# Wireless Thermostat (WTS10)

## Installation Instructions

The Daintree Networks Wireless Thermostat (WTS10) operates seamlessly within the ControlScope® wireless building control platform. The WTS10 is a low voltage wireless commercial programmable thermostat that can connect to any single or multi-stage conventional or heat pump HVAC system. As part of the ControlScope system and using industry standard ZigBee® wireless communications, the WTS10 can be managed and programmed from any location using the ControlScope Manager (CSM) web application, eliminating the need for on-site, manual thermostat adjustment.

## Installation Process

If this is a new thermostat installation, locate the thermostat 4 to 5 feet above the floor in accordance with applicable building codes. Install in a location that provides good airflow characteristics and avoid areas behind doors, near corners, air vents, direct sunlight, or heat generating devices. Installation in these areas could impact thermostat performance. Wiring must conform to all building codes and ordinances as required by local and national code authorities having jurisdiction for this installation.

**1.** Always turn off power to the air conditioning and/or heating system prior to installing thermostat.

**2.** Determine the HVAC equipment type. **Note to Installer:** Circle the type of equipment and giive this information to the commissioning agent:

- A. 1 Stage Heat / 1 Stage Cool Conventional System
- B. 2 Stage Heat / 2 Stage Cool Conventional System
- C. 3 Stage Heat / 2 Stage Cool Conventional System
- D. 1 Stage Heat / 1 Stage Cool Heat Pump System (without Auxiliary Heating)
- E. 2 Stage Heat / 1 Stage Cool Heat Pump System (with Auxiliary Heating)
- F. 2 Stage Heat / 2 Stage Cool Heat Pump System (without Auxiliary Heating)
- G. 3 Stage Heat / 2 Stage Cool Heat Pump System (with Auxiliary Heating)

**3.** Refer to the Wiring: Thermostat Terminals section to determine the number of wires necessary to install this thermostat with your system.

- A common connection between the HVAC unit and the thermostat "C" terminal is required.
- When replacing an existing thermostat, and before disconnecting any wires, mark each wire connected to the existing thermostat with the terminal letter to which it is connected.
- Make sure the disconnected wires do not slip back through the wall opening; anchor them outside the wall opening.

**4.** Ensure that power to the air conditioning and heating systems is turned off.

**5.** Mount the WTS10 thermostat.

- A. Remove the thermostat front body from the base.
- B. Guide thermostat wires through the center opening in the base. Anchor them so they do not slip back into the wall.
- C. Hold the thermostat base against the wall in the desired thermostat location.
- D. Mark placement of mounting holes as appropriate.
- E. Remove thermostat base from the wall. Install wall anchors as required at the mounting hole locations.
- F. Re-insert the wires through the center opening on the base. Anchor them so they do not slip back into the wall.
- G. Fasten the base to the wall using the supplied #6 screws into the wall anchors.

**6.** Refer to Wiring: Thermostat Terminals and wire the terminals on the thermostat base to the attached HVAC equipment.

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## Installation Process continued

**7.** On the thermostat body, locate switch SW1 on the circuit board as shown below. This is used to set the thermostat for operation with the HVAC system.

SW1: Set System Type - Example shows
Switch #1: Off (G/O) - Gas
Switch #2: On (STD) - Conventional

**Front Body Terminal Pins:** Align with terminal block on base   **Reset Pin**

**8.** Set switches as appropriate for your system:

| System Type | Source | Switch #1 | Switch #2 |
|---|---|---|---|
| Conventional | Electric | E/B (on, up) | STD (on, up) |
| | Gas | G/O (off, down) | |
| Heat Pump | Heat Changeover Valve | E/B (on, up) | HP (off, down) |
| | Cool Changeover Valve | G/O (off, down) | |

**9.** Attach the thermostat front body to the base, being careful to align the terminal pins on the front body with the terminal block on the base.

**10.** Restore system power.

**11.** Test the thermostat according to the procedure in the Test section for the connected HVAC system.

**12.** Set the time and date on the thermostat. See the **"Keypad Operation Guide."**

**13.** Review the default program schedules in the **"Keypad Operation Guide"** and adjust as necessary.

**14.** When you are ready to commission the ControlScope wireless network, see Joining the ZigBee Wireless Network.

## Wiring: Thermostat Terminals

To prevent electrical shorts and potential damage to the thermostat, ensure all of the base wire connections are secure and are not touching any other terminal. Push any excess wire back into the wall cavity and insulate the wire opening with suitable material.

*Insert Wires here.*

| Terminal | Conventional Heat Cool System | Heat Pump System |
|---|---|---|
| L | HVAC system monitor | HVAC system monitor |
| C | 24VAC common for control circuit and WTS10 power input * | |
| G | Fan | Fan |
| Y | 1st stage cooling | 1st stage compressor |
| Y2 | 2nd stage cooling | 2nd stage compressor |
| W | 1st stage heating | Auxiliary heating |
| W2/E | 2nd stage heating | Emergency heating |
| W3/O/B | 3rd stage heating | Changeover valve |
| RH | 24VAC Power supply for Heating side | |
| RC | 24VAC Power supply for Cooling side | |

*Insert Front Body terminal pins here.*

Do not remove RC-to-RH jumper unless you have separate power supply wires for Heating and Cooling.

**\* A common connection between the HVAC unit and the "C" terminal is required.**

**Orange**
off = normal operation

**Multicolor**
off: normal operation while joined to network
Red: Not joined
Green flashing: Network join scan in progress
Green for 3 seconds: Join successful
Amber: HVAC Warning ("L" terminal active, HVAC system trouble)
Amber flashing: CSM "identify" response

MON May 16     11:23a
HEAT
FAN AUTO
67 °F 68
MENU

**UP**
**Override Set Point**
**DOWN**

**RESET PINHOLE**   **LEFT**   **MIDDLE**   **—  +**   **RIGHT**

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## Testing

### WARNING! Read BEFORE Testing

- Do not short across terminals on the gas valve or at the heating or cooling system control board to test the thermostat installation. This could damage the thermostat and void the warranty.
- Do not select COOL mode if the outside temperature is below 50° F (10° C). This could damage the controlled cooling system and cause personal injury.
- Ensure the power supply is correct and the display is reading current room temperature.

### Test for Conventional System

**1.** Press and hold down the (LEFT) button, then momentarily press Reset pinhole. The screen will go blank. When you see INSTALLATION MODE release (LEFT) button. All the outputs are turned off.

**2.** "HVAC: ELEC Heat/Cool" indicates SW1 is set for Electric Conventional System. "HVAC: GAS Heat/Cool" indicates SW1 is set for Gas Conventional System. If the display is incorrect, please review the SW1 switch positions.

**3.** "FAN" is highlighted. Press the **+** button to toggle the FAN output (ON/OFF). After testing the FAN output, it is best to keep the FAN output ON to test other outputs.

**4.** Press the ▼ (DOWN) button to highlight COOL: "Stage1". Press the **+** button to toggle the COOL stage 1 output (ON/OFF).

**5.** Press the ▼ (DOWN) button to highlight "Stage 2". Press **+** button to toggle the COOL stage 2 output (ON/OFF).

**6.** Press the ▼ (DOWN) button to go to the HEAT test. All cool outputs are turned off; the fan output will be turned off for a GAS System, and the fan output will keep current status for an Electric System.

**7.** HEAT: "Stage1" is highlighted, press the **+** button to toggle the HEAT stage 1 output (ON/OFF).

**8.** Press the ▼ (DOWN) button to highlight "Stage2". Press the **+** button to toggle the HEAT stage 2 output (ON/OFF).

**9.** Press the ▼ (DOWN) button to highlight "Stage3". Press the **+** button to toggle the HEAT stage 3 output (ON/OFF).

**10.** Press the Reset pinhole to stop the INSTALLATION MODE.

### Test for Heat Pump Systems

**1.** Hold the (LEFT) button, then momentarily press Reset pinhole. The screen will go blank. When you see INSTALLATION MODE release the (LEFT) button. All the outputs are turned off.

**2.** "HVAC: Heat Pump <O>" indicates SW1 is set for cool changeover valve O. "HVAC: Heat Pump <B>" indicates SW1 is set for heat changeover valve B. If the display is incorrect, please review the SW1 switch positions.

**3.** The setting for "STAGE" is highlighted. Press the **+** button to scroll through the selections: "1H1C or 2H/1C" and "2H2C or 3H2C." When the desired STAGE selection is highlighted, press the ▼ (DOWN) button to enter your selection and advance to the FAN selection.

**4.** Press the **+** button to toggle the FAN output (ON/OFF). Keep the FAN output ON while testing the other outputs.

**5.** Press the ▼ (DOWN) button to highlight the setting for "COOL: Stage1". Press the **+** button to toggle the COOL stage 1 output (ON/OFF). For a 2-Stage cooling system, press the ▼ (DOWN) button to highlight "Stage2". Press the **+** button to toggle the COOL stage 2 output (ON/OFF).

**6.** Press the ▼ (DOWN) button to go to the HEAT test. All cool outputs will be turned off, and the fan output will keep it's current status. HEAT: "Stage1" is highlighted. Press the **+** button to toggle the HEAT stage 1 output (ON/OFF). **For a 2 or 3-Stage heat system**, press the ▼ (DOWN) button to highlight "Stage2". Press the **+** button to toggle the HEAT stage 2 output (ON/OFF). **For a 3-Stage heat system**, press the ▼ (DOWN) button to highlight "AUX". Press the **+** button to toggle the Auxiliary Heating output (ON/OFF). Press the ▼ (DOWN) button to highlight the "EMER" setting. Press the **+** button to toggle the EMERGENCY output (ON/OFF).

**7.** Press the Reset pinhole to stop the INSTALLATION MODE.

# Wireless Thermostat (WTS10)

## LED Operation

The WTS10 has two LEDs above the display. Upon power-up the LEDs cycle on and off briefly as the thermostat goes through its start-up routine. After the start-up routine is complete, the LEDs operate as described in the tables below.

| Left (orange) LED | Description |
|---|---|
| Not Lit | Normal operation. |
| Orange, flashing | Bootloader reprogramming MCU after OTA firmware update performed successfully. |

| Right (multicolor) LED | Description |
|---|---|
| Not Lit | Normal operation while joined to ZigBee network. |
| Red, solid | Thermostat has not joined a ZigBee network. |
| Green, flashing | Thermostat is scanning for a network to join. |
| Green, solid for 3 seconds | Thermostat has joined a ZigBee network. |
| Amber, solid | HVAC system warning: 24VAC is detected at thermostat's L terminal. |
| Amber, flashing | Thermostat is responding to an "Identify" command from CSM. |

## Joining the ZigBee Wireless Network

After successfully completing the Installation Test the WTS10 is ready to communicate with the Daintree Wireless Area Controller (WAC) and be commissioned and configured using the ControlScope Manager (CSM) web-based application. The thermostat automatically tries to join the WAC network every 5 minutes. The WAC must be commissioned and Add New Devices must be initiated on the WAC before the thermostat can join the ZigBee wireless network.

**For information about configuring the thermostat using CSM, see the on-line help.**

Once the thermostat is joined, it ignores its built in schedules. The WAC passes configuration information like setpoint, heat/cooling mode, lock levels etc. at the start of each CSM schedule.

If the thermostat loses communication with the WAC the following things will happen: (1)    Thermostat continues to use the existing configuration set by the WAC. (2) Keypad automatically unlocks after 30 minutes to allow manual changes. (3) If remote temperature sensor(s) are enabled, and the thermostat does not receive a remote temperature report within 15 minutes, it will switch to its built-in temperature sensor.

## Specifications

| Power Supply | 24VAC, 50Hz |
|---|---|
| Output | 3A max, 1A each terminal |
| Operating Environment | 32°F to 113°F (0°C – 45°C).  Indoor use only |
| Compliance | ETL listed, FCC ID: D12CT-EM2606, IC ID: 1700A-CT-EM2606 |
| Radio Properties | 2405 ~ 2475MHz<br>Transmit Power max 10dbm |
| Temperature Measurement | Fahrenheit or Celsius<br>Display range: 14°F – 99°F (5°C – 37°C)<br>Display resolution: 1°F (1°C)<br>Setting range: 45°F – 90°F (7.0°C – 32.0°C)<br>Setting resolution: 1°F (0.5°C)<br>Accuracy: +/- 1°F @ 75°F |
| Control | Switching differential 1st stage: User selectable<br>• 0.5°F (default), 1.0°F, 2.0°F (0.25°C, 0.5°C, 1.0°C)<br>Switching differential 2nd stage: Fixed 2°F (1°C)<br>Switching differential 3rd stage: Fixed 2°F (1°C)<br>Operational differential: Less than +/- 2°F<br>Control timing:<br>• Compressor short cycle timer – 5 min<br>Residual cooling fan delay: User selectable<br>• 0 (disabled), 30, 60, 90 sec<br>• Default = 60 sec |
| Switching Circuit | Control Switches:<br>• Latching relay, 2A max load per relay<br>Relays:<br>• 1st stage/Aux heating control<br>• 2nd stage/Emergency heating control<br>• Fan Control<br>• Heating/Cooling O/B control, 3rd stage conventional heat control<br>• 1st stage cooling control / 1st stage heat-pump heating control<br>• 2nd stage cooling control / 2nd stage heat-pump heating control |

| CE Certification | |
|---|---|
| Operating Environment | 32oF to +113oF (0oC – 45oC) Indoor Use Only |
| Radio Properties | 2405 ~ 2475MHz<br>Transmit Power max 10dbm |
| Compliance | Radio Equipment Directive 2014/53/EU |
| Power Supply | 24VAC, 50Hz |

Current declares that the radio equipment type (WTS10) complies with Directive 2014/53/EU

Full declaration text available at: www.LED.com

Max. radiated power: <10 dBm. Frequency: 2405 - 2475 MHz

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