

## T921A,B,E-G Proportional Control Thermostats

*T921 Thermostats provide 3-wire, low voltage proportional control for Series 90 (135 ohm) valve motors, damper motors, and balancing relays in heating or cooling system applications.*



T921A

T921B

T921E

T921F

T921G

- Accessory faceplates available for horizontal mounting of T921A,B,E models.
- COOL-HEAT changeover switch in the T921B.
- Night setback mechanism and switch in the T921E.
- A spdt (single pole double throw) Class 2 auxiliary switch in the T921F,G, which operates at the low (T921F) and high (T921G) end of the throttling range.

- A bellows element adjusts the potentiometer slider to regulate motor operation.
- Various temperature ranges are available.
- All models are available with a thermometer and a locking cover.

### CONTENTS

<i>Specifications</i> .....	2
<i>Ordering Information</i> .....	2
<i>Installation</i> .....	4
<i>Setting and Adjusting</i> .....	7
<i>Operation</i> .....	7

# Specifications

## 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 the standard models except as noted below.

### TRADELINE® MODEL AVAILABLE:

T921A Thermostat for vertical or horizontal mounting.  
TEMPERATURE RANGE AND SCALE:

56° to 84° F [13° to 29°].

### ADDITIONAL FEATURES:

- TRADELINE® packed with cross-reference label and special TRADELINE® instructions.
- T6051A may be used in electric heat systems.
- They all include slotted sides and an add-on faceplate to allow the thermostat to be mounted horizontally. They also include the 127246A Adapter Plate Assembly for vertical mounting on a horizontal conduit box or for horizontal mounting on a vertical conduit box.

## STANDARD MODEL

### MODELS:

T921A: Heating or cooling applications.

T921B: Is the same as the T921A but includes a cool-heat changeover switch.

T921E: Includes a switch and heater that provide a night setback of approximately 10° F [5.5° C].

T921F: Includes an spdt low voltage Class 2 auxiliary switch that operates at the low end of the throttling range.

T921G: Includes an spdt low voltage Class 2 auxiliary switch that operates at the high end of the throttling range.

### SETTING ADJUSTMENT RANGE:

T921A,B,E-G: 56° to 84° F [13° to 29° C].

T921A,B,E-G: 13° to 29° C [56° to 84° F].

T921A: 42° to 75° F [5° to 24° C].

T921A,B: 66° to 95° F [19° to 35° C].

THERMOMETER: Bimetal. Scale ranges T921A only: 45° to 75° F [7° to 24° C]. All other models: 60° to 90° F [16° to 32° C], 15° to 35° C [59° to 95° F]. T921A is also available with a blank cover and no thermometer.

### AUXILIARY SWITCH DIFFERENTIAL:

T921F: 2° F [1° C].

T921G: 1° F [0.5° C].

### THROTTLING RANGE:

Fixed.

T921A: 2.5° F [1° C] midscale.

T921B,E: 4° F [2° C].

T921F: 6° F [3° C].

T921G: 5° F [2.5° C].

Variable.

T921A model available with potentiometer for 5° to 6° F [2.5 to 3° C] throttling range.

### ELECTRICAL RATINGS:

Voltage: 24 to 30 Vac.

Auxiliary Switch Contact Rating (When Used For Pilot Duty): 100 VA at 30 Vac.

### DIMENSIONS:

Refer to Fig. 1.

### ACCESSORIES (ORDER SEPARATELY):

127246A Adapter Plate Assembly for mounting all models vertically on a horizontal conduit box. (T921 models are shipped with a faceplate for vertical mounting.)

When mounting the T921A,B,E horizontally, see Table 1 to order the faceplate with the appropriate scale. NOTE: Do not mount the T921F,G horizontally.

34297B Thermostat Guard Assembly and 138541A Mounting Plate.

133722A Thermostat Guard (clear plastic cover).

133723A Thermostat Guard (beige plastic cover).

# Ordering Information

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

1. Model number.
2. Scale range.
3. Accessories, if desired.

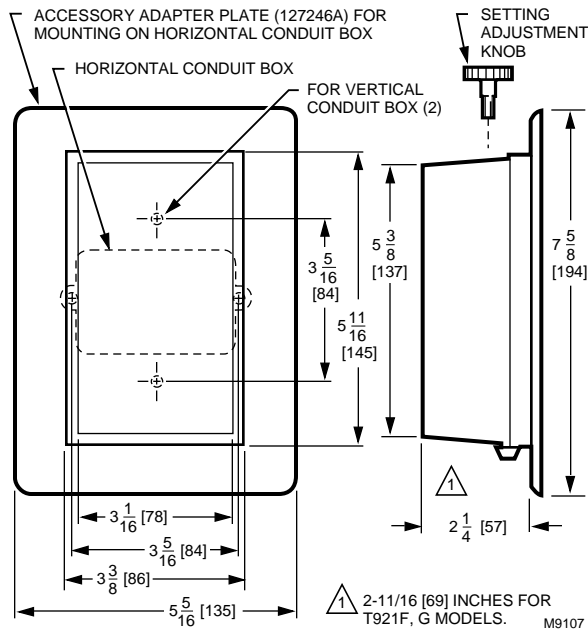
If you have additional questions, need further information, or want to comment on our products or services, please write or phone:

1. Your local Honeywell Home and Building Control Sales Office (check the white pages of the phone directory).
2. Home And Building Control Customer Satisfaction

Honeywell Inc., 1885 Douglas Drive North  
Minneapolis, Minnesota 55422 1-800-468-1502

(In Canada—Honeywell Limited/Honeywell Limitee, 740 Ellesmere Road, Scarborough, Ontario M1P 2V9) 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.

**Fig. 1—T921 approximate installation dimensions in in. [mm].**



**TABLE 1—ACCESSORY FACEPLATE.**

Scale	Part No.
56° to 84° F [13° to 29° C]	135135A
13° to 29° C [56° to 84° F]	135135B
42° to 75° F [5° to 24° C]	135135C
66° to 95° F [19° to 35° C]	135135D
56° to 84° F [13° to 29° C]	135135C <sup>a</sup>

<sup>a</sup>Blank faceplate.

**REPLACEMENT PART:**

130224 Locking Cover Knob.

**OPTIONAL SPECIFICATION (USING THE T991B):**

Alternate proportional control similar to the T921A, but uses an outdoor temperature, automatic control point reset.

T991B with 3-1/2: 1 reset and 50° to 120° F [10° to 49° C] temperature setting scale (when the outdoor bulb is at 60° F [16° C]).

**DIMENSIONS:**

Refer to Fig. 2.

**ACCESSORIES:**

Compression fittings, immersion wells: Refer to the appropriate specification or the TRADELINE® Catalog.

314439 Mounting Clips: For mounting a capillary tubing (averaging element) in a duct.

7640HX Averaging Element Mounting Kit: For mounting in existing installations where access to the duct is impractical.

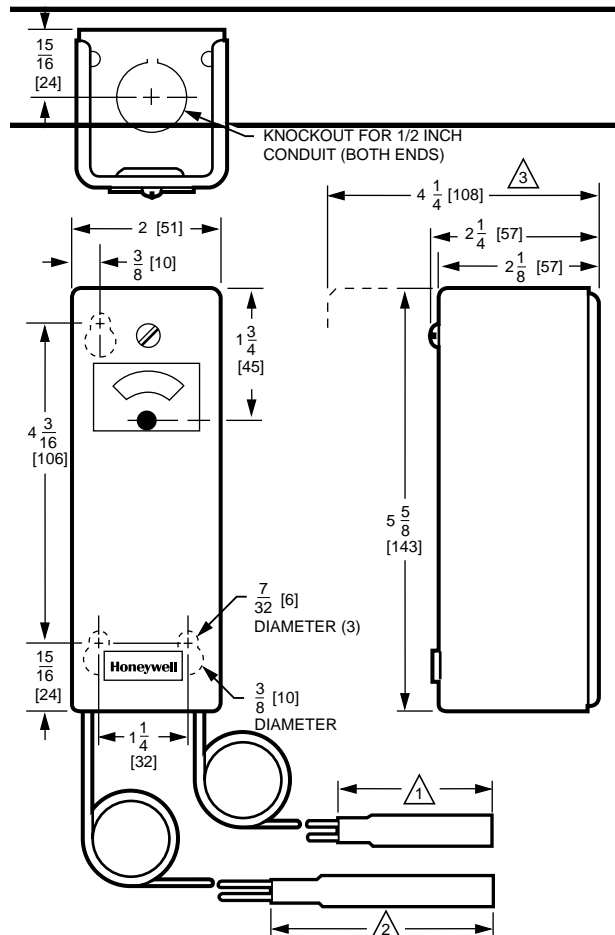
Q615A Enclosure: To protect the device when mounted outside; splash proof.

801534 Calibration Wrench.

107324A Bulb Holder: For mounting the bulb in a duct.

34886A Outdoor Bulb Shield: To protect the outdoor bulb mounting.

**Fig. 2—T991B approximate installation dimensions in in. [mm].**



① OUTDOOR BULB SIZE VARIES INVERSELY WITH THE RESET RATIO.

② INDOOR BULB LENGTH AND DIAMETER IS 4-1/2 [114] INCH BY 1/2 [13] INCH EXCEPT FOR THE AVERAGING ELEMENT WHICH IS 1/8 [3] INCH DIAMETER BY 12 FT. [3 M] LONG.

③ CLEARANCE NECESSARY TO REMOVE COVER.

M9108

# Installation



## CAUTION

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

### WHEN INSTALLING THIS PRODUCT...

1. Installer must be a trained, experienced service technician.
2. All wiring must comply with applicable electrical codes, ordinances and regulations.
3. Do not exceed the ratings listed on the device nameplate.
4. After the installation is complete, conduct a thorough checkout of the product operation.

### LOCATION

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

- Do not mount the thermostat where it can be affected by:
- drafts, or dead spots behind doors and in corners.
  - hot or cold air from ducts.
  - radiant heat from the sun or appliances.
  - concealed pipes and chimneys.
  - unheated (uncooled) areas such as an outside wall behind the thermostat.

### MOUNTING

1. Disconnect power supply before installation to prevent electrical shock and equipment damage.
2. Loosen the locking screw at the bottom of the case with an Allen wrench.
3. Lift off the thermostat cover.
4. Remove the mounting screws that secure the thermostat to the backplate and remove the backplate.
5. Fasten the backplate to the conduit box (see Fig. 3). Use the 127246A Adapter Plate Assembly (ordered separately) to mount the thermostat vertically on the horizontal conduit box; or to mount the thermostat horizontally on the vertical conduit box (see Fig. 4).

NOTE: When an accessory adapter plate is used, fasten the adapter plate to the conduit box with the two screws provided. Then fasten the backplate to the adapter plate.

6. Make all electrical connections to the terminals on the back of the thermostat before mounting the instrument on the backplate. Refer to the Wiring section.
7. Mount the thermostat on the backplate with the mounting screws.
8. After performing the checkout tests, replace the thermostat cover and tighten the locking screw.

### ADD FACEPLATES FOR HORIZONTAL MOUNTING (T921A,B,E ONLY)

T921 models are shipped with a faceplate for vertical mounting. When mounting the T921A,B,E horizontally, see Table 2 to order the faceplate with the appropriate scale. NOTE: Do not mount the T921F,G horizontally.

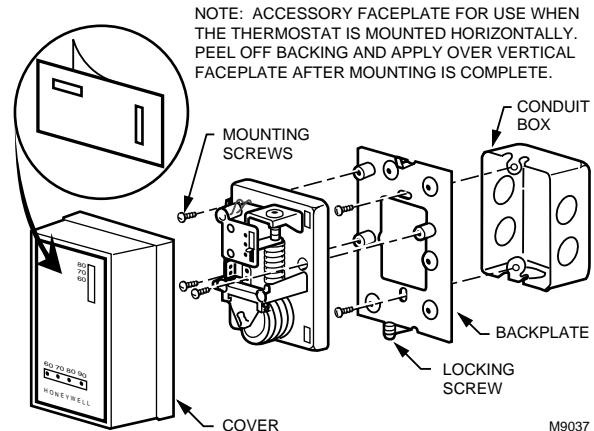
TABLE 2—ACCESSORY FACEPLATE

Scale	Part No.
56° to 84° F [13° to 29° C]	135135A
13° to 29° C [56° to 84° F]	135135B
42° to 75° F [5° to 24° C]	135135C
66° to 95° F [19° to 35° C]	135135D
56° to 84° F [13° to 29° C]	135135C <sup>a</sup>

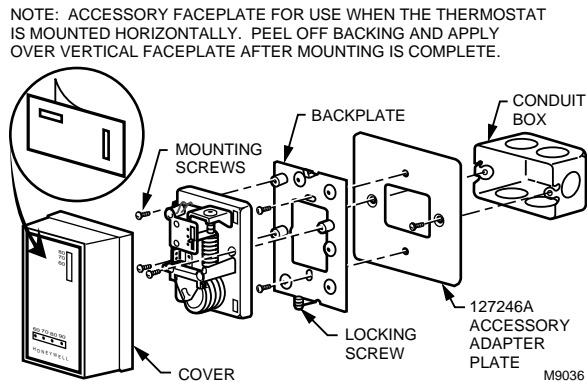
<sup>a</sup>Blank faceplate.

Affix the accessory faceplate when mounting the T921A,B,E models horizontally with contemporary covers. Peel the backing strip from the faceplate and place it lightly over the vertical faceplate. Align the edges and corners and make sure the scales align with the markings. Press firmly over the entire surface. Do not attempt to reapply once the faceplate has been mounted.

**Fig. 3—Vertical mounting of T921A,B,E-G Thermostats on vertical conduit box. T921A,B,E Thermostats can also be mounted horizontally on horizontal conduit box using add-on faceplate. (Do not mount T921F,G horizontally.)**



**Fig. 4—Vertical mounting of T921A,B,E-G Thermostats on horizontal conduit box.**  
T921A,B,E Thermostats can also be mounted horizontally on vertical conduit box using add-on faceplate. (Do not mount T921F,G horizontally.)



**WIRING**

Be sure all wiring must comply with applicable electrical codes, ordinances and regulations.

Do not exceed the following electrical ratings:

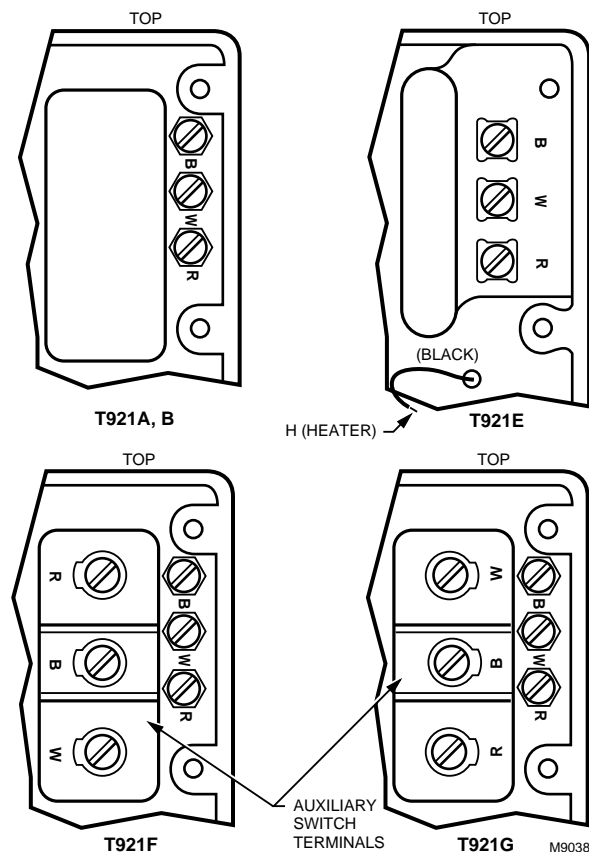
Voltage: 24 to 30 Vac.

Auxiliary Switch Contact Ratings: 100 VA at 30 Vac.

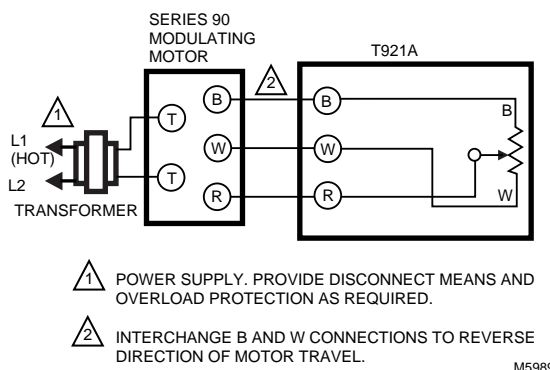
Make all electrical connections to the terminals on the back of the thermostat before mounting the instrument onto the conduit box. Terminal locations for all models are shown in Fig. 5. Note the difference in terminal designations for the auxiliary switch on the T921F and G. The H (Heater) terminal on the T921E is a black leadwire.

Typical wiring diagrams are shown in Figs. 6 through 10. Wire the T921 color-to-color when the modulating motor must drive the valve or damper open on temperature fall (heating application). When opposite motor action is required, reverse the B and W connections. Refer to the appropriate instructions when wiring the 2-position actuator (Figs. 9 and 10).

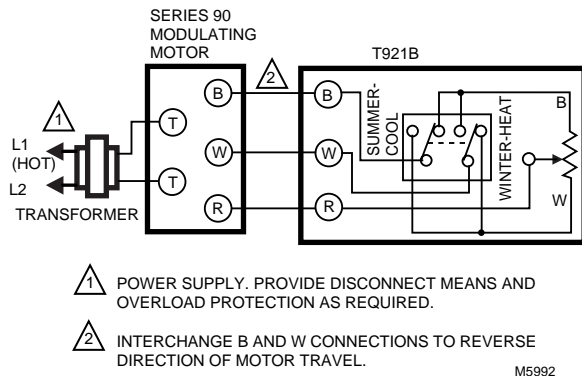
**Fig. 5—Terminals on back of thermostats.**



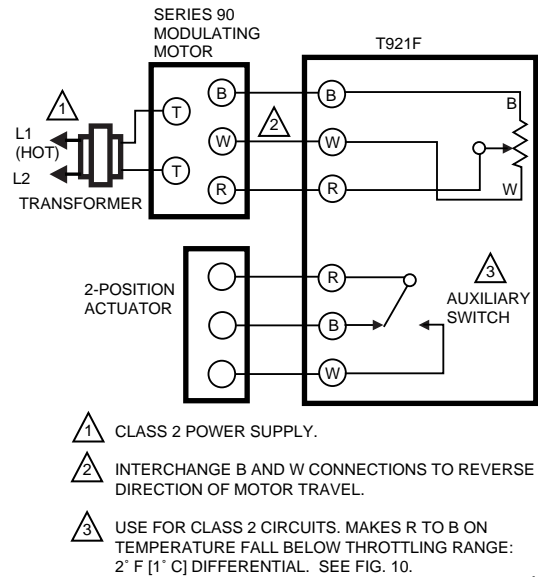
**Fig. 6—Typical wiring diagram for T921A.**



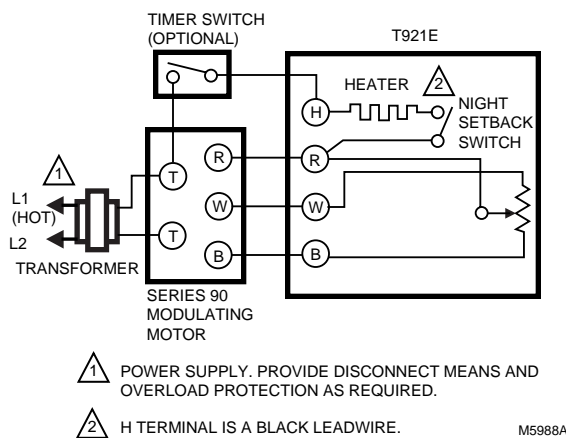
**Fig. 7—Typical wiring diagram for T921B.**



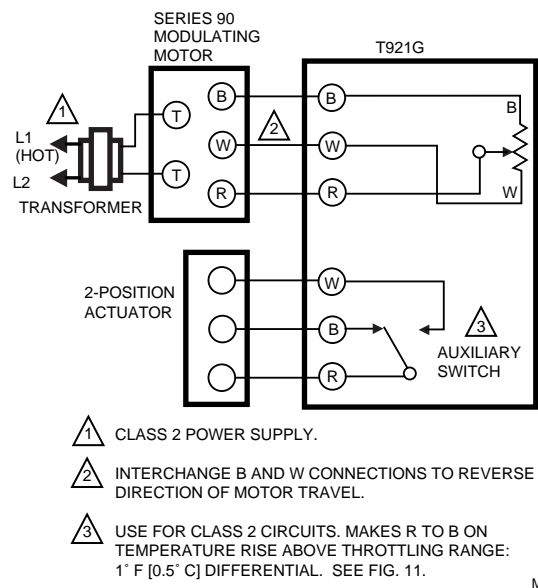
**Fig. 9—Typical wiring diagram for T921F.**



**Fig. 8—Typical wiring diagram for T921E.**



**Fig. 10—Typical wiring diagram for T921G.**



# Setting and Adjusting

## TEMPERATURE SETTING

Adjust all T921 models at the top of the thermostat for vertically mounted models and on the left side for horizontally mounted models using the setting adjustment knob or an Allen wrench (see Fig. 11). The device is shipped with the temperature setting indicator at the center of the temperature range. Without removing the cover, turn the setting adjustment knob or use an Allen wrench so the indicator is at the desired average room temperature.

## ADDITIONAL FEATURES:

### T921B SUMMER-WINTER CHANGEOVER

The T921B includes a summer-winter changeover switch. It is labeled COOL-HEAT. For horizontally mounted models, this switch is located on the left side of the thermostat. For vertically mounted models, it is located on the top of the thermostat (see Fig. 11).

### T921E NIGHT SETBACK

The T921E includes a manual night setback switch located on the top of the thermostat (see Fig. 11).

This switch energizes a heater that offsets the thermostat approximately 10° F [6° C], lowering the temperature for night operation. Leave this switch in the OFF position for normal operation; turn it to the ON position for lower night time temperature.

**CALIBRATION**

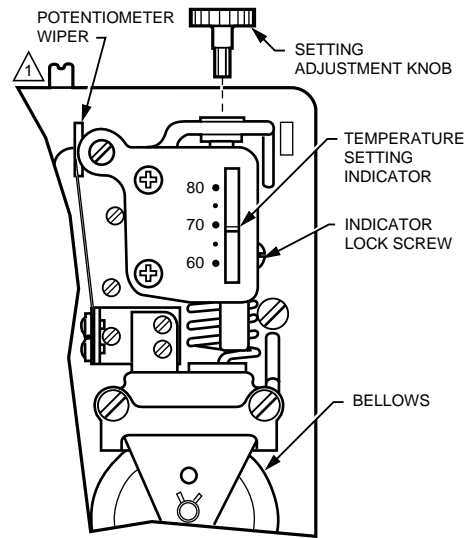
**IMPORTANT:** Do not recalibrate unless the thermostat continues to be out-of-adjustment after several hours of operation.

T921 Thermostats are calibrated at the factory so when the room temperature matches the setpoint temperature, the wiper is at the center of the active potentiometer winding.

If the thermostat is out of calibration, proceed as follows (see Fig. 11):

1. Remove the thermostat cover.
2. Turn the thermostat setting adjustment knob or an Allen wrench until the valve or damper motor is at mid-point.
3. Loosen the indicator lock screw and move the indicator to room temperature. Tighten the lock screw.
4. Replace the thermostat cover. Recheck the calibration and repeat the procedure if necessary.

**Fig. 11—Internal view of vertically mounted T921 (horizontally mounted model is similar).**



⚠ SUMMER-WINTER (COOL-HEAT) CHANGEOVER SWITCH ON T921B ONLY; NIGHT SETBACK SWITCH ON T921E ONLY. M9039

# Operation

In the T921, a vapor-filled bellows moves the potentiometer wiper by expanding or contracting in proportion to temperature changes. As the wiper moves, the appropriate motor winding is energized, opening or closing the valve or damper to compensate for the temperature change in the controlled area.

Operation of the auxiliary switch in the T921F,G is shown in Figs. 12 and 13.

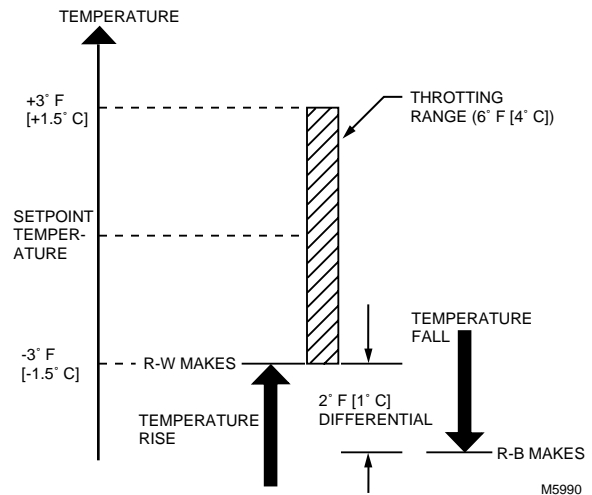
See Table 3 for the throttling range of each thermostat. The T921F Auxiliary Switch makes R-W at the low end of the throttling range on temperature rise and makes R-B at 2° F [1° C] below the low end of the throttling range on temperature fall.

The T921G Auxiliary Switch makes R-W at the high end of the throttling range on temperature fall and R-B at 1° F [0.5° C] above the high end of the throttling range on temperature rise.

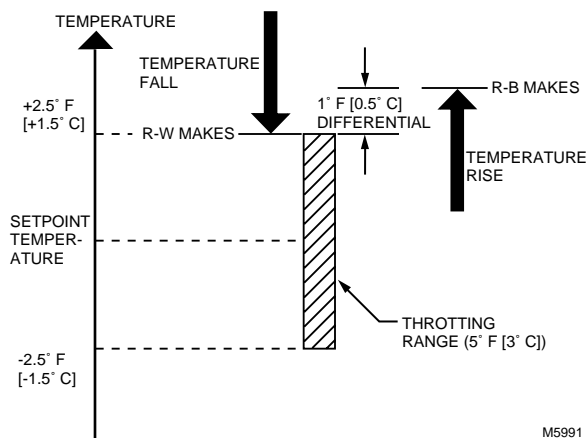
**TABLE 3—THERMOSTAT THROTTLING RANGES**

Model	Throttling Range
T921A	2.5° F [1.5° C] midscale
T921B	2.5° F [1.5° C] midscale
T921E	4° F [2° C]
T921F	6° F [4° C]
T921G	5° F [3° C]

**Fig. 12—T921F auxiliary switch operation.**



**Fig. 13—T921G auxiliary switch operation.**



### CHECKOUT

After the thermostat is wired and mounted, check to be sure the thermostat and controlled equipment are functioning properly. Before proceeding, allow from one to three hours for the system to stabilize.

#### T921A

1. Set the temperature setting indicator to room temperature by using the setting adjustment knob, or an Allen wrench (see Fig. 11). The valve or damper motor should be at midpoint.
2. Move the setpoint 5° F [3° C] below room temperature. In a heating application, the valve or damper should close; in a cooling application, the valve or damper should open. If the valve or damper is driven in the opposite direction, interchange the wires at the B and W terminals.

**NOTE:** If a proportional action limit control is used, the motor may not move the damper or valve all the way closed or open. Check the limit action after interchanging the wiring.

3. Move the setpoint 5° F [3° C] above room temperature. In a heating application, the valve or damper should open; in a cooling application, the valve or damper should close.
4. If the valve or damper responds properly to the thermostat, move the setpoint to the desired temperature.

#### T921B

1. Place the changeover switch (see Fig. 11) in the HEAT position and follow steps 1 through 3 of the T921A procedure.
2. Move the switch to the COOL position and repeat steps 1 through 3 of the T921A procedure.
3. If the valve or damper responds properly to the thermostat, move the setpoint to the desired temperature.

#### T921E

1. Place the night setback switch (see Fig. 11) in the OFF position and follow steps 1 through 3 of the T921A procedure.
2. Move the setpoint 5° F [3° C] above room temperature; the valve or damper should open.
3. Move the night setback switch to the ON position; as the heater in the thermostat warms up, the valve or damper should be driven toward the closed position. Allow 30 minutes for the heater and bellows to warm up.
4. If the valve or damper responds properly to the thermostat, move the setpoint to the desired temperature.

#### T921F

1. Follow steps 1 through 3 of the T921A procedure.
2. Move the setpoint at least 10° F [6° C] above room temperature. The auxiliary switch should be made R-B and the valve or damper should be open (for heating application). Lower the setpoint gradually; the auxiliary switch should make R-W before the setting indicator reaches room temperature. As the setting indicator moves below room temperature, the valve or damper should be driven closed.
3. If the valve or damper responds properly to the thermostat, move the setpoint to the desired temperature.

#### T921G

1. Follow steps 1 through 3 of the T921A procedure.
2. Move the setpoint at least 6° F [4° C] below room temperature. The auxiliary switch should be made R-B and the valve or damper should be closed (for heating application). Raise the setpoint gradually; the auxiliary switch should make R-W before the setting indicator reaches room temperature. As the setting indicator moves above room temperature, the valve or damper should open.
4. If the valve or damper responds properly to the thermostat, move the setpoint to the desired temperature.

**Honeywell**

**Home and Building Control**  
Honeywell Inc.  
1985 Douglas Drive North  
Golden Valley, MN 55422

**Home and Building Control**  
Honeywell Limited—Honeywell Limitée  
740 Ellesmere Road  
Scarborough, Ontario  
M1P 2V9

*Helping You Control Your World*