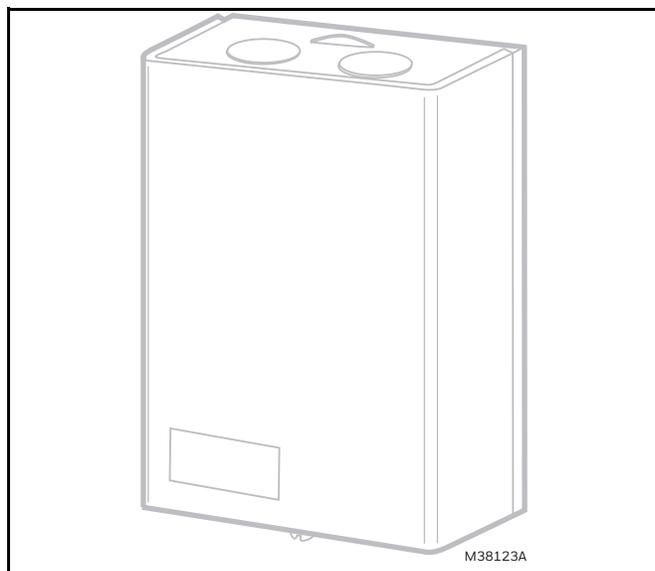




L8124A,B,C,E,G,L,M Aquastat® Relays

PRODUCT DATA



GENERAL

These immersion type controllers are for use with forced hydronic heating systems that include domestic hot water service.

FEATURES

- **L8124 Aquastat® Relays provide high limit, low limit, and circulator control for maintaining boiler temperatures.**
- **L8124 Aquastat Relays can provide multizone control by using a separate circulator and R845 Relay for each zone.**
- **All L8124 Aquastat Relays mount directly on the boiler.**
- **L8124E,G and L have large transformers and extra terminals for supplying power to low voltage zone valves.**
- **L8124M is for use in a wood-coal/gas-oil multifuel heating system. Circulator is independently controlled by the thermostat.**
- **Aquastat Controller consists of a diaphragm powerhead and Micro Switch™ assembly that respond to temperature changes in the boiler water.**

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.

Pressure Rating:

200 psi (1380 kPa) on outside of immersion well.
100 psi (690 kPa) on capsule if inserted directly.

Maximum Ambient Temperature:

Case: 150°F (66°C).
Sensing element: 265°F (129°C).

Thermostat Heat Anticipator Setting: 0.2A.

Low Limit:

Setting: 110°F to 220°F, adjustable (43°C to 104°C).
Differential: 10°F to 25°F, adjustable (6°C to 14°C).

High Limit:

Setting: 130°F to 240°F, adjustable (54°C to 116°C).
Differential: 10°F, fixed (6°C).

Mounting Means: 1/2 or 3/4 in. taper pipe threaded.

Dimensions: See Fig. 1 and 2.

Sensing Element: 3/8 x 2-7/8 in. (10 x 73 mm).

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

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

Approvals:

Underwriters Laboratories Inc.:

Listed (L8124 models with well): File No. MP466,
Guide No. MBPR.

Component Recognized (L8124 Models Without Well):
File No. MP466, Guide No. MBPR2.

Canadian Standards Association:

Component Recognized: File No. LR1620,
Guide No. 400-E-O.



Table 1. Aquastat Relay models.

Model Number	Burner Control Circuit	Case Dimensions						Can be Used For Multizone With Circulators ^a	No. of V8043 Zone Valves Powered Without Additional Transformer	Electrical Ratings		Mounting
		Height		Width		Depth				Burner Circuit	Circulator Circuit	
		in.	mm	in.	mm	in.	mm					
L8124A	120V	6-1/8	156	4-3/8	111	3-1/16	78	Yes	—	Same as L8124A-G,L circulator rating	120 Vac: 7.4A (full load); 44.4A (locked rotor)	Vertical
L8124B	b	6-1/8	156	4-3/8	111	3-1/16	78	—	—	0.25A at 1/4 to 12 Vdc		Vertical or horizontal
L8124C	120V	4-3/8	111	6-1/8	156	3-1/16	78	Yes	—	Same as L8124A-G,L circulator rating	240 Vac: 3.7A (full load); 22.2A (locked rotor)	Horizontal
L8124E	24V	6-1/8	156	4-3/8	111	3-1/16	78	Yes	2	1.25A at 24 Vac; 30 VA (total load) B1-B2 TV-Z		Vertical or horizontal
L8124G	120V	6-1/8	156	4-3/8	111	3-1/16	78	—	2	Same as L8124A-G,L circulator rating		
L8124L	120V	4-3/8	111	6-1/8	156	3-1/16	78	Yes	2	Same as L8124A-6,L circulator rating		
L8124M	120V	4-3/8	111	6-1/8	156	3-1/16	78	Yes	—	Same as L8124A		Horizontal

^a Multizone control can be provided by using a separate circulator and R845 Relay for each zone.

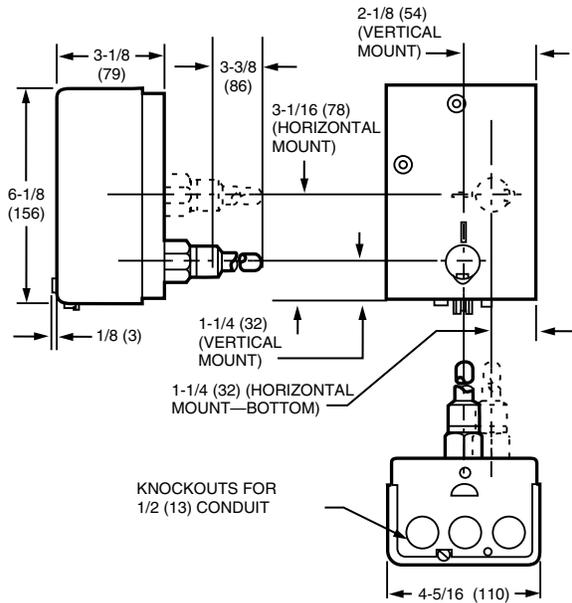
^b Contacts are not powered; they are rated for switching of millivoltage loads.

Replacement Aquastat Assemblies:

See Table 2 and Fig. 3 through 7.

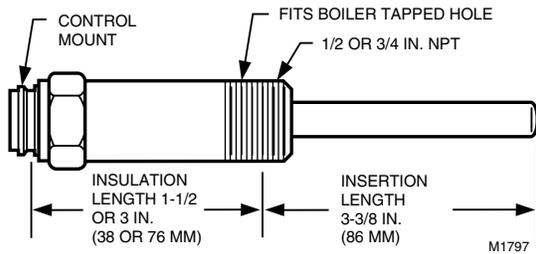
Table 2. Replacement Aquastat assemblies.

Model	Fahrenheit	Celsius (L8124A, 100/220V Model Only)
	1-1/2 in. or 3 in. (38 or 76 mm) insulation	1-1/2 in. or 3 in. (38 or 76 mm) insulation
L8124A-C, E,G,L,M	125026AAE	125026BAC



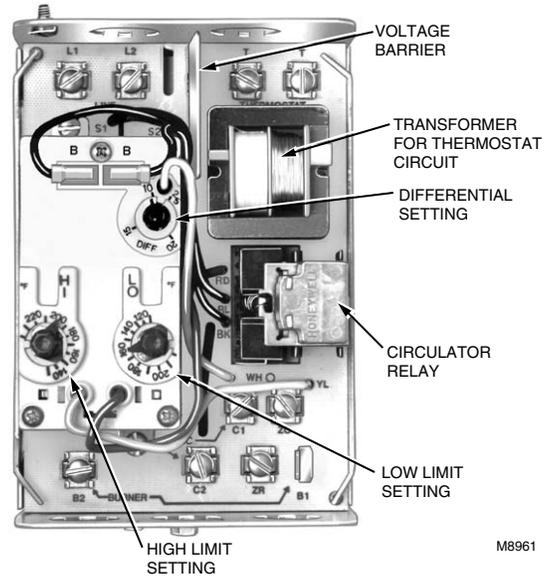
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Fig. 1. L8124 mounting dimensions in in. (mm).



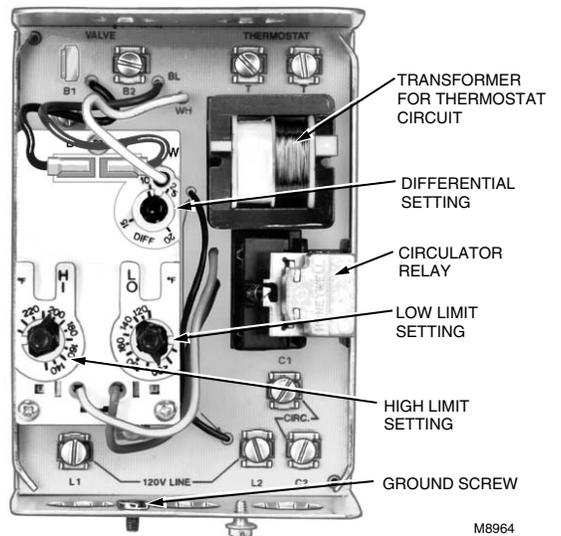
M1797

Fig. 2. Immersion well dimensions. (Refer to form 68-0040, Wells and Fittings for Temperature Controllers, to order well.)



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Fig. 3. Internal view of L8124A and C.



M8964

Fig. 4. Internal view of L8124B.

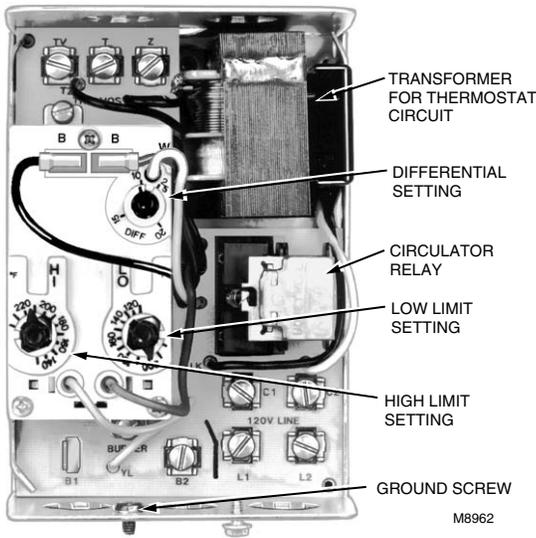


Fig. 5. Internal view of L8124E.

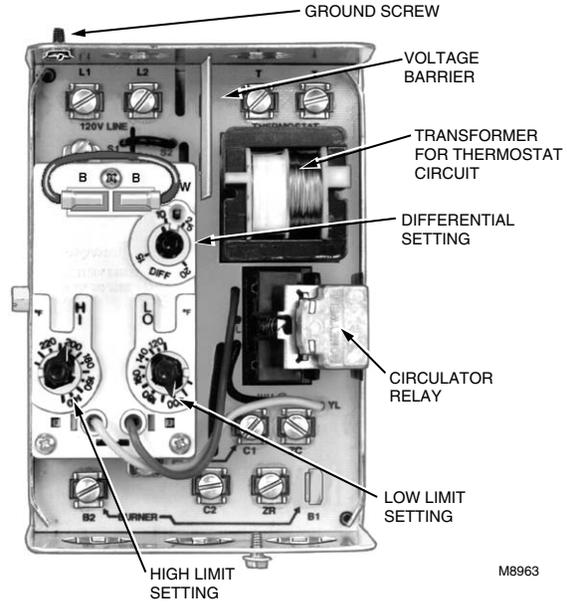


Fig. 7. Internal view of L8124M.

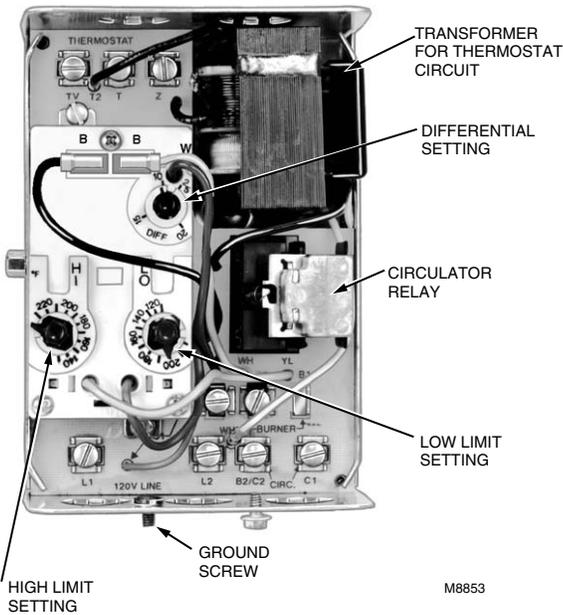


Fig. 6. Internal view of L8124G and L.

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 severe injury, death or property damage.

Product is for use only in a system with a pressure relief valve.



WARNING

Electrical Shock Hazard.

Can cause severe injury, death or property damage.

Disconnect power supply before beginning installation to prevent electrical shock or equipment damage.

IMPORTANT

1. *Terminals on these Aquastat relays are approved only for copper wire.*
2. *Immersion well must snugly fit sensing element and bulb must rest against bottom of well. Bend the tubing, if necessary, to hold bulb against the bottom of the well. Do not make a sharp bend in the tubing that can produce a break in the tubing and cause loss of fill. This condition will cause the high and low limit controllers to be made continuously.*

Mounting

The boiler must be provided with a tapping that allows horizontal mounting of the well. It should be located where boiler water of average temperature can circulate around the well.

To mount the L8124, proceed as follows:

1. Turn off all power and drain the boiler.
2. If no tapping is provided, prepare one that is properly sized and threaded at the location selected.
3. Install the immersion well (ordered separately) in the boiler tapping and tighten securely.

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

4. Refill the boiler and check for water leakage.
5. Loosen, but do not remove, the clamp screw on the bottom (L8124A,B,E,G) or on the top (L8124C,L,M) of the case.
6. Insert the element in the well until it bottoms.
7. Fit the case onto the well so that the clamp on the case slides over the flange on the well. Securely tighten the clamp screw.

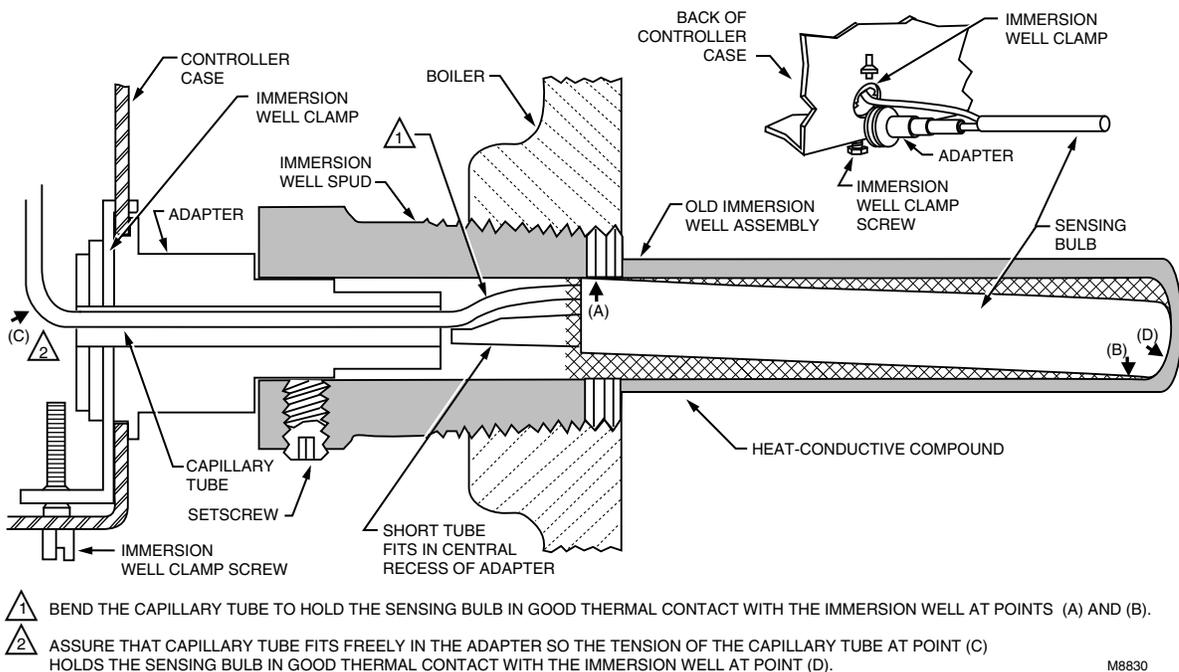


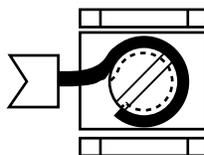
Fig. 8. Position of bulb in immersion well, and use of well adapter when required.

WIRING

IMPORTANT

Terminals on the L8124 Aquastat Relay are approved for use with only copper wire. The terminals allow only wrap-around wiring.

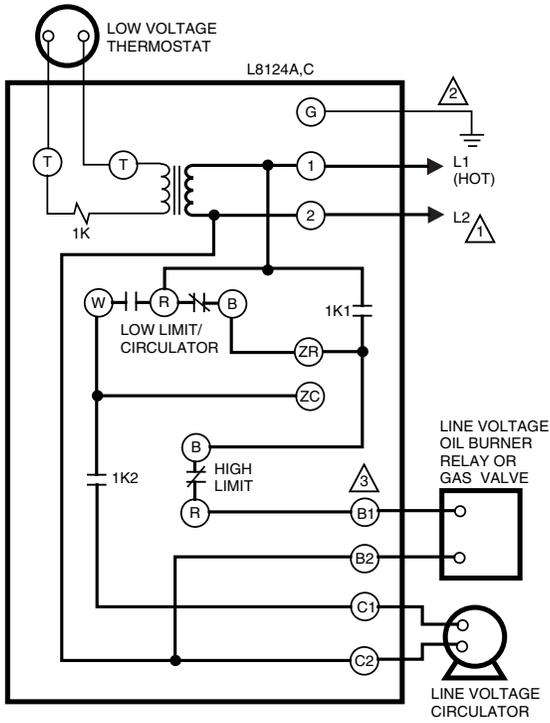
1. Strip 7/16 in. of insulation from the wire end.
2. Wrap the wire at least 3/4 of the distance around the screw as shown.



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.

All wiring must comply with local electrical codes and ordinances. Do not exceed the limits in the Specifications section when applying this control. Use manufacturer instructions when wiring controlled equipment or refer to typical hookups in Fig. 9 through 20.



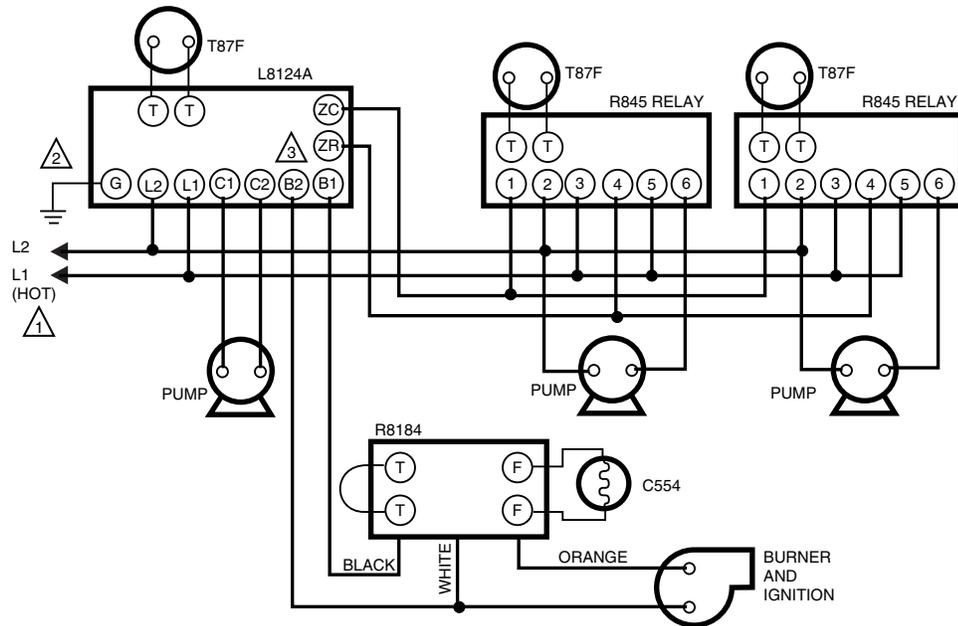
1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 CONTROL CASE MUST BE CONNECTED TO EARTH GROUND. USE GROUNDING SCREW PROVIDED.

3 B1 IS 1/4 IN. TAB TERMINAL.

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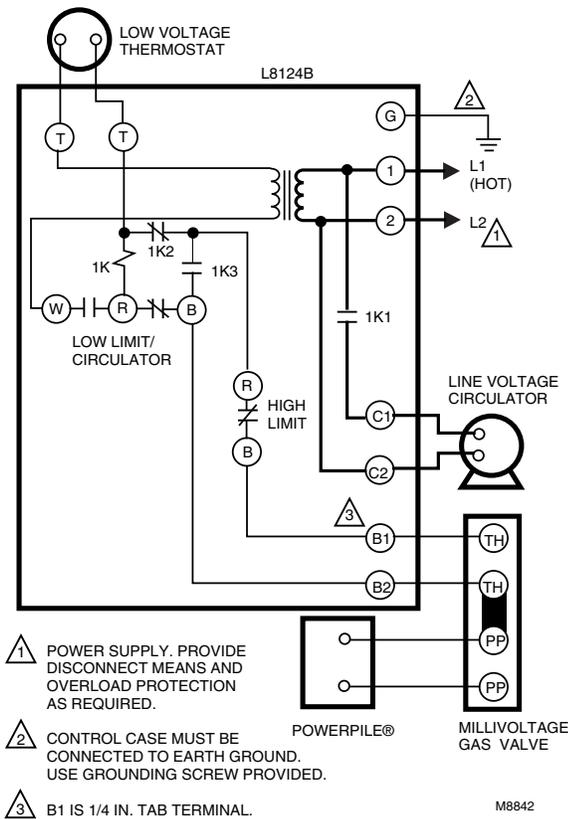
Fig. 9. L8124A,C single zone connections and internal schematic.



- 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 B1 IS 1/4 IN. TAB TERMINAL.

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Fig. 10. L8124A in an oil-fired, forced hot water, tankless, zoned, pump system.



- 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 B1 IS 1/4 IN. TAB TERMINAL.

M8842

Fig. 11. L8124B single zone connections and internal schematic.

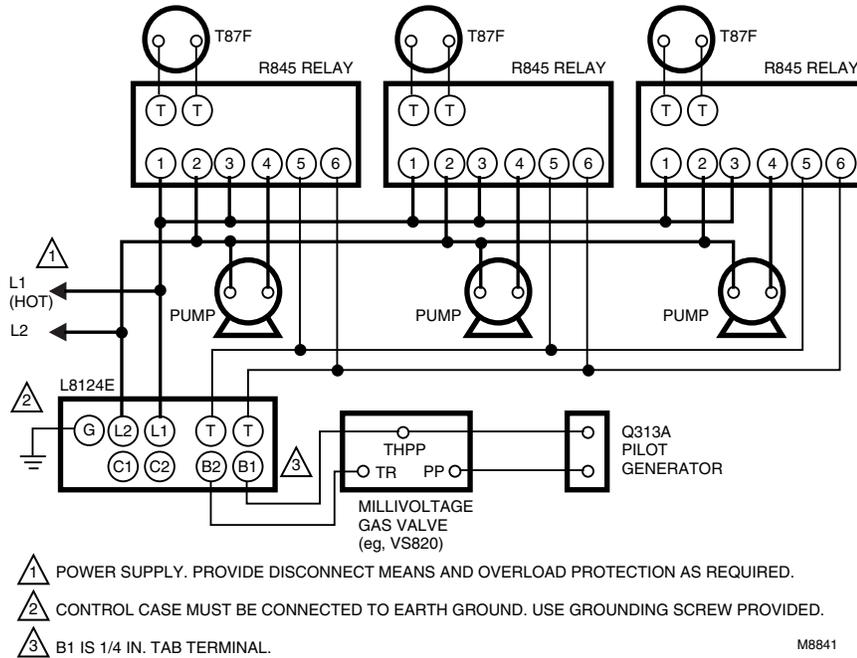


Fig. 12. L8124B in a gas-fired, millivolt, forced hot water, tankless, zoned, pump system.

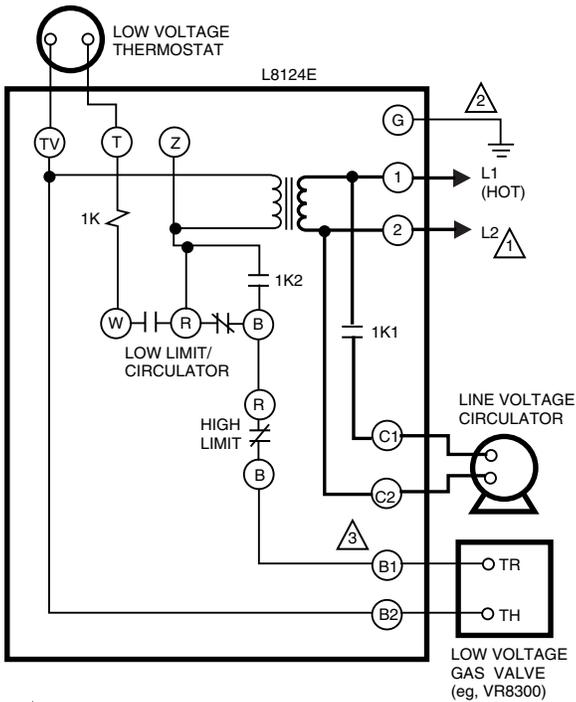


Fig. 13. L8124E single zone connections and internal schematic.

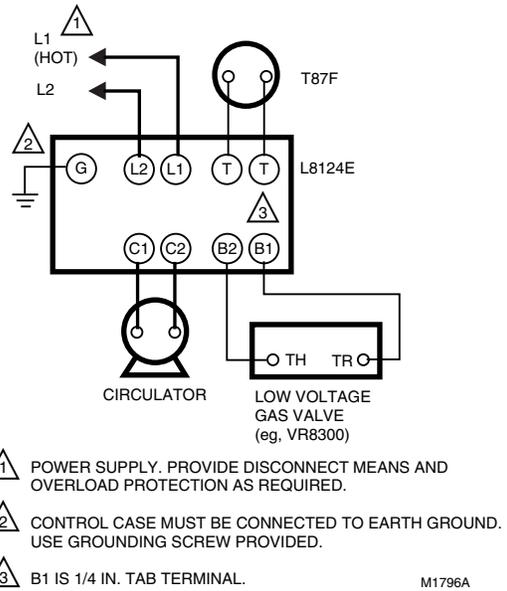


Fig. 14. L8124E in a 24V, gas-fired forced hot water, tankless system.

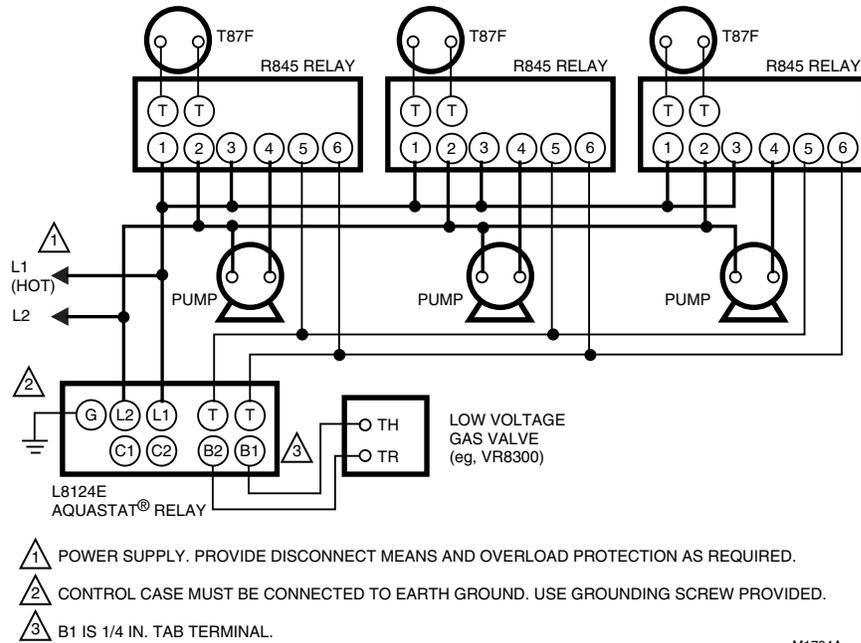


Fig. 15. L8124E in a 24V, gas-fired forced hot water, tankless, zoned pump system.

OPERATION

High Limit Controller

The high limit opens and turns off the burner when the water temperature reaches the set point. The high limit automatically resets after the water temperature drops past the set point and through the 10°F (6°C) differential.

Low Limit and Circulator Controllers

On a temperature rise, with the adjustable differential at the minimum setting of 10°F (°C), the burner circuit (R-B) breaks and the circulator circuit (R-W) makes at the control set point. On a temperature drop of 10° F (6°C) below the set point, the R-B circuit makes and the R-W circuit breaks. See Fig. 21.

At any differential setting greater than 10°F (6°C), the R-B make temperature and R-W break temperature will remain the same (control setting minus 10°F (6°C)). The R-B break and R-W make temperature will be the set point temperature plus the difference between the differential setting and 10°F (6°C).

EXAMPLE: Set point of 140°F (60°C) differential set at 25°F (14°C). On a temperature rise, R-B will break and R-W will make at 155°F (68°C). On a temperature fall, R-B will make and R-W will break at 130°F (54°C).

On the L8124M, the burner and circulator circuits are controlled separately—the low limit controls the burner circuit (R-B) as described above, while the low voltage thermostat directly controls the circulator circuit (see Fig. 17).

SETTING AND CHECKOUT

⚠ WARNING

Fire or Explosion Hazard.

Can cause severe injury, death or property damage.
Use product only in a system with a pressure relief valve.

Setting

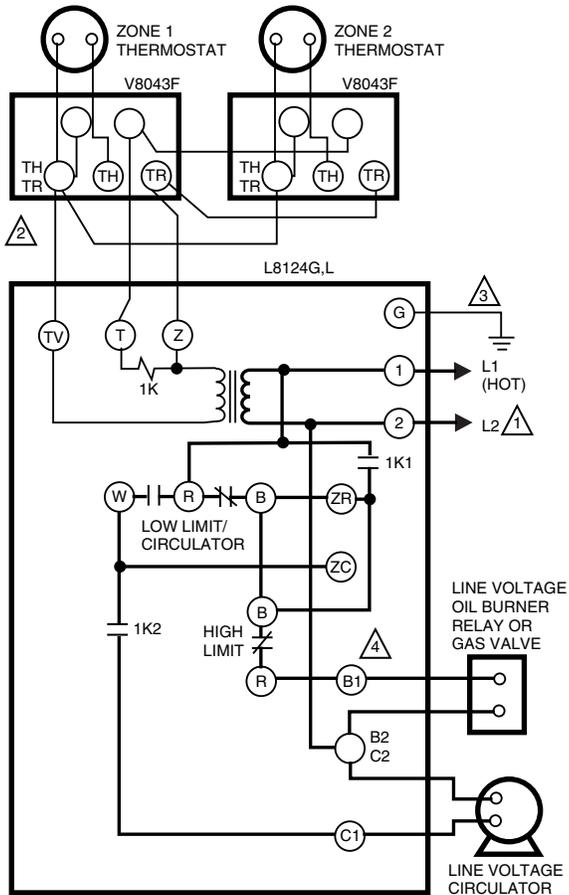
Follow the boiler manufacturer recommendation when making the L8124 settings. The high limit setting must be at least 20°F (11°C) higher than the low limit setting. Place the indicators over the selected temperature marks. The low limit differential is set by turning the differential adjustment knob to the desired amount of differential.

Setting Stop

A setting stop (Resideo part no. 126580, ordered separately) may be installed on the adjusting knob to prevent turning the knob beyond a predetermined point. Fig. 22 shows it installed on the high limit switch knob to prevent setting higher than 200°F (93°C).

IMPORTANT

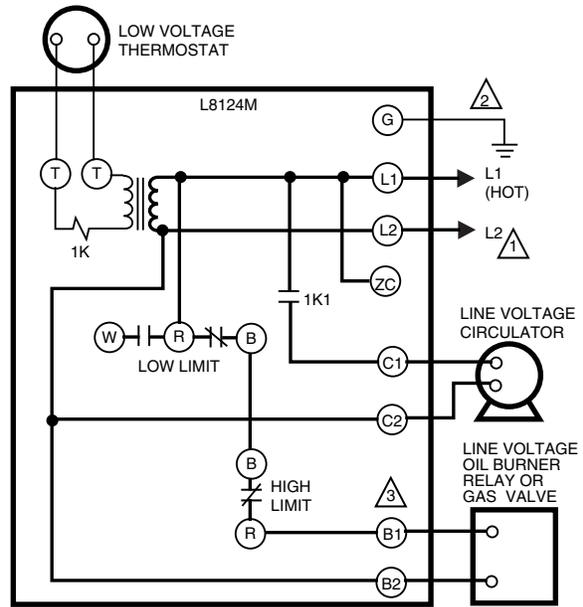
The setting stop cannot be reset once it is in place. If the stop must be removed, snip it off with cutters; do not twist it off.



- ⚠️ 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- ⚠️ 2 UP TO TWO V8043F ZONE VALVES CAN BE POWERED WITH L8124G,L. ADD ADDITIONAL TRANSFORMER FOR EVERY TWO OR LESS VALVES.
- ⚠️ 3 CONTROL CASE MUST BE CONNECTED TO EARTH GROUND. USE GROUNDING SCREW PROVIDED.
- ⚠️ 4 B1 IS 1/4 IN. TAB TERMINAL.

M1795B

Fig. 16. L8124G,L multizone system with zone valve connections and internal schematic.



- ⚠️ 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 B1 IS 1/4 IN. TAB TERMINAL.

M8804

Fig. 17. L8124M single zone connections and internal schematic.

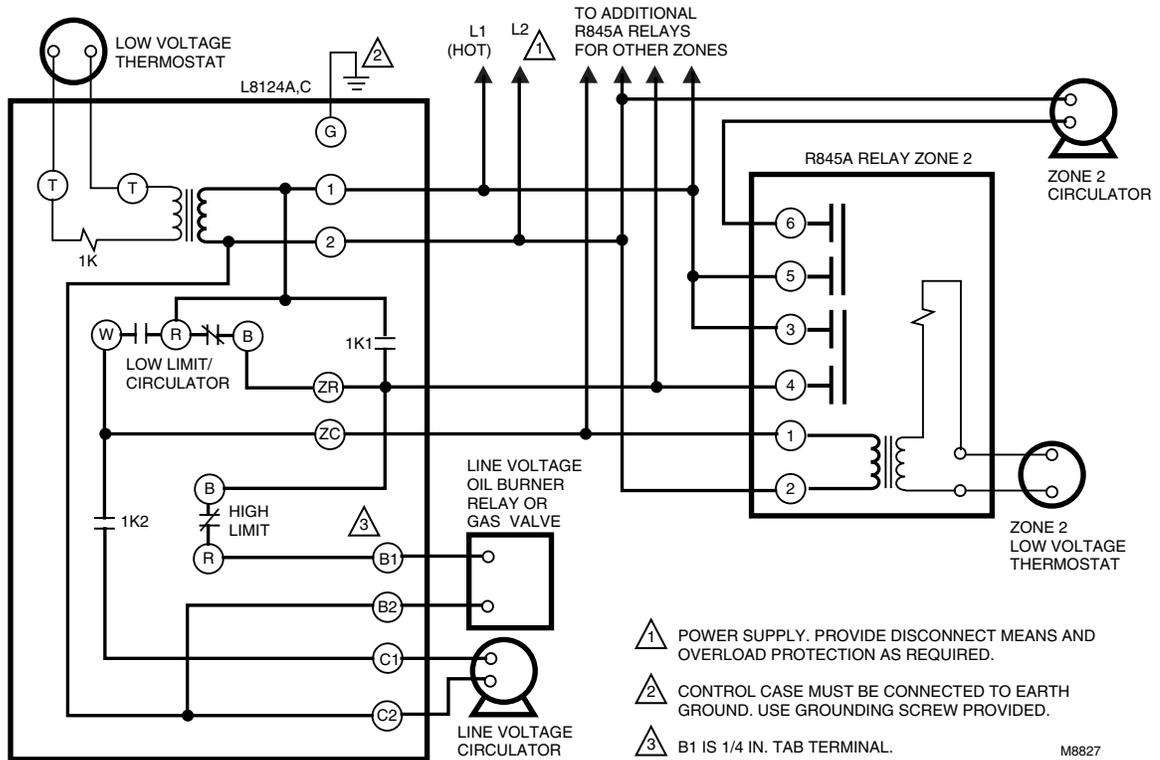


Fig. 18. L8124A,C multizone system with circulator connections and internal schematic.

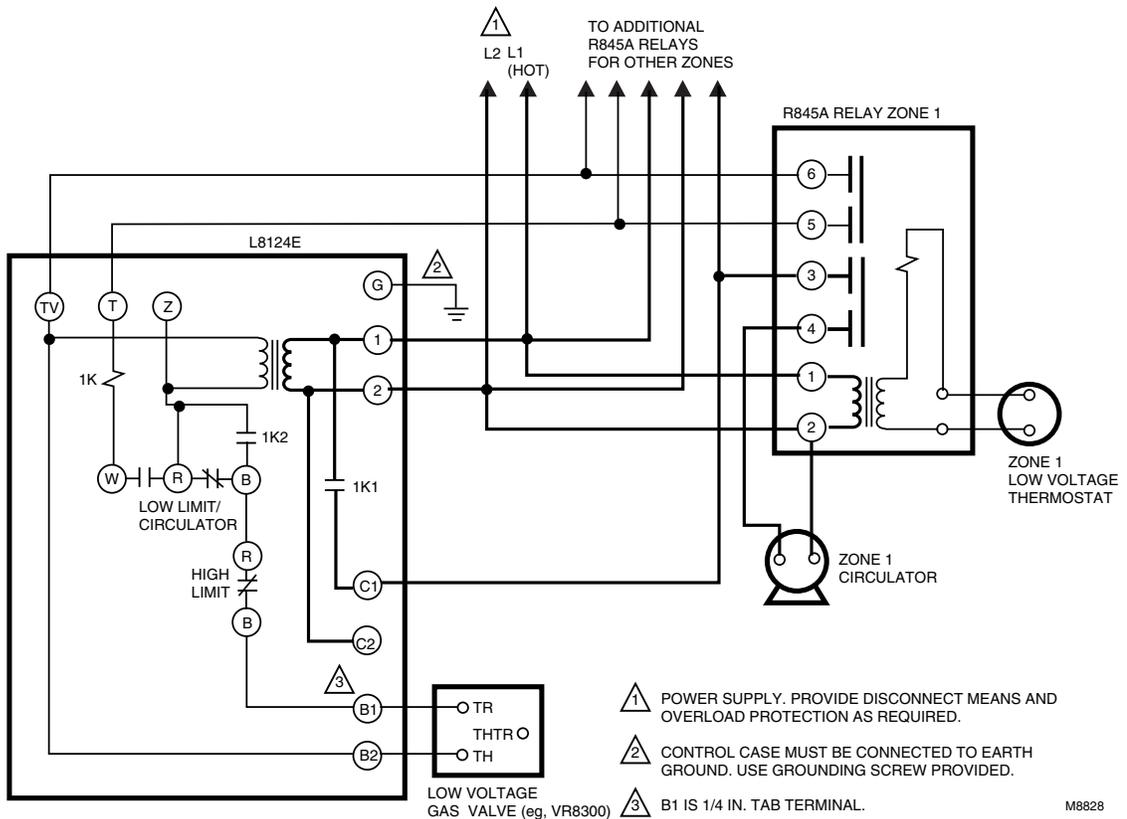


Fig. 19. L8124E multizone system with circulator connections and internal schematic.

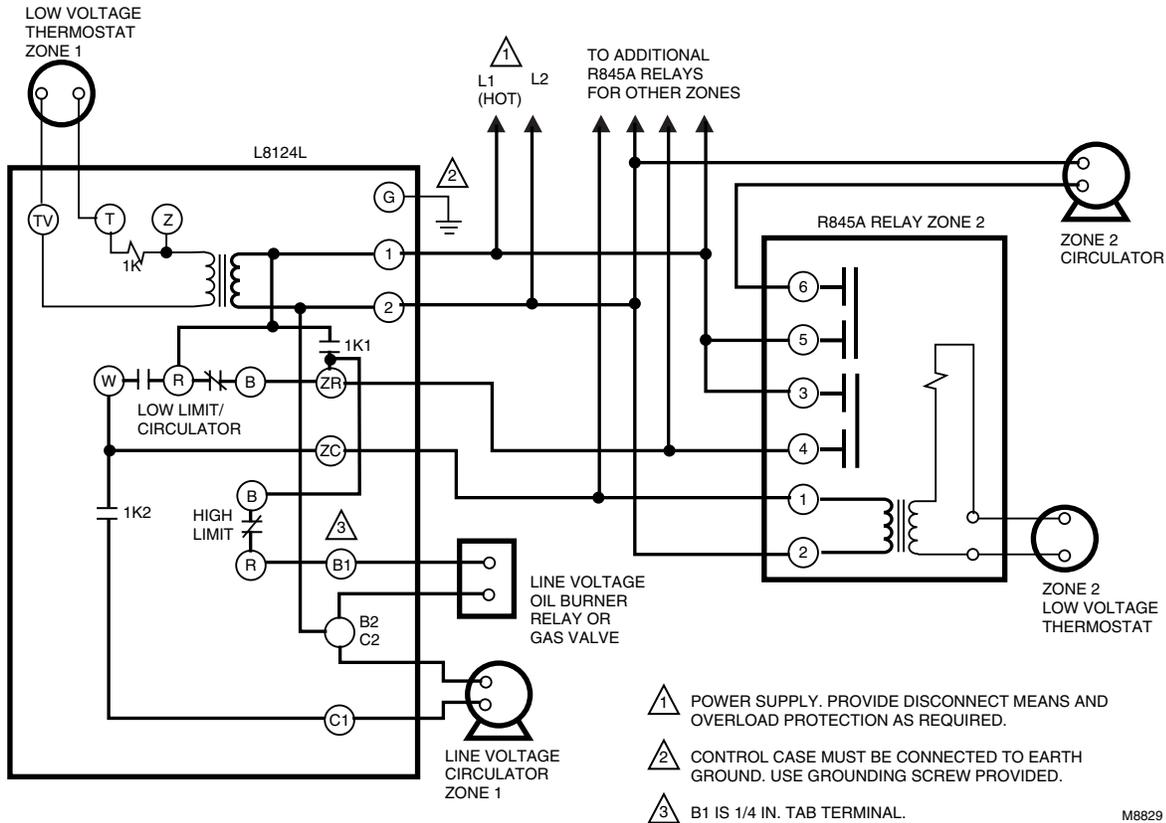


Fig. 20. L8124L multizone system with circulator connections and internal schematic.

To install the setting stop:

1. Turn the knob to the setting that is to be established as the limit.
2. Place the setting stop over the knob in the position where the arm of the setting stop strikes (after the stop is pressed into place) and prevents turning the knob beyond the desired limit setting.
3. Press the setting stop tightly onto the knob so its inner teeth securely engage the knob.
4. Turn the knob back and forth several times to make sure the stop functions properly.
5. In all the settings are made, replace the cover.

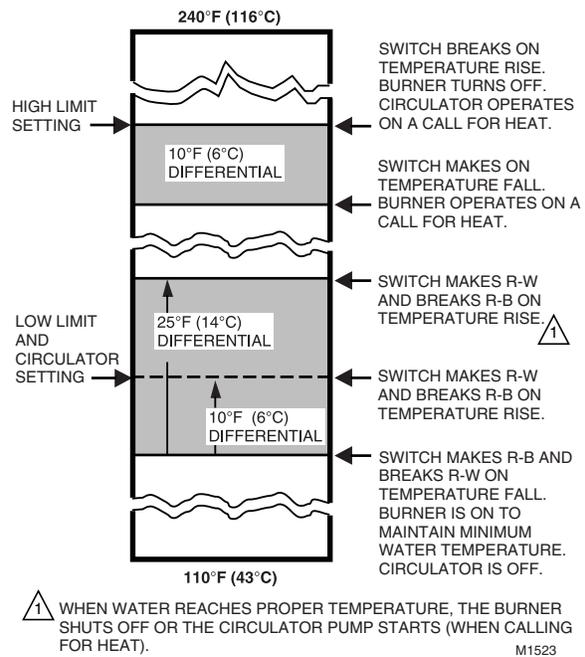


Fig. 21. Relationship of set points and differential.

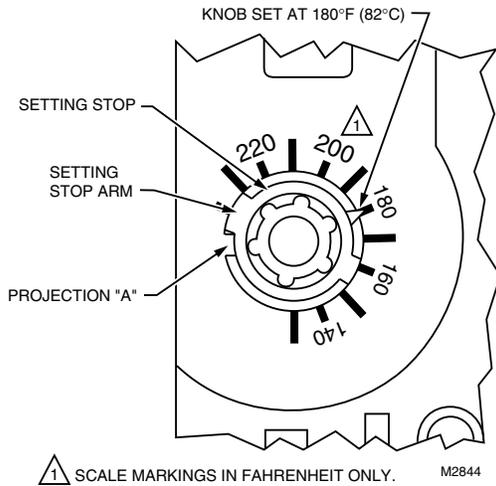


Fig. 22. Setting stop in position to limit the high limit setting to 200°F (93°C).

Heat Anticipator

The thermostat heat anticipator should be set at 0.2A.

CHECKOUT

Put the system into operation and observe each function through at least one complete cycle. Be sure the control operates as intended.

Material Safety Data Sheet (MSDS) for heat-conductive compound, if included.

MATERIAL SAFETY DATA SHEET (MSDS)

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION.

Product Name: Heat conductive compound.

MSDS ID: DS9021.

Synonyms: MS1699.

Product Use: Heat conductive material used to enhance contact and heat transfer in temperature sensor applications.

Manufacturer: Resideo Technologies Inc., 1985 Douglas Drive North, Golden Valley, MN 55422.

Date Released: October 8, 1999.

NFPA Ratings:

Health 0; Flammability 1; Reactivity 0;
Personal Protection B.

Section 2. Composition, Information on Ingredients (Table 3).

Table 3. Ingredients of Heat Conductive Compound^a.

Ingredients	CAS Number	Percent	PEL	TLV
No. 2 Lithium Complex Grease (70%):				
Mineral Oil	64742-65-0	35-50	5 mg/m ³	5 mg/m ³
Mineral Oil	64742-62-7	20-25	5 mg/m ³	5 mg/m ³
Lithium Hydrostearate/Sebacate Complex	68815-49-6	4-9	—	—
Zinc Alkyldithiophosphate	68649-42-3	0-2	—	—
Aluminum Paste (30%):				
Aluminum, as Al	7429-90-5	20-25	15 mg/m ³	10 mg/m ³
Aliphatic Petroleum Distillates	8052-41-3	10-15	2900 mg/m ³	525 mg/m ³
Stearic Acid	57-11-4	1-2	—	—
Aromatic Petroleum Distillates	64742-95-6	1-2	5 mg/m ³	5 mg/m ³

^a Additional Information: Part No. 120650 (0.5 oz. tube); Part No. 107408 (4 oz. can); Part number 197007 (5 gallon container). May also contain minute amounts of lithium and molybdenum lubricant compounds.

Section 3. Hazard Identification

Acute Health Effects:

Skin—Excessive contact can cause skin irritation and dermatitis.

Eye—Direct contact with eye will cause irritation.

Inhalation—No adverse effects are expected.

Ingestion—Ingestion of product may cause nausea, vomiting and diarrhea.

Chronic Health Effects:

Existing skin rash or dermatitis may be aggravated by repeated contact.

OSHA Hazard Classifications:

None.

Carcinogenicity:

Not considered to be a carcinogen by either OSHA, NTP, IARC, or ACGIH.

Target Organs:

None known.

Section 4. First Aid Measures

Eye Contact:

Flush eyes with water for 15 minutes. Remove any contact lenses and continue to flush. Obtain medical attention if irritation develops and persists.

Skin Contact:

Remove excess with cloth or paper. Wash thoroughly with mild soap and water. Obtain medical attention if irritation develops and persists.

Ingestion:

Contact physician or local poison control center immediately.

Inhalation:

Remove patient to fresh air and obtain medical attention if symptoms develop.

Section 5. Fire Fighting Measures

Flash Point:

>383°F (195°C). Will burn if exposed to flame.

Extinguishing Media:

Carbon dioxide, dry chemical or foam.

Special Fire Fighting Procedures:

None.

Explosion Hazards:

None. Aluminum powder can react with water to release flammable hydrogen gas. In the form of this product, this reaction is not expected.

Section 6. Accidental Release Measures

Scrape up and dispose as solid waste in accordance with state and federal regulations.

Section 7. Handling and Storage

Store in dry place. Keep container closed when not in use.

Section 8. Exposure Controls and Personal Protection

Ventilation:

No special ventilation is required when working with this product.

Respiratory Protection:

None required.

Eye Protection:

Not normally required. However, use chemical safety goggles or faceshield if potential for eye contact exists, especially if material is heated.

Hand/Clothing Protection:

Not normally required. Protective gloves and clothing are recommended, as material is difficult to remove from skin and clothing.

Other Protective Equipment:

None required.

Section 9. Physical and Chemical Properties

Appearance/Odor:

Aluminum color, semi-solid material, pleasant odor.

Solubility in Water:

Negligible.

Specific Gravity:

0.86.

Section 10. Stability and Reactivity

Stability:

Stable.

Reactivity:

Hazardous polymerization will not occur.

Incompatibilities:

Strong oxidizing agents and halogens.

Hazardous Decomposition Products:

Carbon dioxide, carbon monoxide.

Section 11. Toxicology Information

No data available.

Section 12. Ecological Information

Chemical Fate Information:

Hydrocarbon components will biodegrade in soil; relatively persistent in water.

Section 13. Disposal Consideration

Dispose of as solid waste in accordance with Local, State and Federal regulations.

Section 14. Transportation Information

DOT Classification:

Not classified as hazardous.

Section 15. Regulatory Information

SARA Title III Supplier Notification:

Include in Section 311/312 inventory reports if amounts exceed 10,000 pounds. Aluminum compounds are subject to the reporting requirements under Section 313 of Emergency Planning and Community Right-to-Know Act of 1986 (40 CFR 372). Ingredients listed in TSCA Inventory.

Section 16. Other Information

This information is furnished without warranty, expressed or implied, except that it is accurate to the best of our knowledge.

Prepared By:

PROSAR, 1295 Bandana Boulevard, Suite 335, St. Paul, MN 55108 (651-917-6100).

L8124A,B,C,E,G,L,M AQUASTAT® RELAYS



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