Honeywell TC500A Programmable Commercial Thermostat

For Multistage Conventional and Heat Pump Systems

# General

1. **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.
2. **System Requirements:**
   1. Control up to 3H/3C for conventional gas or electric heat, and up to 5H/3C for heat pump applications
   2. Auxiliary heating type may be staged or modulating
   3. Modulating heat may be configured with programmable minimum threshold setting
   4. Fan speed options: single, two-speed, or variable speed (0-10VDC, modulating/auxiliary heat or staged heating/cooling with up to 6 speeds)
   5. Integral temperature and humidity sensor
   6. BACnet device capable of IP over Wi-Fi and MS/TP via wired networking
   7. Remote thermostat cloud-based connectivity via Wi-Fi connection and mobile app to monitor temperature, change set-points, or manage scheduling for up to 20 thermostats
   8. Daily schedule copy feature to multiple days of week
   9. 365-day schedule with up to 20 holidays/special events
   10. BACnet system scheduling and holiday configuration
   11. Real-time Clock with 72-hour retention during power loss
   12. Up to four occupied or standby periods per day
   13. Automatic heat/cool changeover with 2°F (1°C) minimum dead band
   14. Unoccupied override for a 0 to 18-hour configurable period, with 3-hour default
   15. Temporary override setpoint adjustment of up to +/-30°F (+/-16.5°C)
   16. Pre-occupancy purge using standby mode to enable economizer and provide suitable ventilation
   17. Configurable heating and cooling parameters including minimum operating cycle time. throttling range, and cycles per hour
   18. Configurable recovery ramps for heating and cooling
   19. Discharge air temperature cooling/heating lockout (optional sensor)
   20. Outdoor air temperature cooling/heating lockout (optional sensor)
   21. Display or control room temperature in °F or °C
   22. Integration with multiple remote temperature sensors (2-wire bus or analog) with configurable weighted averaging (optional)
   23. Packaged economizer integration output economizer
   24. Provide four levels of user management – installer, admin, basic user, and visitor
   25. Remote occupancy sensor input for Standby mode
   26. Thermostat reset option to restore factory default settings
   27. On/Off humidification function
   28. On/Off and reheat dehumidification functions
   29. Power-up delay after power failure (0- 300 seconds)
   30. 20-30 Vac operational voltage range
   31. Auto sleep display to reduce energy consumption without user interaction after time-out
   32. Display activates via near proximity sensor or screen touch detection
   33. Edge to edge glass display for easy cleaning
   34. 4” Diagonal capacitive color touch screen LCD display (480x480 pixel)
   35. Three color LED indicator to show the operational status (heat, cool, fan, and active - pulsing) when display enters sleep mode
   36. Service mode to manually command the outputs to test the operation of mechanical equipment
   37. System status screen showing device information, live status, and sensor readings
3. **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.
4. **Wiring:** All wiring shall meet National Electrical Codes and local electrical codes.
5. **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 of thermostat installation, the contractor shall conduct a total system test for the owner and engineer.   
   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:

1. **Heating:** The thermostat shall control the heating output based on 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.
2. **Cooling:** The thermostat shall control the cooling output based on 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.
3. **Economizer Interface:** When configured enables economizer via digital output (relay contact) whenever the thermostat is in occupied status (Occupied or Standby Mode)
4. **Heating Setback and Cooling Setup:** Initiation of heating setback or cooling setup for each of 7 days or holidays, special events shall be provided by a programmed time schedule entered into the thermostat, mobile app, and/or building automation system.
5. **Setpoint Recovery from Unoccupied to Occupied:** The thermostat shall incorporate a programmable ramping feature for both heating and cooling that gradually changes the space setpoints with settings for both min. and max. setpoint recovery in degrees per hour. During recovery operation, the setpoint changes at a rate in degrees per hour
6. **Fan Operation:** Fan operation shall be selectable as follows:
   1. Continuous: Fan operates continuously in occupied mode, and during standby modes, and during a call for heating or cooling.
   2. Auto: Fan is energized with calls for heating and cooling.
7. **Minimum Stage Operation Time:** Adjustable for Heating or Cooling:
   1. Minimum On: 0 – 5 minutes
   2. Minimum Off: 0 – 5 minutes
8. **Power Interruption:** 
   1. On loss of power, the thermostat shall maintain programmed times and temperatures indefinitely
   2. Clock and day information shall be retained for a minimum of 72 hours.
9. **Temporary Override:** 
   1. Temporary Override may be used when the thermostat is in Unoccupied or Standby mode. It shall switch to the Occupied mode for an installer-configured number of hours. The default shall be three hours.
   2. Selecting Temporary Override shall cancel the overrides and return to the programmed schedule

# Features and Specifications

## TC500A Thermostat Features

1. Color Touch Screen Interface— Three main informational screens
   1. Home Screen: operational status, current temperature, occupancy, humidity, WiFi, alerts and setpoint
   2. Outdoor/Indoor Conditions: temperature, humidity, CO2 (optional)
   3. Settings Menu: scheduling, Override, setpoints, configuration, alarms, backlight brightness, contractor info., °F/°C
2. Wired or Wireless Control—WiFi + Mobile App, BACnet IP, BACnet MS/TP
3. Flexible Installation—RTU/AHU – up to 3H/3C (conventional) 5H/3C (heat pump), 8 digital outputs, (2) UI’s, (2) UIO’s, RS485, 2-wire bus
4. User Mobile App—Remote Setpoint, schedule, current operating modes, and alerts
5. Contractor Mobile App—Localized commissioning via Bluetooth connection for full configuration of thermostat plus cloning of multiple thermostats based on saved configuration
6. Multi-Level user types—Visitor, Basic, Admin, Installer
7. Scalable control—Upgradable to provide advanced energy savings analytics for multi-site
8. 365-day schedule with up to 20 holidays/special events
9. Configurable fan speeds
10. Humidification and Dehumidification functions
11. Remote Sensor support: Temperature & Averaging, Outdoor Temperature, Discharge Air, Humidity, Occupancy, CO2
12. Sylk sensor support
13. Tamper-proof housing
14. Auto-changeover
15. Configurable alarms
16. 5-year warranty

## Power Characteristics

1. Power Supply Rated voltage: 24VAC 50/60Hz,
2. Working voltage range: 20-30VAC, UL listed class-2 transformer or IEC 61558 listed transformer.
3. Power Consumption (Display ON) Max. 8.5VA @ 24VAC (355mA @ 24VAC)
4. Min. Load 4VA (all Digital Outputs OFF, No Sylk sensor)
5. Max. Load 96VA (all Digital Outputs ON)

## Electrical Characteristics

1. Rated Impulse Voltage: 500 V
2. Construction of Control: Independently Mounted Control
3. Operation Method: Type 1 Action
4. Pollution Degree: 2
5. Purpose of Control: Operating Control

## Display

1. Display Type 24 BPP TFT display with CTP
2. Resolutions 480x480 pixel
3. Active Display Area 4” diagonally
4. Backlight LCD (Dimmable)

## Operating Environment

1. Ambient Operating Temperature 32 to 122 °F (0 to +50°C)
2. Ambient Operating Humidity 10 to 90% relative humidity (noncondensing)
3. Storage Temperature -40 to 150 °F (-40 to 65.5°C)
4. Protection Class IP20

## I/O Characteristics

|  |  |
| --- | --- |
| UIO x 2 | * Resistive Temperature Sensor Input   + 10K NTC type II, C7021 series   + 20K NTC, TR21 and C7041 series. * Temperature Accuracy   + ±0.5°C (±1°F) at 10 – 32°C (50 – 90°F)   + ±1.1°C (±2°F) at -1.1 – 50°C (30 – 122°F) * Voltage Input, SELV   + 0-10V, ±5% of full scale * Digital Input   + Dry contact closure   + Open circuit (≥ 100 kOhms)   + Closed circuit (≤100 Ohms) * Voltage Output * 0-10V, ±3% of full scale @2K ohms |
| UI x 2 | * Resistive Temperature Sensor Input   + 10K NTC type II, C7021 series   + 20K NTC, TR21 and C7041 series * Temperature Accuracy   + ±0.5°C (±1°F) at 10 – 32°C (50 – 90°F)   + ±1.1°C (±2°F) at -1.1 – 50°C (30 – 122°F) * Voltage Input, SELV   + 0-10V, ±5% of full scale * Digital Input   + Dry contact closure   + Open circuit (≥ 100 kOhms)   + Closed circuit (≤100 Ohms) |
| DO (G, Y1,Y2,Y3,W1,W2,W3) | * Relay Output   + 1 Amps Max. at 24VAC |
| DO (AUX) | * Relay Dry Contact   + 1 Amps Max. at 24VAC/DC |

## Supported Sensors and Devices

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| --- | --- | --- |
| **Sensors** | **Options** | **Part Numbers** |
| Occupancy Sensor | Direct (Normally Open)  Reverse (Normally Closed) | Dry contact occupancy sensor |
| Dirty Filter Sensor | Direct (Normally Open)  Reverse (Normally Closed) | DPS200, DPS400, DPS1000  (Dry contact differential pressure switch) |
| Proof of Air Flow Sensor | Direct (Normally Open)  Reverse (Normally Closed) | DPS200, DPS400, DPS1000  (Dry contact airflow switch) |
| Shutdown Sensor | Direct (Normally Open)  Reverse (Normally Closed) | Dry contact shutdown switch |
| Mixed Air Temperature Sensor | NTC 20K  NTC 10K, Type II  Sylk | C7250A, C7041 series  C7021 series  C7400S |
| Outdoor Air Sensor | NTC 20K  NTC 10K, Type II  Sylk | C7250A, C7041 series  C7021 series  C7400S (Temperature and Humidity) |
| Discharge Air Sensor | NTC 10K, Type II  NTC 20K  Sylk | C7021 series  C7041 series  C7400S (Temperature and Humidity) |
| CO2 sensor (analog) | 0-10 VDC  Sylk | C7232  TR40-CO2 |
| Proof of waterflow | Digital Input | Dry contact waterflow switch |
| Space Temperature Sensors | NTC 20K  Sylk | TR21, TR21-A (Averaging)  TR40 (max 4), TR75/TR120 (max 1) |
| Fan or Compressor Current Switch | Direct (Normally Open)  Reverse (Normally Closed) | Coming 2022 |

## Communication Technologies and Standards

|  |  |
| --- | --- |
| BACnet IP | Over Wi-Fi |
| Wi-Fi | 802.11 b/g/n  Supported security levels  OPEN, WPA, WPA2-AES, WPA2-TKIP, WPA3 |
| Bluetooth | BLE 4.2 with 1 Mbps  Classic Bluetooth with max. 3 Mbps |
| SylkTM | Honeywell SylkTM |

## Certifications and Standards

* CE
* FCC Title 47 part 15 subpart B, Title 47 part 15 subpart C
* ICES-003
* UL/cUL- UL60730-1, UL60730-2-9
* RoHs
* REACH
* California Title 24 (Coming Soon)
* California Prop 65
* EN 60730-1, EN 60730-2-9, EN 301489-1, EN 301489-17, EN 300328, EN 301893, EN 62479
* RSS 210