

T6984 A,B,C,D,E Electronic Floating Control Thermostats

PRODUCT DATA



FEATURES

- PI control action provides accurate, stable room temperature control.
- T6984 models are used with Series 60 direct-coupled damper actuators such as ML6161 or ML684 or with Series 60 valve actuators such as VC6930 or M6410.
- 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 selectable Zero Energy Band (Z.E.B.) to meet requirements of ASHRAE 90.1.
- Heat/cool models have installer-definable set point at midpoint of Z.E.B., at heating set point, or at cooling set point.
- DIP switch selectable 75°F (24°C) limit for heating and cooling setpoints.
- Reheat models feature fast/slow response selection to match heating system dynamics.
- T6984 features selectable motor timing from 20 seconds to 7 minutes.
- Available in horizontal or vertical formats.

APPLICATION

These microprocessor-based thermostats provide proportional-plus-integral individual room control in zoned commercial Heating, Ventilating, and Air Conditioning systems. Typical applications include hydronic perimeter (heating and/or cooling), pressure dependent variable air volume, or a bypass box with or without terminal reheat.

The T6984 family provides modulating (floating) control. Optional features include automatic heat/cool changeover, reheat control, remote night setback with local timed override, and remote sensor on VAV models.

Contents

Specifications	2
Ordering Information	2
Installation	3
Wiring Diagrams	4,5
Operation	6
Control Operation	7
Setting and Checkout	8

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: T6984A,B,C,D,E with timed floating output

Table 1 — Model Specifications

OS Family	Stage 1 (Cooling)	Stage 1 H/C C/O	Reheat Output	Night Setback	Sensor
T6984A	floating	n/a	n/a	n/a	internal
T6984B	floating	n/a	on/off	n/a	internal
T6984C	floating	optional	n/a	n/a	internal
T6984D	floating	optional	on/off	remote	internal
T6984E	floating	optional	n/a	n/a	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 mm²] wires each depending on model.

POWER SUPPLY:

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

OPERATING AMBIENT:

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

ACCURACY: 1°F (0.4°C)

PRECISION: ±0.5°F (0.4°C).

SETPOINT RANGE:

55–90°F [13–32°C] – T6984A, C, E

Heating: 55–75°F [13–24°C] – T6984B,D

Cooling: 75–90°F [24–32°C] – T6984B,D

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

REMOTE SENSOR:

47 kΩ NTC thermistor [part no. 272845]

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 wiring.

272847 – Remote sensor (duct mounted).

Table 2 — Option Settings

Parameter	Selection	T6984 Model				
		A	B	C	D	E
Motor Timing	20;30;60;90;120/150; 240 or 420	•	•	•	•	•
Night Setback	5°F (3°C) heat/cool offset, or 10°F (5°C) setback/cooling shutdown				•	
Zero Energy Band	3°F (1.5°C); or 5°F (3°C)		•		•	
Setpoint Definition	Heating; Cooling or H/C midpoint		•		•	
Reheat Time Constant	Fast (7.5 min.); or Normal (15 min.)		•		•	

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—

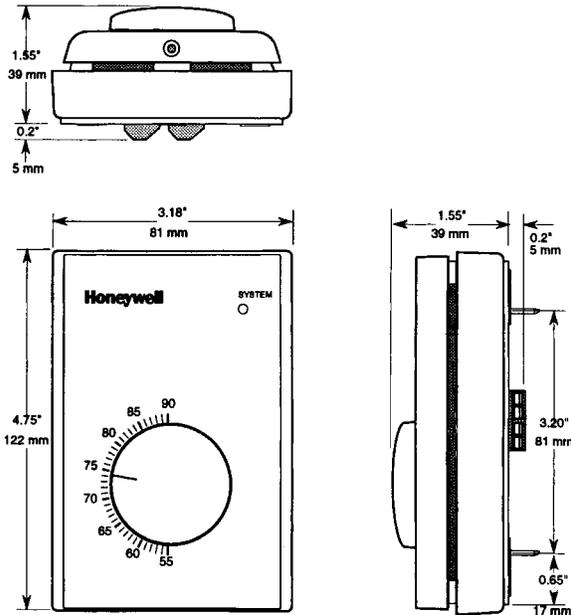
1. Order number.
2. Accessories, if desired.
3. Order additional system components and system accessories separately.

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)



CAUTION

Disconnect power supply to prevent electrical shock or equipment damage.

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.

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

T6984 thermostats must be configured for proper operation by setting DIP switches.

T6984A-E

Selectable motor timing: 20,30,60,90,120,150,240, 420 seconds.

T6984B,D

Reheat output control action: 7.5 or 15 minutes.

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

Setpoint adjustment: cooling,centred, heating centred with Limit Override for Commissioning

T6984D

Night setback amount: see Table 2 for complete listing of Option Settings.

Table 3 — T6984 DIP Switch Definition

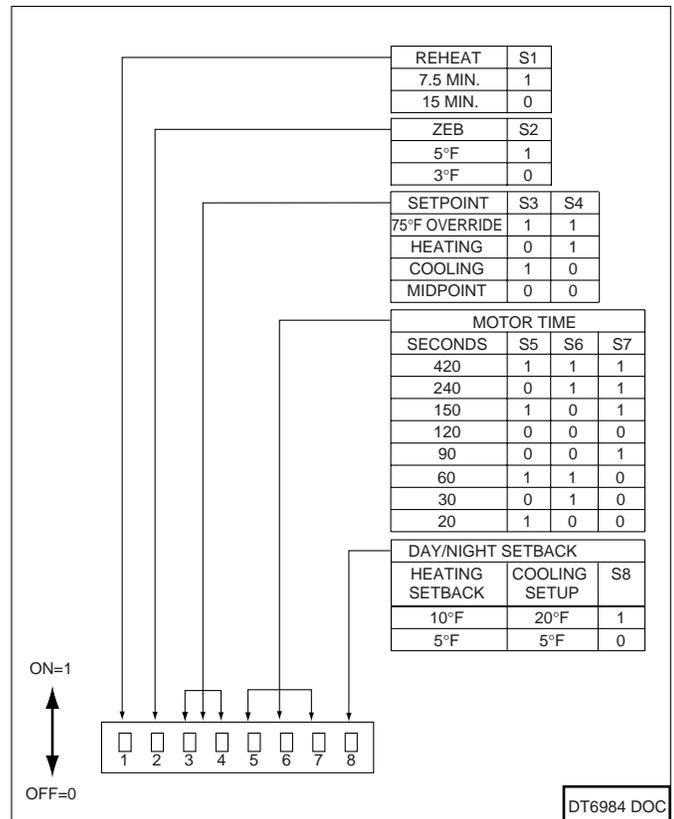
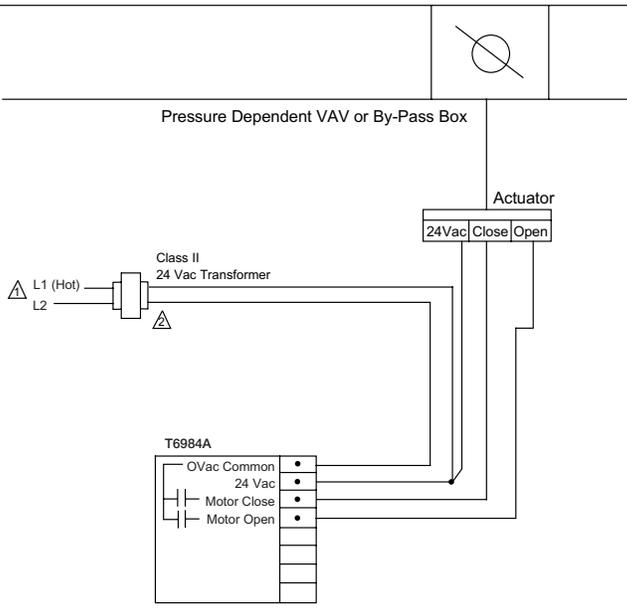
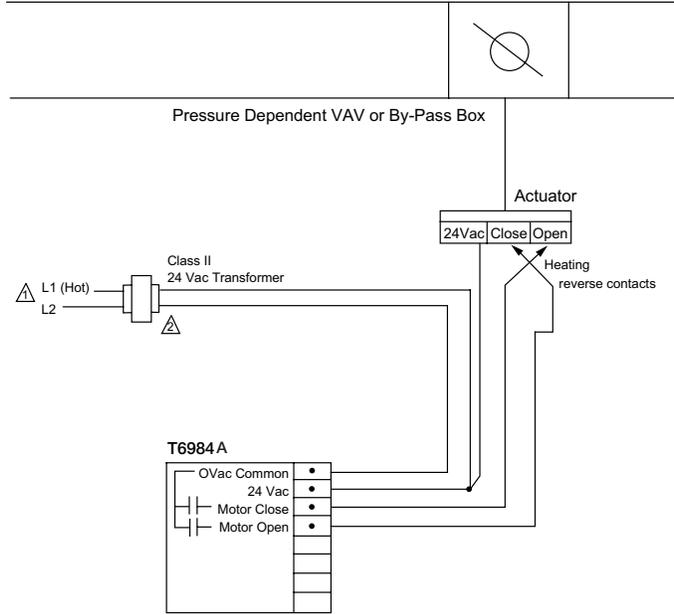


Figure 2: T6984A – Cooling only application



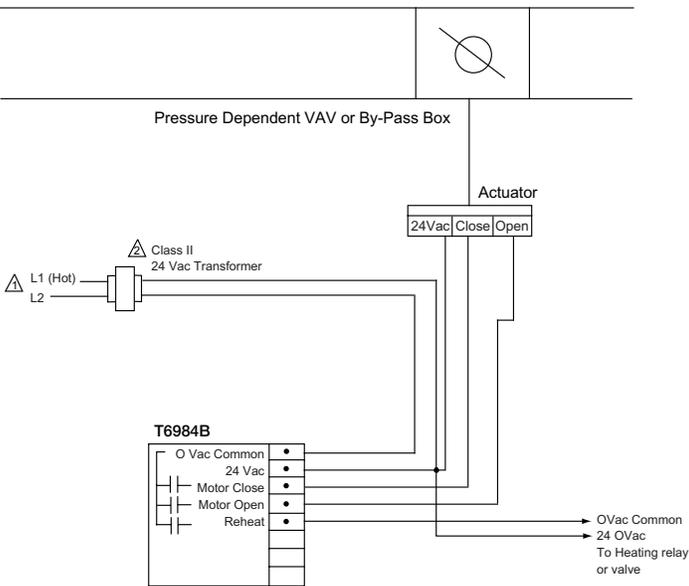
- ⚠ Provide disconnect means and overload protection as required.
- ⚠ Size transformer for thermostat and actuator
i.e. 2VA [T6984] + 2.2VA [ML6161] = 5VA min.

Figure 3: T6984A – Heating only application



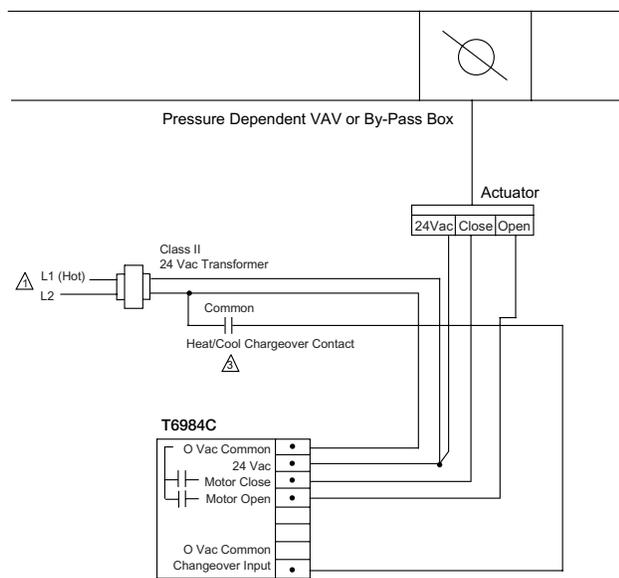
- ⚠ Provide disconnect means and overload protection as required.
- ⚠ Size transformer for thermostat and actuator
i.e. 2VA [T6984] + 2.2VA [ML6161] = 5VA min.

Figure 4: T6984B Cooling or heating with terminal reheat



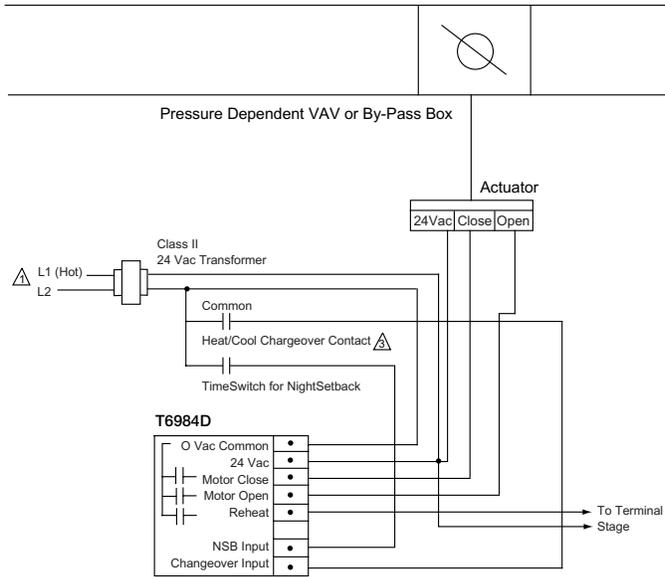
- ⚠ Provide disconnect means and overload protection as required.
- ⚠ Size transformer for thermostat and actuator
i.e. 2VA [T6984] + 2.2VA [ML6161] = 5VA min.

Figure 5: T6984C Heating/cooling with contact changeover



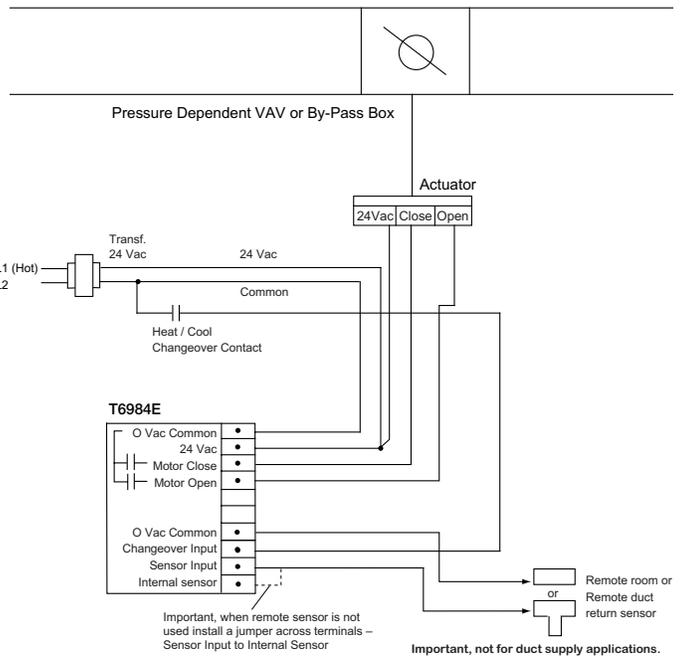
- ⚠ Provide disconnect means and overload protection as required.
- ⚠ Size transformer for thermostat and actuator
i.e. 2VA [T6984] + 2.2VA [ML6161] = 5VA min.
- ⚠ Contact closure reverses action of floating output.

Figure 6: T6984D with Remote contact changeover and terminal reheat



- ⚠ Provide disconnect means and overload protection as required.
- ⚠ Size transformer for thermostat and actuator
i.e. 2VA [T6984] + 2.2VA [ML6161] = 5VA min.
- ⚠ Contact closure reverses action of floating output.

Figure 7: T6984E with Remote Sensor



- ⚠ Provide disconnect means and overload protection as required.
- ⚠ Size transformer for thermostat and actuator
i.e. 2VA [T6984] + 2.2VA [ML6161] = 5VA min.
- ⚠ Contact closure reverses action of floating output.

Important, when remote sensor is not used install a jumper across terminals – Sensor Input to Internal Sensor

Important, not for duct supply applications.

Floating Output (Stage 1)

All T6984 thermostat features 2 paired electronic triac outputs for the control of floating damper actuators and valves. Together these triacs provide 1 PI floating stage.

For proper operation, the DIP switch (S5, S6 and S7) settings should correspond to the maximum running time of the end device used. If there is a small difference, chose a slower timing than the actuator. Temperature error, will be corrected by the PI action of the thermostat.

The green LED will indicate if the actuator is opened or opening.

The yellow LED will indicate if the actuator is closed or closing.

Control actions are illustrated without integral error correction. Integral action improves T6984 accuracy.

The triacs are protected by a self-resetting PTC fuse rated at 1.1A max. inrush, 0.5A running. In the event of an overload or short circuit condition fuse will reduce the current to the load to a very low level. If either of the outputs are shorted, both LEDs will come on to indicate the fault condition. Only one or the other output is on in normal conditions. If power is removed or the overload or short circuit disappears, then the PTC returns to its normal condition and allows normal operation.

Stage 1 normally provides cooling control. To reverse actuator operation simply reverse the open and close connections between the stat and actuator/valve.

Reheat Output (T6984 B and D)

The models feature 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 self-resetting PTC fuses rated at 1.1A max. inrush, 0.5A running. In the event of an overload or short circuit condition they 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 PTCs return to their normal condition and allow full current to flow.

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).

The zero energy band between heating and cooling required by ASHRAE 90.1 can be selected by DIP switch S2. Set S2 =0 for a 3°F ZEB or set S2=1 for a 5°F ZEB. Because T6984 has no droop or switching differential, 3°F ZEB is equivalent to 5°F ZEB required with electromechanical thermostats such as T874.

Change-Over Models (Models T6984 C,D,E)

These models feature an input for Stage 1 Heating/Cooling changeover. An external contact closure reverses action of the floating 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. A separate remote bulb may also be used in other applications.

Day-Night Control (Model T6984 D)

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 S8.

Selecting S8 =1 will result in a 10 °F heating setpoint setback and a 20 °F cooling setpoint setup.

Selecting S8 =0 will result in a 5 °F heating setpoint 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 remote timer contact should be connected between terminal 6 and 7.

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: (T6984E)

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 (see figure 7).

If no remote sensor is needed, install jumper across proper screw terminals (see figure 7); this will enable the internal sensor.

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

Fig. 8 : T6984A Cooling Only

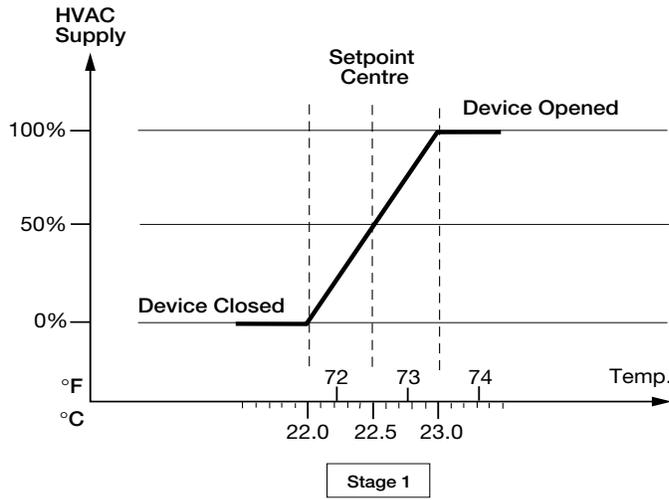


Fig. 9 : T6984B Heating/Cooling with Stage 1 and Reheat

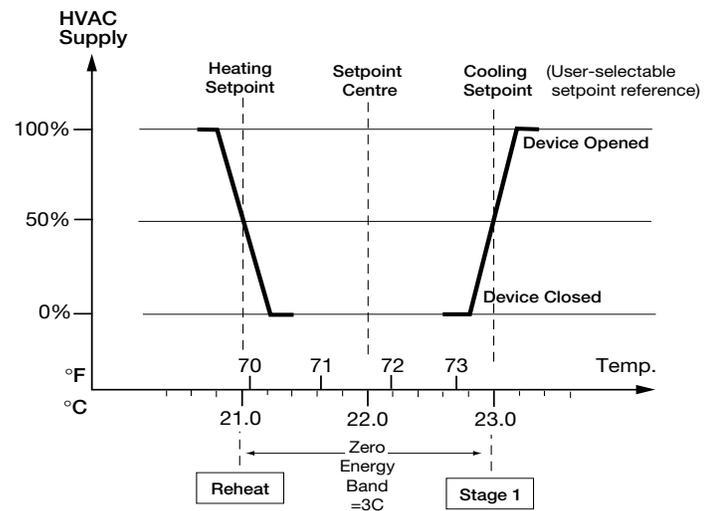


Fig. 10 : T6984C Heating Cooling with Auto Changeover contact

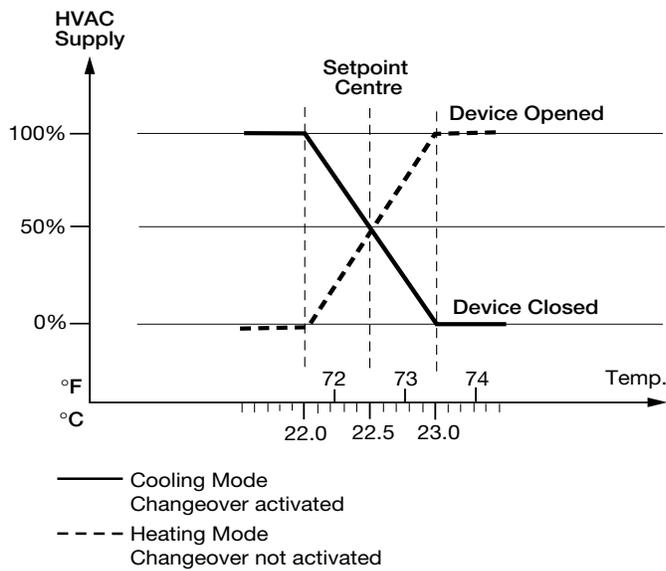
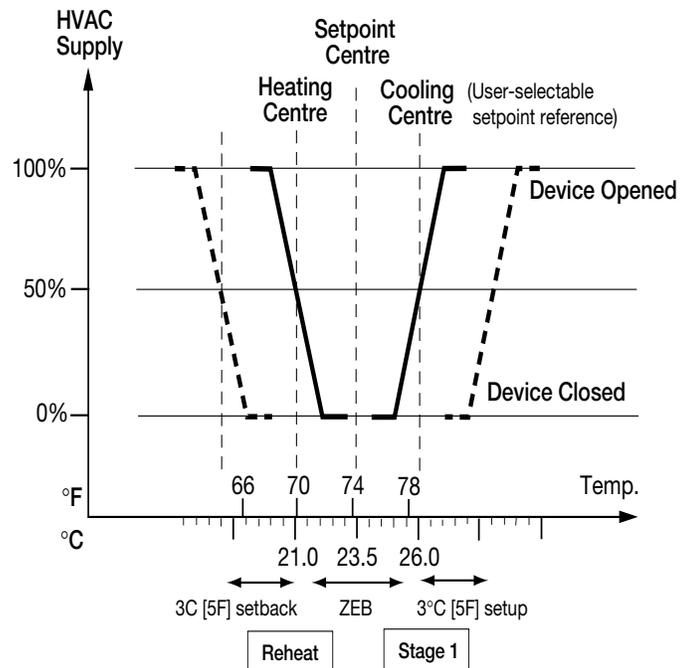


Fig. 11 : T6984D with Stage 1 and Reheat, Changeover Activated with Night Setback



Checkout

Table 4 — System Status LED's

Thermostat operation can be confirmed with the System and Service LEDs on the thermostat cover.

Model	Color	Explanation
T6984A	green	High intensity = Demand for cooling. Low = no demand.
T6984B	green	High intensity = Demand for cooling/heating. Low = no demand.
T6984C	green	High intensity = Demand for cooling (heating if changeover is activated). Low = no demand.
T6984D	red	Flashing = Night setback/set-up activated.
T6984E	green	High intensity = Demand for cooling (heating if changeover is activated). Low = no demand.

Table 5 — Internal Service LED's

A	B	C	D	E	Color	Indication when
•	•	*	*	*	green	Motor/valve is opening
*	*	*	*	*	yellow	Motor/valve is closing
	•		•		red	Reheat triac is closed (load energized)

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

Test Condition:

1. No contact changeover input
2. T6984B,D: 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	Yellow	Red (reheat models only)
Minimum Position	ON	OFF	OFF
Maximum Position	OFF	ON	ON

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

Power-up sequence:

When power is first applied to the thermostat, a 24V pulse equal to the motor travel time is applied to the actuator in order to bring it to the full closed position. This synchronizing sequence is required since the thermostat has no way of knowing the actuator position. Once the actuator is closed, the pulses to the actuator are synchronized with the motor position via the settings on the DIP switch. The thermostat then positions the actuator exactly, using timed voltage pulses. **The thermostat will not respond to setpoint demands until this reset sequence is complete.**

Caution: This will occur any time the power is restored; due to normal variations that occur among actuators or valves with the same time specification, the T6984 is not recommended for use with more than one actuator or valve at a time. Use T7984 with modulating 2 to 10 Vdc actuators if control of multiple units is required.

Honeywell

Home and Building Control

Honeywell Inc.
1985 Douglas Drive North
Golden Valley, MN
55422

Honeywell Limited
155 Gordon Baker Road
North York, ON
M2H 3N7

Helping You Control Your World