Honeywell

T641A,B,C Floating Control Thermostats

Installation instructions for the trained service technician.

Application

The T641A,B,C Floating Control Thermostats provide spdt outputs to control floating actuators in applications such as variable air volume (VAV) terminal units.

—T641A: standard spdt floating control thermostat.

—T641B: incorporates momentary system override switch to provide external relay connection to be energized for override in building management systems or other applications.

—T641C: provides manual heat/cool changeover switch.

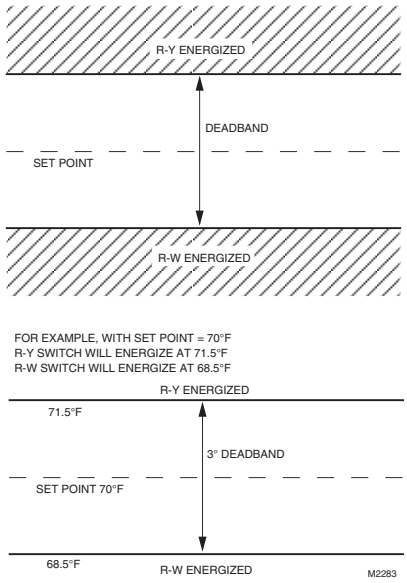
Operation

FLOATING CONTROL

The control provided by the T641 is conventionally termed *floating control*. During floating control, a variation of two-position control, the thermostat provides a three output control, Advance motor, Reverse motor, and Hold.

On a change in temperature, the T641 drives the actuator to an intermediate position and then opens the circuit to the actuator. The actuator remains in this position until there is a temperature change at the T641. The actuator is said to *float between the limits* of the T641 to satisfy various load requirements. See Fig. 1.

Fig. 1—T641 floating control.



VAV SYSTEMS

VAV systems control the temperature within a space by varying the volume of supply air. Air is delivered to the space at a fixed temperature. The volume of supply air is controlled by the space thermostat modulating the supply air damper. When full heating and cooling flexibility is required in a zone, it is handled by perimeter heating, or reheat capability in the air terminal units. As individual zones *shut down,* the total air flow in the system is regulated by a central duct static pressure controller. The fan system is sized to handle an average peak load, not the sum of the individual peaks. As each zone peaks at a different time of day, extra air is borrowed from the off-peak zones. This transfer from low-load to high-load zones occurs only in true VAV systems.

Pressure dependent systems do not incorporate an individual zone air flow sensor and depend on a stable system pressure to maintain flow. These systems require slower motors such as the seven minute ML6161 models that are typically controlled by the T641 thermostats.

HEAT ANTICIPATION/COOL ANTICIPATION

Control of heating or cooling units with a thermostat does not allow for the temperature to remain exactly at the thermostat set point, but varies within a certain temperature range. Anticipation is added to the thermostat to reduce this range.

The anticipator is a small resistive heater in the thermostat which heats when the system is on or off. The heat produced by the anticipator raises the internal bimetal temperature slightly faster than the surrounding room temperature. The thermostat *anticipates* the need to shut off the heating system sooner than it would if affected by room temperature only. The T641 has fixed or voltage anticipation.

Installation

WHEN INSTALLING THIS PRODUCT…

1. Read these instructions carefully. Failure to follow them could 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.

CAUTION

1. Disconnect power supply to prevent electrical shock or equipment damage.
2. To prevent interference with the thermostat linkage, keep wire length to a minimum and run wires as close as possible to the subbase.
3. Do not overtighten thermostat captive mounting screws, because damage to subbase threads can result.
4. Do not short across coil terminals on relay. This can burn out the thermostat heat anticipator.

IMPORTANT: *An incorrectly leveled thermostat will cause the temperature control to deviate from set point. It is not a calibration problem.*

LOCATION

Install the thermostat about 5 ft. [1.5 m] above the floor in an area with good air circulation at average temperature.

Do not install the thermostat where it may be affected by—

— drafts, or dead spots behind doors and in corners.
— hot or cold air from ducts.
— radiant heat from sun or appliances.
— concealed pipes and chimneys.
— unheated (uncooled) areas behind the thermostat, such as an outside wall.

MOUNTING AND WIRING

IMPORTANT: *The T641 is electrically compatible and designed to operate with actuators that have seven minute timings for a full stroke of 90° (angular). Using with motors that have timings less than seven minutes (90° full stroke) will result in unstable temperature control.*

The thermostat can be mounted on a horizontal outlet box or directly on the wall. Choose the method that best fits your installation.

In replacement applications, check the existing thermostat wires for cracked or frayed insulation. Replace any wires in poor condition. All wiring must comply with local codes and ordinances. The T641 utilizes a four-wire operation, so an additional transformer *common* wire must be present for correct wiring and operation. See Fig. 2 for functional schematic of T641. Screw terminals are on the back of the thermostat. See Fig. 3.

The part no. 221618 Cover Plate is available when replacing a competitive device that has left marks on the wall. See Fig. 4.

1. Grasp the thermostat cover at the top and bottom with one hand. Pull outward on bottom edge of the cover until it snaps free of the thermostat base. Carefully remove and save the packing material surrounding the mercury switches. See Fig. 3.

2. Run wiring from the actuator (if necessary) to the location. If the wiring is plastered into the wall, make a hole next to the cable and loosen the wires so they can be pushed back into the wall later. Thread wires through hole in packing material saved in step 1. Connect the wires to the terminals on the back of the thermostat. See Figs. 5 and 6.

3. Push the excess wire back through the hole and plug any opening with packing material to prevent drafts that may affect thermostat performance.

4. Through the thermostat two middle mounting holes, use the screws provided to loosely secure the T641 to the wall or outlet box.

5. Level the thermostat exactly using a spirit level or plumb line. Tighten the two mounting screws at the middle of the device. See Fig. 3.

Fig. 2—Functional equivalent anticipator circuit of T641.

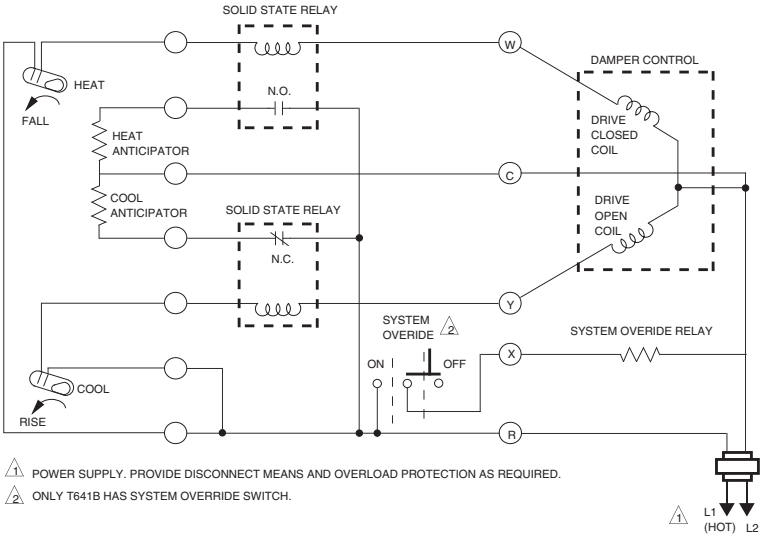


Fig. 3—Thermostat components and leveling procedure

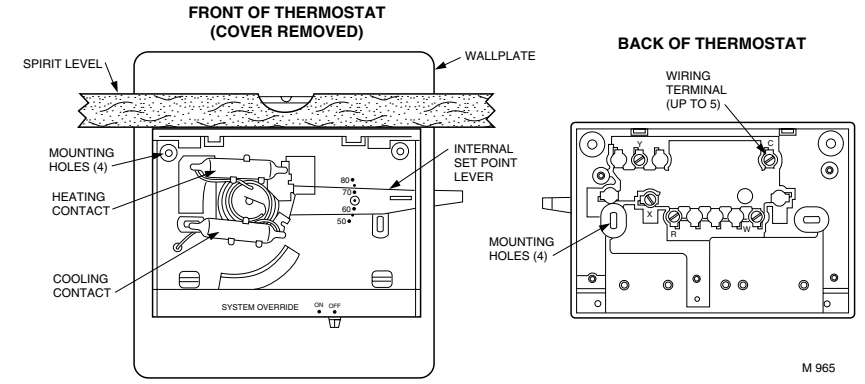


Fig. 4—Mounting T641 using the accessory wallplate.

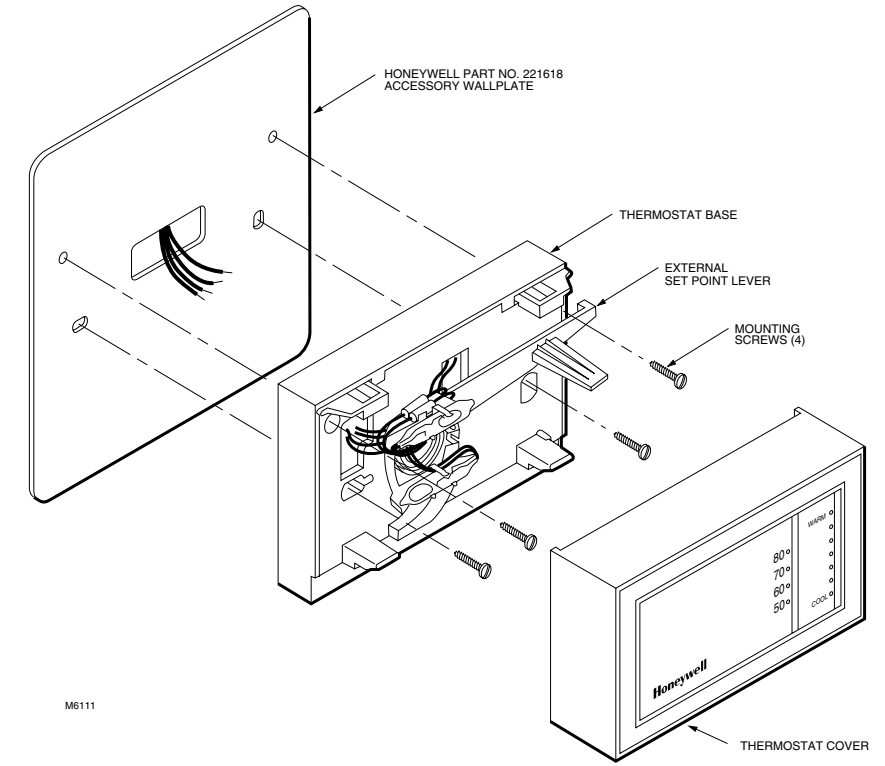


Fig. 5—ML6161 used with T641 for Type *B* damper applications. Y terminal will energize counterclockwise winding on call for cooling, driving motor open.

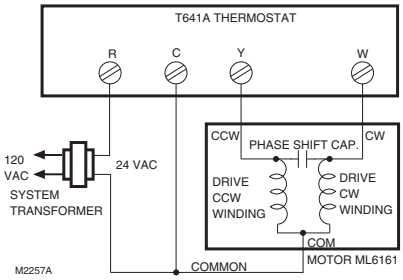
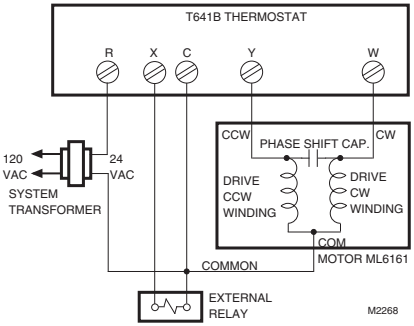


Fig. 6—T641B showing terminals X and C energizing external relay when momentary system override switch is pressed to ON position.



IMPORTANT: *An incorrectly leveled thermostat will cause the temperature control to deviate from set point. It is not a calibration problem.*

6. Install two screws in top mounting holes and tighten.
7. Replace the thermostat cover.

WARNING

Because the cooling anticipator operates continuously in the floating band, the T641 incorporates a factory offset that calibrates the thermostat. The offset causes the T641 to appear to be switching 10.5° F lower when not powered compared to actual operation. The cooling anticipator is needed to provide proper thermostat cycling by matching the current draw of the ML6161 Actuator. To ensure proper thermostat calibration and operation, the *C* terminal *must* be used.

Settings

TEMPERATURE SETTING

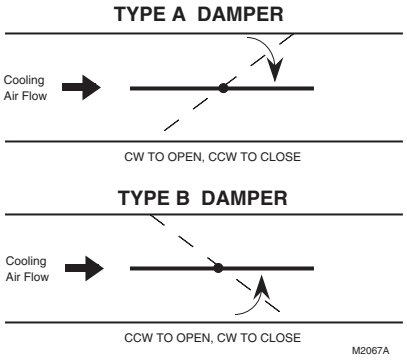
Move the heating and cooling set point levers to the desired comfort positions. See Fig. 3.

SWITCH SETTING

T641B—momentary system override switch that in the ON position will energize a relay that can be used in building management systems or other application. The momentary override switch will output a 24 Vac signal as long as the switch in held in the ON position. In the OFF position, no output signal will be present. For use in building management systems, the system that the T641B interfaces with must be capable of detecting a contact closure and respond accordingly to perform a desired action.

T641C—manual heat/cool changeover switch. With this switch set in the cool position, wire to damper actuator as shown in Fig. 5. Be sure to determine direction of damper opening for correct wiring between the T641 and ML6161. See Fig. 7. The changeover switch can be placed in the heat position to reverse action at terminals Y and W.

Fig. 7—Determining direction of damper opening for correct wiring of ML6162 to T641.



NOTE: The ML6161 is designed to open a damper by driving the damper shaft in either the clockwise (cw) or counterclockwise (ccw) direction. To wire the T641 correctly to the ML6161, see Figs. 5 and 7.

With the T641 controlling the ML6161 or equivalent actuator, lower the set point of the thermostat to call for cooling. Observe the operation of the motor. If the damper is closed, it should begin to open. If not, adjust the set point of the T641 higher to determine if the wiring is correct. If no movement is observed, check for the presence of 24 Vac between terminals C and Y during a call for cooling. With the proper wiring and 24 Vac present, the actuator should operate correctly. If 24 Vac is not present between C and Y on a call for cooling, replace the T641.

To check out the ML6161 when controlled by the T641, determine the direction the damper shaft moves to open the damper (cw or ccw). See Fig. 7. Place 24 Vac across the appropriate common-cw ↷ or common-ccw ↶ terminals to energize the actuator. The ML6161 should begin to open the damper. If the motor does not run, try switching the 24 Vac across opposite common-cw or ccw terminals to determine if the damper will begin to close. Replace the ML6161 if the motor does not run in either direction.

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