

INSTALLATION INSTRUCTIONS – WINTER/SUMMER KIT

HYDRONIC HEATING WITH THE SOLAR WATER HEATER

This winter/summer kit provides the necessary components for connections to a boiler. Through the proper installation of this kit, a boiler can heat the potable water indirectly during the cold season when the boiler water is normally hot. The potable water can be heated by an electric element during the warmer months. This increases the boiler efficiency by eliminating the need to heat the boiler from a cold start during warm months.

It is important that you read and understand these instructions completely prior to installing the kit components.

Verify that this kit includes the following components:

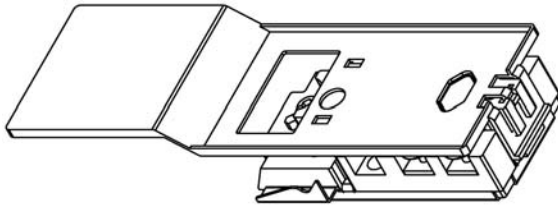
Label – “To Boiler Return”



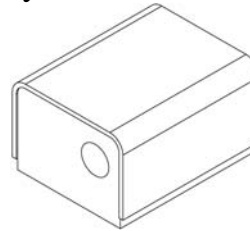
Label – “From Boiler Supply”



Surface mounted thermostat w/cover



Honeywell R845A Switching Relay



ELECTRICAL CONNECTIONS

Before taking any steps to install the kit components, verify that all power is off and that the water heater is placed properly.

DANGER

Positively assure all electrical connections are unpowered before attempting installation or service of electrical components or connections of the water heater or building. Lock out all electrical boxes with padlock once power is turned off.

WARNING

When installed, the water heater must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, and /or the CSA C22.1 Electric Code, latest editions.

Failure to properly wire electrical connections to the water heater may result in serious physical harm.

Electrical power may be from more than one source. Make sure all power is off before attempting any electrical work.

1. Unscrew and open the lower access cover. Lift the insulation and remove the twisted brown wires from the bracket. Keep the wires from interfering and insert the thermostat (with cover) securely in the bracket. The back of the thermostat must be in good contact against the tank wall to accurately sense the temperature.
2. Remove the wire nut from the twisted brown wires and strip the wire ends leaving $\frac{3}{4}$ " of bare wire exposed. Grasp the bottom of the grey thermostat cover and lift to gain access to the screw terminals. Connect the wires to the thermostat as shown in Figure 1. Gently tug each wire to the side, verifying that they are firmly secured. Adjust the temperature setting if necessary. Lower the thermostat cover over the screw terminals and allow the insulation to come back down over the thermostat cover. Fasten the access cover back in place by inserting the bottom tab just inside the heater jacket and tipping up to secure the top to the outside of the jacket with the screw.
3. Remove the Honeywell RA845A switching relay from the box and inspect for damage. Remove the cover and secure the Honeywell RA845A switching relay to the jacket head. This Honeywell RA845A switching relay uses the thermostat contacts to open and close the hot 120 Vac leg going to the circulator. Feed the brown wires through the installed black rubber grommet and strip the ends leaving $\frac{3}{4}$ " of bare wire exposed. Connect the twisted brown wires to the "T" screw terminals in the Honeywell RA845A switching relay as shown in Figure 1. Connect the 120Vac line voltage to the Honeywell RA845A switching relay and circulator as shown in Figure 1. Apply the Honeywell RA845A switching relay cover and tighten in place.

Failure to wire the control exactly as shown may result in dangerous or improper operation for each of the components.

4. Remove the backing to the supplied labels and cover the existing labels as shown in Figure 2.

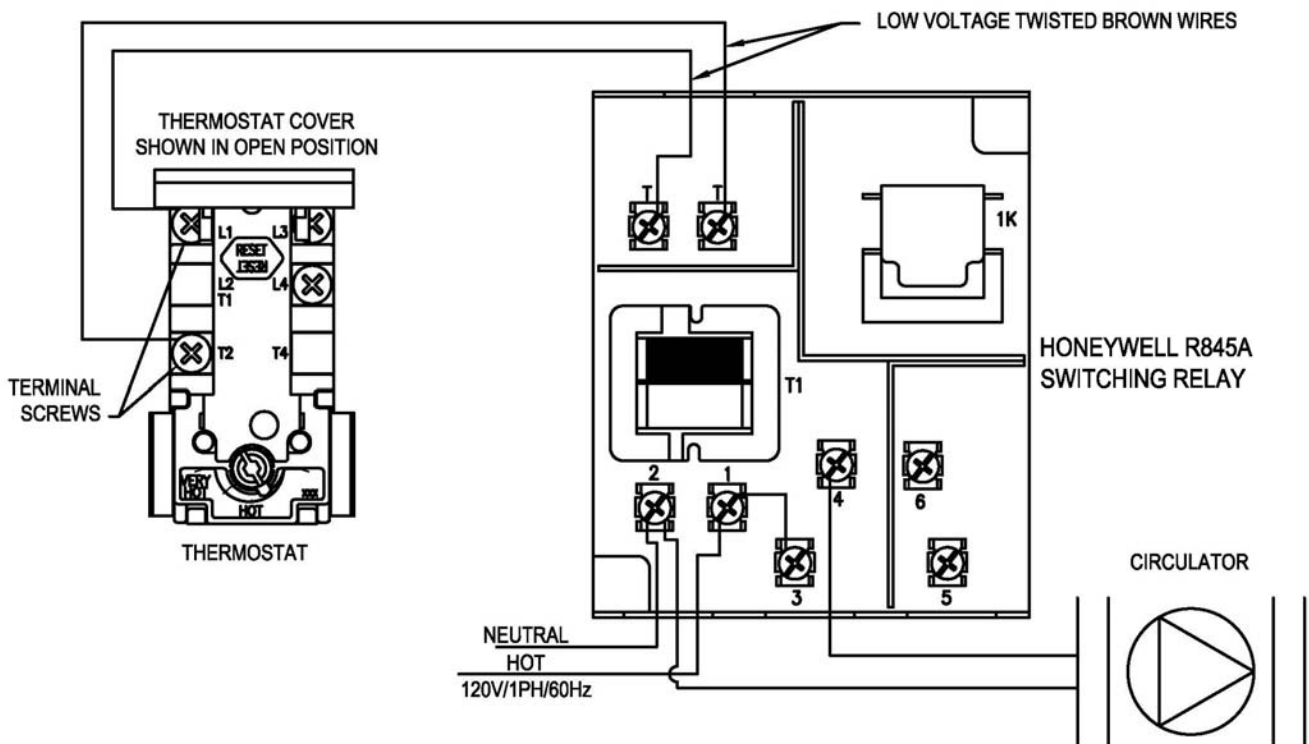


Figure 1 – Winter/Summer Kit Wiring Diagram

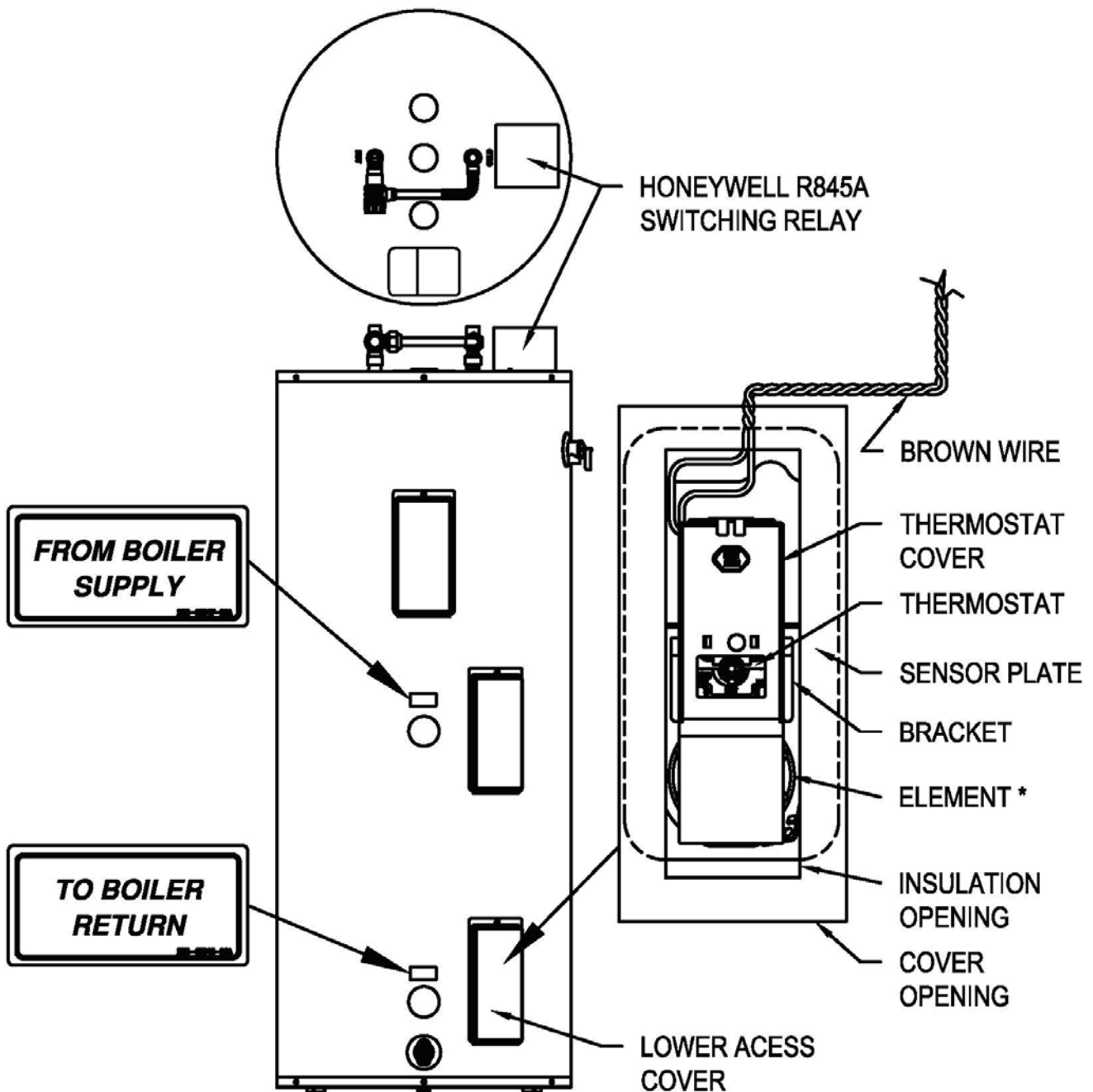


Figure 2 – Water Heater Illustration and Label Placement Diagram

*In models with a single heating element, the element is replaced with a plug.

INDIRECT WATER HEATER RATINGS

Table 1: Indirect Water Heater Performance in Boiler Application

| MODEL | Maximum First Hour Rating (Gal/Hr) @ | | Continuous Draw Rating (Gal/Min) @ | | Approximate Boiler Output Needed For Ratings (BTU/hr) |
|------------------------|--------------------------------------|--------|------------------------------------|--------|---|
| | 140 °F | 115 °F | 140 °F | 115 °F | |
| Single-wall 60-Gallon | 306 | 456 | 4.2 | 6.7 | 220,000 |
| Double-wall 60-Gallon | 210 | 305 | 2.6 | 4.2 | 140,000 |
| Single-wall 75-Gallon | 321 | 470 | 4.2 | 6.7 | 220,000 |
| Double-wall 75-Gallon | 225 | 320 | 2.6 | 4.2 | 140,000 |
| Single-wall 115-Gallon | 357 | 507 | 4.2 | 6.7 | 220,000 |
| Double-wall 115-Gallon | 260 | 350 | 2.6 | 4.2 | 140,000 |

NOTES: Based on 200 °F boiler water temperature and 50 °F potable water inlet temperature. 140°F and 115°F are steady-state potable water outlet temperatures.

POTABLE WATER TEMPERATURE ADJUSTMENT

Table 2 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.

! DANGER


Hotter water increases the risk of scald injury. Scalding may occur within 5 seconds at a setting of 140°F (60°C). Water temperature over 125°F (52°C) can cause severe burns or death from scalds. Children, disabled and the elderly are at the highest risk of being scalded. Please feel the water before bathing or showering.

! WARNING

SCALDING

This water heater can deliver scalding temperature water at any faucet in the system. Be careful whenever using hot water to avoid scalding injury. By setting the thermostat on this water heater to obtain an increased water temperature, you may create the potential for scald injury. To protect against injury, you should install an ASSE approved thermostatic 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. This water heater was shipped with an ASSE approved thermostatic mixing valve. Install this valve according to the directions in the mixing device container. **DO NOT OPERATE THIS WATER HEATER WITHOUT AN ASSE APPROVED THERMOSTATIC MIXING DEVICE.** If this water heater was shipped without an ASSE approved thermostatic mixing valve, contact the manufacturer.

! DANGER



Water temperature over 125°F can cause severe burns instantly or death from scalds. Children, disabled and elderly are at highest risk of being scalded. Review this instruction manual before setting temperature at water heater. Feel water before bathing or showering. Temperature limiting valves are available.

Figure 3 – Scald Warning

| APPROXIMATE TIME/TEMPERATURE RELATIONSHIPS IN SCALDS | |
|--|---------------------|
| 120°F | More than 5 minutes |
| 125°F | 1 ½ to 2 minutes |
| 130°F | About 30 seconds |
| 135°F | About 10 seconds |
| 140°F | Less than 5 seconds |
| 145°F | Less than 3 seconds |
| 150°F | About 1 ½ seconds |
| 155°F | About 1 second |

Table 2 – Scald Relationships

IMPORTANT DECISIONS REQUIRED BEFORE INSTALLATION

SIZING

1. **Boiler Heating Capacity** – The indirect-fired water heater will provide the rated performance only if used in conjunction with a heat source with a heating capacity (Boiler Output) at least as much as the minimum noted in Table 1. If the heat source has less capacity, the output of the tank will be reduced. To determine the approximate reduction in output from the tank, use the following formula:

$$\text{New Rating} = (\text{Continuous Draw Rating}) \times \frac{\text{New Boiler Output Capacity}}{\text{Listed Boiler Output Capacity}}$$

For example, what would the 140°F Continuous Draw Rating be if a Solar Single-wall 75-gallon indirect-fired heater were installed with a heat source having a Boiler Output Capacity of 175,000 BTU/h?

Answer:

New Rating

$$= 4.2 \text{ gal/min} \times (175,000 \text{ BTU/h}) / (220,000 \text{ BTU/h})$$

$$= 4.2 \text{ gal/min} \times 0.795 = \mathbf{3.3 \text{ gal/min}}$$

NOTICE

Increasing the boiler heating capacity above the values listed in Table 1 will not increase the rating of the water heater.

CAUTION

Maximum boiler water supply temperature to the indirect heat exchanger must not exceed 250°F (121°C).

2. **Circulator Sizing** – Refer to the water heater’s installation manual for the corresponding pressure drop through the coil for the given model. Calculate the pressure drop of all straight pipe and fittings on the supply and return of the water heater at the selected flow rate. Add the piping/fitting pressure drop to the pressure drop through the water heater coil. Select a circulator that will provide an appropriate flow rate at the combined pressure drop.

SYSTEM ZONE CONTROL

The indirect-fired water heater must be installed as a zone separate from the space heating system. The domestic hot water zone’s piping and circulator must be sized for a minimum flow rate with all zones in use and a maximum flow rate with only the water heater in use. For this reason, the preferred method of zone control is with circulators.

1. **Circulators** – With space heating zones using circulators, the indirect-fired heater should be added as an additional zone with a circulator.
2. **Zone Valves** – Select a valve with a low-pressure drop to assure adequate flow through the water heater.
3. **Hybrid** – The space heating zone can be zoned using zone valves and the indirect-fired heater zoned with a circulator.

DOMESTIC HOT WATER PRIORITY

Two options are available, Priority and Non-Priority.

1. **Priority** – Demand for space heating is interrupted or postponed until the domestic hot water demand is satisfied. This option provides maximum delivery of domestic hot water. Priority is recommended when:
 - a) Boiler net output is 100,000 Btu per hour or less, or
 - b) When boiler output required to satisfy domestic hot water demand is at least 50% of the boiler output required to satisfy space heating demand, or
 - c) When an interruption in space heating can be tolerated during a long domestic hot water draw.
2. **Non-Priority** – Boiler output is divided between space heating and domestic hot water heating. Delivery of domestic hot water can be reduced during simultaneous space and domestic hot water heating operations, depending on such factors as boiler output, boiler over-sizing, number of space heating zones calling for heat, and the ratio of domestic hot water load to space heating load.

PIPING CONNECTIONS

The heat exchanger interior has been designed for non-potable water, such as in a hydronic heating system. If replacing an existing water heating appliance, be sure to turn off electrical power and / or gas supply to the existing appliance.

The return and supply system connections should now be identified on the side of the water heater. The use of shut off valves and unions are recommended for future service convenience. A suitable expansion tank must be installed in the heating circuit. Consult local codes for proper use, sizing and installation of an expansion tank.

DO NOT operate this water heater in a closed system without provisions for controlling thermal expansion.

INSTRUCTIONS FOR BOILER CONNECTIONS

The indirect-fired heater connection labeled "To Boiler Return" should be piped to the boiler return piping as close to the boiler as possible and especially 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 flow control or check valve is required to prevent back flow through the water heater during operation of the space heating system. Pipe and fittings between the boiler and indirect-fired water heater should be 3/4" diameter or larger.

SYSTEM LAYOUT FOR WINTER/SUMMER WATER HEATING SYSTEM (See Figure 4)

- 1) Install a properly sized expansion tank. An air separator and vent is recommended to eliminate air in the system.
- 2) A pressure reducing valve is recommended for installation to maintain appropriate pressure in the closed loop system.
- 3) The circulator should be installed to "pump away" from the expansion tank as shown.
- 4) Purge all air from the filled, closed system.

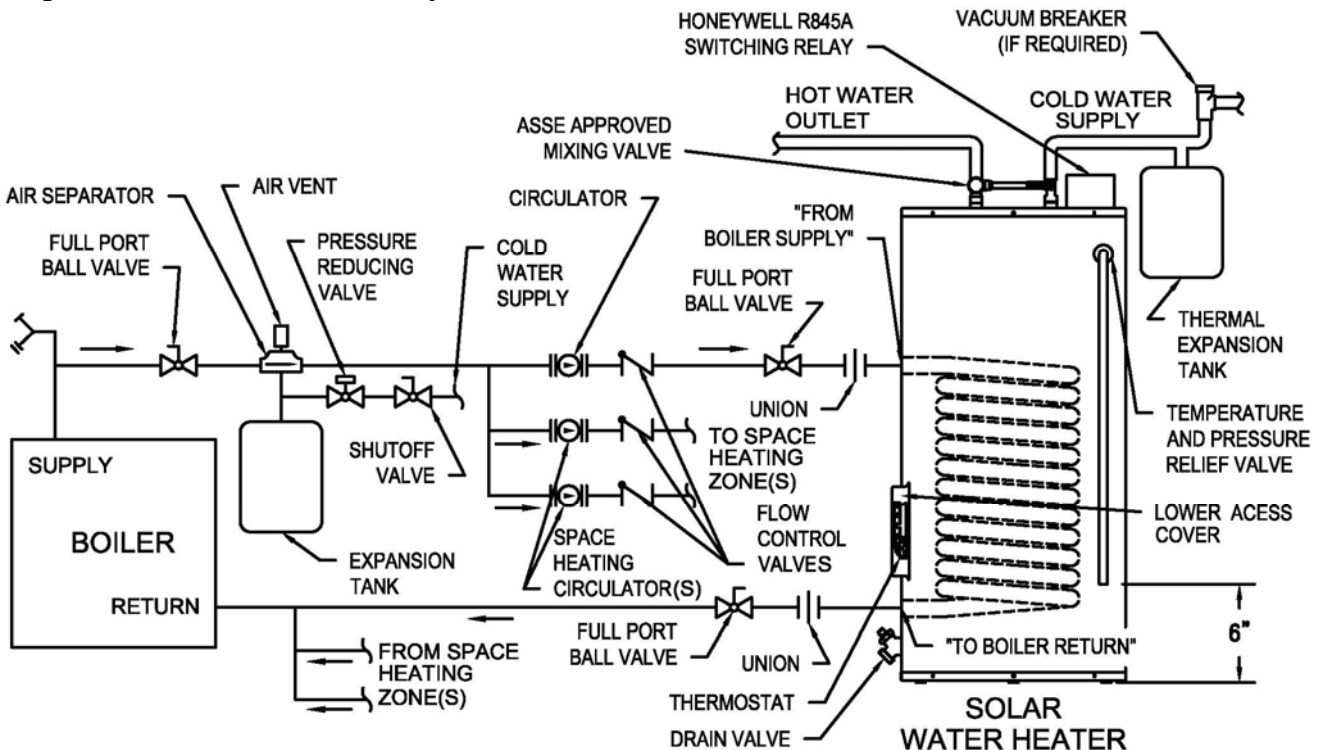


Figure 4 – Piping for Boiler Application (Winter/Summer)

CONNECT WATER BOILER SUPPLY PIPING

1. For boiler system connections, refer to Figure 4. The indirect-fired water heater connection labeled "FROM BOILER SUPPLY" should be piped to the boiler supply piping. Mount the circulator making sure the flow arrow points toward the water heater. The use of shut-off valves and unions are recommended for future service convenience. The use of an air separator and vent is recommended to eliminate air in the system. Pipe and fittings between the boiler and indirect-fired water heater must be 3/4" diameter or larger.

FILL BOILER SYSTEM

1. On new boiler installations, do not purge the boiler or space heating system through the water heater. During any boiler or space heating system flushing, cleaning, or purging, the water heater should be isolated to avoid possible attack on the carbon steel coil by chemical additives.
2. Purge air from boiler/water heater piping.
3. Check system for leaks. Repair as necessary.

Refer to the Installation and Operating manual that came with the water heater for instructions on the water heater standard operations.