

# T7984 A,B,C Electronic Modulating Control Thermostats

PRODUCT DATA



## APPLICATION

These microprocessor-based thermostats provide proportional-plus-integral individual room temperature control in zoned commercial Heating, Ventilating, and Air Conditioning systems such as hydronic heating and/or cooling, pressure dependent VAV or by-pass box with or without terminal reheat.

The T7984 family provides modulating (2 to 10 Vdc analog) control. Optional features include automatic heat/cool changeover, reheat control, remote night setback with local timed override, and remote sensor on VAV models.

## FEATURES

- PI control action provides accurate, stable room temperature control.
- T7984 models are used with Series 70 direct-coupled damper actuators such as ML7161 or ML7984, or with valve actuators such as ML7285, ML7421, ML7425, ML7474 or ML7475.
- All models feature user-friendly set point knob.
- All models feature output status LEDs for installer check-out.
- Locking cover and range stops are standard.
- Night setback models feature selection of two different offset temperatures and use central time switch control.
- Night setback models feature 2 1/2 hour local timed override.
- Heat/cool models feature automatic changeover with 3° or 5°F (1.5°C or 3°C) selectable Zero Energy Band (Z.E.B.) to meet requirements of ASHRAE 90.1
- Heat/cool models have installer-definable setpoint at midpoint of Z.E.B, at heating setpoint, or at cooling setpoint.
- Reheat models feature fast/slow response selection to match heating system dynamics.
- Dipswitch selectable 75°F (24°C) limit for heating and cooling setpoint.
- Available in horizontal or vertical formats.

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## 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.

**MODELS:** T7984A,B,C, 2 to 10 Vdc analog output

Table 1 — Model Specifications

OS Family	Stage 1 (Cooling)	Stage 1 H/C C/O	Reheat Output	Night Setback	Sensor
T7984A	analog	optional	n/a	n/a	internal
T7984B	analog	optional	on/off	remote	internal
T7984C	analog	optional	analog	remote	remote or int.

### DIMENSIONS:

See Figure 1.

### MOUNTING:

Mounts to single-gang NEMA-standard 2"x 4" electrical box, or directly to wall requires 1 1/8" [35 mm] access hole for wiring.

### WIRING:

Four to eight 1/8" screw terminals suitable for 2 no. 18 AWG [1 mm<sup>2</sup>] wires each depending on model.

### POWER SUPPLY:

19–30 Vac, 50–60 Hz, 2 VA, Class 2. (Does not include actuator or reheat stage power requirements.)

### OPERATING AMBIENT:

32–104°F [0–40°C] at 5-95% Relative Humidity (non-condensing).

### ACCURACY: 1°F (0.4°C)

**PRECISION:** ±1°F (.5°C) temperature after stabilization.

### SETPOINT RANGE:

55–90°F [13–32°C], T7984A.

Heating: 55–75°F [13–24°C], T7984B, C\*.

Cooling: 75–90°F [24–32°C], T7984B, C\*.

\* The maximum heating setpoint and minimum cooling setpoint is electronically limited to 75°F.

### REMOTE SENSOR:

47 kΩ NTC thermistor [part nos. 272845 and 272847].

**ANALOG OUTPUT:** 2 to 10 Vdc, 2 mA max.

### SWITCHED OUTPUT RATING:

0.5 A running, 1.1 A inrush, 24 Vac, protected with self-resetting fuse.

### OPERATING PARAMETERS:

See Table 2 for installer selections.

### APPROVALS:

Designed for Class II low voltage installation only.  
Case and cover meets UL 94-5V flammability requirements, and North American codes for line voltage thermostat enclosures. Meets requirements of F.C.C. Part 15 Class B, IEC 801-3 for radio frequency interference.

### ACCESSORIES:

272845 – Remote sensor (wall mounted).

272846 – Adaptor plate for 2-gang NEMA, or British 75 mm electrical box.

272847 – Remote sensor (duct mounted).

Table 2 — Option Settings

Parameter	Selection	T7984 Model		
		A	B	C
Reheat Time Constant	Fast (7.5 min.); or Normal (15 min.)		•	
Zero Energy Band	3°F (1.5°C); or 5°F (3°C)		•	•
Setpoint Definition	Heating; Cooling or H/C midpoint		•	•
Night Setback	5°F (3°C) heat/cool offset, or 10°F (6°C) heat offset 20°F (11°C) cool offset		•	•
Main Sensor	Remote or internal			•

## ORDERING INFORMATION

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

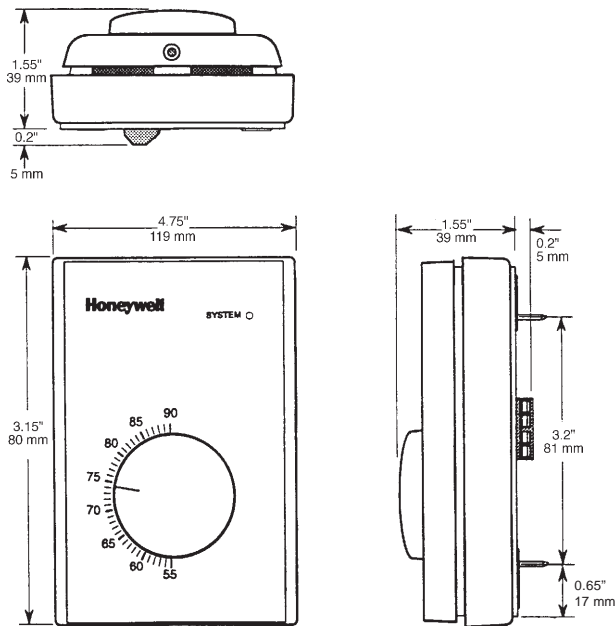
1. Order number.
2. Accessories, if desired.
3. Order additional system components and system accessories separately.

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

1. Your local Home and Building Control Sales Office (please check the white pages of your phone directory).
2. Home and Building Control Customer Satisfaction  
Honeywell, Inc., 1885 Douglas Drive North  
Minneapolis, Minnesota 55422-4386 (612) 951-1000

In Canada—Honeywell Limited/Honeywell Limitee, 155 Gordon Baker Rd., North York, ON M2H 3N7. 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 – Dimensions in inches (mm)



## INSTALLATION

### Location

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

Do not install thermostat where it may be affected by:

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

### Mounting

The thermostat can be mounted directly on the wall with or without a wallplate or a standard single gang electrical box, or double gang with adaptor plate (accessory part 272846).



## CAUTION

Disconnect power supply to prevent electrical shock or equipment damage.

### Wiring

- Typical wiring connections are shown in Fig.2 to Fig.7. Wiring connections may be made to the screw terminal block with 2-18AWG or 1-14AWG, solid or stranded copper wires. Connect the system wires to the thermostat terminals. Push excess wire back into hole. Plug hole to prevent drafts.
- Auxiliary screw terminal strip may be used in a junction box when the application requires multiple wires to be brought down at the thermostat. This can make troubleshooting, startup and servicing easier.

## DIP Switch Settings

T7984 thermostats must be configured for proper operation by setting DIP switches.

### T7984B

Reheat output control action: 7.5 or 15 minutes.

### T7984B, C

Zero energy band (ZEB): 3°F (2°C) or 5°F (3°C)

Setpoint adjustment: cooling, centred, heating centred with limit override for commissioning.

Night setback amount: see Table 2 for complete listing of option settings.

### T7984C

Main sensor, internal or remote.

Table 3 — T7984 DIP Switch Definition

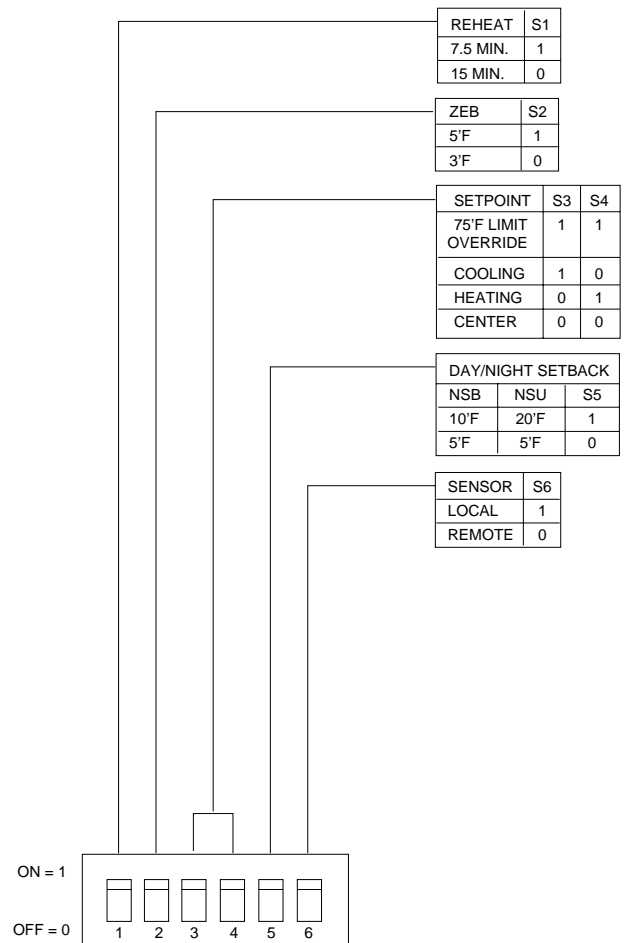
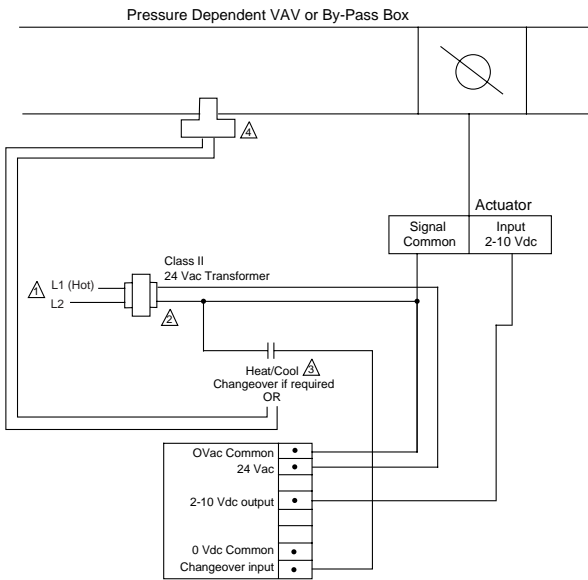
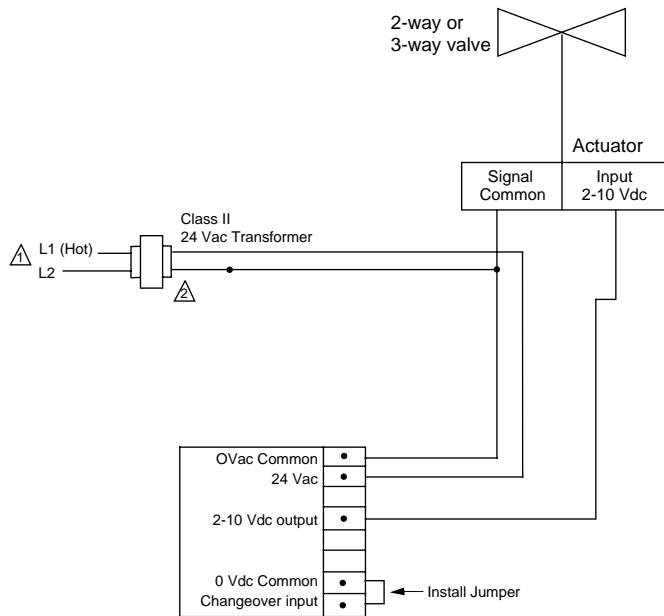


Figure 2: T7984A – Cooling only application, or Heating/Cooling with changeover



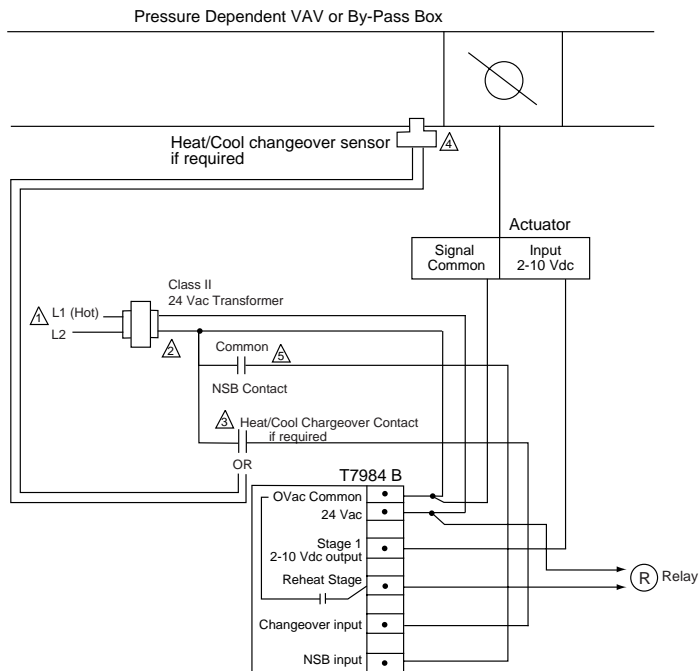
- ⚠ Provide disconnect means and overload protection as required.
- ⚠ Size transformer for thermostat and actuator  
i.e. 2VA [T7984] + 2.2VA [ML6161] = 5VA min.
- ⚠ Heat/Cool changeover contact: one contact can be used for all thermostats.
- ⚠ Heat/Cool changeover sensor: one sensor per thermostat.

Figure 3: T7984A – Heating only application



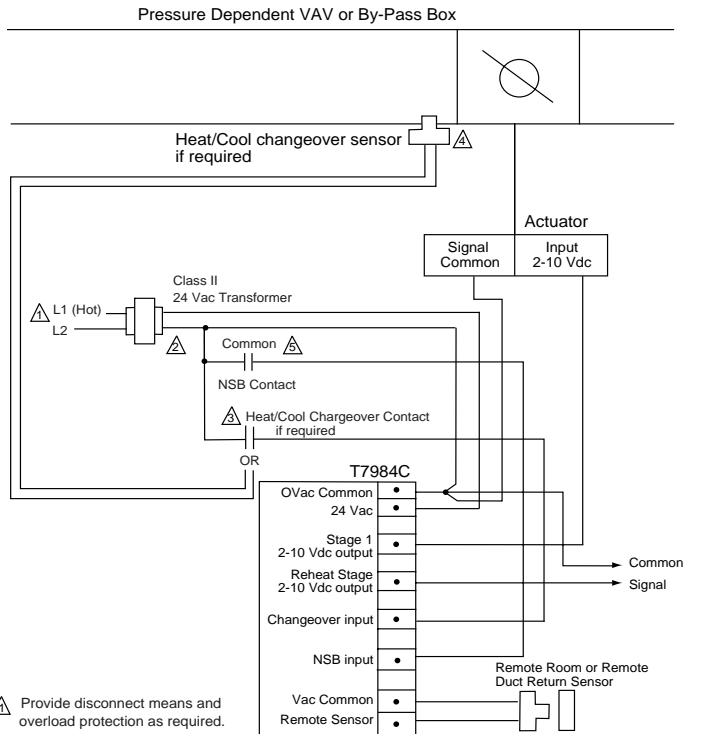
- ⚠ Provide disconnect means and overload protection as required.
- ⚠ Size transformer for thermostat and actuator  
i.e. 2VA [T7984] + 2.2VA [ML6161] = 5VA min.

Figure 4: T7984B Heating/Cooling with changeover and on/off terminal reheat



- ⚠ Provide disconnect means and overload protection as required.
- ⚠ Size transformer for thermostat, actuator and reheat device, i.e. 2VA [T7984] + 2.2VA [ML6161] = 5VA min.
- ⚠ Heat/Cool changeover contact: 1 contact can be used for all thermostats.
- ⚠ Heat/Cool changeover sensor: 1 sensor per thermostat.
- ⚠ NSB contact; 1 contact can be used for all thermostats.

Figure 5: T7984C Heating/cooling with changeover and analog terminal reheat



- ⚠ Provide disconnect means and overload protection as required.
  - ⚠ Size transformer for thermostat, actuator and reheat device, i.e. 2VA [T7984] + 2.2VA [ML6161] = 5VA min.
  - ⚠ Heat/Cool changeover contact: 1 contact can be used for all thermostats.
  - ⚠ Heat/Cool changeover sensor: 1 sensor per thermostat.
  - ⚠ NSB contact; 1 contact can be used for all thermostats.
- Not for duct supply applications.  
— If Remote Sensor is used, set DIP # 6 S6= 0

## 2 to 10 Vdc Analog Output (Stage 1)

T7984 thermostats feature one modulating 2 to 10 Vdc analog output for the control of analog damper actuators and valves. This output provides one PI modulating stage.

The internal green LED intensity is proportional to output (stage 1). Control action is illustrated and shown without integral error correction. Integral action improves T7984 accuracy.

This analog output is rated at 2 mA max.

Stage 1 normally provides cooling control.

## On Off Reheat Output (T7984 B only)

This model features an electronic triac output for the control of heating valves or relays.

For normal operation set the DIP switch (S1) to the OFF or "0" position. This corresponds to a 15 minute (fixed 4 cycles/hour) PI time proportioning output. For systems with excess heating capacities set the DIP switch (S1) to the ON or "1" position. This provides a faster 7.5 minute PI (fixed 8 cph) time proportioning output in order to reduce overshoots and improved control. Use these settings with forced air heating or hyronic systems without reset.

A red LED will indicate when the electronic triac is closed. The output is protected by a self-resetting PTC fuse rated at 0.5 A max., 1.1A inrush. In the event of an overload or short circuit condition it will reduce the current to the load to a very low level. If power is removed or the overload or short circuit disappears, then the PTC will return to its normal condition and allow full current to flow.

Model with a reheat feature has a setpoint limitation capability compatible with ASHRAE 90.1. Both heating and cooling setpoints are internally limited to 75 °F (24°C). The cooling setpoint cannot go below 75 °F while the heating setpoint cannot go above 75 °F. This setpoint limit can be overridden for system checkout by setting the DIP switches S3=1 and S4=1.

The DIP switches S3 and S4 select the position of the setpoint. The setpoint can be selected as either a cooling setpoint (S3=1 and S4=0), a heating setpoint. (S3=0 and S4=1) or centered (S3=0 and S4=0).

## 2 to 10 Vdc Analog Output (Model T7984C only)

This model features a 2 to 10 Vdc analog reheat output for modulating heating devices.

The internal red LED intensity is proportional to reheat output. This analog output is rated at 2 Ma max.

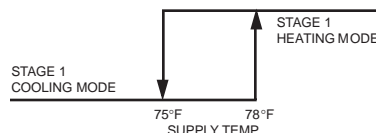
Models with reheat feature a setpoint limitation capability compatible with ASHRAE 90.1. Both heating and cooling setpoints are internally limited to 75 °F (24°C). The cooling setpoint cannot go below 75 °F while the heating setpoint cannot go above 75 °F. This setpoint limit can be overridden for system checkout by setting the DIP switches S3=1 and S4=1.

The DIP switches S3 and S4 select the position of the setpoint. The setpoint can be selected as either a cooling setpoint (S3=1 and S4=0), a heating setpoint. (S3=0 and S4=1) or centered (S3=0 and S4=0).

## Change-Over Models (T7984 A, B,C)

These thermostats feature an input for Stage 1 Heating/Cooling changeover. The changeover can be done two ways: One; An external contact closure reverses action of the 2 to 10 Vdc, Stage 1 output. A common contact may be used for many thermostat inputs, provided that the signal common is respected and there are no ground or power loops. The c/o contact is typically a dry contact from a mechanical thermostat or aquastat.

Two; A remote thermistor supply sensor can be used for each thermostat, one sensor per thermostat. When a supply sensor is used, changeover temperature trip point from cooling to heating is illustrated –



## Day-Night Control (Models T7984B, C)

The Day-Night Model features heating setback and cooling setup capability for increased energy conservation. Upon remote contact closure (ie. from a remote 24 Hr. clock timer), the heating setpoint is lowered and the cooling setpoint is raised.

The system LED is not available for Day-Night models. The setback and setup value can be selected by the setting of DIP switch S5.

Selecting S5 =1 will result in a 10 °F (6°C) heating setback and a 20 °F cooling setpoint setup.

Selecting S5 =0 will result in a 5 °F (3°C) heating setback and a 5 °F cooling setpoint setup.

A common contact may be used for many thermostat inputs, provided that the signal common is respected and there are no ground or power loops.

The System LED flashes to indicate the night or unoccupied mode is active. The night mode can be overridden by the push button switch on the thermostat pressing this once returns the control to the normal setpoint for 2.5 Hours.

### Remote Sensor Option (Model T7984C)

In some applications it may be necessary or desired to mount a remote sensor in another location. A remote wall or remote duct return sensor may be connected across proper screw terminals. If using a remote sensor, it is important to select S6=0.

If no remote sensor is needed, select S6=1; this will enable the internal sensor.

Important: The remote sensor is not for supply control applications.

Fig. 8 : T7984A Stage 1 can be:

Cooling Only  
Heating Only  
Heating/Cooling with changeover

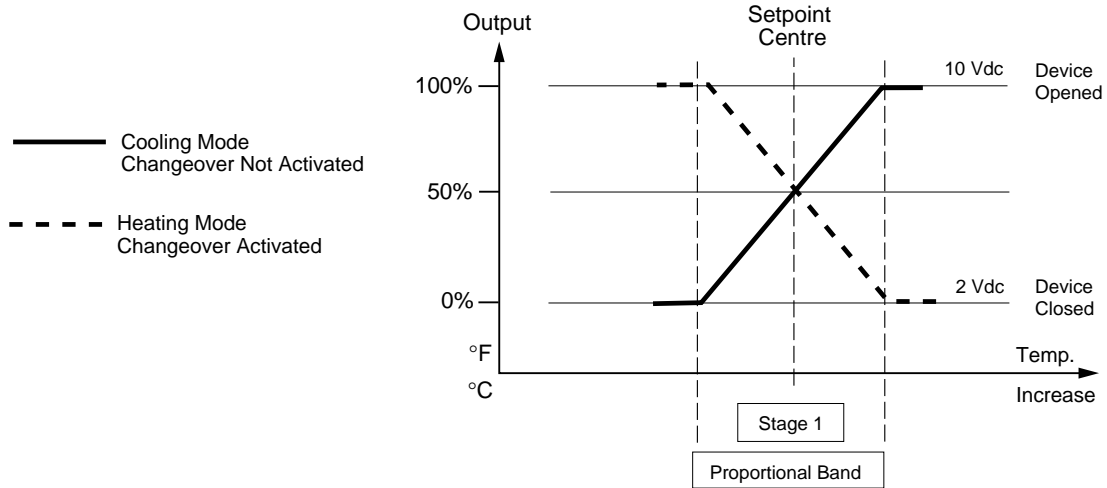


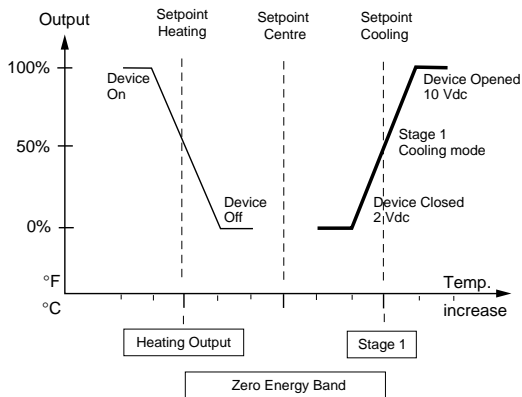
Fig. 9 : T7984B Stage 1 can be:

Cooling Only  
Heating Only  
Heating/Cooling with changeover

Reheat Output is:

On Off  
Heating Only

Changeover for Stage 1 (cooling mode) not activated



Changeover for Stage 1 activated

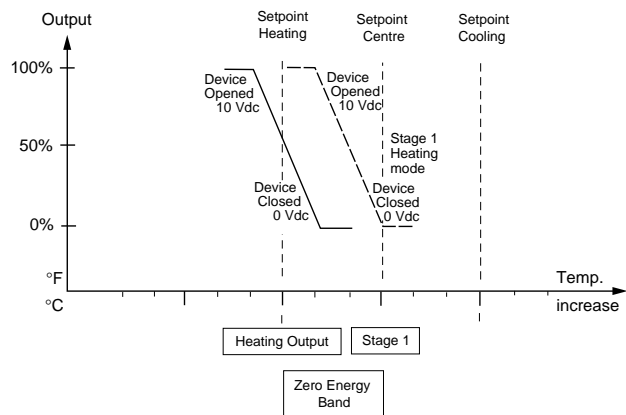


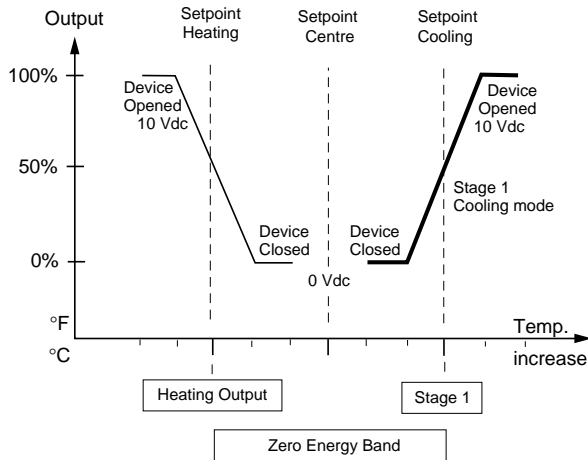
Fig. 10 : T7984B Stage 1 can be:

Cooling Only  
Heating/Cooling with changeover

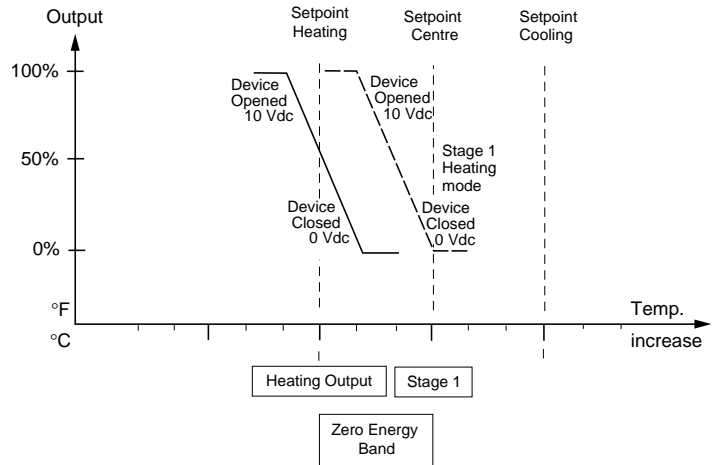
Reheat Output is:

Analog 2 to 10 Vdc  
Heating Only

Changeover for Stage 1 not activated



Changeover for Stage 1 activated



## Checkout

Table 4 — System Status LED

Thermostat operation can be confirmed with the System status LED on the thermostat cover.

Model	Color	Explanation
T7984A	green	High intensity = Demand for cool or heat. Low = No demand.
T7984B, C	red	Flashing = Night setback/ setup activated.

Table 5 — Internal Service LED's

A	B	C	Color	Indication when
*	*	*	green	Intensity is proportional to stage 1 output
	•		red	Reheat triac is closed (load energized)
		•	red	Intensity is proportional to reheat output

\* Motor/valve action reverses when heat/cool changeover input is active.

## Test Condition:

1. No contact changeover input or changeover sensor disconnected
2. T7984B,C: Set DIP switch S3 and S4 to "ON" position to remove 75°F limitation.
3. Room temperatures must be between 60-80°F

Table 6

Rotate Knob to:	Green	Red (reheat models only)
Minimum Position	ON	OFF
Maximum Position	OFF	ON

The NIGHT setback feature can be temporarily overridden for 2-1/2 hours by depressing the override button on the thermostat cover.

**Honeywell**

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