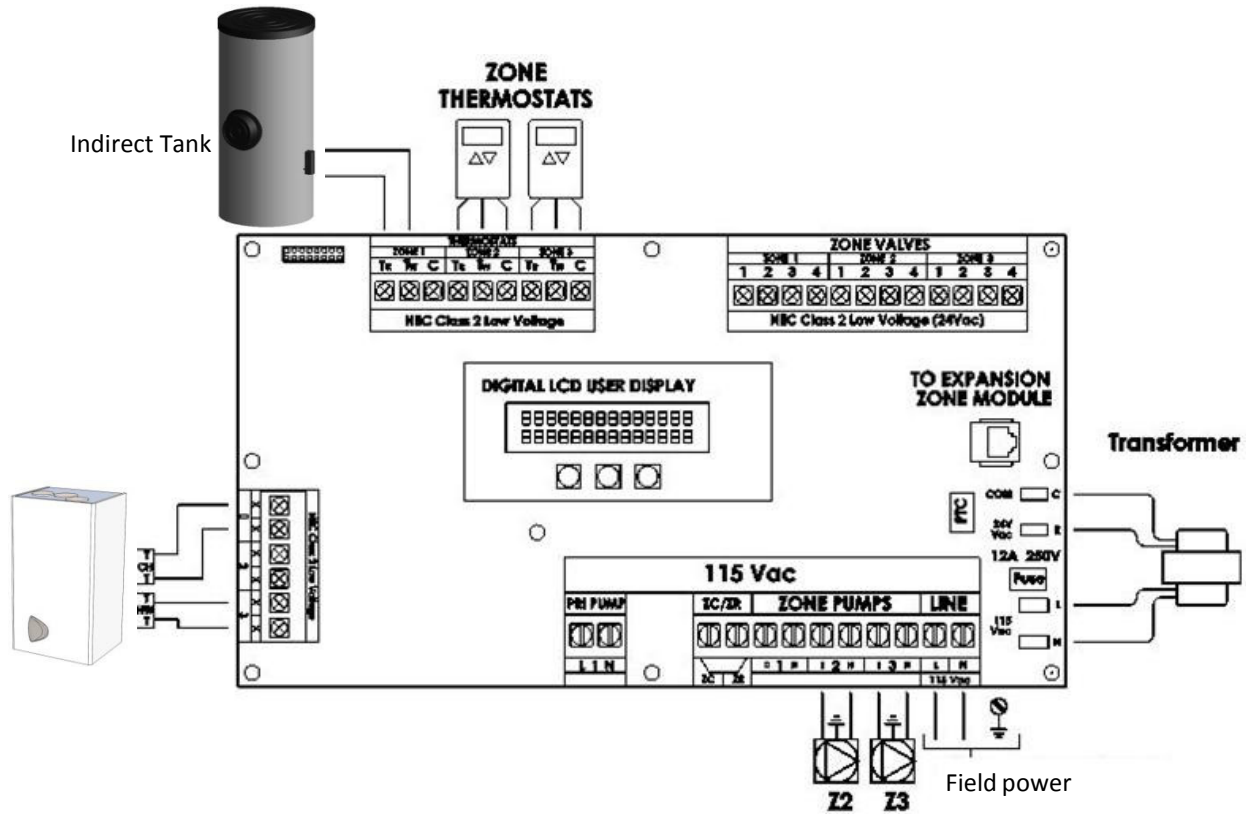


Figure 7 is the wiring diagram for boilers that do not differentiate CH call and DHW call. The boiler has only one temperature setting for both CH call and DHW call. For such boiler, primary secondary piping is not required.

Figure 8 is the wiring diagram for boilers that have different temperature settings for a CH call and DHW call. Boilers can be those that do not require primary secondary piping, or a primary loop/pump built inside the boiler.

Figure 9 is the wiring diagram for boilers piped with external primary loop. The primary loop pump can be powered by the Argo zone control board. It may can be powered by the boiler integrated control, if primary pump terminals are available.

Figure 10 Is the wiring diagram for boilers with internal pump and a three-way valve. For such boilers, no DHW pump is needed.

For boilers that can take Indirect Tank Temperature signal, a tank temperature sensor (normally supplied by the boiler manufacturer) can be inserted into the Aquastat well. The temperature signal is directly supplied into the boiler control board. Therefore, the Aquastat supplied with the indirect tank will not be used.

Install electric wiring and grounding in accordance with the National Electrical code and local regulations. (Refer to wiring diagrams given in the documentations of pumps, boilers, Argo controls, etc. for more information.)

V. OPERATION



Hot Water Can Scald!

Water heated to temperature for clothes washing, dish washing and other sanitizing needs can scald and cause permanent injury.

Children, elderly, and infirm or physically handicapped persons are more likely to be permanently injured by hot water. Never leave them unattended in bathtub or shower. Never allow small children to use a hot water tap or draw their own bath.

If anyone using hot water in the building fits the above description, or if state laws or local codes require certain water temperatures at hot water taps, you must take special precautions:

- Use lowest possible temperature setting.
- Install some type of tempering device, such as an automatic mixing valve, at hot water tap or water heater. Automatic mixing valve must be selected and installed according to manufacturer's recommendations and instructions.

Water passing out of drain valves may be extremely hot. To avoid injury:

- Make sure all connections are tight.
- Direct water flow away from any person.

Table 6: Hot Water Temperature and Time to Scald Injury

Approximate Time/Temperature Relationships in Scalds		
Hot Water Temperature		Time for scald injury
°F	°C	
120	49	More than 5 Minutes
125	52	1½ to 2 Minutes
130	54	About 30 Seconds
135	57	About 10 Seconds
140	60	Less Than 5 Seconds
145	63	Less Than 3 Seconds
150	66	About 1½ Seconds
155	68	About 1 Second

1. Startup

DANGER

Burn, scald hazard. This water heater can deliver scalding temperature water at any faucet in the system. Be careful when using hot water to avoid scalding injury. By setting the Aquastat on this water heater to obtain an increased water temperature, you create the potential for scald injury.

After the water heater has been piped and wired and boiler water piping is purged of air, the water heater is ready to be started.

- Follow boiler installation instructions to place the boiler in operation.
- The tank Aquastat is factory pre-set to 125° F and will call for heat if the water in the tank is lower than 125° F.
- When the indirect tank is calling for heat, the tank thermostat contacts close and send a call for DHW signal to the boiler indirectly or through Argo Control. Such signal will start the DHW pump and the boiler.
- After the tank has reached the temperature setting, the tank Aquastat opens and de-energizes the DHW pump and the boiler.

To protect against injury, install an ASSE approved mixing valve (a device to limit the temperature of water to protect against scald injury via mixing hot and cold water supply) in the water system. This valve will reduce point of discharge temperature in branch supply lines. Consult with a plumbing professional.

2. Temperature Adjustment

The tank thermostat controls the maximum water temperature in the water heater. If it is set too high, the resulting hot water can cause painful scalding with possible serious and permanent injury. The temperature at which this occurs varies with a person's age, and the length of time in contact with the hot water. The slower response time of infants, older, or handicapped people increase the hazard for them.

It is recommended that the Aquastat be set for the lowest possible temperature that satisfies your needs. This will also provide you with the lowest energy consumption and cost.

Check the water temperature at a hot water faucet soon after the tank thermostat has satisfied, and the circulator and the boiler have turned off. Adjust as Needed.

Lowering the thermostat setting will not have an immediate effect on the water temperature because the stored water will have to be used and the thermostat must go through the cycle of heating cold water and satisfying at the new, lower temperature. Additional temperature checks should follow the completion of a heating cycle. Further adjustments may be required after you have use the water heater.

Lowering the thermostat setting will not have an immediate effect on the water temperature because the stored water will have to be used and the thermostat must go through the cycle of heating cold water and satisfying at the new, lower temperature. Additional temperature checks should follow the completion of a heating cycle. Further adjustments may be required after you have use the water heater.

Table 6 details the approximate relationship of water temperature and time with regard to scald injury and may be used as a guide in determining the safest water temperature for your applications.

The scald label shown on Page 21 can be found on all Indirect Water Heaters and Storage Tanks. Take note and use caution when adjusting the temperature settings with your water system. Be sure to always feel the water before bathing or showering, especially when drawing a bath for an infant or elder.

VI. MAINTENANCE

The water heater is intended to provide many years of reliable service. Components, such as thermostats and pressure temperature relief valves, may be subject to failures that require service. Depending on the quality of the water supply, sediment and/or scale may coat the heating coil in the tank and reduce hot water recovery rate. Failure to use the correct procedures or parts can result in unsafe operation.

1. Inspections

The owner should arrange to have the following inspections and simple maintenance procedures done at the suggested frequencies.

- Check boiler piping and domestic water piping annually. Check for any signs of leakage at all the joints, unions and shut-off valves. Repair as required.

WARNING

Burn and scald hazard. Temperature pressure relief valve could discharge steam or hot water during operation.

- Check temperature pressure relief valve annually. The temperature pressure relief valve should be checked to ensure that it is in operating condition. To check the relief valve, lift the lever at the end of the valve several times. The valve should seat properly and operate freely. If the water does not flow, remove and inspect for obstructions or corrosion. Replace with a new valve of the recommended capacity as necessary. Do not attempt to repair the valve, as this could result in improper operation and a tank explosion. In areas with poor water conditions, it may be necessary to inspect the pressure temperature relief valve more often than once a year.
- Sediment, annually except where harsh water quality may require more frequent service. Depending on water conditions, a varying amount of sediment may collect in the tank. Levels requiring service are indicated by a small temperature difference between the boiler supply and return lines, and a reduced recovery rate. Repeated flushing usually clears such material. As a preventive measure, water should be drawn from the drain valve until it runs clear and the installation of a water filter should be considered.
- Scale, annually. Hard water may cause scale buildup on the outside of the heating coil inside the tank. A water softener will prevent this problem. Symptoms are identical to sediment buildup. If repeated flushing does not resolve the problem, chemical cleaning may be required. Contact a qualified contractor.

Before manually operating the temperature pressure relief valve, verify a drain line has been attached to the valve to direct the discharge to an open drain. Failure to take this precaution could mean contact with extremely hot water discharging from the valve during this checking operation. If the temperature pressure relief valve on the heater discharges periodically or continuously, it may be due to thermal expansion of water in a closed water supply system, or it may be due to a faulty relief valve. Thermal expansion is the normal response of water when it is heated. In a closed system, thermal expansion will cause the system pressure to build until the relief valve actuation pressure is equaled. Then the relief valve will open, allowing some water to escape, slightly lowering the pressure. Contact your water supplier or local plumbing inspector on how to control the situation.

2. Inspect Anode Rod, Annually

The purpose of the magnesium anode is to reduce the damaging effects of aggressive water on the water heater. Aggressive water will cause the anode(s) to erode. The anode(S) shall be inspected at least annually to determine whether a new anode should be installed. Use anode replacement parts supplied by ECR only. ECR anodes are 1-1/4" NPT and are made with magnesium, brass, and stainless steel. There is no steel in an ECR anode. Severe or rapid deterioration of the anode indicates very aggressive water. If this occurs, have the water tested to verify whether it is within the limits outlined on page 11. Failure to inspect the anode and replace if necessary could result in damage to the water heater. If this unit is installed and maintained according to the instructions and conditions in this manual, this product will last for a long time. Refer to Figure 12 for the following procedure.

- Close domestic water isolation valves.
- Drain the water heater completely and allow it to cool.
- Remove the anode cover on the top of the unit.
- After the water heater has drained and cooled, remove the insulation, screws, and washers from the flange.
- Inspect the gasket and replace if necessary.
- Remove the anode and replace if needed. The anode should be replaced when more than 6" of core wire is exposed. Replace the anode with an ECR supplied anode only. See replacement parts list.
- Assemble anode, gasket, flange and screws into the assembly.
- Refill the water heater, and restore to operation.
- Verify operation of boiler and water heater.

Figure 12. Anode Rod Inspection



VIII. TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
No hot water at faucets	Boiler does not operate.	Press reset button Check main cut-off switch Check fuses or breakers. Check power supply Check shaft coupling
	Circulator does not operate	Check shaft coupling
	Improper thermostat setting	Turn thermostat to a higher setting.
	Zone valve does not open	Check power supply and valve
	Electrical problem	Check fuses and replace. Check circuit breaker and reset. Check power supply
	Sediment and/or scale buildup	If boiler, circulator, and thermostat are operating properly, and the boiler is cycling on the high limit several times before the tank thermostat is satisfied, the coil may have a coating of sediment and/or scale.
	Clogged filter	Clean or replace filter.
Insufficient or runs out of hot water at the faucet	Thermostat setting too low.	Turn the thermostat to a higher setting.
	Under sized boiler with no priority to domestic water heating.	Rewire for priority.
	Peak draw of hot water is greater than the tank storage.	Determine peak usage and compare to tank volume.
	Sediment and/or scale buildup	Clean coil
	Faulty water heater thermostat	Replace thermostat
Water at faucet too hot	Thermostat set to high	Lower thermostat setting.
	Improper system plumbing	Compare plumbing to installation guide. Inspect check valves.
	Improper wiring.	Compare wiring to installation guide.
Boiler cycles more than 5 times per day in summer	Excessive demand	Reduce demand or consider larger boiler and/or water heater.
	Faulty thermostat	Replace thermostat
	Boiler high limit set to low	Increase boiler hi-limit setting
	Sediment and or scale buildup	Clean coil

Figure 13. Indirect Water Heater Internal Structure

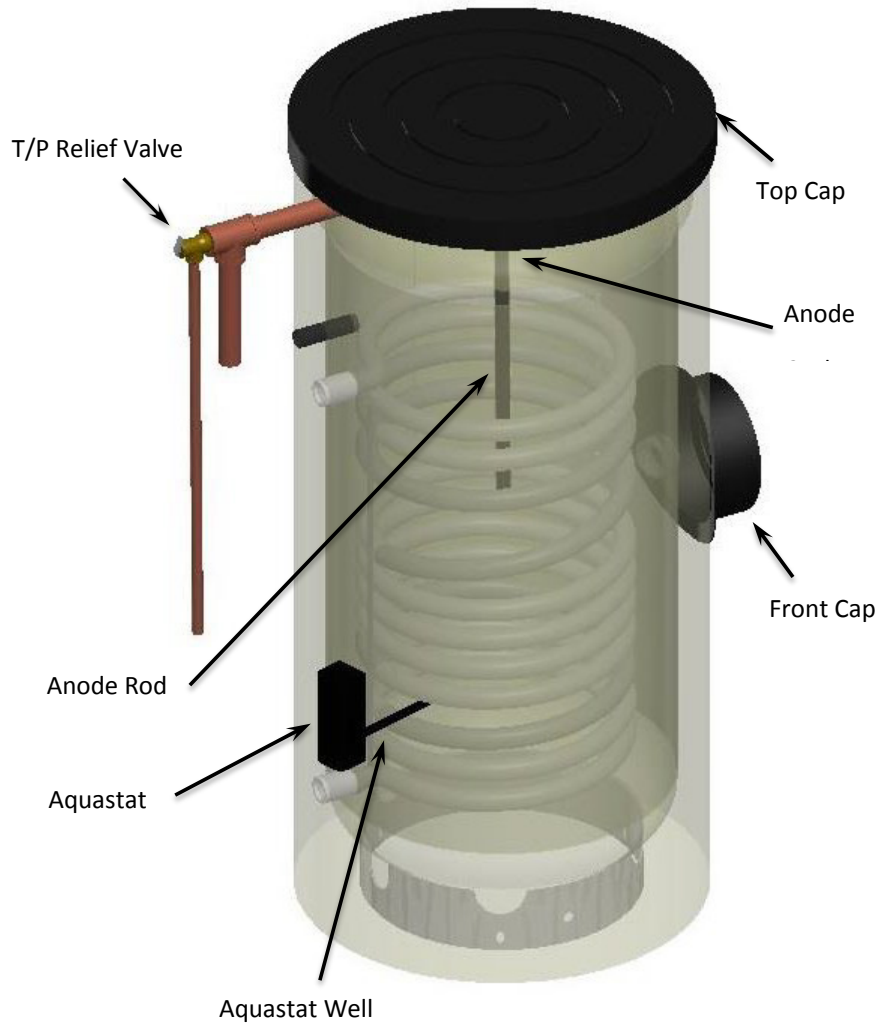


Table 8. Replacement Parts

Description	Model			
	40 Gal	50 Gal	80 Gal	105 Gal
Temperature and Pressure Relief Valve	240010926			
Aquastat Well	AQ-020.01			
Aquastat	240009521			
Plastic Top Cap	2400122111		240012239	
Plastic Front Cap	240012212			
*Anode Kit	550003505		550003527	
Flange Cap	240012250		240012251	
Flange Gasket	240012210		240012238	
**Hardware Kit	550003510		550003525	

* Anode Kit includes: Anode, Gasket and Bushing

** Hardware Kit includes: Bolts and nuts for flange cap

IX. CRITICAL CHECK POINTS AFTER INSTALLATION

Critical Check Points		Confirm
1	All pipes, fittings, soldered joints, threaded connections, etc., are leak free.	
2	There are no flammables in the vicinity of the installation	
3	There are no combustible materials inside the specified clearances	
4	There is enough drainage at the location of installation	
5	The discharge of the pressure temperature relief valve is piped to no more than 6 inches above the floor	
6	The P/T relief valve is no more than 8 inches away from the tank	
7	Confirm the operation of the pressure temperature relief, not stuck closed	
8	All the air in the indirect water heater is purged out of the tank	
9	All air in the hot water boiler system is purged out	
10	All pipes are well supported and hold in place	
11	Temperature setting on the Aquastat is proper for the application	
12	The mixing valve setting is proper for the application	
13	Water temperatures at faucets and shower heads are proper	
14	If installed, DHW service re-circulation pump setting is proper	
15	If indirect water heater temperature sensor is used, instead of the Aquastat, confirm that the sensor is inserted all the way to the bottom of the Aquastat well. The sensor wire between the tank and the boiler is hold into place securely.	
16	If local regulation requires back flow preventer, confirm that it is installed	
17	If back flow preventer is installed, confirm that a thermal expansion tank is installed for DHW water	

Installer Name (print)	
Installer signature	
Date (mm / dd / yyyy)	



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All specifications subject to change without notice.

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