

Fig. 1. Mounting dimensions of the L404A,B,C,D,F and L604A,L Pressuretrol® Controllers 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, flame safeguard control technician.
4. After installation is complete, check out product operation as provided in these instructions.

⚠ WARNING

Electrical Shock Hazard.

Can cause severe injury, death or property damage.

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

⚠ CAUTION

Equipment Damage Hazard.

Improper use with a compressor can damage the controller.

When using the controller with a compressor, install a dampening device (such as a needle valve, header, or surge tank) to dampen pulsations that can damage the controller or reduce its life.

IMPORTANT

1. Locate the controller where the ambient temperature will not exceed 150°F (66°C).
2. Use pipe compound sparingly to avoid clogging the hole in the pipe or diaphragm fitting.
3. Do not tighten the controller by hand by holding the case.
4. Accurately level the controller for proper operation.

Location and Mounting

NOTE: For most accurate operation; add supplemental heat to installations where the heat falls below -20°F (-29°C). Never locate the controller where the temperature falls below -35°F (-37°C), because mercury in the switch freezes at this temperature.

When used with steam boilers, always mount the controller *above the water line* in the boiler. A steam trap (siphon loop) must always be connected between the controller and the boiler (see Fig. 2) to prevent boiler scale and corrosive vapors from attacking the diaphragm. The loop on the steam trap must always be perpendicular to the face of the controller. If the loop is parallel to the controller, expansion or contraction of the loop tips the controller and causes inaccurate operation of the switch.

The controller can be mounted:

- alongside the pressure gauge,
- in a fitting on the boiler provided by the manufacturer,
- at a remote location in case of excessive vibration,
- in a special mounting on a low water cutoff.

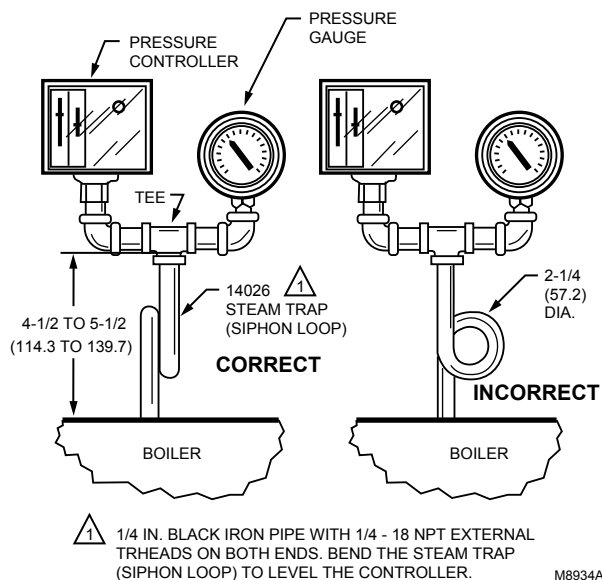


Fig. 2. Right and wrong mounting of a steam trap (siphon loop), with approximate dimensions in in. (mm).

Make all pipe connections in accordance with approved standards. Use only a small amount of pipe compound to seal the connection joints. Excess pipe compound can clog the small hole in the fitting and prevent the controller from operating properly.

To avoid leaks and damage to the case, use a parallel jaw wrench on the controller hexagonal fitting. *Do not tighten the controller by hand by holding the case.*

Leveling

A controller with a mercury switch must be accurately leveled for proper operation. It is level when the leveling indicator (see Fig. 11) hangs freely with its pointer directly over the index mark inside the back of the case. Level the controller by carefully bending the steam trap (siphon loop).

Mounting Alongside a Pressure Gauge

To mount the controller *alongside a pressure gauge* (Fig. 2), remove the gauge. In its place, install a steam trap (siphon loop) with a tee on top. Using elbows and pipe nipples, mount the controller and pressure gauge on the ends of the tee. Level the controller after installation.

Mounting on a Boiler

If it is not convenient to mount the controller alongside the pressure gauge, install steam trap (siphon loop) in the fitting provided by the boiler manufacturer. If there is no fitting, mount the steam trap at a location recommended by the boiler manufacturer. Screw the controller directly to the steam trap and level the controller.

Mounting at a Remote Location

If there is *excessive vibration* at the boiler than can adversely affect the operation of the controller, mount the controller at a remote location. All piping from the boiler must be suitable and solidly mounted. The piping must be properly pitched to drain all condensation back to the boiler. A steam trap (siphon loop) must be mounted between the remote piping and the controller. Level the controller after installation.

Supervision of Atomizing Medium Pressure (Air or Steam)—L404B

When air or steam is used as an atomizing medium in an oil burner system, authorities having jurisdiction (approval bodies and codes) often require a low limit to prevent opening the main oil valve until sufficient atomizing pressure is present, and to shut down the system when the atomizing pressure falls too low.

The L404B is recommended for this application. It makes a circuit when the pressure rises to the setpoint and breaks when the pressure falls to the setpoint minus the differential (Fig. 10).

Wiring



WARNING

Electrical Shock Hazard.

Can cause severe injury, death or equipment damage.

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

1. Assure all wiring complies with applicable electrical codes, ordinances and regulations. Use NEC Class 1 (line voltage) wiring.
2. For normal installation, use moisture-resistant No. 14 wire suitable for at least 167°F (75°C) when you are using the controller with a flame safeguard primary control, or at least 194°F (90°C) when using it with a programming control.
3. For high temperature installations, use moisture-resistant No. 14 wire, selected for a temperature rating above the maximum operating temperature.
4. All models have a terminal block inside the cover (see Fig. 3 and 4) and a 7/8 in. (22 mm) hole in one side for 1/2 in. conduit, cable or wires. Remove the front cover by loosening the screw at the bottom of the main scale.
5. Refer to Fig. 5 through 9 for typical hookups. Follow the burner or boiler manufacturer wiring diagrams, if provided.
6. Make sure the loads do not exceed the Switch Contact Ratings in the Specifications section.
7. Replace the front cover when the wiring is completed.

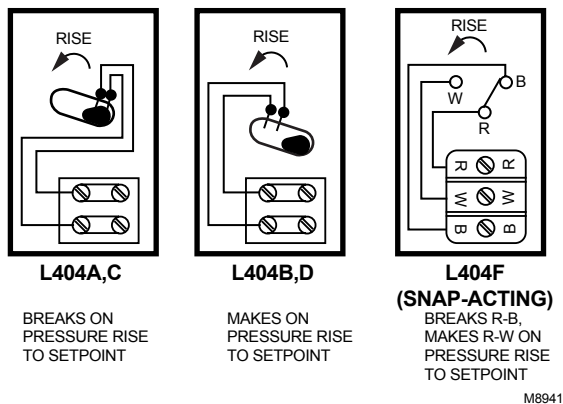


Fig. 3. L404 terminal blocks and internal schematics.

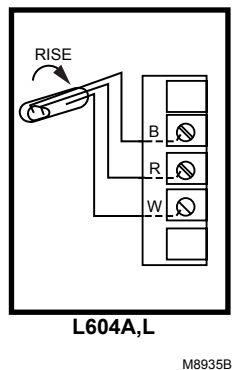


Fig. 4. L604 terminal block and internal schematic.

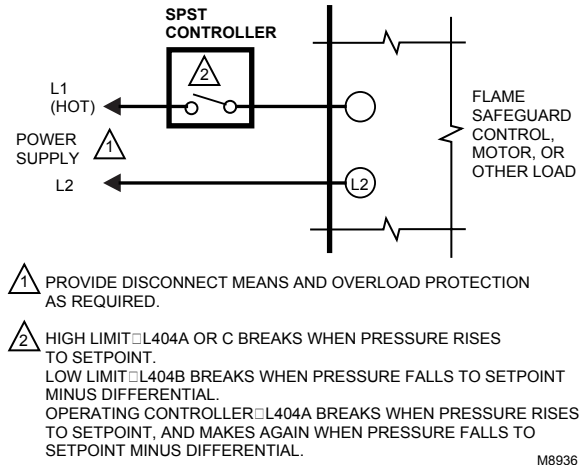


Fig. 5. L404 used as a limit or as an operating controller.

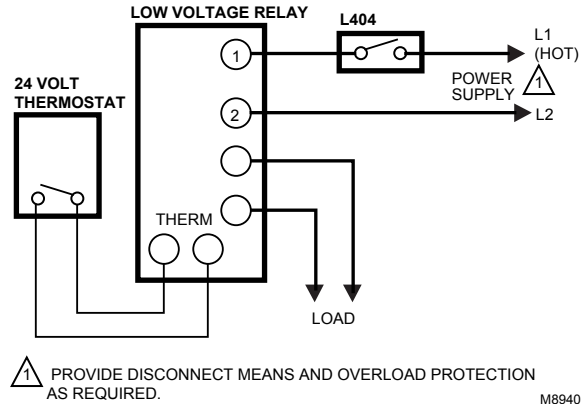


Fig. 6. L404 with a low voltage relay.

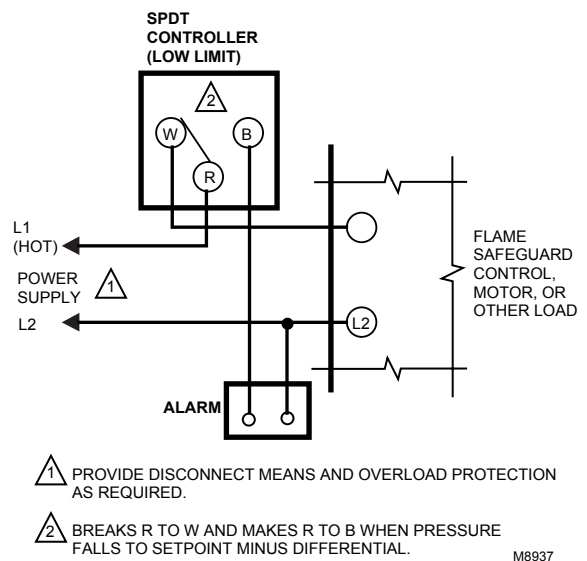


Fig. 7. L404F, L604A (jumper installed) used as a high limit, with an alarm circuit.

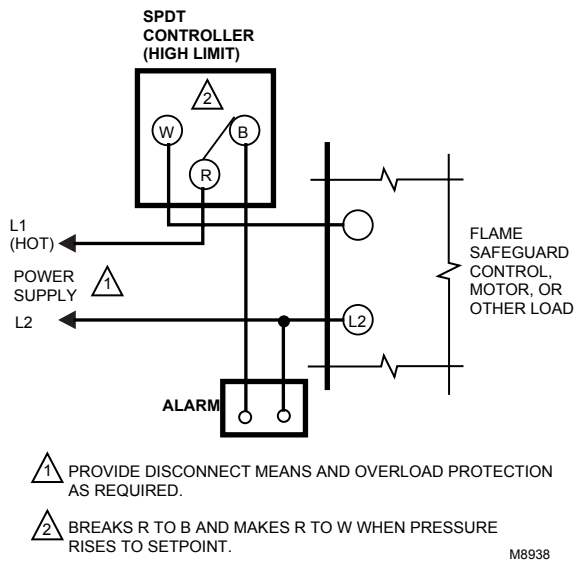


Fig. 8. L404F or L604A (with jumper installed) used as a low limit, with an alarm circuit.

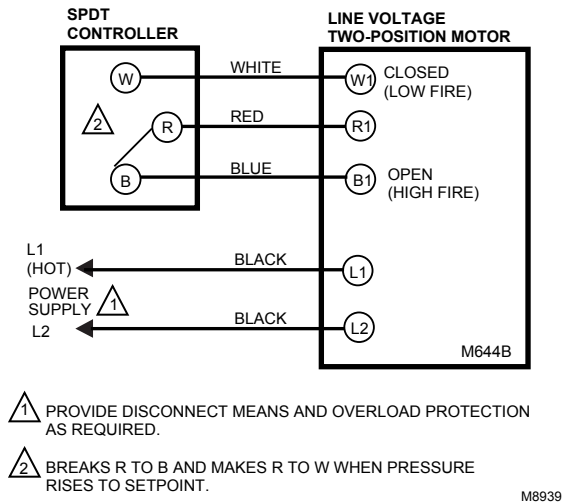


Fig. 9. L404F or L604 with jumper installed, controlling an M6184 motor.

SETTING AND CHECKOUT

Setting

In all models, the differential is subtractive from the main scale set point. The upper operating point is determined by the main scale set point, while the lower operating point is determined by the main scale setting less the differential setting. The L404F and L604A (with jumper installed), L have spdt switching action. Operating points are shown in Fig. 10.

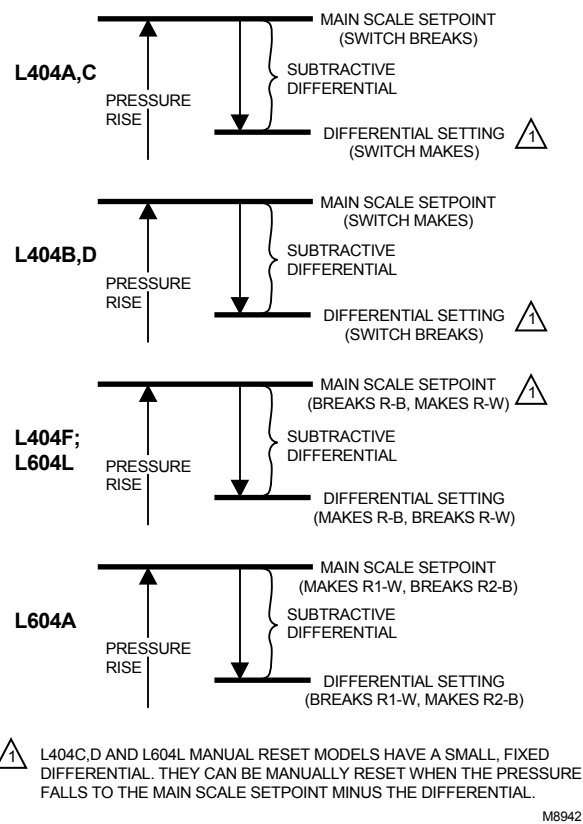


Fig. 10. L404 and L604 operating points.

Adjust the main scale set point for the desired operating pressure by turning the main scale adjusting screw (Fig. 11) on the top of the case until the main scale setting indicator is at the desired value. On an L404A,B,F with a 5 to 150 psi (.3 to 10.3 kg/cm² [34 to 1034 kPa]) operating range, or an L604A, adjust the differential setting by turning the differential adjusting screw (Fig. 11) until the differential setting indicator is at the desired value. L404C,D and L604L are manual reset models: see the next paragraph. The scaleplates are marked psi and kg/cm².

Trip-Free Manual Reset Feature (L404C,D and L604L only)

The L404C breaks, the L404D makes, and the L604L makes R-W and breaks R-B when the pressure rises to the main scale setpoint. They will not automatically return to their former positions. To reset one of these controllers, wait until the pressure falls to the set point minus the differential (Fig. 10). Then depress the manual reset lever (Fig. 11) and release it. The controller will not be reset until you release the manual reset lever. This prevents the controller from becoming an automatic-reset device if the reset lever is stuck, held in, or tied down.

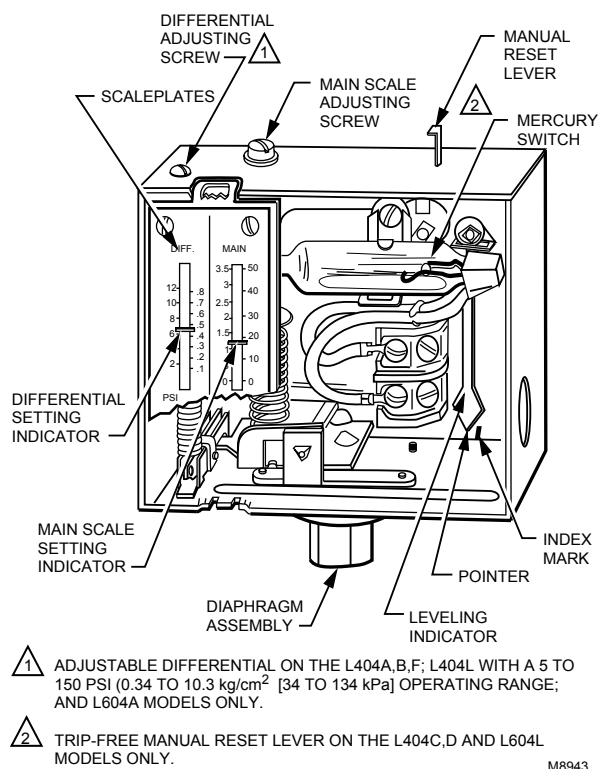


Fig. 11. Setting a Pressuretrol® Controller.

Checkout

After the controller has is installed, wired, and set, test it with the system in operation. First allow the system to stabilize. Then observe the operation of the controller while raising and lowering its setpoint. Pressure should increase when the setpoint is raised and decrease when the set point is lowered.

Also check the make and break points of the controller. If they do not agree with a separate, accurately calibrated pressure gauge, a slight adjustment of the scaleplate(s) may be necessary.

Use accurate pressure testing equipment when checking out the controller. Do not rely on inexpensive gauges. The controllers are carefully calibrated at the factory.

Boiler Installation

If the controller is being used on a boiler installation, test it as follows:

1. Note the boiler pressure by checking the boiler pressure gauge. (To perform this test properly, the boiler should have a pressure reading near the middle of the controller's main scale range.)
2. Turn the main scale adjusting screw (Fig. 11) until the main scale setting indicator on the controller corresponds to the boiler pressure gauge reading.

3. The L404A or C should break the control circuit(s) automatically when the boiler pressure gauge reading equals or slightly exceeds the controller setting.
4. The L404B or D should make the circuit under the same circumstances.
5. The L404F; L604L should make the R-W circuit and break the R-B circuit under the same circumstances.
6. The L604A should make the R1-W circuit and break the R2-B circuit under the same circumstances.
7. If the controller is operating properly, turn the main scale adjusting screw (Fig. 11) until the main scale setting indicator is at the desired set point.

If a Controller Seems to Operate Improperly

If the controller is suspected of operating improperly, it may be further checked as follows (Fig. 12):

1. Disconnect all power to the controller, loosen the cover screw, and remove the cover.
2. Disconnect the wires from the controller.
3. Connect an ohmmeter between the switch terminals.
4. Lower the set point of the controller (simulating a pressure increase) through a range greater than the differential. The switch should either make or break, depending on the model of the controller. (An L404A or C should break, an L404B or D should make, an L404F; L604L should break R-B and make R-W, and an L604A should break R2-B and make R1-W.) If it makes, the ohmmeter reads zero; if it breaks, the ohmmeter reads infinity.
5. Raise the set point of the controller (simulating a pressure decrease) through a range greater than the differential. The switch should break or make, just the opposite of its action in step 4 (except for the L404C,D and L604L manual reset models).

NOTE: An approximation of the differential can be made by observing the change in set point required for a resistance change from zero to infinity.

6. If the controller operates improperly, replace it.
7. When the controller is operating properly, reconnect the wires to the terminal block, replace the cover and tighten the cover screw, and reconnect the power.

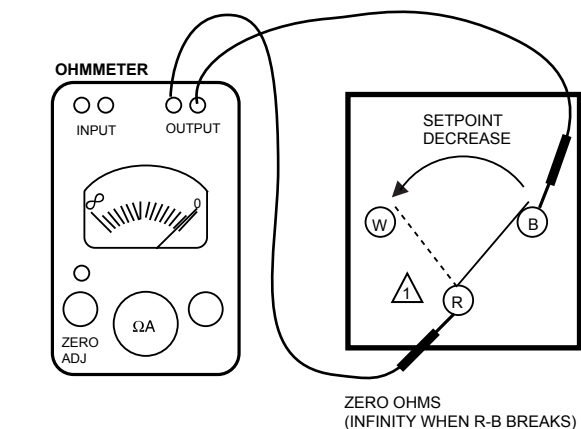


CAUTION

Equipment Damage Hazard.

Improper operation can damage the equipment.

Do not put the system into service until you have satisfactorily completed all applicable tests described in this Checkout section, in the Checkout section of the applicable instructions for the flame safeguard control, and any others required by the burner and boiler manufacturers.



⚠ AN L604 IS SHOWN. AN L404F OPERATES SIMILARLY (SPDT SWITCHING). AN L404A, B, C OR D HAS ONLY TWO TERMINALS (SPST SWITCHING); AN L404A R C BREAKS AND L404B OR D MAKES WHEN THE SETPOINT IS DECREASED FAR ENOUGH.

M8944A

Fig. 12. Checking controller operation using an ohmmeter.

SERVICE INFORMATION

Calibration

The controller was carefully calibrated during manufacturing and should not require recalibration. Most calibration errors are caused by improper leveling. The controller should be level when the pointer on the leveling indicator is directly over the index mark (Fig. 11). In some cases, the leveling indicator may not be accurate enough. The pointer may be over the index mark, but the controller still may not be operating within the tolerance of its scale setting. In this case, carefully bend the steam trap (siphon loop) until the controller switches properly.

Maintenance

The cover of the controller should be in place at all times to protect the internal components from dirt, dust, and physical damage. Routine maintenance should consist of occasional inspection and blowing or brushing away any accumulated dirt and dust. To ensure proper functioning of the controller at all times, perform an operational check of the entire system during routine maintenance checks.

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