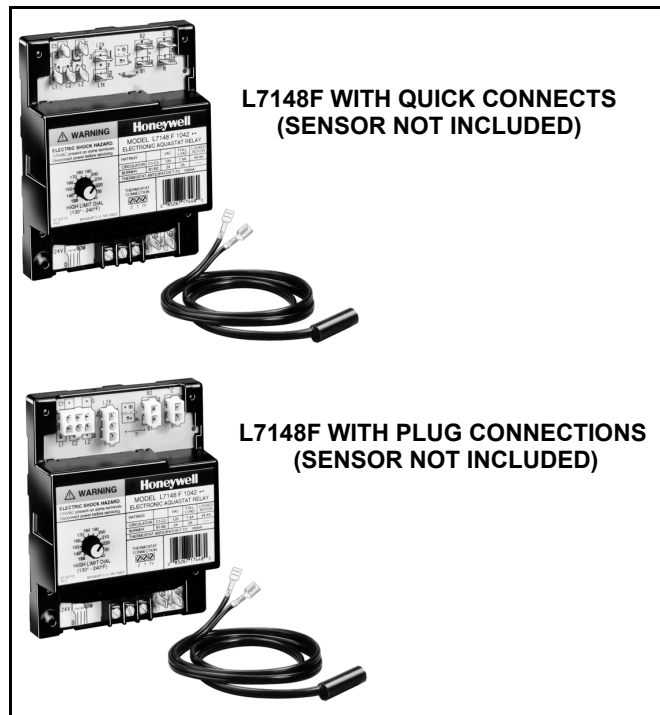


L7148F Electronic Aquastat® Controller

PRODUCT DATA



FEATURES

- Available with quick connect or AMP® plug connections. T, TV and Z terminals are provided in a terminal block with screw connections.
- Vent damper plug optional.
- Separate high limit control not required.
- Software defined minimum/maximum limit settings.
- External 120 Vac to 24 Vac transformer, ordered separately, is field replaceable and upgradable.
- Patented limit rated 209659A,B,C Sensors are separately replaceable.
- Communications port for future field added advanced feature modules.
- Flush mounted to sheet metal rather than spud mounted to sensing well.
- 3/16 in. (5 mm) B1 quick connect and AMP plug connections meet ANSI miswiring requirements.
- UL353 Limit Controls approval for both U.S. and Canada.
- Meets UL 1998 Software Safety Standards.
- Diagnostic LED to assist in system troubleshooting.

GENERAL

The L7148F Electronic Aquastat® Controller is an immersion type hydronic controller that provides high limit protection and controls circulator, gas valve and optional vent damper equipment. The complete L7148F system requires a sensor, immersion well and transformer, all of which must be ordered separately. See Table 1 for sensor specifications.

An external 120 Vac to 24 Vac transformer is required to power the L7148F. For total external transformer VA requirements, add the 10 VA requirement for the control, gas valve load requirement (connections B1, B2), zone valve connection requirement (see zone valve specifications), vent damper requirement and VA requirement for any other equipment. Total low voltage load must not exceed 4A.

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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.

Standard Models

Models:

L7148F Electronic Aquastat Controller with quick connect terminals, with or without vent damper plug and communications port (for adding advanced feature modules).

L7148F Electronic Aquastat Controller with AMP plug connections, with or without vent damper plug and communications port (for adding advanced feature modules). AMP connector on wiring board for transformer connection.

High Limit Setpoint Range: 130°F to 240°F (54°C to 116°C). (Select models may be different.)

Differential: Fixed 10°F (6°C). (Select models may be different.)

Operating Voltage Range:

L1-L2 Line Voltage Power: Nominal, 120 Vac.
R-C 24V Transformer Output: Nominal, 24 Vac.

Minimum/Maximum Ambient Temperature:

-30°F (-9°C) with 2.0A 24V load.
150°F (66°C) with 2.0A 24V load.

Operating Relative Humidity: 0 to 95% RH non-condensing.

Electrical Ratings (60 Hz only):

B1-B2: 2.0A at 24 Vac.
C1-C2: Full Load 7.4A at 120 Vac; Locked Rotor, 44.4A at 120 Vac.

NOTE: Total Low Voltage load must not exceed 4.0A.

Case Dimensions: See Fig. 1.

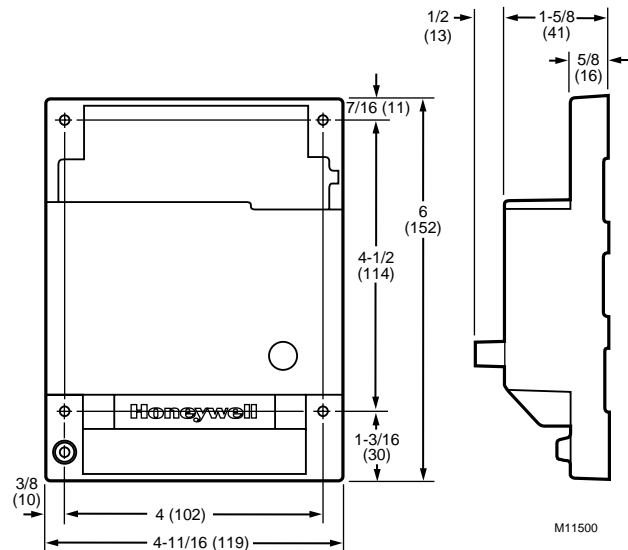


Fig. 1. L7148F dimensions in in. (mm).

Mounting: Vestibule mount.

Approvals:

Underwriters Laboratories Inc. Component Recognized:
File No. MP466.

Canadian Underwriters Laboratories Inc. Component
Recognized: File No. MP466.

ANSI Miswiring: 3/16 in. (5 mm) B1 quick connect terminal
and AMP® plug connections meet ANSI Appliance
Miswiring Standard.

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

Accessories:

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

121371AA Sensor Retaining Clamp.

32002656-001 Sensor Retaining Spring.

Sensor: Sensor available separately. For leadwire lengths
available, see Table 1.

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Home and Building Control Sales Office (check white pages of your phone directory).
2. Home and Building Control Customer Relations
Honeywell, 1885 Douglas Drive North
Minneapolis, Minnesota 55422-4386

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9.

International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

Immersion Well: Available separately. Contact your distributor or Honeywell sales representative to order, or refer to Accessories for Immersion Wells, Compression Fittings, and Element Holders, form 68-0040.

Transformer: Available separately with either quick connect terminals or AMP plug connections. Contact your distributor or Honeywell sales representative to order.

Table 1. Sensor Specifications.

Sensor	Termination	Lead Length	Diameter	Capsule Length	Mounting	Material
32004955-001	One 1/4 in. (6 mm) and one 3/16 in. (5 mm) quick connect terminal.	12 in. (304 mm), 18 gauge wire.	3/8 in. (10 mm)	1-1/4 in. (32 mm)	Compression	Thermal plastic
32004955-002		18 in. (458 mm), 18 gauge wire				
32004955-003		25 in. (610 mm), 18 gauge wire.				
32004955-004		36 in. (914 mm), 18 gauge wire				
32004955-005		48 in. (1219 mm), 18 gauge wire.				

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

Fire or Explosion Hazard.
Can cause property damage, severe injury or death.
Use this product only in systems with a pressure relief valve.

WARNING

Electrical Shock Hazard.
Can cause electrical shock or equipment damage.
Disconnect power supply before beginning wiring. Never apply a jumper across (or short) terminals B1 and B2. This will burn out the transformer.

Mounting

WARNING

Fire or Explosion Hazard.
Can cause serious injury, death or property damage.
Sensor must be fully inserted to bottom of well.

IMPORTANT

The L7148F is not designed for spud mounting to the sensing well.

Sensor and immersion well are not provided and must be purchased separately. Mounting screws must be obtained locally. See Table 1 for sensor specifications. The sensor is adaptable to existing immersion wells with a shell I.D. of 3/8 in. (10 mm). To order an immersion well, contact your distributor or Honeywell sales representative, or refer to Accessories for Immersion Wells, Compression Fittings, and Element Holders, form 68-0040.

In new and replacement applications, mount the Electronic Aquastat Controller on the vestibule away from heated surfaces. Use four no. 6 screws, obtained locally, to mount the control through the four mounting holes.

Mount the immersion well, purchased separately, where boiler water of average temperature can circulate freely around it.

To insert the immersion well into the boiler:

1. Turn off all power and drain the boiler.
2. If no tapping is provided, prepare properly sized and threaded tapping 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.
4. Refill the boiler and check for water leakage.

IMPORTANT

- Sensor must be fully inserted to bottom of well.
- Remove all heat conductive compound from the well prior to sensor insertion.

5. Insert the sensor into the well. Make sure the sensor fits securely against the bottom of the well.

To secure sensor and leadwire with mounting clamp (see Fig. 2.):

1. Loosen the draw nut and spread the jaws of the clamp.
2. Slide the jaws of the clamp over the mounting flange.
3. Adjust the sensor leadwire to fit through the groove in the mounting clamp.

IMPORTANT

Do not overtighten the draw nut or a system shut-down could occur.

4. Tighten the draw nut so that the clamp is firmly attached to the well and the leadwire is held securely in place.
5. Secure excess leadwire to prevent disconnection of sensor or removal from the well.

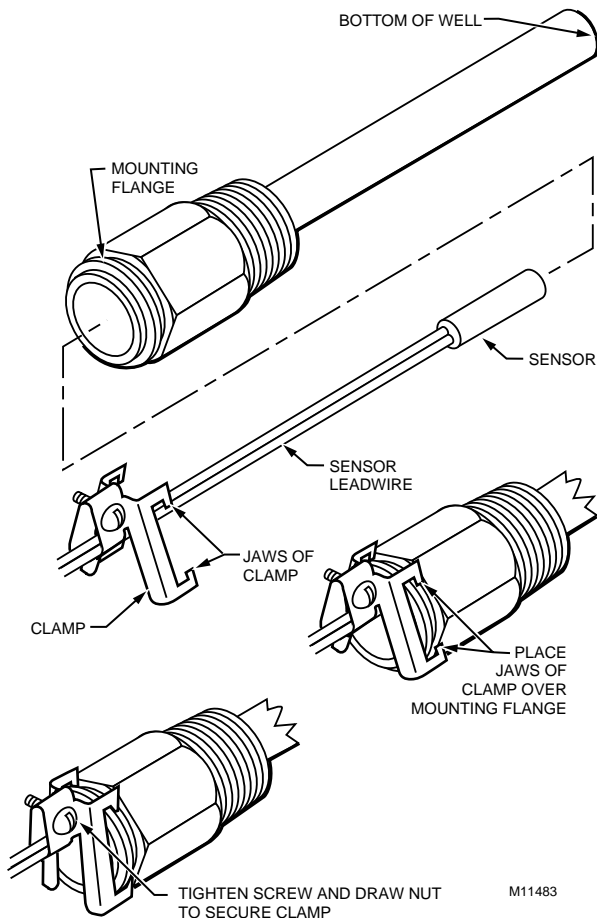


Fig. 2. Secure sensor and leadwire with mounting clamp or spring (see Accessories).

Wiring

⚠ WARNING

**Electrical shock hazard.
Can cause serious injury, death or equipment damage.**

Disconnect power supply before beginning wiring.

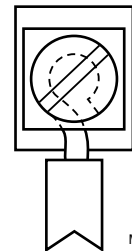
IMPORTANT

- An external transformer is required for operation. The user must size the transformer for the specific application.
- If L7148F is used to power zone valves, total low voltage (24V) load must not exceed 4A. Use a zoning panel such as the Honeywell R8889 when load exceeds these ratings.

All wiring must comply with local electrical codes and ordinances. Refer to the SPECIFICATIONS section when applying this control. For appropriate wiring diagrams, see Fig. 3 through 10.

For screw terminal connections:

1. Strip 1/16 in. of insulation from the wire end.
2. Insert the wire under the terminal screw and contact plate.
3. Using a standard, flat-headed screwdriver, tighten the screw until the wire is firmly in contact with the screw and contact plate.
4. Tighten the screw an additional one-half turn.



For quick connect terminal connections:

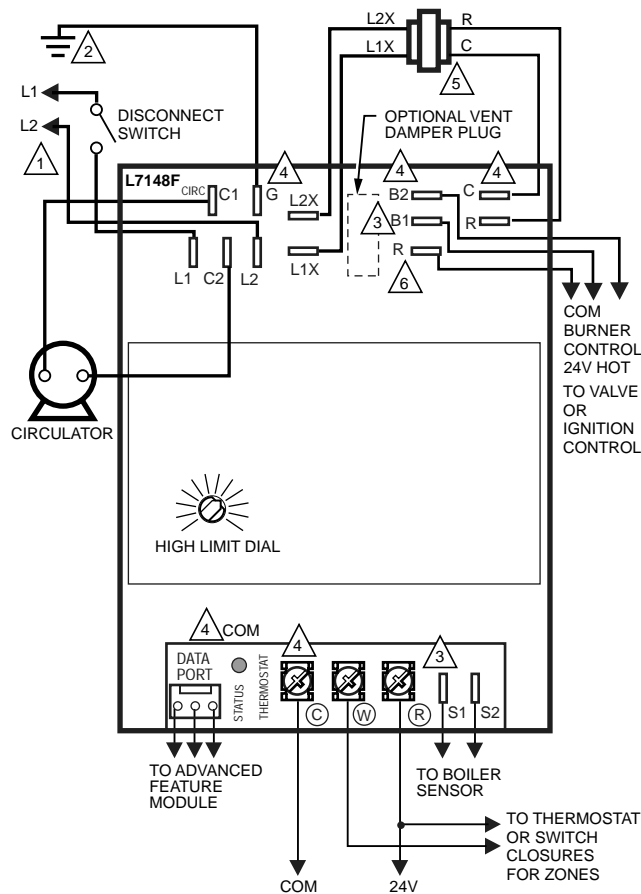
Connect the quick connect to the appropriate terminal on the control. B1 and S1 are 3/16 in. (5 mm) quick connect terminals; all other terminals are 1/4 in. (6 mm).

For AMP plug connections:

Connect the AMP plugs to the receptacles on the control. An AMP plug connection is shown in Fig. 8.

The L7148F and appropriately sized external transformer can power up to three Honeywell V8043 Zone Valves. Additional valves, in groups of three or less, require an additional transformer, or use Honeywell R8889 Zone Valve Panel. Follow the appropriate wiring diagrams when using zone valves. See Fig. 4, 5, 7, and 9.

On systems requiring a vent damper, the Honeywell vent damper can be connected directly to some L7148F Electronic Aquastat models (Fig. 9) or S8610 Spark Ignition Modules (Fig.8). With the vent damper plugged into the Electronic Aquastat Controller, a fuse in the Electronic Aquastat Controller blows when the thermostat first closes. Once the fuse is blown, the Electronic Aquastat Controller does not operate unless the vent damper is connected. With the vent damper plugged into the S8610, a fuse in the ignition module blows when first powered. Once the fuse is blown, the ignition module does not operate unless the vent damper is connected.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 GROUND MUST BE AN EARTH GROUND CONNECTION.
- 3 B1 AND S1 ARE 3/16 IN. QUICK CONNECT TERMINALS. ALL OTHER TERMINALS ARE 1/4 IN.
- 4 C, COM, Z, B2, G ARE ALL CONNECTED INSIDE DEVICE.
- 5 FOR EXTERNAL TRANSFORMER VA REQUIREMENTS, REFER TO APPLICATION SECTION.
- 6 R IS A CONVENIENCE TERMINAL FOR 24V HOT CONNECTION FOR USE WITH IGNITION CONTROLS.

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Fig. 3. External connections for L7148F.

ADJUSTMENT

A manual adjustment potentiometer is used to set the high limit controller. At the maximum setpoint of 240°F (116°C), the calibration tolerance is plus 10°F (6°C) and minus 15°F (8°C). (Meets ASME and UL353 Standards).

(Select models available with other ranges.)

NOTE: Setpoint Range: 130°F (54°C) to 240°F (116°C).
Differential: Fixed at 10°F (6°C).

OPERATION

A system containing an L7148F Electronic Aquastat does not require a separate high limit controller. The L7148F can replace a Honeywell L4080 High-Limit Controller and an R8225 Transformer. The L7148F does not provide a low limit function. An external transformer, appropriately sized for the specific application; a sensor, and an immersion well are required for Aquastat™ operation.

In the L7148F system without an advanced feature module, the circulator is on any time there is a thermostat call for heat. The addition of an advanced feature module may alter operation. The burner is also on during a thermostat call for heat unless the boiler water temperature exceeds the high limit setting.

The L7148F Electronic Aquastat has three states of operation: normal, high-limit and reset: (The control moves back and forth between the normal and high-limit states, as needed. However, the control only enters the reset state when there is an abnormal condition such as an internal error or shorted sensor.)

1. **Normal:** The control enters the normal state when the temperature of the boiler drops below the high limit setting minus 10°F (-12°C). The control exits the normal state and returns to the high limit state when the temperature of the boiler exceeds the high limit setting.
2. **High limit:** The control enters the high limit state when the temperature of the boiler exceeds the high limit setting. The control exits the high limit state and returns to the normal state when the temperature of the boiler drops to the high limit setting minus 10°F (-12°C).
3. **Reset:** Detects an error condition such as an open sensor and shuts down all outputs. The control continues to function and automatically restarts if the error condition is corrected.

High Limit

The high-limit switch shuts off the burner (B1, B2 output) when the boiler water temperature exceeds the high-limit setting. Because heating systems differ, the correct temperature setting for each system can vary. Follow the boiler manufacturer recommendations for the proper setting. Turn the HIGH-LIMIT dial on the control until the desired setting is directly below the indicator.

Sequence of Operations

The state of the burner and circulator outputs are dependent on the thermostat input mode (On/Off) and the current operation mode (High limit/Normal/Reset). See Table 2 Sequence of Operations.

NOTE: Table 2 applies only to the operation of the Electronic Aquastat Controller without an advanced feature module. Advanced feature modules provide additional functions such as boiler temperature display and outdoor reset of high limit. Changes in output states and operation modes caused by these additional functions are not included.

Table 2. Sequence of Operation

Thermostat	Operation Mode	Burner	Circulator
Off	Normal	Off	Off
Off	High Limit	Off	Off
On	Normal	On	On
On	High Limit	Off	On
Either	Reset	Off	Off

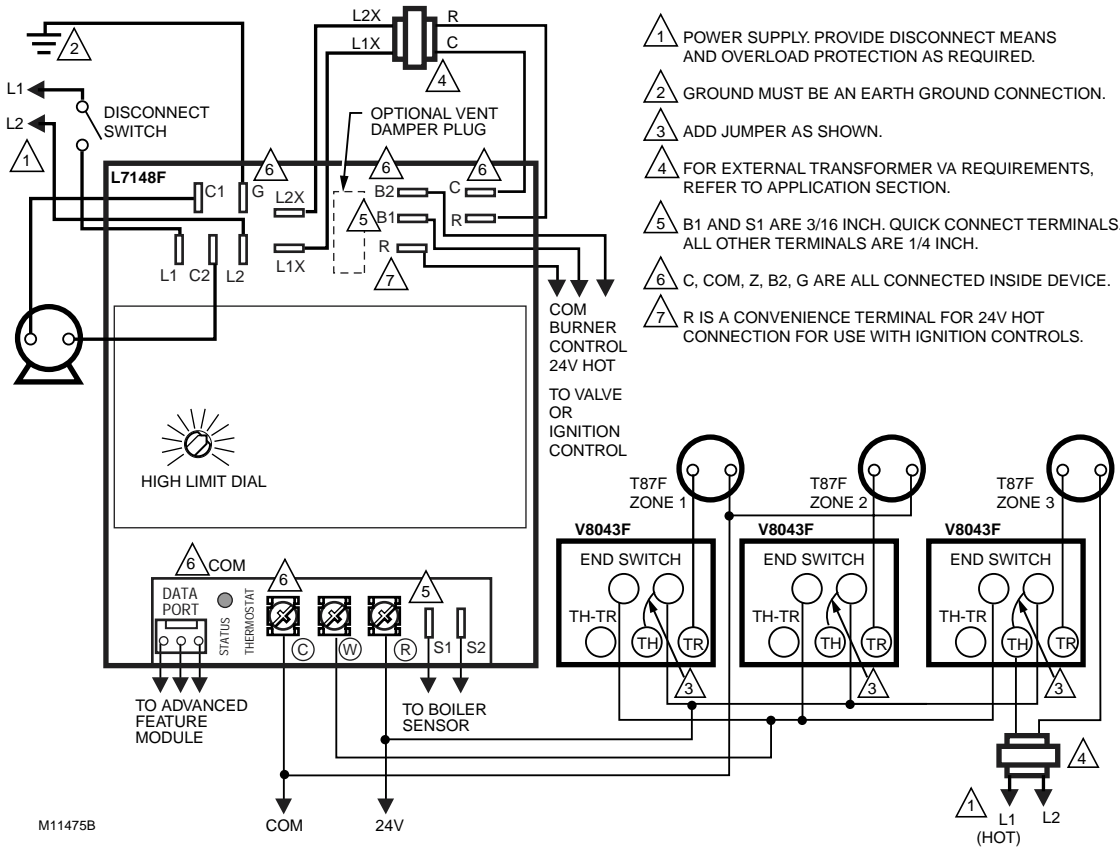
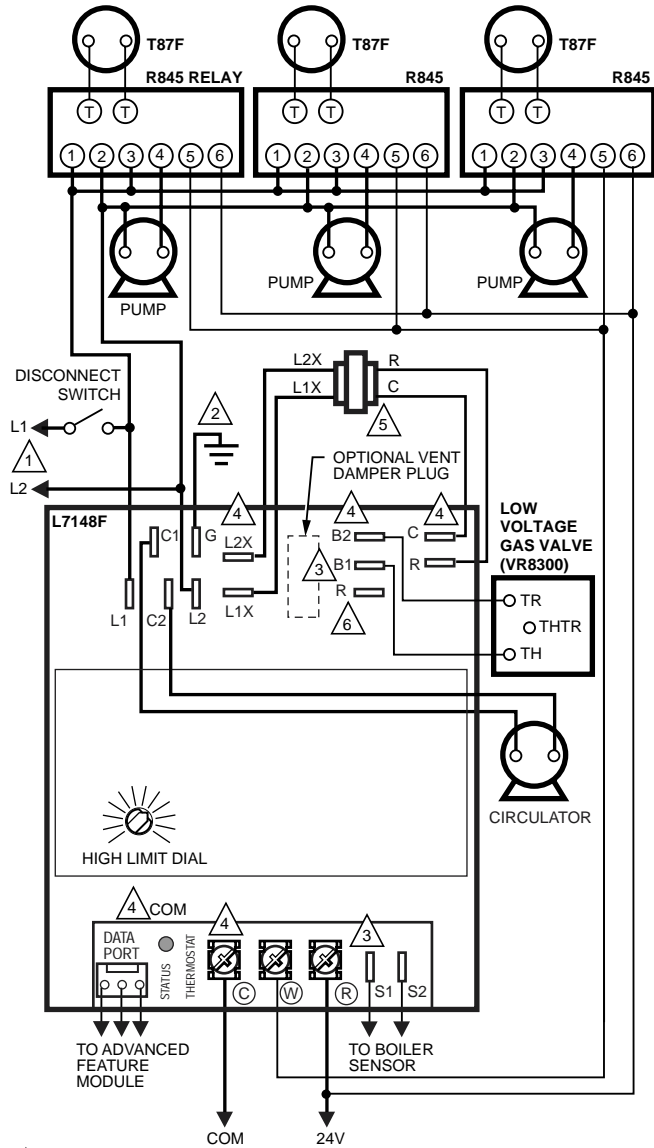


Fig. 4. Wiring L7148F with multizone valves.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 GROUND MUST BE AN EARTH GROUND CONNECTION.
- 3 B1 AND S1 ARE 3/16 INCH QUICK CONNECT TERMINALS. ALL OTHER TERMINALS ARE 1/4 INCH.
- 4 C, COM, Z, B2, G ARE ALL CONNECTED INSIDE DEVICE.
- 5 FOR EXTERNAL TRANSFORMER VA REQUIREMENTS, REFER TO APPLICATION SECTION.
- 6 R IS A CONVENIENCE TERMINAL FOR 24V HOT CONNECTION FOR USE WITH IGNITION CONTROLS.

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Fig. 5. Wiring L7148F in a gas-fired, forced hot water, tankless, zoned, pump system.

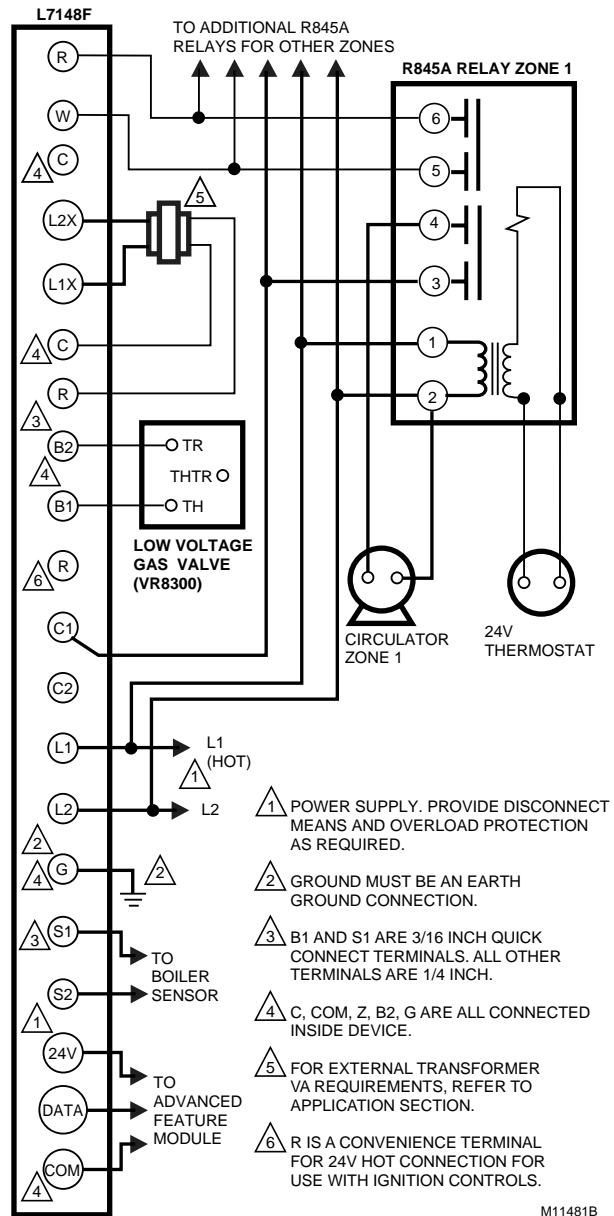


Fig. 6. Wiring L7148F in multizone system with R845 Switched Circulator.

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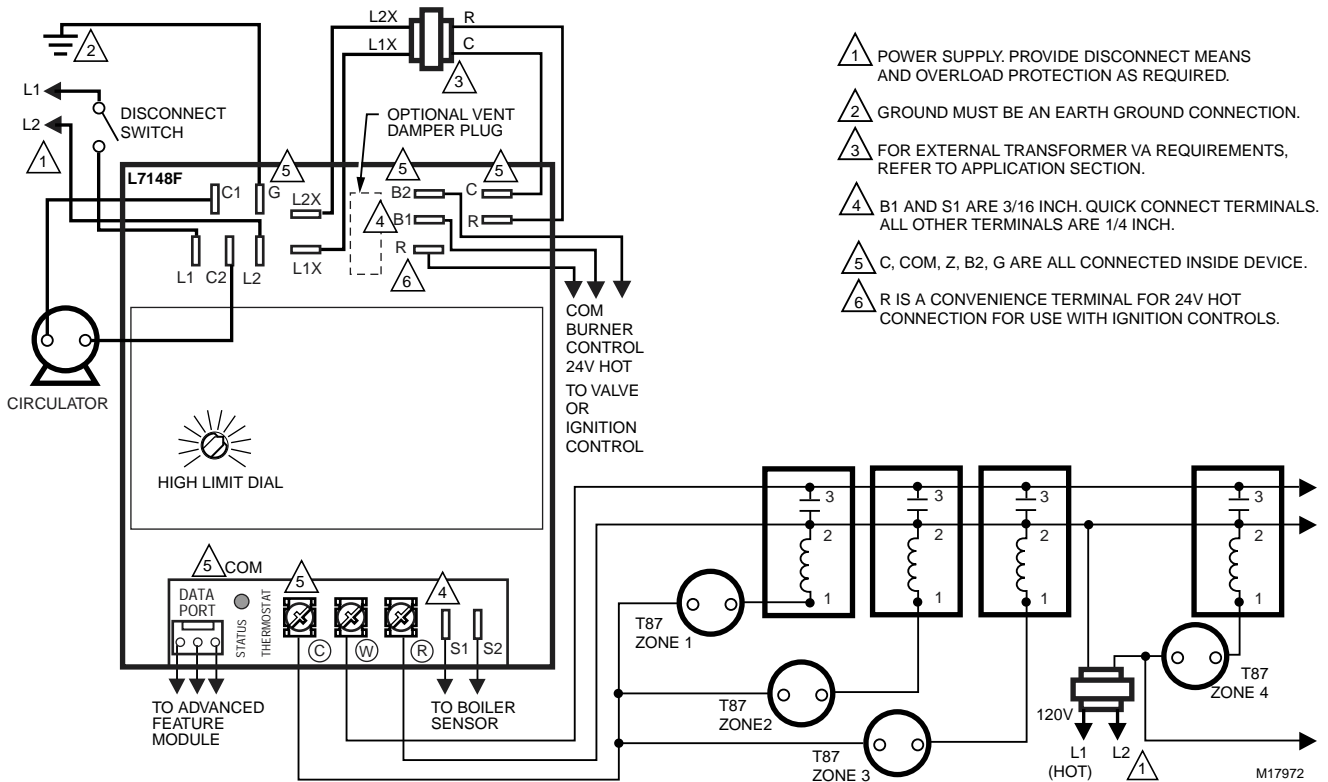


Fig. 7. Typical three-wire zone valve hookup diagram.

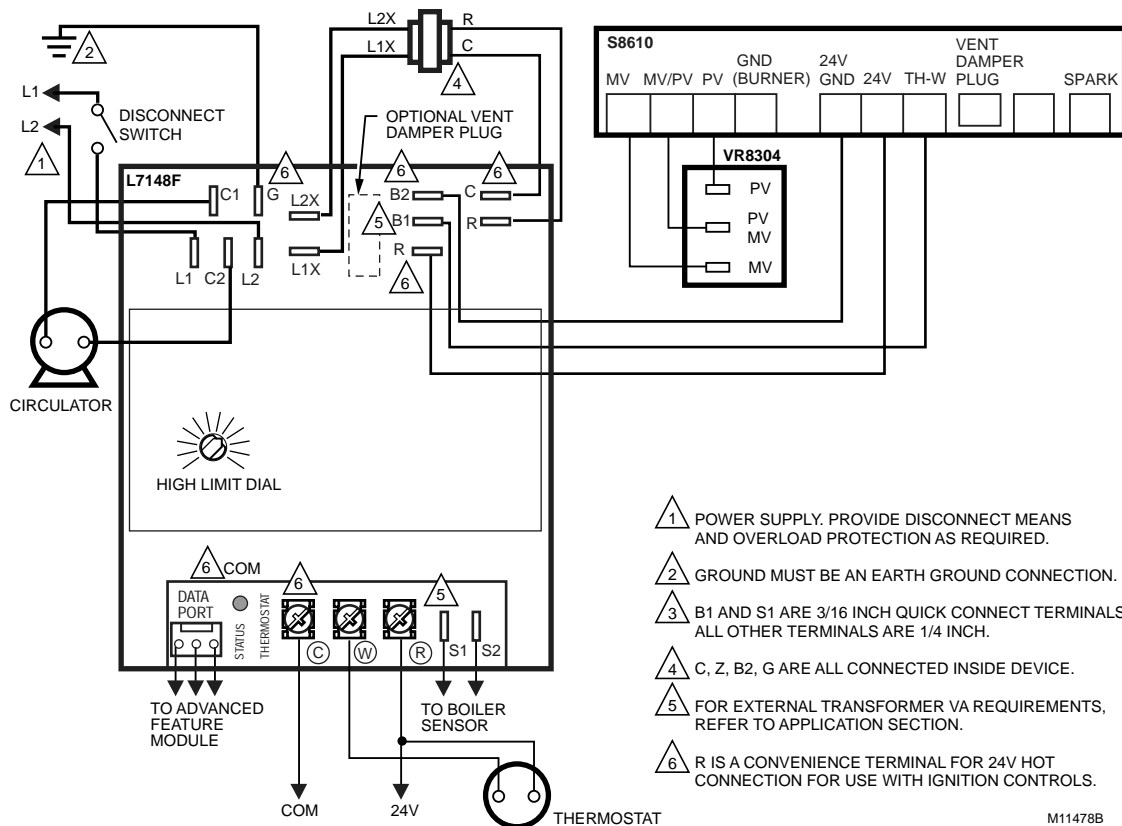


Fig. 8. Wiring L7148F with S8610 Intermittent Pilot Ignition Module with automatic vent damper plug and Honeywell D892/D896/M892/M896 Vent Damper.

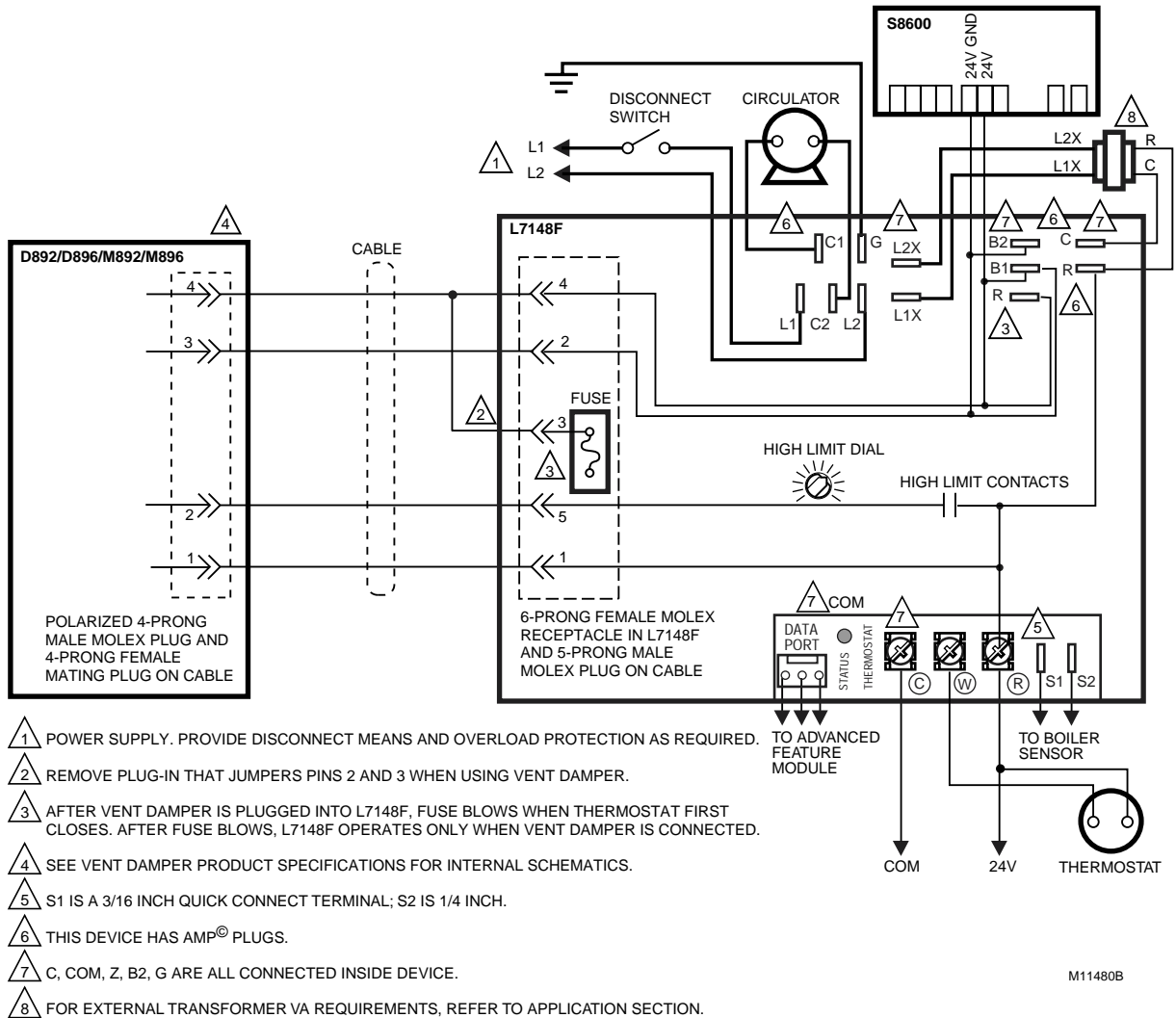


Fig. 9. Wiring L7148F with AMP plug connections and internal plug directly to D892/D896/M892/M896 Vent Damper in hydronic intermittent pilot system.

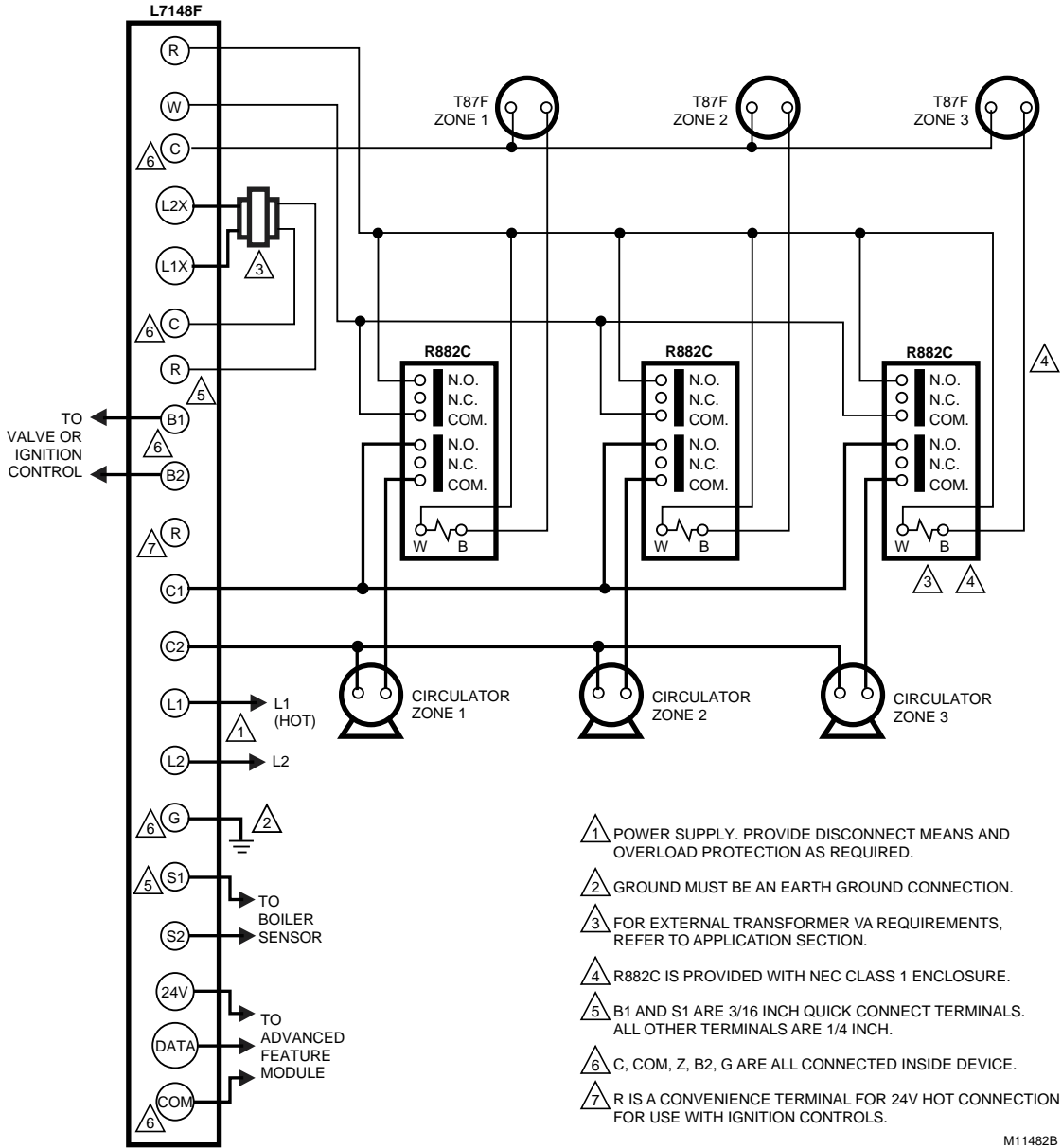


Fig. 10. Multizone system with R882C Switched Circulator.

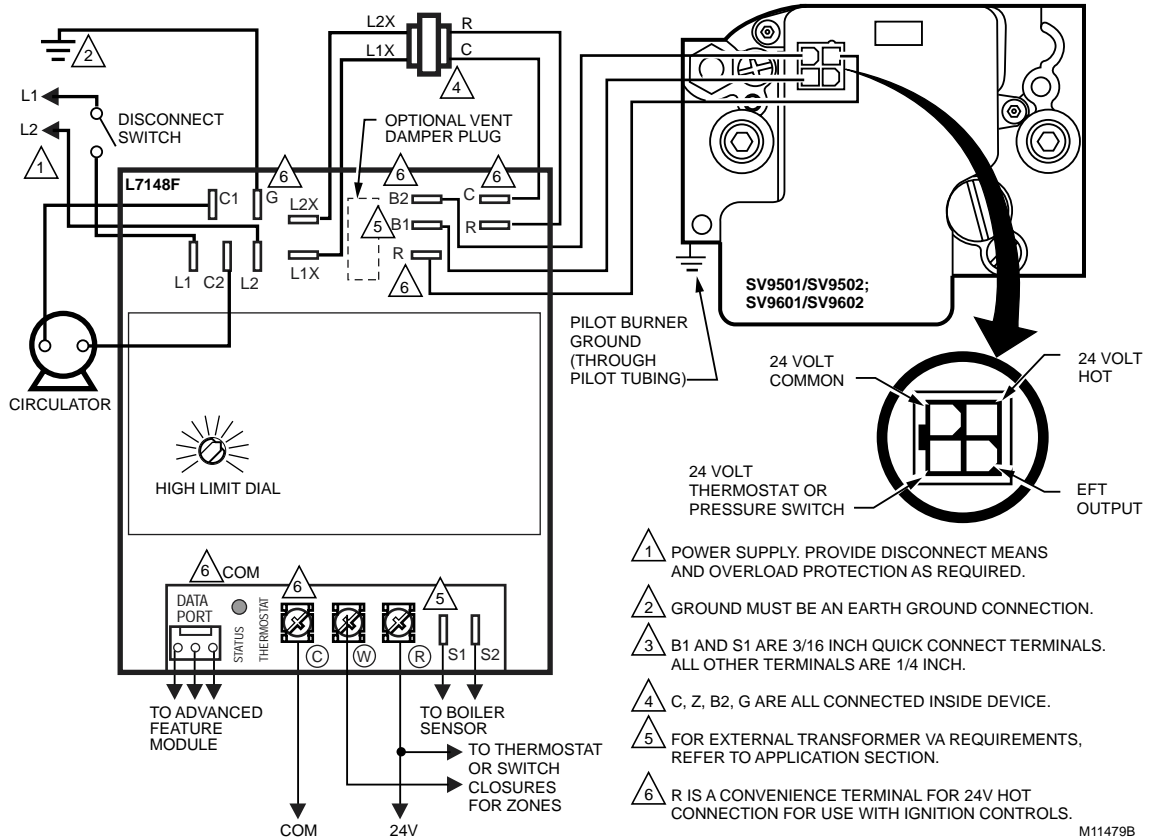


Fig. 11. Wiring L7148F with SV9501/SV9502/SV9601/SV9602 SmartValve™ System Controls.

CHECKOUT

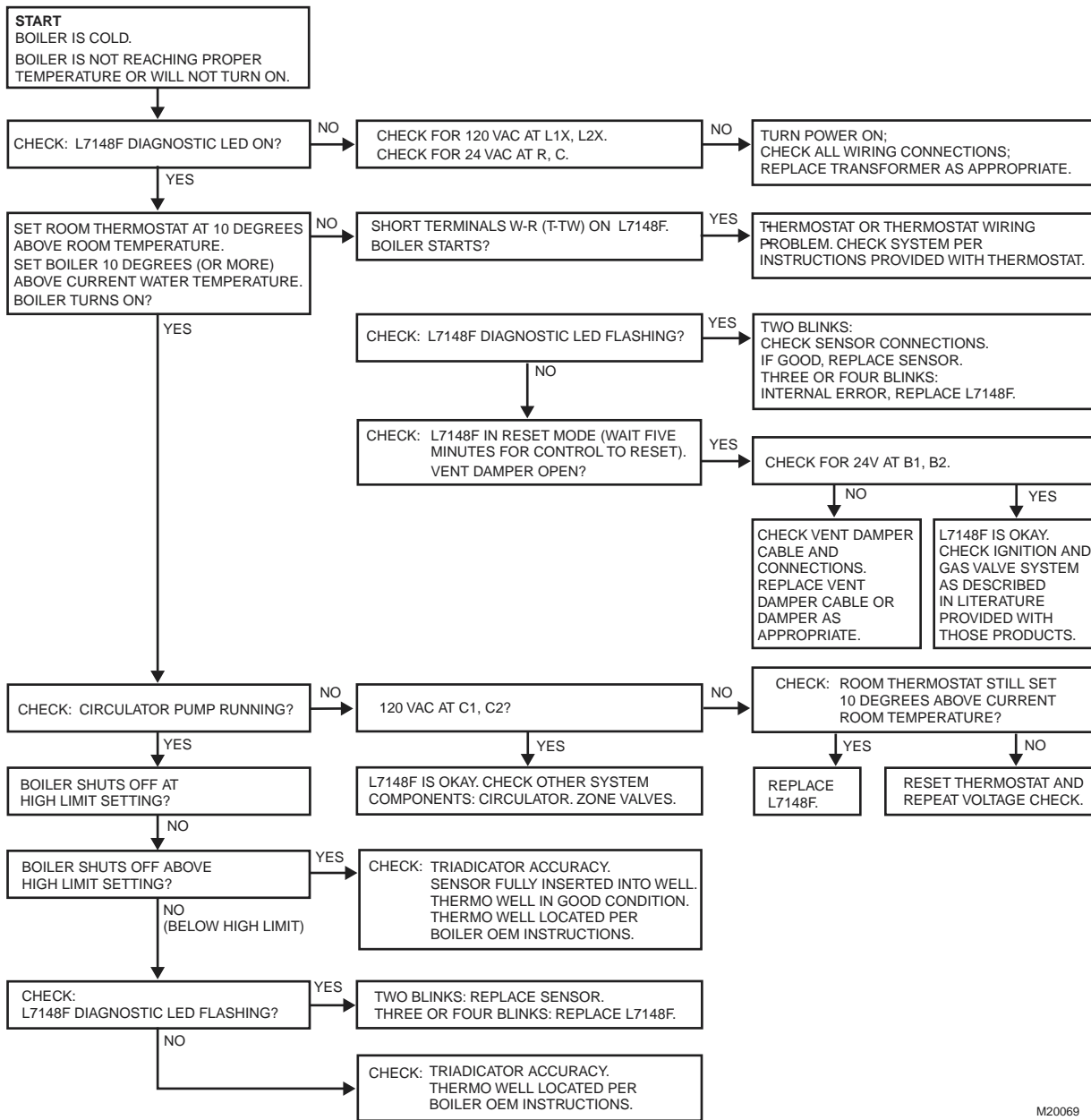
Check to make certain that the Electronic Aquastat Controller has been properly installed and adjusted. Put the system into operation and observe the action of the device through several cycles to make certain that it provides proper control of the system as described in the Operation section.

TROUBLESHOOTING

When attempting to diagnose system performance, reference to the diagnostic LED can help to identify specific areas not working properly. Table 3 shows the LED codes. Fig. 12 provides a troubleshooting chart.

Table 3. LED Codes.

Number of Blinks	Indication
Constant On	Power on—normal operation.
2	Sensor error—check connection and/or replace sensor.
3 or 4	L7148F failures—replace control



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Fig. 12. L7148F troubleshooting flowchart.

Honeywell

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