

## T7351 Programmable Commercial Thermostat FOR MULTISTAGE CONVENTIONAL AND HEAT PUMP SYSTEMS

### ENGINEERING GUIDE SPECIFICATION

#### GENERAL

- A. Overview:** The contractor shall furnish, install, and place in operating condition an HVAC control system described herein. All units shall be located in accordance with the plans.
- B. Type of System:**
- System Requirements:
- a. Control up to three heating and three cooling stages for gas heat, electric heat, heat pump or compressor cooling.
  - b. Permit 365-day programming with schedule copy.
  - c. Provide 365-day clock with automatic daylight savings changeover and up to 10 holidays.
  - d. Provide 48-hour clock backup.
  - e. Provide two occupied and two unoccupied periods per day.
  - f. Offer automatic heat/cool changeover with 2° F (1° C) minimum deadband.
  - g. Provide override capability for a 1 to 8 hour configurable period, with 3-hour default.
  - h. Include a comfort adjust feature to modify setpoints for the override duration.
  - i. Provide configurable Proportional plus Integral plus Derivative (P + I + D) temperature control.
  - j. Display room temperature in °F or °C.
  - k. Use multiple remote sensors (optional).
  - l. Use in conjunction with an economizer (optional).
  - m. Provide three levels of keypad lockout - none, overrides only and complete.
  - n. Provide occupancy input for Standby setpoint (optional).
  - o. Provide Temporary Not Occupied Override, 1-99 days.
  - p. Provide discharge high and low limits (with optional sensor).
  - q. Provide outdoor ambient lockout (with optional sensor).
  - r. Provide keypad method for saving and restoring both user and factory default settings.
  - s. Provide five methods for dehumidification (minimum ON time, reheat, reset temp setpoint, hot gas bypass and simple dehumidification).
  - t. Provide separate configurable recovery ramps for heating and cooling.
  - u. Provide sequential start after power failure.
  - v. Provide separate configurable cycle rates for heating and cooling response.
- System Components:
- a. Seven day (365 day optional) programmable thermostat with subbase.
  - b. Discharge air sensor (optional).
  - c. Wall mount temperature and integral or wall mount humidity sensors (optional).
  - d. Outdoor air sensor (optional).
  - e. Occupancy sensor (optional).
- C. Codes and Standards:** The system shall comply with applicable provisions of ASHRAE 90-75.
- These specifications are based on equipment from Honeywell to set a standard for design and quality.
- D. Wiring:** All wiring shall meet National Electrical Codes and local electrical codes.



**E. Testing Guarantee Service:**

Prior to installation, the contractor shall provide copies of submittals.

The contractor is responsible for assuring that conduit and wire quantity, size, and type are suitable for the equipment supplied.

Upon completion, the contractor shall conduct a total system test for the owner and engineer.

All components, parts, and assemblies supplied by the manufacturer shall be guaranteed against defects in materials and workmanship for 12 months.

Warranty service shall be performed by the contractor.

## SEQUENCE OF OPERATIONS

The heating and cooling setpoints shall be individually adjustable for both the occupied, unoccupied and standby periods. The thermostat shall have a minimum deadband of 2° F (1° C) (no mechanical heating or cooling shall operate within this deadband). Space temperature deviation above the cooling setpoint or below the heating setpoint shall generate a demand signal to control the system as follows:

**A. Heating:**

The thermostat shall control the heating output based on the demand signal communicated from the thermostat program, taking into account both space temperature deviation (proportional gain), the duration of that temperature deviation (integral gain), and the rate of change of the deviation (derivative gain).

The thermostat shall energize heating equipment when space temperature falls below heating setpoint.

**B. Cooling:**

The thermostat shall control the cooling output based on the demand signal communicated from the thermostat program, taking into account both space temperature deviation (proportional gain), the duration of that temperature deviation (integral gain), and the rate of change of the deviation (derivative gain).

The thermostat shall energize cooling equipment when space temperature exceeds cooling setpoint.

(Optional Remote Equipment) A solid state enthalpy changeover control shall determine the capability of the outdoor air to provide free cooling (optional). The system shall operate as follows:

- a. Free cooling available from Outdoor Air: On a call for cooling, the system shall enable the economizer to provide free cooling. If this does not meet the space demand, the system shall call for mechanical cooling to satisfy the programmed setpoint.
- b. Free Cooling Not Available From Outdoor Air: On a call for cooling, the system shall hold the economizer to minimum position and cooling shall be energized to satisfy the programmed setpoint.

**C. Economizer Interface:** The auxiliary relay contacts of the subbase shall be connected to the economizer's minimum position potentiometer or power circuit.

- a. Occupied Period: The auxiliary relay contact will close, allowing the economizer to operate normally and be available for free cooling if outdoor conditions permit.
- b. Unoccupied Periods: The auxiliary relay contact will open, defeating the economizer minimum position.

**D. Dehumidification:**

The thermostat shall provide five methods for dehumidification:

- a. Minimum On - Increasing the compressor minimum on time.
- b. Reset - lower the cooling setpoint.
- c. Reheat - cooling and simultaneous reheat.
- d. Auxiliary output - to external dehumidifier.
- e. Hot gas bypass - auxiliary output operates depending on humidity level and number of active cooling stages.

**E. Heating Setback and Cooling Setup:**

Initiation of heating setback or cooling setup for each of 7 or 365 days shall be provided by a programmed time schedule manually entered into the thermostat. When all or a portion of a manually programmed schedule is unavailable, the thermostat shall control to the default program as shown in Table 1.

**Table 1. Default Program.**

	Occupied	Unoccupied	Standby
Heating Setpoints	70° F (21° C)	55° F (13° C)	67° F (19° C)
Cooling Setpoints	78° F (26° C)	85° F (29° C)	78° F (26° C)

**F. Setpoint Recovery from Not Occupied to Occupied:**

The thermostat shall incorporate a ramping feature that gradually changes the space setpoints. During recovery operation, the setpoint changes at a rate in degrees per hour depending on the outdoor air temperature. If there is no outdoor air temperature sensor available, the minimum ramp rate is used.

**G. Fan Operation:**

Fan operation shall be selectable as follows:

- a. On: Fan operates continuously in occupied mode, and during standby modes, and during a call for heat or cool.
- b. Auto: Fan is energized with calls for heating and cooling.

**H. Minimum Stage Operation Time:**

- a. Minimum On: Heat - 1 minute; Cool - 3 minutes.
- b. Minimum Off: Cool & Heat Pump - 1 minute.

**I. Power Interruption:**

- a. On loss of power, the thermostat shall maintain programmed times and temperatures for 10 years.
- b. Clock and day information shall be retained for a minimum of 48 hours.

**J. Overrides:**

- a. The Temporary Occupied Override can be used when the thermostat is in Not Occupied or Standby mode. It shall switch to the Occupied mode for an installer-configured number of hours. The default shall be three hours.
- b. The Temporary Not Occupied Override shall fix the schedule to operate in Not Occupied mode for a number of days (between 1 and 99) without changing programming saved in memory.
- c. Pressing "Run Schedule" shall cancel the overrides and return to the program.

## THERMOSTAT MODELS AND FEATURES

**Table 2. T7351 Thermostat Features.**

Model	Applications	Maximum Stages <sup>a</sup>		Features	Auxiliary Relay
		Heat	Cool		
T7351	Conventional or Heat Pump	3 (2) <sup>b</sup>	3 (4) <sup>b</sup>	Humidity, Occupancy, Outdoor, Discharge Air Capability	Yes

<sup>a</sup> Model is down-selectable and can be configured to control fewer stages than the maximum allowed.

<sup>b</sup> Heat pump applications for these models have a maximum of two heat stages and two cool stages.

## OPTIONS

- A. Discharge Air Sensors:** C7041, C7031J1050 (Averaging), C7770A1006.
- B. Outdoor Air Sensors:** C7089A1002, C7170A1002.
- C. Temperature Sensors (Remote):** T7770A1006, T7770B1046, T7770C1044, T7770D1000, and T7771A1005 (any T7770 20K NTC).
- D. Economizer Logic Modules:** W6210, W6215, W7210, W7212, W7215, W7459.
- E. Humidity Sensors (Remote):** H7625, H7635, H7655.
- F. Other Accessories:** 209651A Vertical Mounting Hardware Wallplate Adapter (Trident white).  
50000452-001 Troubleshooting Cable.  
TG511, TG512 Universal Versaguard Thermostat guards.

### Automation and Control Solutions

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