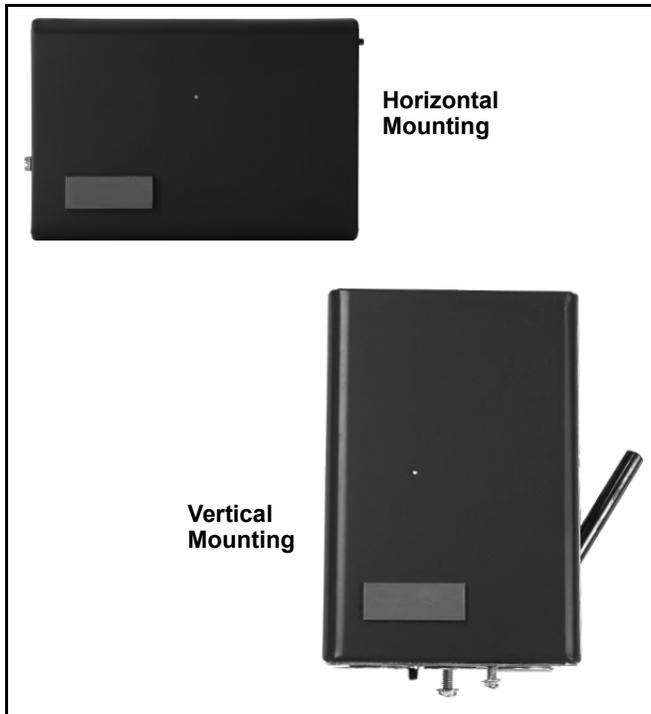




L8148A,E,J Aquastat® Relays

PRODUCT DATA



FEATURES

- All models are used with a 24 Vac thermostat.
- Models include special terminals for adding remote, low limit temperature control.
- L8148E,J have terminals for adding zone valve system wiring.
- L8148E models are available with plug for connecting Aquastat Relay directly to D892/M892 Vent Dampers.
- All devices include transformer to provide power for the low voltage control circuit. Different models provide switching of line, low, or millivoltage burner circuit.
- Case available for horizontal or vertical mounting.
- Combinations of two insulation and two insertion well lengths are available.

APPLICATION

The L8148 Aquastat® Relays are immersion type hydronic controllers that combine high limit protection with switching relay control of burner and circulator motors.

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SPECIFICATIONS

IMPORTANT

The specifications given in this publication do not include normal manufacturing tolerances. Therefore, this unit may not exactly match the listed specifications. Also, this product is tested and calibrated under closely controlled conditions, and some minor differences in performance can be expected if those conditions are changed.

Models: See Table 2.

Electrical Ratings:

Table 1. Circulator Control Circuit (Amperes).

Type	120 Vac	240 Vac
Full Load	7.4	3.7
Locked Rotor	44.4	22.7

Voltage and Frequency: 120 Vac, 60 Hz.

Burner Control Circuits:

Line Voltage: Ratings same as for circulator above.

Low Voltage: 0.8A maximum at 24 Vac.

Millivoltage: 0.25A at 1/4 to 12 Vdc.

Approvals:

Underwriters Laboratories Inc. Listed: File No. MP466, Guide No. MBPR (models with well); Guide No. MBPR2 (models without well).

Canadian Standards Association Certified: File No. LR1620, Guide No. 400-E-O.

ANSI Miswiring: Models with 1/4 in. tab terminal meet ANSI Appliance Miswiring Standard.

Immersion Well Dimensions:

Brass Spud for Boiler Fitting: 1/2 or 3/4 NPT.

Insulation Depth: 1-1/2 or 3 in. (38 or 76 mm).

NOTE: Not all models include wells. If well is not included but is needed, refer to form 68-0040 to order.

Insertion Length: 3-3/8 in. (86 mm).

Maximum Pressure On Immersion Well:

255 psi (1758 kPa).

Maximum Bulb Temperature:

40°F higher than setpoint, or up to 265°F (23°C higher than setpoint, or up to 129°C).

Material Safety Data Sheets (MSDS): For more information on heat-conductive compound, see form 69-0955.

Maximum Ambient Temperature:

150°F (66°C) with 1.2A, 24V load.

77°F (25°C) with 1.4A, 24V load.

Table 2. Standard L8148 Model Specifications.

Model Number	Burner Circuit Voltage	Mounting Case ^a	Special Provision for Adding Remote Low Limit	High Limit	Second Limit	Circulator Control	Maximum Number of Zone Controls		Thermostat Required	Manual/ Auto Switch
							Valves ^b	Relays ^c		
L8148A	Line	Horizontal	Yes	Yes	No	Can be added remotely	—	—	24V	No
L8148E ^{d,e}	Low	Vertical					2	4		
L8148J	Low or millivolt	Vertical or horizontal					Yes			

^a See Fig. 1 for case dimensions.

^b Number of V8043 Zone Valves that can be powered from the L8148 without additional transformer(s). 1.2A load is the maximum permissible when ambient temperature exceeds 77°F (25°C).

^c Number of R8230C Relays that can be powered from the L8148. Additional relays in groups of four or fewer require an additional transformer.

^d Models available with plug for connecting L8148E directly to the D892/M892 Vent Dampers.

^e Models available with plug (L8148E) and 50 VA transformer are for use with the Resideo SV9500/SV9600 SmartValve® System Control. No zone valves or relays can be powered from the L8148 when used with SV9500/SV9600 gas valves.

Maximum Ambient Temperature:

150°F (66°C) with 1.2A 24V load;

77°F (25°C) with 1.4A 24V load.

Optional Specifications:

Scale Range: 140°F to 240°F (60°C to 116°C).

High Limit Dial Stop.

Thermostat Heat Anticipator Setting: 0.2A.

Case Dimensions: See Fig. 1.

Standard Scale Range: 180°F to 240°F (82°C to 116°C).

Accessories:

107408 Heat Conductive Compound (4 oz. can). For more information, see form 69-0955, Heat Conductive Compound.

124904 Well Adapter. For ordering information, see form 68-0040, Immersion Wells and Compression Fittings.

Differential: Nonadjustable.

Finish: Gray enamel.

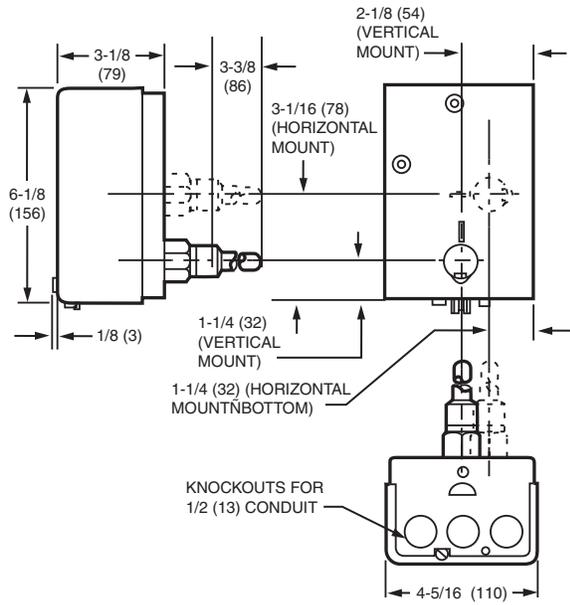


Fig. 1. L8148 dimensions in in. (mm).

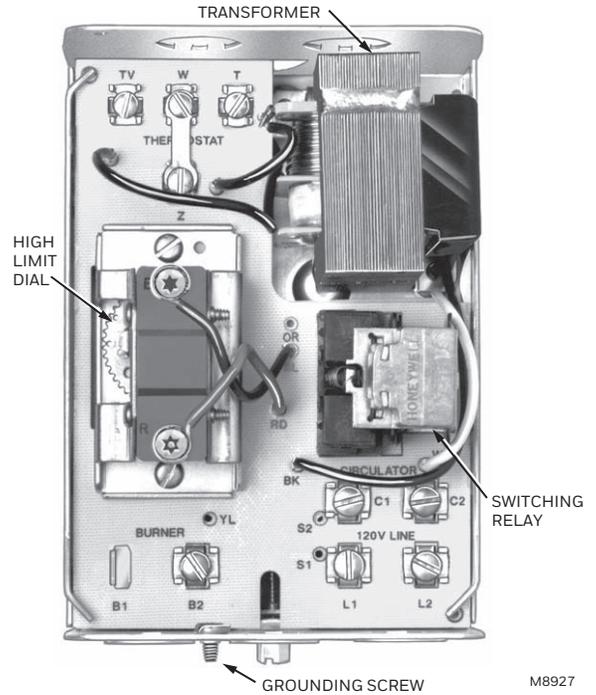


Fig. 3. Internal view of L8148E Aquastat® Relay.

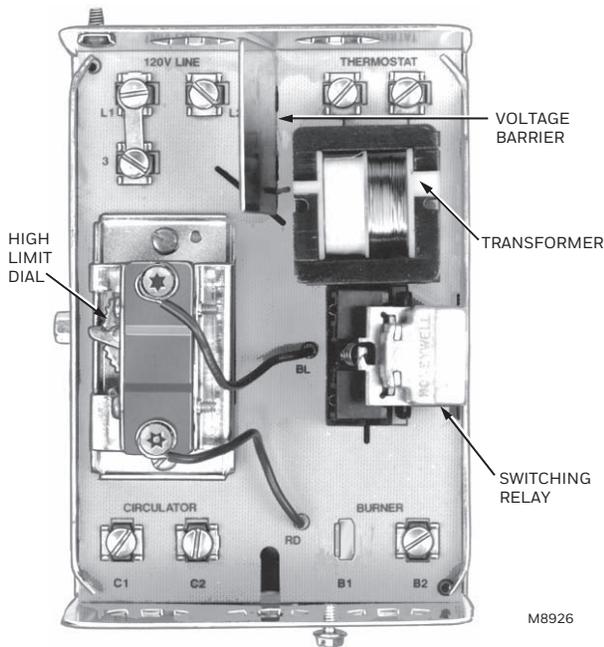


Fig. 2. Internal view of L8148A Aquastat® Relay.

INSTALLATION

When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.



WARNING

Explosion Hazard.

Can cause severe injury, death or property damage.

This product is intended for use only in systems with a pressure relief valve.



WARNING

Electrical Shock Hazard.

Can cause severe injury, death or equipment damage.

1. Disconnect power supply before beginning installation to prevent electrical shock or equipment damage.
2. Never apply a jumper across (or short) terminals B1, B2, or B3. This burns out the transformer.

Mounting

Boilers have tapings to allow immersion well (which must be ordered separately) to be mounted horizontally so boiler water of average temperature can circulate freely around the well.

1. Turn off all power and drain the boiler.
2. If no tapping is provided, prepare one properly sized and threaded, and locate near the top of the boiler.
3. Coat the well threads sparingly with pipe dope, install the well in the boiler tapping, and tighten securely.

NOTE: Do not attempt to tighten by using the case as a handle.

4. Refill the boiler and check for water leakage.
5. Increase sensitivity of the bulb by coating with a good heat-conductive compound. When used, coat the bulb completely.
6. Insert the bulb element into the well until it bottoms. If necessary, slightly bend the tube inside the case to hold the bulb against the bottom of the well.

NOTE: Some models have a tubing length adjustable to 3 in. (76 mm). In these models, pull out extra tubing from inside the case, if needed.

7. Center the loop of excess tubing in front of the immersion well so it cannot touch any electrical parts.
8. Fit the case onto the well so the clamp on the case slides over the flange on the well. Tighten the clamp screw securely.

IMPORTANT

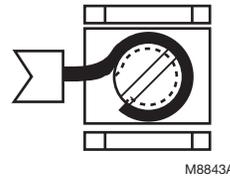
Best thermal response is obtained with a well that snugly fits the sensing bulb. For wells used, the bulb should be inserted until it rests against the bottom of the well. Use a well of correct length and bend the tubing, if necessary, to hold the bulb against the bottom of well, but do not make a sharp bend in the tubing.

If the well does not fit snugly on the bulb, use the heat-conductive compound as follows: Fold the plastic bag of compound lengthwise and twist it gently. Then snip off the end of the bag and work the open end of the bag all the way into the well. Slowly pull out the bag while squeezing it firmly to distribute the compound evenly in the well. Insert the bulb all the way to the bottom of the well. Bend the tubing, if necessary, to hold the bulb against the bottom of the well and to hold the outer end of the bulb firmly in contact with the side of the well (Fig. 4). Wipe excess compound off the outer end of the well.

Wiring

IMPORTANT

Terminals on the L8148 Aquastat Relay are approved for use with only copper wire. The terminals allow only wrap-around wiring.



1. Strip 7/16 in. of insulation from the wire end.
2. Wrap the wire at least 3/4 of the distance around the screw as shown.
3. Using a standard, flat-headed screwdriver, tighten the screw until the wire is snugly in

contact with the screw and contact plate.

4. Tighten the screw an additional one-half turn.

NOTE: Do not use a push-type ratchet screwdriver.

Disconnect power supply before making wiring connections to prevent electrical shock or equipment damage.

All wiring must comply with local electrical codes and ordinances. Do not exceed limits in the Specifications section when applying this control.

When wiring a switch equipped with 1/4 in. tab terminal connector, use 18 to 22 gauge wire with AMP Inc. part no. 2-520129-2 fully insulated flag receptacle connector or equivalent.

The L8148E,J can power up to two V8043 Zone Valves. Additional valves, in groups of two or fewer, require an additional transformer. Follow appropriate wiring diagrams, see Fig. 5 through 14, when using zone valves or a low limit controller.

NOTE: On systems requiring a vent damper, the vent damper can be connected directly to some L8148E Aquastat Relay models (Fig. 12) or an S8610 Ignition Module (Fig. 11).

When the vent damper is plugged into the Aquastat Relay, a fuse in the Aquastat Relay will blow when the thermostat first closes. Once the fuse is blown, the Aquastat Relay will not operate unless the vent damper is connected.

When the vent damper is plugged into the Aquastat Relay, a fuse in the Aquastat Relay will blow when the thermostat first closes. Once the fuse is blown, the Aquastat Relay will not operate unless the vent damper is connected.

With the vent damper plugged into the S8610, a fuse in the ignition module will blow when first powered. Once the fuse is blown, the ignition module will not operate unless the vent damper is connected.

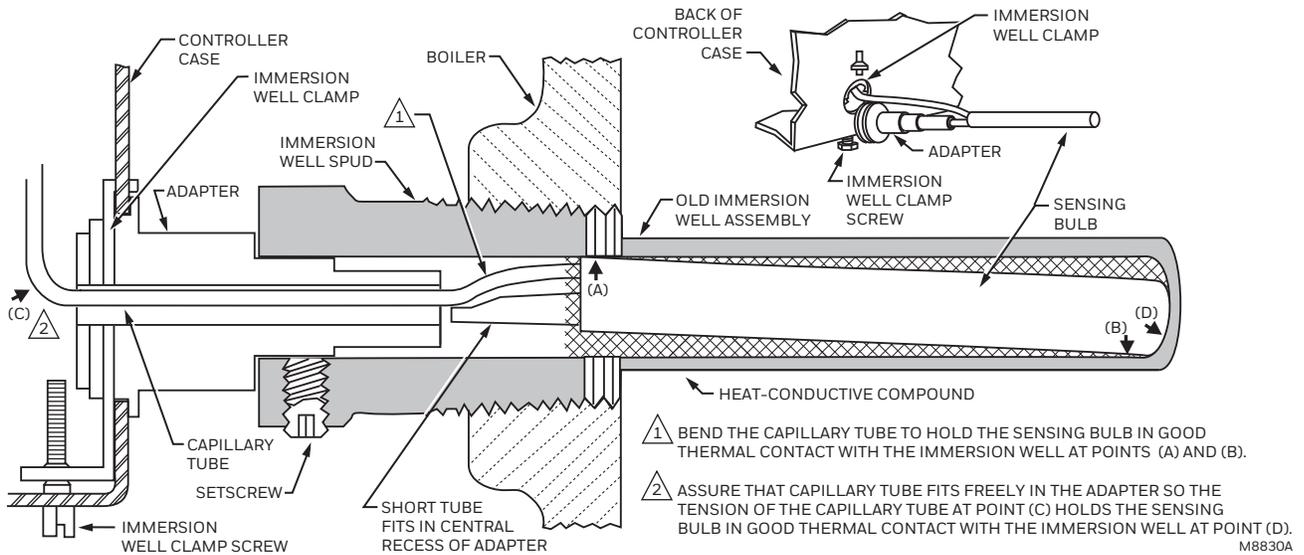


Fig. 4. Position of bulb in immersion well, and use of well adapter when required.



CAUTION

Equipment Damage Hazard.

Exceeding load limits can damage the equipment.

1. When L8148E or J is used to power zone valves, low voltage 1.4A; 1.2A load is the maximum permissible when ambient temperature exceeds 77°F (25°C). Use additional transformer(s) if load exceeds ratings.
2. When L8148E (with 50 VA transformer) is used to power SV9500/SV9600, a separate transformer must be used to power zone valves.

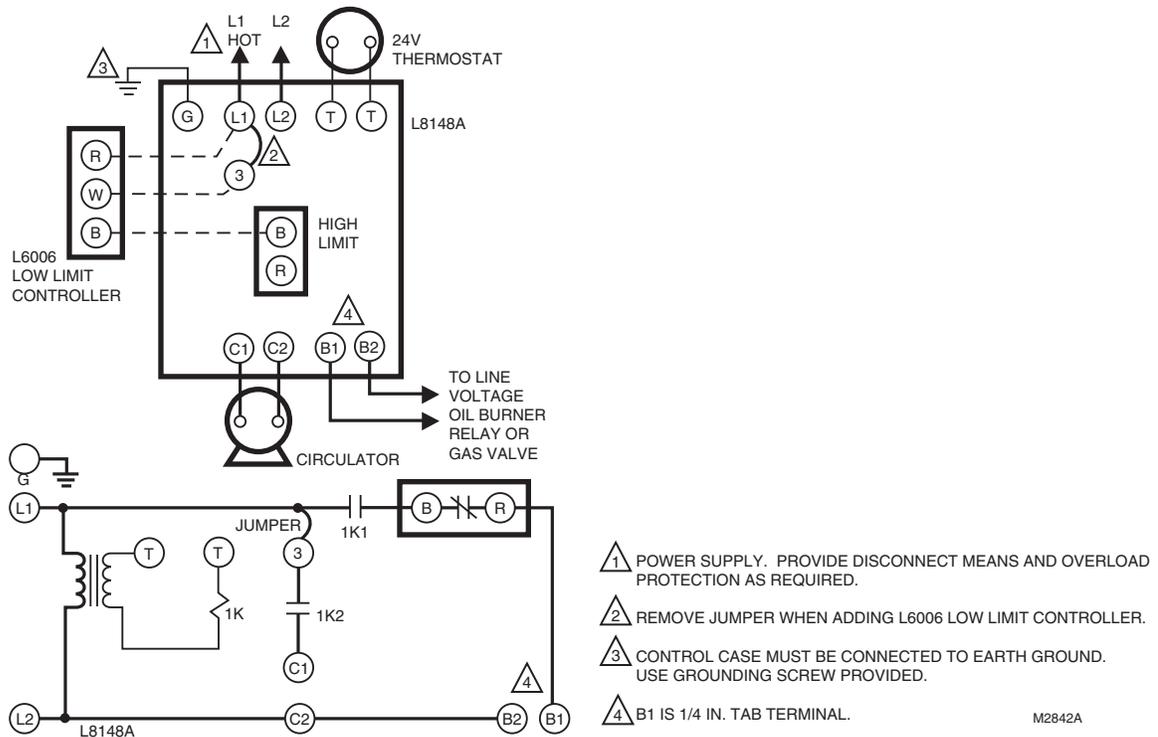


Fig. 5. External connections and internal schematic for L8148A.

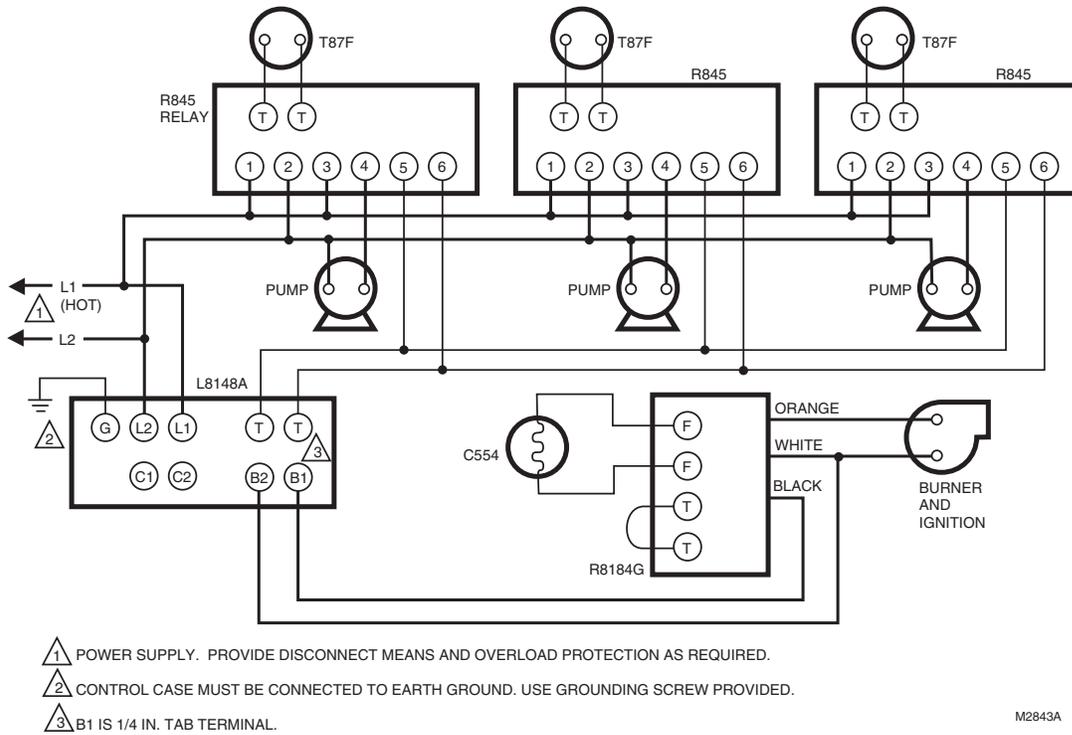


Fig. 6. Wiring L8148A in oil-fired, forced hot water, no tankless, zoned, pump system.

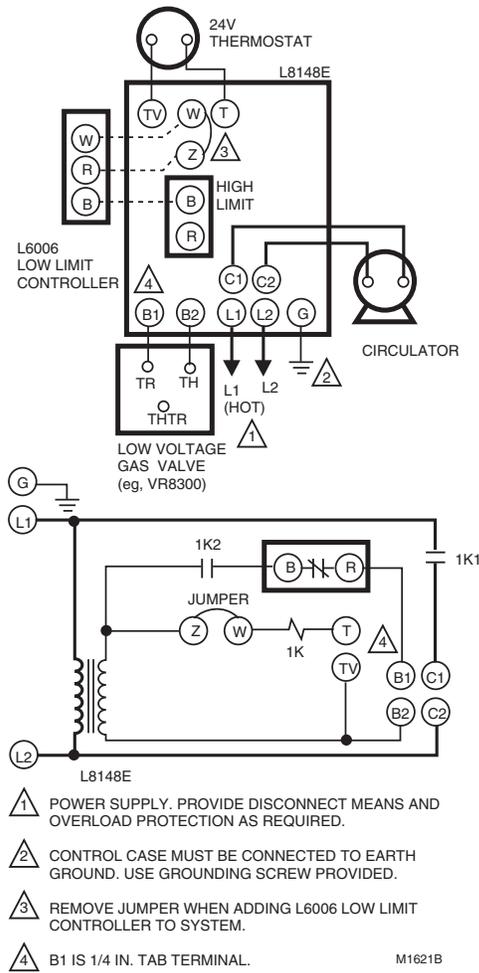


Fig. 7. External connections and internal schematic for L8148E.

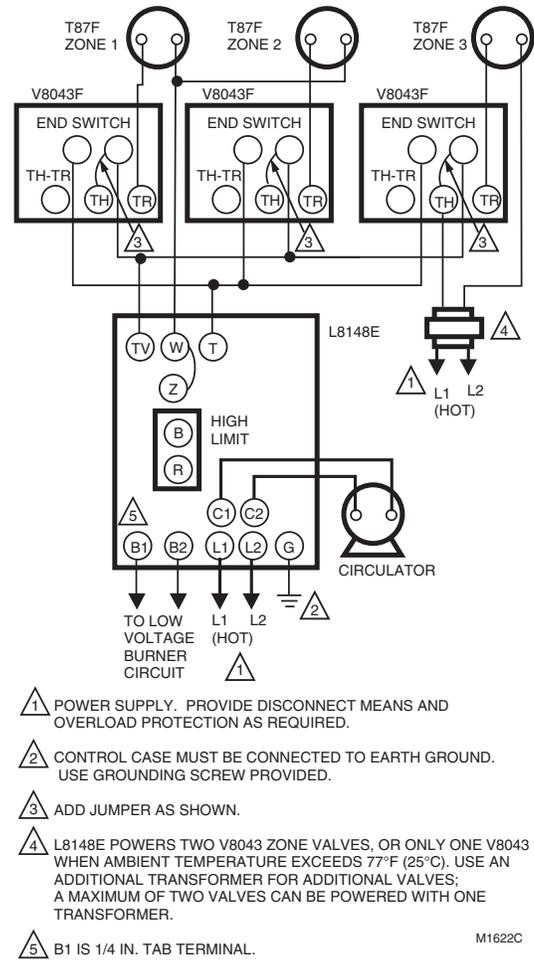


Fig. 8. Wiring L8148E with multizone valves.

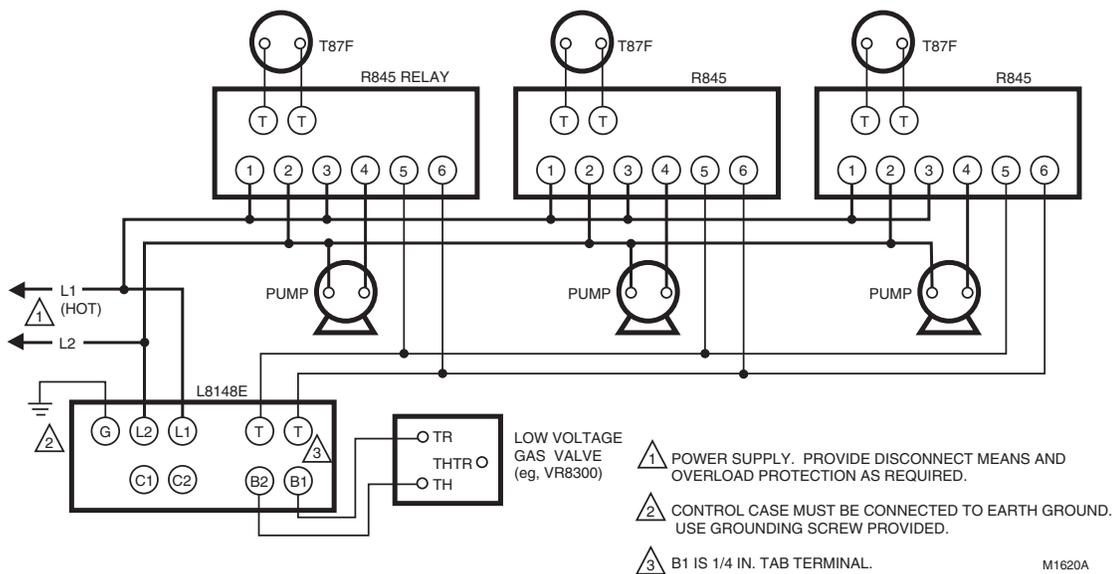


Fig. 9. Wiring L8148E in a gas-fired, 24V, forced hot water, no tankless, zoned, pump system.

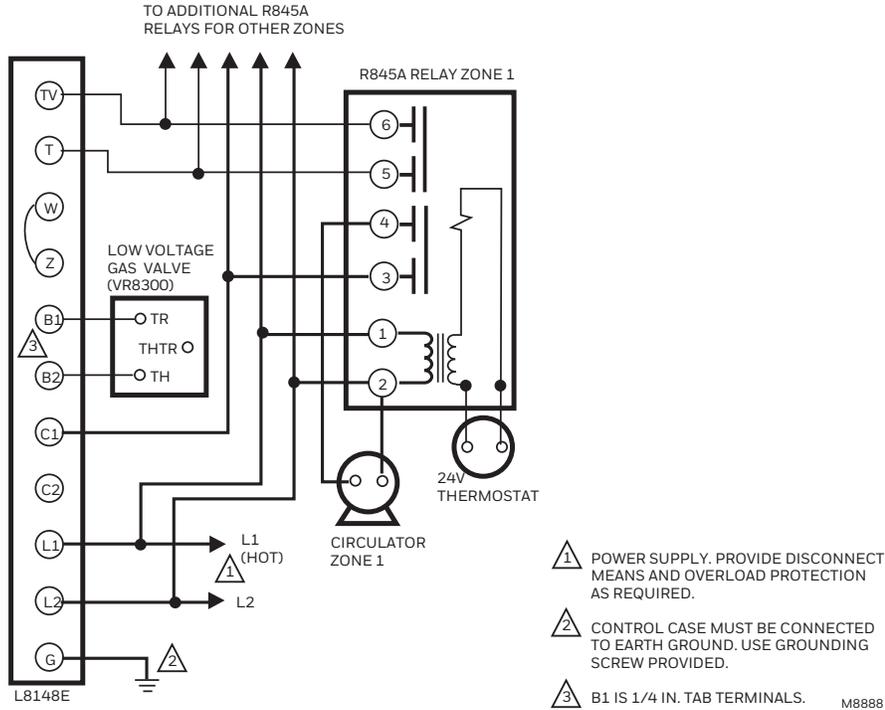
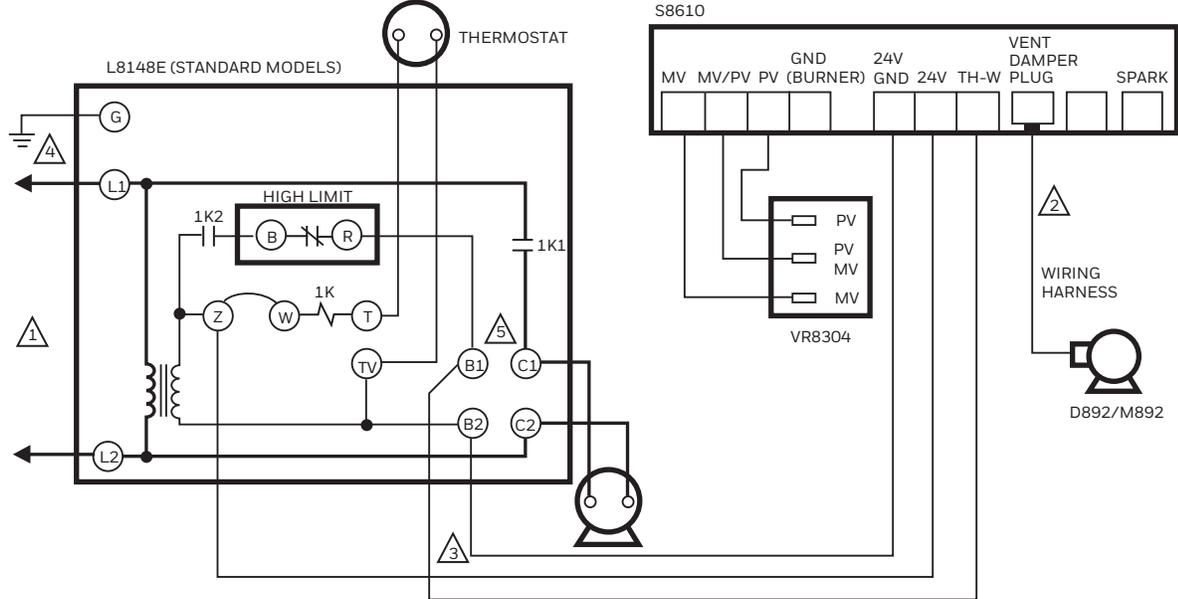


Fig. 10. Wiring L8148E in multizone system with R845 switched circulator.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 REMOVE PLUG ONLY IF USING VENT DAMPER. WITH PLUG REMOVED AND VENT DAMPER CONNECTED, FUSE BLOWS WHEN THERMOSTAT FIRST CLOSES. THEN MODULE OPERATES ONLY WHEN VENT DAMPER IS CONNECTED.
- 3 CAREFULLY FOLLOW WIRING; MISWIRING COULD RESULT IN CONSTANT ON.
- 4 CONTROL CASE MUST BE CONNECTED TO EARTH GROUND. USE GROUNDING SCREW PROVIDED.
- 5 B1 IS 1/4 IN. TAB TERMINAL.

Fig. 11. Wiring L8148E with S8610A,F Intermittent Pilot Ignition Module with automatic vent damper plug and Resideo D892/M892 Vent Damper.

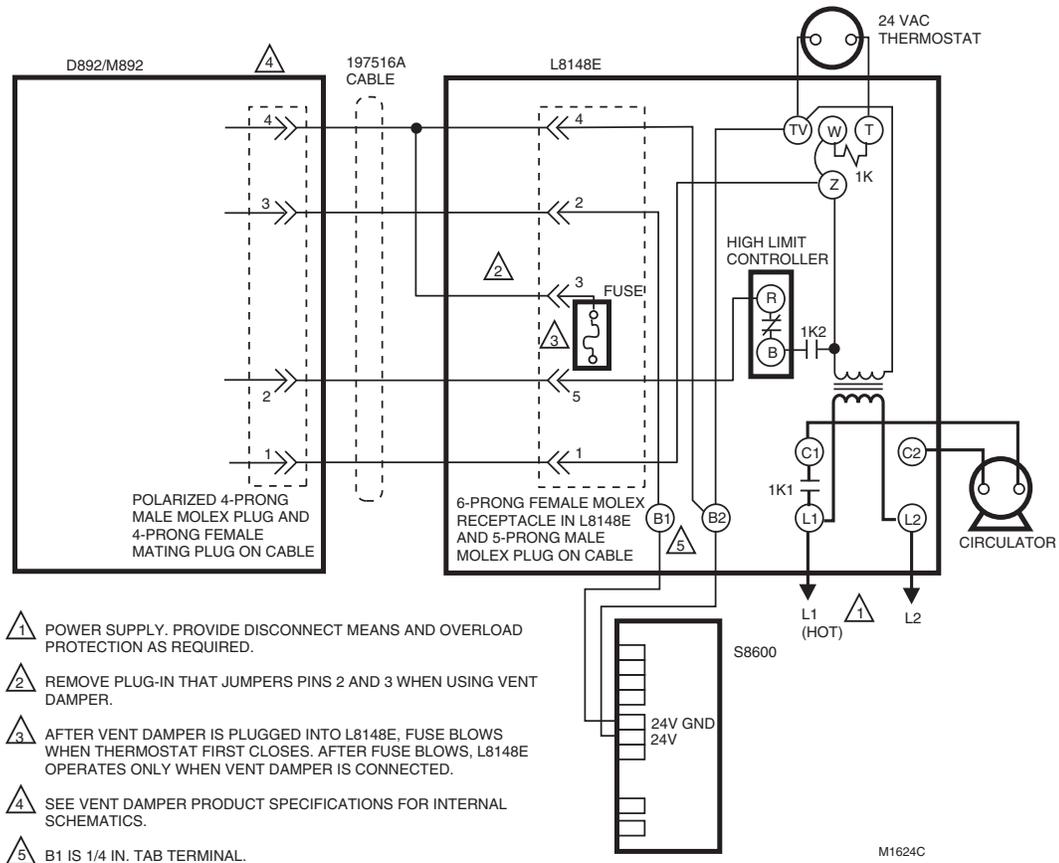


Fig. 12. Wiring L8148E with internal plug directly to D892/M892 Vent Damper in hydronic intermittent pilot system.

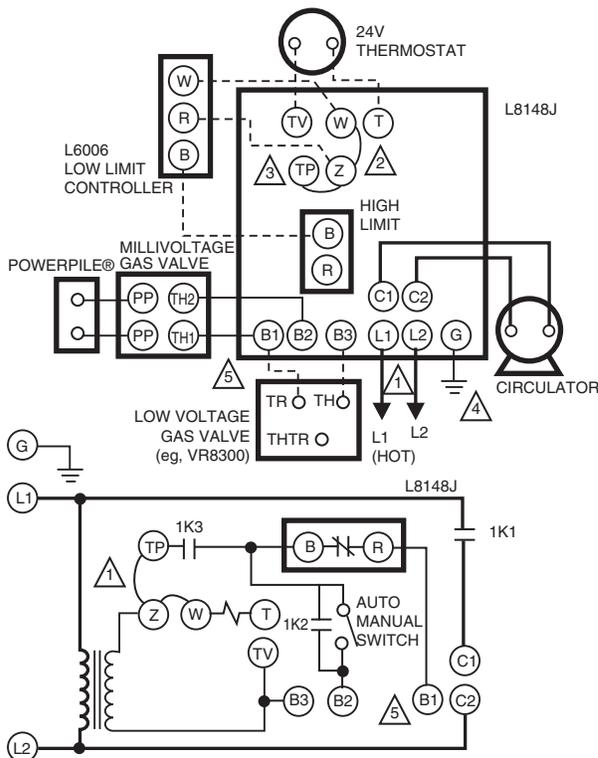
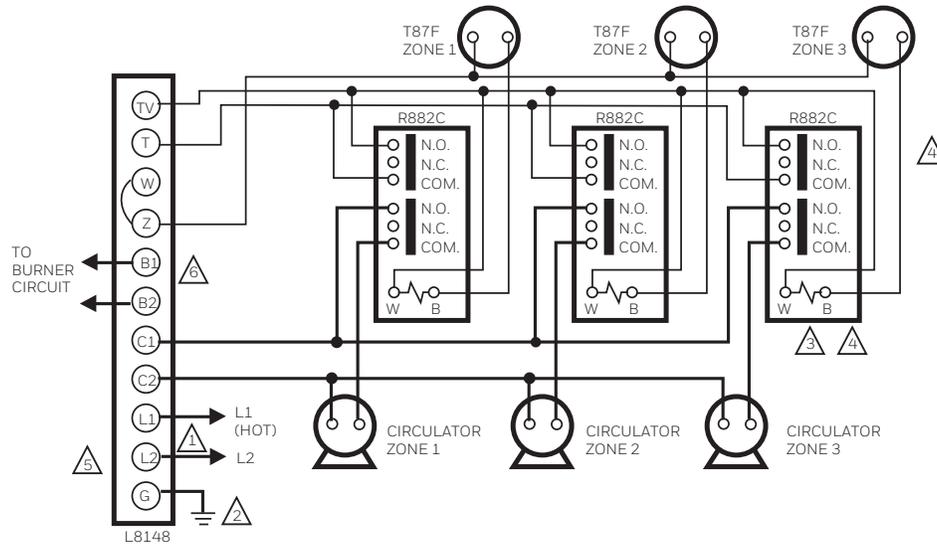


Fig. 13. Internal schematic and external connections for wiring L8148J for either low voltage or millivoltage gas valves.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 CONTROL CASE MUST BE CONNECTED TO EARTH GROUND. USE GROUNDING SCREW PROVIDED.
- 3 AS MANY AS THREE R882C RELAYS CAN BE POWERED BY THE L8148E OR J. ADDITIONAL GROUPS, WITH A MAXIMUM OF THREE RELAYS PER GROUP, REQUIRE AN ADDITIONAL TRANSFORMER.
- 4 R882C IS PROVIDED WITH NEC CLASS 1 ENCLOSURE.
- 5 L8148E SHOWN. L8148J IS IDENTICAL EXCEPT WITH ADDITION OF TP AND BE TERMINALS.
- 6 B1 IS 1/4 IN. TAB TERMINAL.

M1623B

Fig. 14. Multizone system with R882C switched circulator.

SETTING AND ADJUSTMENTS

Setting

High Limit Switch

Heating systems differ and the correct temperature setting for one system may not be the correct setting for another. Follow the boiler manufacturer recommendations for proper setting. With cover off, turn the dial until the desired setting is directly below the indicator. Models with optional dial stop can be adjusted using a small screwdriver as shown in Fig. 15.

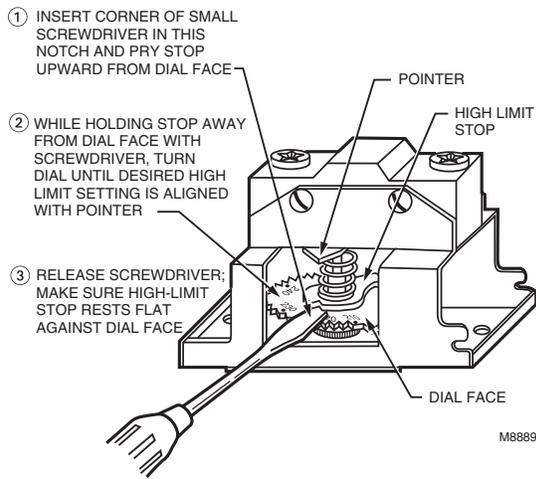


Fig. 15. Adjusting models with optional dial stop.

OPERATION

⚠ WARNING

Explosion Hazard.

Can cause severe injury, death or property damage.

This product is intended for use only in systems with a pressure relief valve.

The switching relay is controlled by the low voltage room thermostat. On a call for heat, the relay contacts make to complete the line voltage circulator circuit and also the burner circuit when the boiler water temperature is below the high limit. The high limit switch shuts off the burner if boiler water temperature exceeds the high limit setting.

The AUTO-MANUAL switch (only L8148J millivolt models) operates the burner during electrical power failure. With the switch at MANUAL, the burner operates continuously until high limit is reached or the switch is reset to AUTO. The circulator, requiring line voltage, is inoperative. When power is restored, reset the switch to AUTO to resume automatic operation.

⚠ CAUTION

Equipment Damage Hazard.

Can cause equipment damage and operational failure.

Never apply a jumper across (or short) terminals B1, B2, or B3. This burns out the transformer.

CHECKOUT

Put the system in operation and observe through at least one complete cycle to be sure all equipment functions as described in the Operation section.



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