

resideo



L4081A,B and L6081A,C Multiple Aquastat® Controllers

PRODUCT DATA



FEATURES

- An immersion type liquid-filled sensing element actuates two snap switches.
- One switch operates as a high limit control.
- The other switch operates as a low limit and/or circulator control, depending on the model.
- Controller may be mounted in any positioning and needs no leveling.
- Separate, easy-to-read, calibrated dial and setpoint adjustments for each switch.
- Differential adjustment on low limit or circulator switch.
- All adjustments accessible inside front cover.
- Push-in terminals for quick connecting.
- Single sensing element for easy installation.
- Two spst snap switches (one spst and one spdt in L6081A,C) act independently at respective temperature settings.

APPLICATION

The L4081 and L6081 Aquastat® Controllers provide boiler water regulation in gas- or oil-fired hydronic heating systems.



60-2105-07

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.

TRADELINE® Models

TRADELINE® models are selected and packaged to provide ease of stocking, ease of handling, and maximum replacement value. TRADELINE model specifications are the same as those of standard models, except as noted below.

TRADELINE Model Available: L6081A Multiple Aquastat Controller.

Additional Features: TRADELINE pack with cross reference label and special instruction sheet, tube of heat-conductive compound and setting stops.

Standard Models

Refer to Table 1 for model specifications.

Ranges:

High Limit: 130°F (55°C) to 240°F (116°C). Stops burner if boiler temperature exceeds setpoint.

Low Limit: 110°F (44°C) to 220°F (105°C). Controls burner during thermostat off periods to maintain boiler water temperature.

Circulator: 110°F (44°C) to 220°F (105°C). Permits circulator operation only if boiler water temperature exceeds low limit setting.

Table 1. Model Specifications.

Model Number	Insertion Type ^a	High Temperature Side		Low Temperature Side	
		Switching	Action on Temperature Rise to Setpoint	Switching	Action on Temperature Rise to Setpoint
L4081A	Well	Spst High Limit	Breaks	Spst Low Limit	Breaks
L4081B				Spst Circulator	Makes
L6081A				Spdt Low Limit/Circulator	Breaks R-B
L6081C ^b					Makes R-W

^aSome models are shipped less well; if well is needed, refer to form 68-0040 for ordering information.

^bDevice is less case and cover.

Scale Markings:

For Fahrenheit models:

High Limit: 160, 180, 200, 220°F.

Low Limit or Circulator: 120, 140, 160, 180, 200°F

For Celsius models:

High Limit: 55, 65, 75, 85, 95°C.

Low Limit or Circulator: 45, 55, 65, 75, 85, 95°C.

At switches: 150°F (66°C).

At sensing element: 265°F (130°C).

Jumper:

The 128975 Push-in Field Addable Jumper (included) can be inserted in the slot between R-R terminals to simplify wiring. (Insert with formed legs up in slot labeled jumper. Be sure to insert fully to positive stop.)

Mounting Dimensions: See Fig. 1 and 2.

Approvals:

Underwriters Laboratories Inc. Listed (L4081A,B and L6081A): File No. MP466, guide No. MBPR. Component Recognized (L6081C): File No. MP466, Guide No. MPBR2. Canadian Standards Association Component Recognized (L4081A,B and L6081A): File No. LR1620, Guide No. 400-E-0.

Maximum Pressure Rating:

Well mounted: 200 psi (1380 kPa).

Direct Immersion: 100 psi (690 kPa).

Maximum Ambient Temperature:

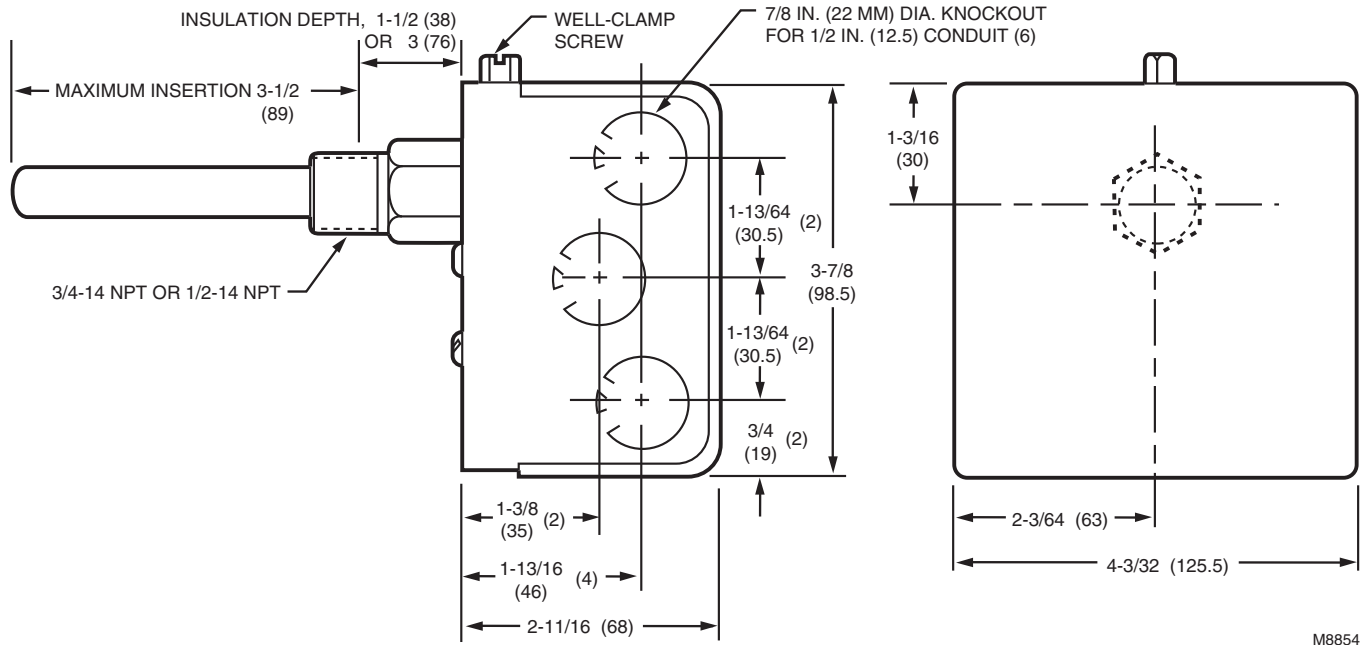


Fig. 1. L4081A,B and L6081A mounting dimensions in in. (mm).

Electrical Ratings: See Table 2.

Table 2. Electrical Ratings (Amperes).

	120 Vac	240 Vac
Full Load	8.0	5.1
Locked Rotor	48.0	30.6
Millivoltage	0.25A at 1/4 to 12 Vdc.	

Plus ignition transformer load of 360 VA. Maximum connected load 2000 VA.

Well Spud Length: 1-1/2 in. (38 mm). Longer spud for 3 in. (76 mm) of insulation available.

Spud Thread Size:

3/4-14 NPT standard.

1/2-14 NPT available.

Optional Specifications:

Plastic coating on immersion well to minimize electrolytic deterioration (on some with well models).

Celsius scale on L4081A.

Accessories (ordered separately):

126580 Setting Stop. Used to prevent turning setting knob beyond a predetermined point.

124904 Well Adapter. Use to convert mounting on some competitive wells to fit L4081/L6081. See form 68-0040.

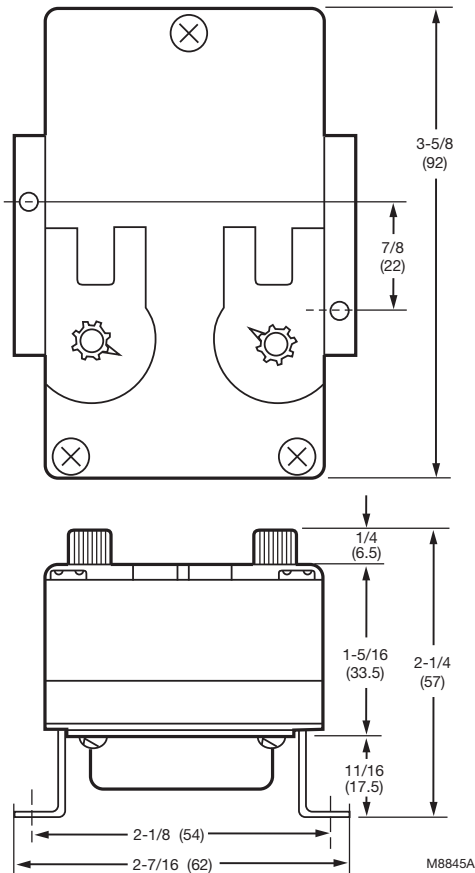


Fig. 2. L6081C mounting dimensions in in. (mm).

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

Electrical Shock Hazard.

Can cause serious injury, death or equipment damage.

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

NOTE: These devices can be installed in any position. Proper location, sizing and threaded boiler tapping are required.

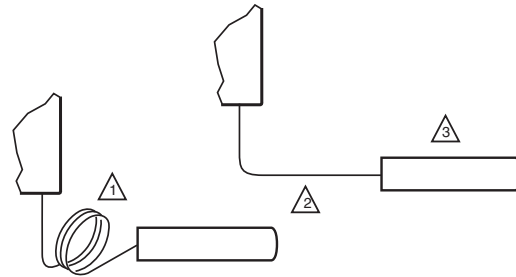
1. Maximum pressure rating for these models is 200 psi (1380 kPa)
2. Maximum permissible ambient temperature as sensing bulb is 265°F (130°C); at switches, 150°F (66°C).
3. The L6081C is without enclosure or well assembly.

MOUNTING

Follow instructions provided by system manufacturer, if available. Otherwise, proceed as follows:

1. Drain the boiler if the system is filled with water.
2. Place the front of the controller down on a horizontal surface and gently raise the sensing bulb until it is at a right angle with the back of the case and centered with the large hole in the case. This requires bending the capillary tube, but be sure to make no sharp bends and no bends near the bulb.

NOTE: Some models have an adjustable tubing length to 3 in. (76 mm). In these models, extra tubing inside the case can be pulled out, if needed. See Fig. 3.



CAUTION:
EXCESSIVE HANDLING OR SHARP BENDS
CAN DAMAGE THE CAPILLARY.

1. SENSING ELEMENT IS FACTORY FORMED FOR 1.5 INCH INSULATION WELL ASSEMBLIES.
2. FOR 3 INCH INSULATION WELL ASSEMBLIES, PULL OUT SUFFICIENT CAPILLARY TO ASSURE THAT THE CAPSULE BOTTOMS IN THE WELL.
3. STRAIGHTEN CAPILLARY SUFFICIENTLY SO IT DOES NOT INTERFERE WITH INSERTING THE CAPSULE INTO THE WELL.

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Fig. 3. Adjusting the capillary length.

3. Adjust the position of the bulb so that the bulb projects 4-7/8 in. (124 mm) from the back of the case for immersion well designed for 1-1/2 in. (38 mm) insulation; or 6-3/8 in. (162 mm), if designed for 3 in. (76 mm) insulation. If this requires bending the tube inside the case, insert the end of your index finger through the hole and carefully mold the tube into the correct shape as you gently pull (or push) the bulb to the correct position. The bulb must project the right distance so that after the case is installed, the spring force of the capillary tube holds the bulb against the inner end of the well for good thermal contact. The tube must be straight for at least 3/8 in. (10 mm) inside the case so the end of the well spud does not strike the coiled tube and pull the bulb away from contact with the inner end of the well.
4. Remove the plug from a properly located boiler tapping.
5. Apply pipe dope sparingly to the threads of the well, then screw the well tightly into the boiler tapping.
6. Fill the system with water, then carefully examine around the threads for leakage. Tighten the well if necessary to stop any leakage.
7. Loosen the wallclamp screw three or four turns., move the screw in and out and not how it moves the well clamp. See Fig. 4. Loosen the screw enough so that when the screw is pushed inward, the T-shaped clamp guide is at the far end of the slot in the case.
8. Mount the case on the well spud in any position that facilitates wiring. With the case in final position, carefully insert the sensing bulb into the well until the case slips over the end of the well spud and fits squarely against the shoulder of the spud.

NOTE: Open the clamp to receive the spud by pushing in the well clamp screw.

9. While holding the case in the correct position, firmly tighten the well clamp screw.

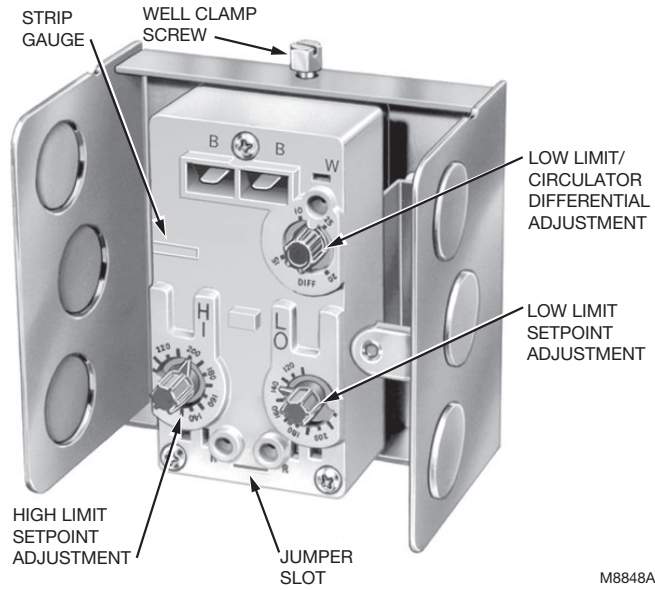


Fig. 4. L6081A with cover removed to show adjustments.

WIRING

⚠ WARNING

Can cause serious injury, death or equipment damage.

Disconnect the power supply to prevent electrical shock or equipment damage.

IMPORTANT

Use care to avoid strain on the control case when using cable or conduit.

⚠ WARNING

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

All wiring must comply with all applicable local codes and ordinances. See cover insert for electrical load ratings. Refer to Fig. 5 through 9 for typical wiring diagrams.

Use the following procedure when connecting wires to the B-B tab terminals (Fig. 4):

1. Connect no. 14, 16, or 18 solid, or no. 14 or 16 unistranded wire to the tab terminals.
2. Strip insulation from the end of each wire.
3. Use the included wire nut from the bag assembly to connect the tab terminal connector to the wire.
4. Connect the wire to the tab terminal.

Use the following procedures when connecting wires to the R-R terminals (Fig. 4):

1. Use no. 14, 16, or 18 solid, or no. 14 or 16 unistranded wire for connecting the push-in terminals.
2. Strip the insulation from the end of each wire.

3. Insert a screwdriver into the rectangular slot near the terminal and hold it in the slot while inserting the wire into the terminal hole as far as possible.
4. Remove the screwdriver when complete.

Jumper

When using the controller field addable jumper (Fig. 4), connect terminals R-R. When the jumper is added, make sure that the two prongs of the jumper face the center of the controller.

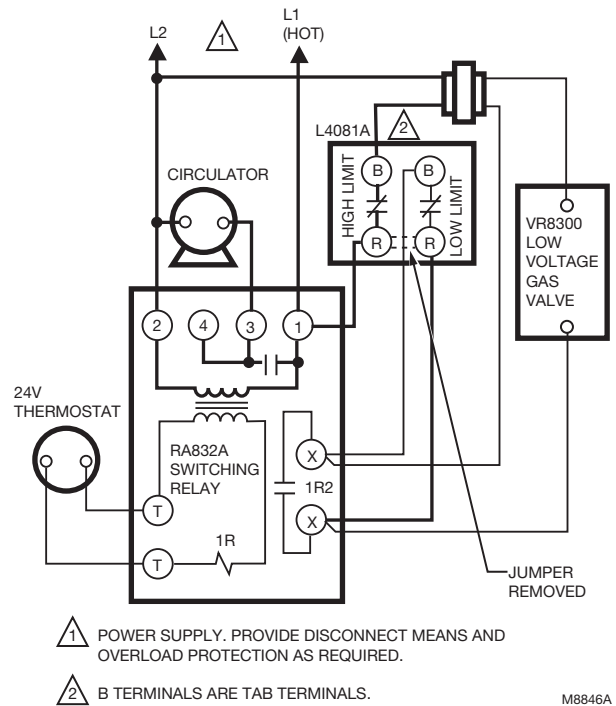


Fig. 5. L4081A used with gas burner (line voltage limit).

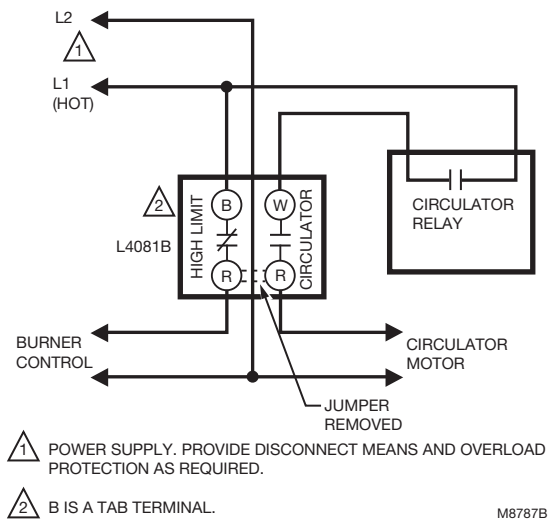


Fig. 6. L4081B used to prevent circulator operation with boiler water temperature below low limit setting.

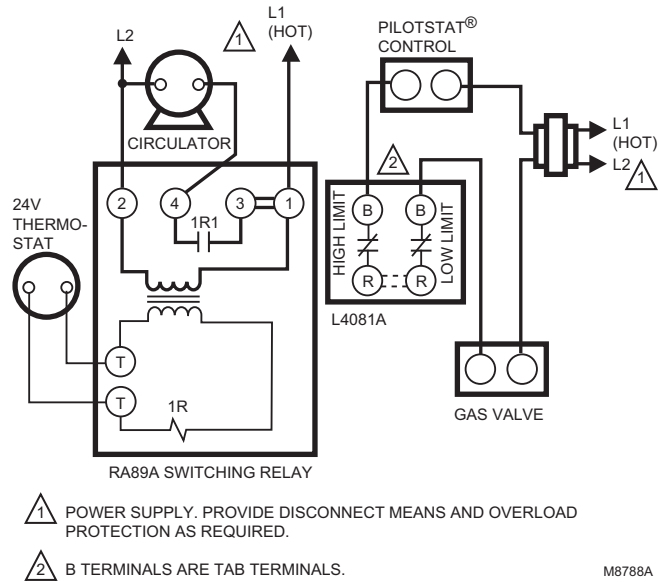


Fig. 7. L4081A used with burner cycled from the water temperature.

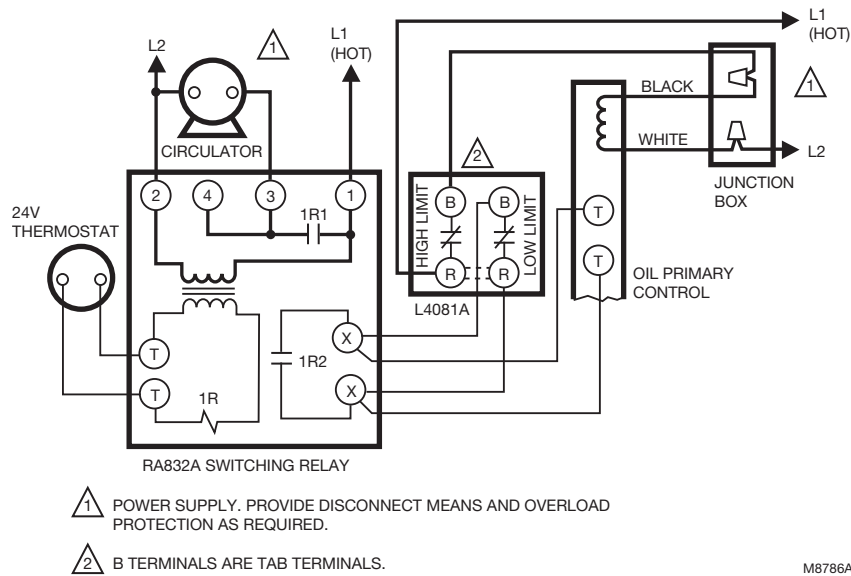
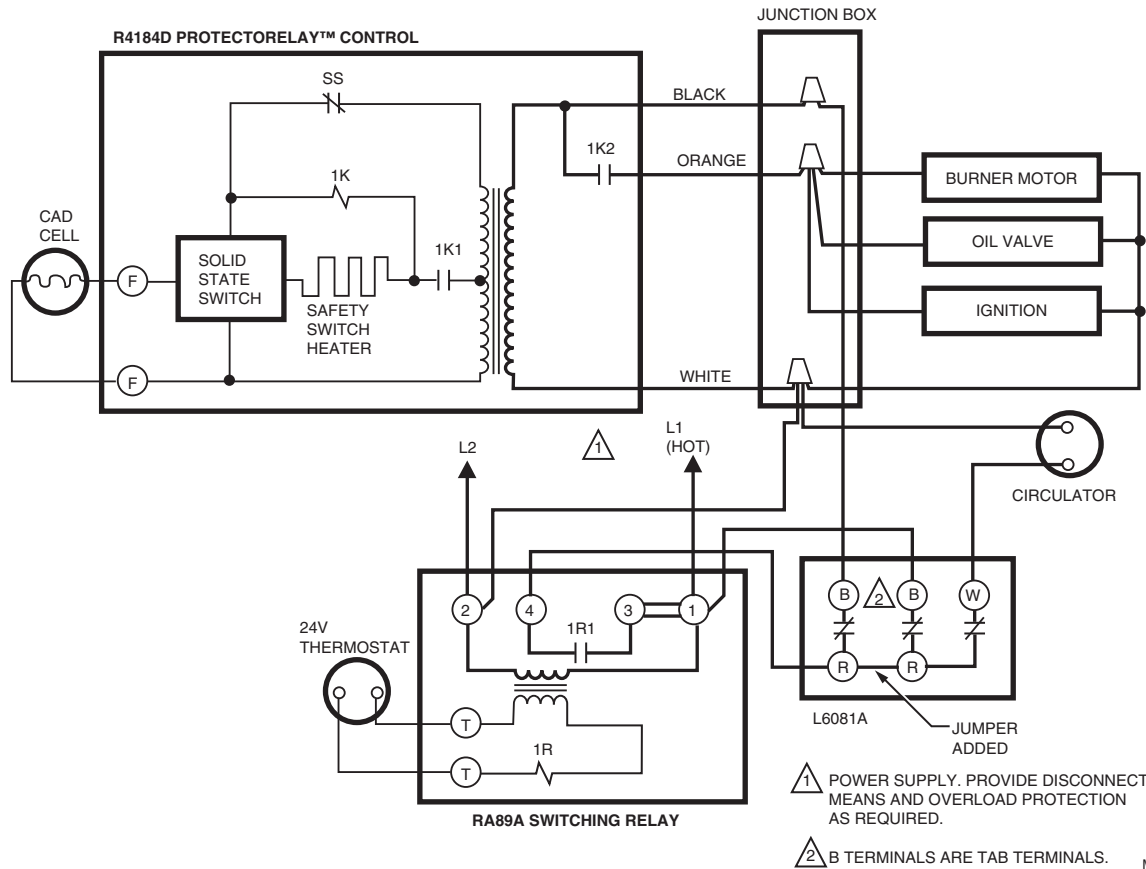


Fig. 8. L4081A used with oil burner.



OPERATION

High Limit

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

Low Limit and Circulator

On a temperature rise, with the adjustable differential at the minimum setting of 10°F (6°C) (also applies to fixed 10°F [6°C] differential models), the burner circuit (R-B) breaks and the circulator circuit (R-W) makes at the control setpoint. On a temperature drop of 10°F (6°C) below the setpoint, the R-B circuit makes and the R-W circuit breaks.

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

Examples:

L4081A: Setpoint of 140°F (60°C); differential set at 25°F (14°C). On a temperature rise, the switch breaks at 155°F (69°C). On a temperature fall, the switch makes at 130°F (55°C).

L4081B: Setpoint of 140°F (60°C); differential set at 25°F (14°C). On a temperature rise, the switch makes at 155°F (69°C). On a temperature fall, the switch breaks at 130°F (55°C).

L6081A,B: Setpoint of 140°F (60°C); differential set at 25°F (14°C). On a temperature rise, R-B breaks and R-W makes at 155°F (69°C). On a temperature fall, R-B makes and R-W breaks at 130°F (55°C).

SETTINGS

Because heating systems differ, follow the boiler manufacturer recommendations when selecting temperature settings.

Study the applicable chart in Fig. 10, which shows the switching response to temperature changes.

With the cover off, set the high limit adjustment at the temperature desired but *not* higher than recommended by the boiler manufacturer (Fig. 4).

Set the low limit and/or circulator adjustment to obtain temperature desired but not less than 20°F (11°C) below the high setting.

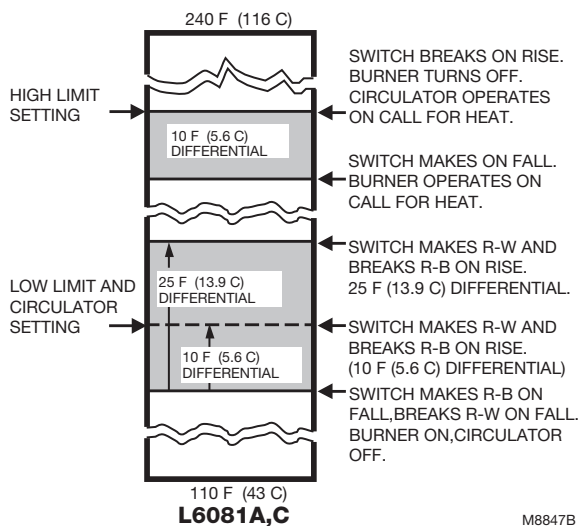
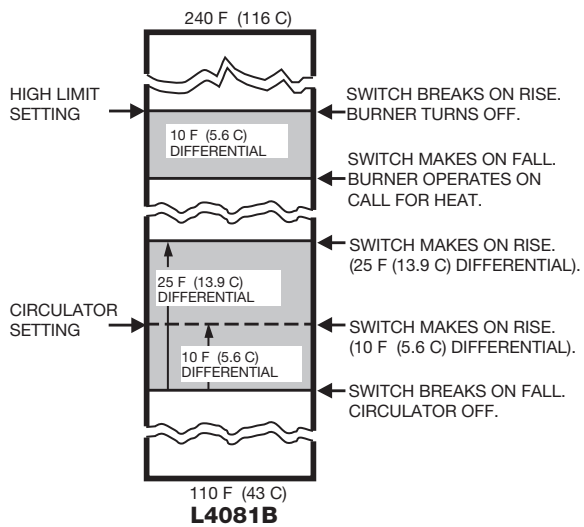
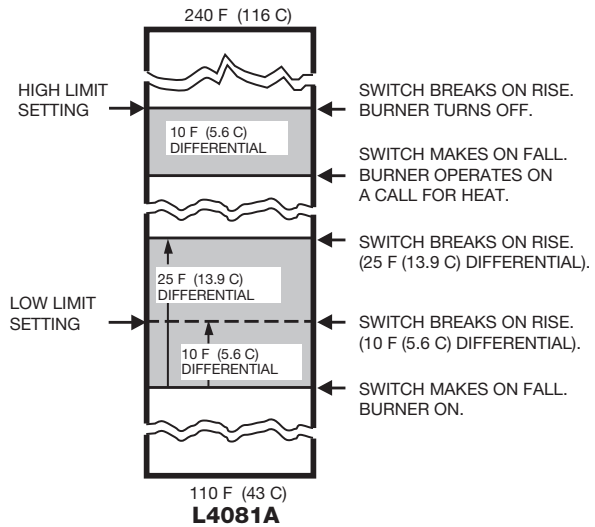
The differential adjustment applies to only the low-limit and/or circulator switch(es). Minimum differential adjustment provided is 10°F (6°C) nominal; maximum is 25°F (14°C) nominal. Set as desired.

Setting Stop

Install the 126580 Setting Stop on the adjusting knob to prevent turning the knob beyond a predetermined point. Fig. 11 shows stops installed on the knob of the high limit switch to prevent setting higher than 180°F (82°C).

To install the setting stop, proceed as follows:

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



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Fig. 10. Charts showing switching response to temperature changes.

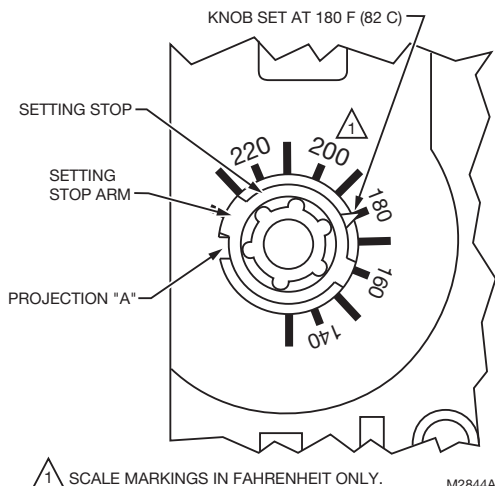


Fig. 11. Setting stop shown in position to limit the high limit setting to 180°F (82°C).

CHECKOUT

After completing installation and controller settings, operate the system. Carefully observe the operation of all components through at least one complete cycle. Be sure to include a check of the high limit switch operation. Make any correction needed; then repeat the checkout. Repeat until system operates properly.

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

^aAdditional 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.

MATERIAL SAFETY DATA SHEET

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, Minneapolis, 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).

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

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.

L4081A,B AND L6081A,C MULTIPLE AQUASTAT® CONTROLLERS



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