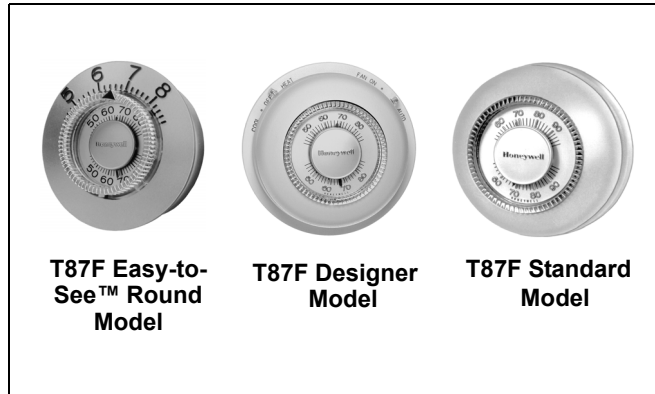


T87F Thermostats

PRODUCT DATA



FEATURES

- For 24 Vac to 30 Vac control of heating or cooling systems.
- Thermostat cover ring may be painted to match room decor.
- Knurled dial provides easy setpoint adjustment.
- Separate temperature setting and thermometer scale located on face of thermostat.
- T87F distinctive style makes an attractive addition to almost any decor.
- Enhanced setpoint visibility model available for the visually impaired.

APPLICATION

T87F Thermostats provide temperature control for residential heating, cooling, or heating-cooling systems. The T87F is designed with a dustproof spdt mercury switch, an adjustable heat anticipator and a concealed wallplate for 2-wire heating hookups. The Tradeline® T87F wallplate is designed for 2-wire heating or cooling, 3-wire spdt heating (series 20), or 3-wire spdt heating-cooling with remote switching. The wallplate also provides cooling anticipation.

The Q539 Subbase may be added for system and fan switching. The Q539 Subbase also provides cooling anticipation.

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SPECIFICATIONS

IMPORTANT

This product is tested and calibrated under closely controlled conditions and some minor differences in performance can be expected if those conditions are changed. The specifications in this publication do not include normal manufacturing tolerances; therefore, an individual unit may not exactly match the listed specifications.

Tradeline® Models:

For use in series 80 heating, cooling, or heating-cooling circuit, or for use in series 20 (spdt) heating only circuit. Tradeline® specifications are the same as those of standard models, except as follows:

T87F Heating, Cooling, or Heating-Cooling Thermostat.
T87F Enhanced Setpoint Visibility Model for the visually impaired.

T87F models that meet Department of Defense (DoD) Manual 4270.1-M specifications.

Model for heating control. Locking cover, without thermometer, 72°F (22°C) maximum heat.

Model for cooling control, locking cover, without thermometer, 78°F (26°C) minimum cool.

T87F with locking cover, range stops 35°F to 65°F (2°C to 18°C) range.

Temperature Ratings:

Setting Range:

Most models: 40°F to 90°F (4°C to 32°C).

Models with positive Off: 50°F to 90°F (10°C to 32°C).

Mounting:

T87F (without positive Off) furnished with 137421A Wallplate.

T87F (with positive Off) furnished with 137421B Wallplate.

Both wallplates suitable for controlling 2-wire spst heating or cooling, 3-wire spdt heating-cooling, or 3-wire spdt series 20 heating systems.

Additional Tradeline® Features:

Cover ring included for covering old thermostat marks or for mounting T87F on outlet box.

137421 Wallplate extends beyond thermostat for trim appearance (198170A Wallplate for Designer Models).

Tradeline® pack with cross reference label and special instruction sheet.

Standard Models:

T87F Heating, Cooling, or Heating-Cooling Thermostat. Thermostat includes 104456B Wallplate for heating only systems. Order Q539 Subbase for heating-cooling.

Electrical Ratings: 1.5A at 30 Vac.

Heat Anticipator: Adjustable 0.1 to 1.2A.

Cooling Anticipator: 0 to 1.5A, 24 Vac to 30 Vac.

Temperature Ratings: 50°F to 100°F (10°C to 38°C).

Switching Action: Dust-free spdt mercury switch.

Temperature Sensing: Coiled bimetal.

Dimensions:

T87F: 3-1/4 in. (82.5 mm) diameter, 1-1/2 in. (38 mm) deep.

With 137421 Wallplate: 3-11/16 in. (93.5 mm) diameter, 1-3/4 in. (44.5 mm) deep.

With Q539 Subbase: 3-11/16 in. (93.5 mm) diameter, 1-3/4 in. (44.5 mm) deep.

Mounting: Thermostat mounts on furnished wallplate, or subbase (order separately).

Finish: Premier White® or taupe.

Optional Specifications:

Positive Off Models (specify heating or cooling):

60°F to 100°F (16°C to 38°C) or 50°F to 90°F (10°C to 32°C) range.

Locking Cover and Range Stop Models:

60°F to 90°F (16°C to 32°C).

45°F to 75°F (7°C to 24°C) range, 68°F marked on scale.

Scale Range Models:

40°F to 90°F (4°C to 32°C).

45°F to 75°F (7°C to 24°C).

5°C to 30°C (67°F to 112°F).

10°C to 30°C (67°F to 86°F).

10°C to 35°C (67°F to 95°F).

Accessories:

Q539 Subbases—provide system and fan switching and cooling anticipation (unless otherwise specified) for T87F heating, cooling and heating-cooling thermostats.

TG587F1008 Thermostat Guard Key Lock Cover with window.
TG587F1016 Thermostat Guard Key Lock cover without window.

104456B Two terminal heat only T87 Wallplate.

137421AE-T87 Taupe Wallplate with positive Off.

137421K-T87 Taupe Wallplate without positive Off.

137421R-T87 White Wallplate.

198170A Designer Beige Adapter Kit.

198172 Cover Ring for T87 Designer Beige models.

199933 Cover Ring for Taupe T87 models.

114855-00029 Cover Ring for Gold T87 models.

137421A-T87 Gold Wallplate without positive Off.

137421B-T87 Gold Wallplate with positive Off.

221886A Easy-to-Use™ Clear Ring. Durable plastic ring snaps on Easy-to-See models.

202687A Premier White® Adapter Kit includes 6 in. cover assembly and adapter ring to mount on outlet box or cover marks from old thermostats.

32005439-001 Taupe Adapter Kit includes 6 in. cover assembly and adapter ring to mount on outlet box or cover marks from old thermostat.

**MERCURY NOTICE**

If this control is replacing a control that contains mercury in a sealed tube, do not place your old control in the trash. Dispose of properly.

Contact your local waste management authority for instructions regarding recycling and the proper disposal of an old control.

INSTALLATION**CAUTION**

Voltage Hazard.

Can cause electrical shock or equipment damage.

Disconnect power before beginning installation.

**CAUTION**

Equipment Damage Hazard.

Improper installation can burn out thermostat heat anticipator.

On systems using a low voltage gas valve, *do not* apply a jumper across the valve coil terminals.

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.

Location

Locate the thermostat about 5 ft (1.5m) above the floor in an area with good air circulation at average temperature.

Do not install 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 sun or appliances.
- concealed pipes and chimneys.
- unheated (uncooled) areas such as an outside wall behind the thermostat.

This thermostat is a precision instrument and was carefully adjusted at the factory. *Handle it carefully.*

Mount Wallplate or Subbase**IMPORTANT**

Use a spirit level to accurately level the wallplate or subbase as shown in Fig. 1. Inaccurate leveling may cause the thermostat to deviate from setpoint.

When using the T87F with a Q539 Subbase, follow the mounting and wiring instructions for the subbase.

Use the cover ring (if desired), adapter plate (if needed), wallplate or subbase, T87F and screws as shown in Fig. 2 and 3.

IMPORTANT

Before mounting the thermostat, see Setting and Checkout section, Heat Anticipator Adjustment subsection.

1. Place the cover ring on the wall at the desired location with the cable entrance holes to the left.

NOTE: If an outlet box is used, place the cable entrance holes toward the bottom. The side showing *MADE IN U.S.A.* must be against the wall.

2. Pull the thermostat cable through the entrance hole of the cover ring and the entrance hole of the wallplate or subbase and adapter plate (if used).
3. Fasten the cover ring, adapter plate (if used), and the wallplate or subbase.
4. Level the wallplate as shown in Fig. 1 and tighten the screws.
5. After wiring the subbase or wallplate, plug the hole to prevent interior wall drafts from affecting the thermostat.
6. Align the thermostat over the wallplate and tighten the three captive mounting screws.

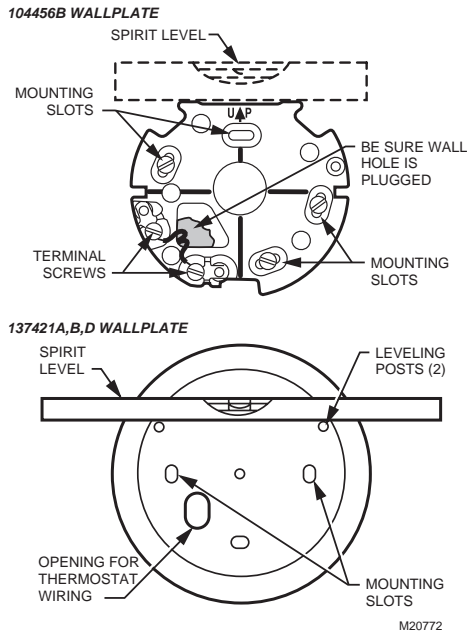


Fig. 1. Level 104456B, 137421A,B,D Wallplates.

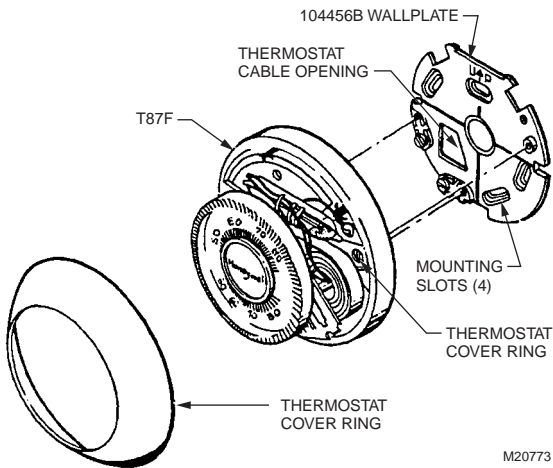
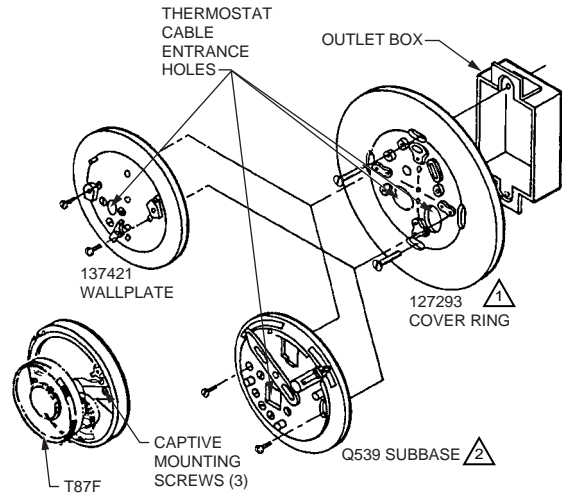


Fig. 2. Mount T87F, 104456B Wallplate.



- 1 IF OUTLET BOX IS HORIZONTAL, MOUNT COVER RING IN POSITION SHOWN, BUT FASTEN WITH SCREWS THROUGH "A".
- 2 USE 137421A,B WALLPLATE FOR HEAT OR COOL APPLICATIONS WITHOUT SWITCHING. USE Q539 SUBBASE FOR HEAT OR COOL APPLICATIONS WITH SWITCHING.

Fig. 3. Mount T87F, Q539 Subbase or 137421 Wallplate to outlet box.

WIRING



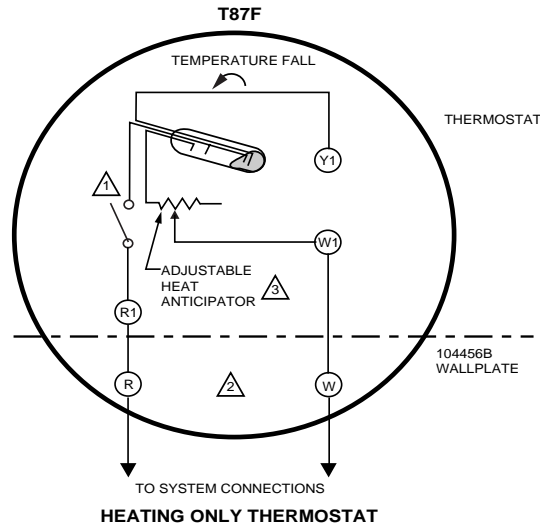
CAUTION

Voltage Hazard.
Can cause electrical shock or equipment damage.
Disconnect power before beginning installation.

IMPORTANT

All wiring must comply with local electrical codes and ordinances.

The T87F may be used in most 2- or 3-wire, spst or spdt, 24 Vac to 30 Vac heating systems controlled by a low voltage thermostat. The following wiring diagrams represent typical applications.

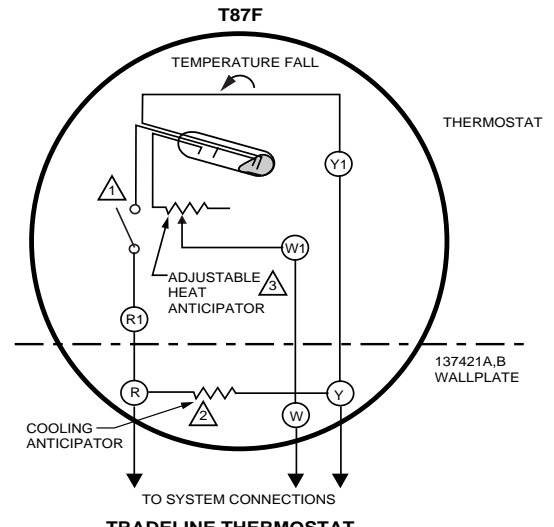


HEATING ONLY THERMOSTAT

- 1 MODEL WITH POSITIVE OFF SWITCH OPENS THE THERMOSTAT CIRCUIT WHEN SETPOINT DIAL IS MOVED TO THE OFF POSITION.
- 2 MAKE SYSTEM WIRING CONNECTIONS TO TERMINALS ON 104456B WALLPLATE.
- 3 R1, W1 TERMINALS ON THERMOSTAT ARE DIRECTLY CONNECTED TO R, W TERMINALS ON WALLPLATE WHEN THERMOSTAT IS MOUNTED ON WALLPLATE.

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Fig. 4. Internal wiring for T87F Heating Only Thermostat.

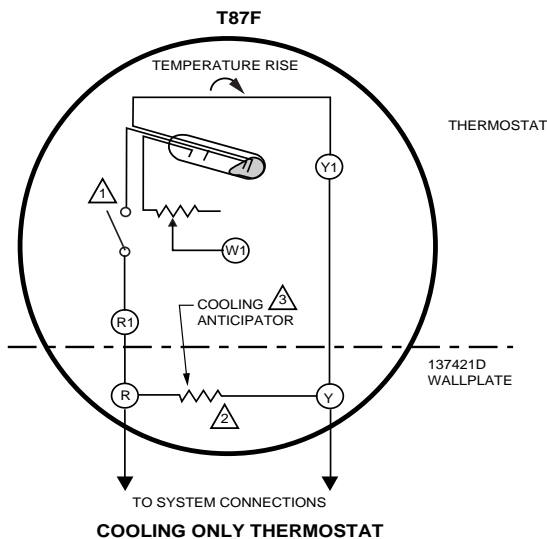


TRADELINE THERMOSTAT

- 1 MODEL WITH POSITIVE OFF SWITCH OPENS THE THERMOSTAT CIRCUIT WHEN SETPOINT DIAL IS MOVED TO THE OFF POSITION.
- 2 MAKE SYSTEM WIRING CONNECTIONS TO TERMINALS ON 137421A,B WALLPLATE.
- 3 R1, W1, Y1 TERMINALS ON THERMOSTAT ARE DIRECTLY CONNECTED TO R, W, Y TERMINALS ON WALLPLATE WHEN THERMOSTAT IS MOUNTED ON WALLPLATE.

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Fig. 6. Internal wiring for Tradeline® T87F Thermostat.

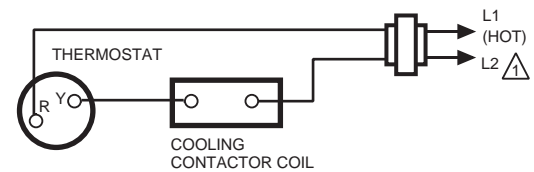


COOLING ONLY THERMOSTAT

- 1 MODEL WITH POSITIVE OFF SWITCH OPENS THE THERMOSTAT CIRCUIT WHEN SETPOINT DIAL IS MOVED TO THE OFF POSITION.
- 2 MAKE SYSTEM WIRING CONNECTIONS TO TERMINALS ON 137421D WALLPLATE.
- 3 R1, W1 TERMINALS ON THERMOSTAT ARE DIRECTLY CONNECTED TO R, Y TERMINALS ON WALLPLATE WHEN THERMOSTAT IS MOUNTED ON WALLPLATE.

M20775

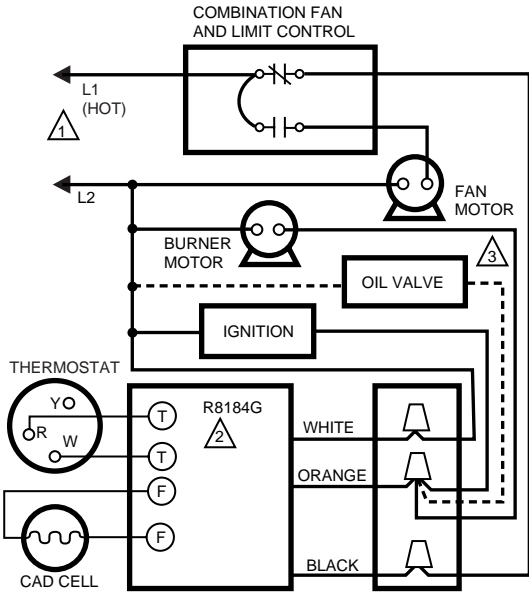
Fig. 5. Internal wiring for T87F Cooling Only Thermostat.



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

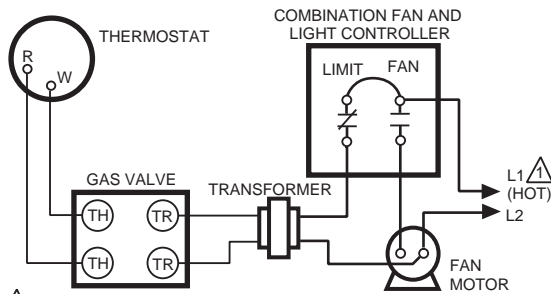
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Fig. 7. Typical wiring for T87F used as a Cooling Only Thermostat.



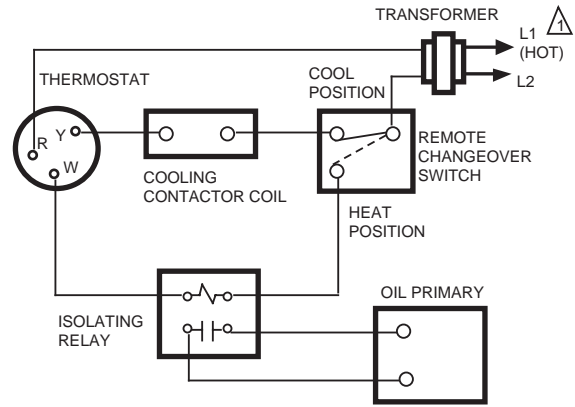
- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 R8184 PROTECTORELAY OIL PRIMARY CONTAINS INTERNAL TRANSFORMER
- 3 CONNECT OIL VALVE, IF APPLICABLE.

Fig. 8. T87F in typical oil heating system.



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

Fig. 9. T87F in typical gas heating system.



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

M6104A

Fig. 10. T87F in heating-cooling application with remote mounted system changeover switch. (Use Q539 Subbase for switching at thermostat location.)

To Replace a Series 10 Thermostat

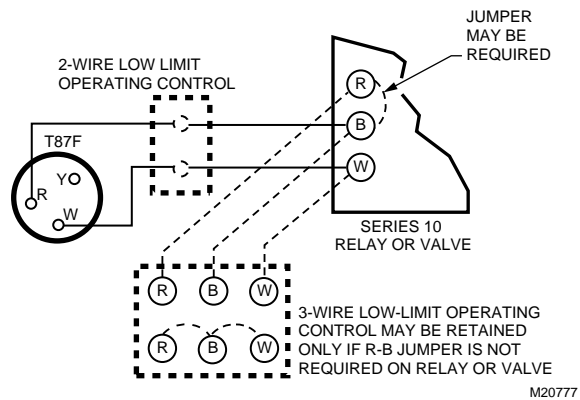
To adapt the T87F to a series 10 three-wire heating system:

1. Connect the wires from the thermostat (R and W) to the terminals on the three-wire primary (B and W). See Fig. 11 and 12.

NOTES:

- Some three-wire controls manufactured by other companies cannot be satisfactorily operated by a two-wire thermostat.
- Before connecting the T87F to a three-wire control, consult the manufacturer.
- Some Honeywell series 10 relays require an R-B jumper (see Fig. 11). These relays are:

R114A,B	R125	R117	R187A1,A4
R116	R126	R178	R190B1,B8
R117	R161	R180	
- Relays or valves that do not require a jumper may retain a three-wire, low limit control as shown in Fig. 11. If the jumper is required, a two-wire control must be used.
- A three-wire, open contact, high-limit control requires a jumper as shown in Fig. 12.



M20777

Fig. 11. T87F (replacing a series 10 thermostat) connected to a 2- or 3-wire low limit control.

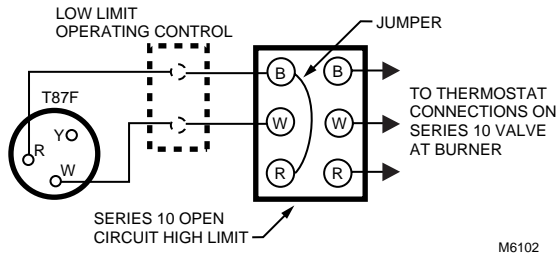
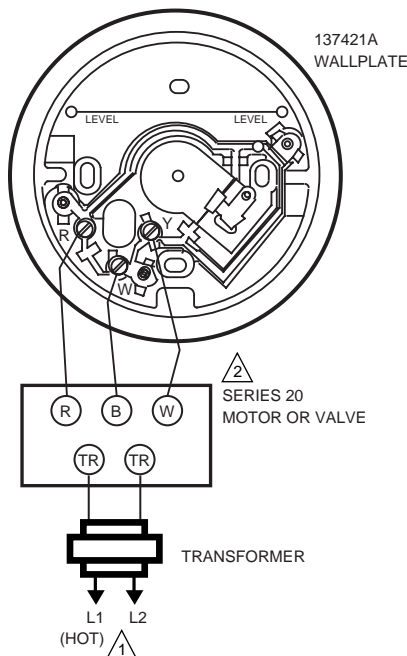


Fig. 12. T87F (replacing a series 10 thermostat) connected to a 3-wire open contact, high-limit control.

To Replace a Series 20 Thermostat

Tradeline® T87F Thermostats directly replace series 20 spdt thermostats, or thermostats in heating installations that require contact on both a rise and fall in temperature (see Fig. 13).



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 MAKE CONNECTIONS AS SHOWN: R TO R, W TO B, Y TO W.

M20778

Fig. 13. Tradeline® T87F in Series 20 Heating Circuit.

To wire a series 20 thermostat:

Series 20 Thermostat	T87F Thermostat
R	R
B	W
W	Y

SETTINGS AND CHECKOUT

Temperature Selection

To select the desired temperature, turn the transparent dial until the desired point on the setting scale (top scale) is in line with the pointer.

On models with range stops the temperature range may be limited at either extreme. The left stop is for the low extreme, the right stop for the high extreme (see Fig. 14).

Heat Anticipator Adjustment

The thermostat has an adjustable heat anticipator that must be set on the number that corresponds to the current rating of the primary control of the system (for example; gas valve, oil primary).

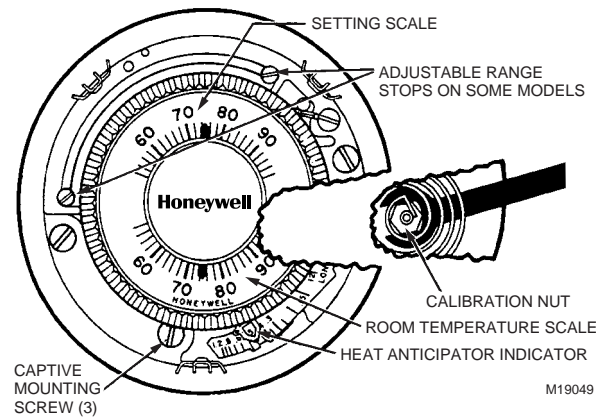


Fig. 14. T87F interior detail.

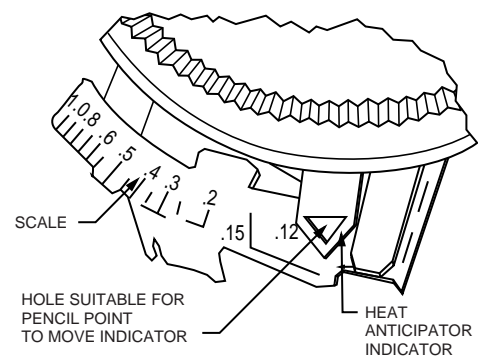


Fig. 15. Adjust heat anticipator to match current rating of primary control.

IMPORTANT

When the T87F is used in a series 20 heating circuit (requires contact on both a rise and fall in temperature), set the anticipator indicator to 1.2.

If the current rating is not known, proceed as follows:

1. Connect an ac ammeter of appropriate range (for example; 0 to 2A) between the R and W terminals on the wallplate, or between R and W on the subbase.
2. Let the system operate through the ammeter for at least one minute before taking the reading.
3. Set the heat anticipator to correspond to the ammeter reading (see Fig. 15).
4. A slightly higher setting to obtain longer burner-on times (and fewer cycles per hour) may be desirable in systems such as a one-pipe steam system. For example:
 - if burner on-time is too short with a heater setting of 0.4, adjust to the 0.45 setting and check the system operation, then
 - adjust to the 0.5 setting and recheck until the desired burner-on time is obtained.

OPERATION**CAUTION**

Equipment Damage Hazard.
Improper installation can burn out thermostat heat anticipator.

On systems using a low voltage gas valve, *do not* apply a jumper across the valve coil terminals.

To check thermostat operation:

1. Turn down the temperature setting to the lowest point.
2. If the subbase is used, move the system switch to the HEAT position.
3. Raise the temperature setting until the burner starts.
4. Slowly turn the dial back. (The burner should stop when the dial has been turned down below the room temperature.)
5. If the T87F controls cooling, move the subbase system switch (if used) to COOL and lower the setting until the cooling equipment starts.
6. Raise the setting above the room temperature and the cooling system should shut down.

7. Make certain that the equipment functions properly in response to the thermostat.

RECALIBRATION**IMPORTANT**

- If the thermostat scaleplate moves (pointer is stationary) when setting the temperature, the thermostat is a Group I model.
- If the scaleplate is stationary and the pointer moves, the thermostat is a Group II model.

The T87F is accurately calibrated at the factory under controlled conditions and no recalibration should be necessary. If it appears that the thermostat is out of calibration, make sure that it is level and is not subjected to radiant heat from the sun, radiators, or appliances.

Remove the thermostat cover ring so you can observe the mercury switch action. After a five- or ten-minute off-period (with thermostat setting below the room temperature), slowly raise the setting until the switch just makes contact. If the thermometer pointer and setting indicator read the same the instant you see the switch make, no recalibration is necessary. If recalibration is necessary, proceed as follows:

1. Turn the setting dial a few degrees above the room temperature and remove the cover.
2. Slip the 104994 Calibration Wrench (available on request) onto the hex under the bimetal coil (see Fig. 14).
3. Hold the dial firmly, and turn the hex counterclockwise for Group I models and clockwise for Group II models, until the mercury breaks contact.
4. Turn the dial to a low setting so that the thermostat loses the heat it has gained from your hands and its own operation.
5. Wait at least five minutes.
6. Slowly turn the dial until the pointers read the same.
7. Firmly hold the dial—carefully turning the hex clockwise for Group I models, counterclockwise for Group II models—until the mercury switch slips to the heating contact end of the tube.
8. Recheck the calibration, select the desired temperature and replace the cover.

NOTE: When the T87F provides cooling control, calibration for heating automatically calibrates for cooling.

Honeywell

Automation and Control Solutions

Honeywell
 1985 Douglas Drive North
 Golden Valley, MN 55422

Honeywell Limited-Honeywell Limitée
 35 Dynamic Drive
 Scarborough, Ontario
 M1V 4Z9

