![XCSpec Controls Corp. logo]

Thermostat
COMMISSIONING GUIDE

![XCSpec Controls Corp. logo]

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- TstatPro (9901-0010)
- TstatPro+ (9901-0020)
- AQ TstatPro+ (9901-0027)

Transforming HVAC
Controls for IoT

TABLE OF CONTENTS

ABOUT XCSPEC

At XCSpec, we merge the realms of building science and health to pioneer *Smart Dynamic Ventilation Controls*. Our mission is to provide affordable solutions that empower individuals to visualize, monitor, and optimize their indoor air quality, effortlessly—while also reducing energy costs.

Introducing our groundbreaking innovation, the AQ TstatPro+. Unlike conventional thermostats, ours offers advanced ventilation controls for indoor air management and additional energy savings.

At XCSpec, we're dedicated to elevating the indoor environment to promote well-being and productivity.
Join us in our mission to revolutionize indoor air quality control and create healthier living and working spaces for all.

Note: *AQ TstatPro+ is the only model with CO_2.*
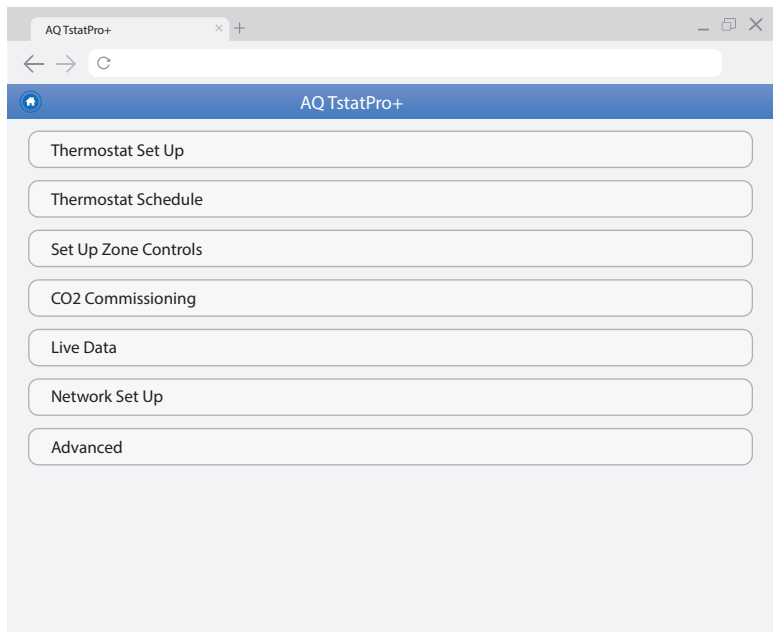
The **AQ TstatPro+** has an embedded web server allowing direct connection with the thermostat from a mobile device or PC over Wi-Fi. Once connected, the unit can be set up and commissioned. The thermostat must be powered and within Wi-Fi communications range.
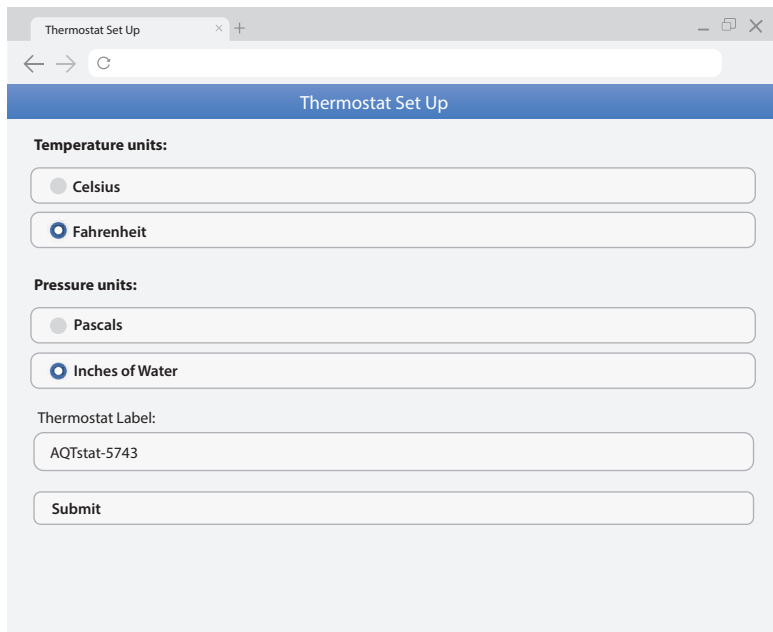
On a mobile phone or PC, pull down the list of available Wi-Fi networks. Select the Wi-Fi network named **AQ-STAT-XXXX** where the last 4 characters match the label on the box or chassis. Select this network and enter the password found on the back of the chassis. After correctly entering the password, the mobile phone or PC will indicate a successful connection.

Launch a browser and enter **192.168.10.1** into the address line. The landing page shown at the left will appear. To return to this from any other page, simply tap the home icon in the upper left corner of the web page or use the back button on your browser.

Suggested Browsers: Chrome, Safari, Firefox, and Edge

You must use the **Submit** button to load set up information into the thermostat.

Note: *AQ TstatPro+ is the only model with CO_2.*

Thermostat Set Up

Temperature units:

- ⚪ Celsius
- 🔘 Fahrenheit

Pressure units:

- ⚪ Pascals
- 🔘 Inches of Water

Thermostat Label:

AQTstat-5743

Submit

The thermostat set up page configures the AQ TstatPro+ system parameters and allows repurposing the use of either the B or the O relays.

Celsius or Fahrenheit: This sets the system to display temperature data is C or F. This changes the temperature displayed on the panel of the thermostat and the live data page.

Pascals or Inches of Water: This sets the system to display pressure in inches of water or pascals. This allows setup of pressure range based on the selected units. This is primarily used when the unit is used to display local space pressure.

Thermostat Label: The label field is a human-readable label associated with a particular thermostat. This label allows easy recognition of any specific unit when receiving email alerts or logging onto the **CloudBEAM** web portal. The label can be up to 54 characters long.

Use the **Submit** button to load this information into the thermostat.

Thermostat Set Up

System Operation Set Up

- ● Heat Only
- ◉ Cool Only
- ● Auto - Switches between driving Heat or Cool Relay
- ● OFF

Submit System Operation Set Up

Heat Pump Selection

- ● Conventional
- ◉ Heat Pump

Humidifer and Dehumidifier Enable

- ● Enable Dehumidifier Enable
- ◉ Enable Humidifier

Select Operating Mode:
Configure the system for the particular application- heat only, cool only or auto. Auto will switch between heat or cool based on zone temperature and set points automatically.

Use the **Submit System Operation Set Up** button to load this information into the thermostat.

Select Conventional or Heat Pump Operation:
This section allows you to set up the for conventional operation or heat pump.

Note: *If using a heat pump and repurposing the B or O relay for occupancy, set the transfer option opposite the heat pump's changeover selection.*

Enable Humidifier or Dehumidifier:
This section allows you enable the humidifier or dehumidifier out relay.

Thermostat Set Up × +

← → C

Thermostat Set Up

Select O/B Relay for Occupancy OR Ventilation (ERV)

- Occupancy
- ● Ventilation

Select Relay:

- Relay O
- Relay B

- Update all above parameters

System Ventilation Set Up
The ventilation mode selected above will be applied to all periods in the schedule.

- Ventilation ON during OCCUPIED times
- Ventilation ON during active heating or cooling
- ● Ventilation ON during active heating, cooling OR when CO2 PPM level is above the CO2 set point set on the CO2 commissioning page

Thermostat Relay O/B Selection: The O or B relay can be repurposed to drive an occupancy out relay to an economizer or signal an ERV to turn on ventilation. This page enables the function by selecting occupancy **OR** ventilation and then selecting the relay to be used.

When the thermostat is configured as a heat pump, care must be taken to make sure you configure the appropriate reversing value for the heat pump.
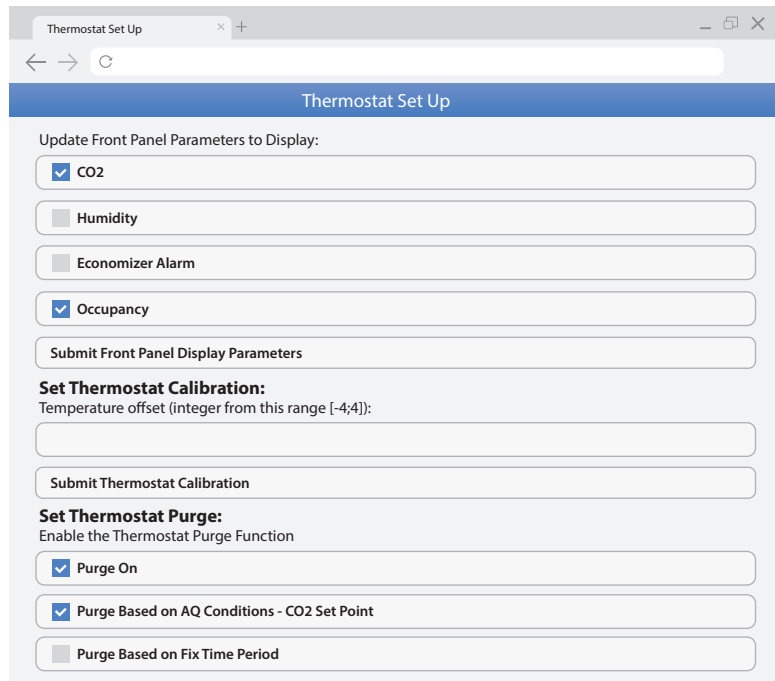
O or B Relay Selection: These radio buttons define which relay to re-purpose.

Setting the Thermostat Ventilation Mode: This section allows you to set up the thermostat's ventilation mode. This ventilation selection is applied to all days in the schedule.

Ventilation ON: This will run the ventilation fan during all occupied periods. Many building codes require this.

Ventilation ON during active heating and cooling runs the fan **ONLY** when there is a call for heating or cooling.

AQ TstatPro+ Only: Ventilation ON during active heating or cooling or when the CO_2 level is above the CO_2 PPM High setting. This option runs the **FAN** when there is a call for heating/cooling **OR** the measured CO_2 PPM is above the CO_2 PPM high setting. The CO_2 high setting is on the CO_2 commissioning page.

Thermostat Set Up	×	+		_ ⊡ ×

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Thermostat Set Up

Update Front Panel Parameters to Display:

☑ **CO2**

☐ **Humidity**

☐ **Economizer Alarm**

☑ **Occupancy**

Submit Front Panel Display Parameters

Set Thermostat Calibration:
Temperature offset (integer from this range [-4;4]):

Submit Thermostat Calibration

Set Thermostat Purge:
Enable the Thermostat Purge Function

☑ **Purge On**

☑ **Purge Based on AQ Conditions - CO2 Set Point**

☐ **Purge Based on Fix Time Period**

Front Panel Display Options: Check the boxes associated with the data to be displayed on the front panel message area. The thermostat will cycle through the different parameters.
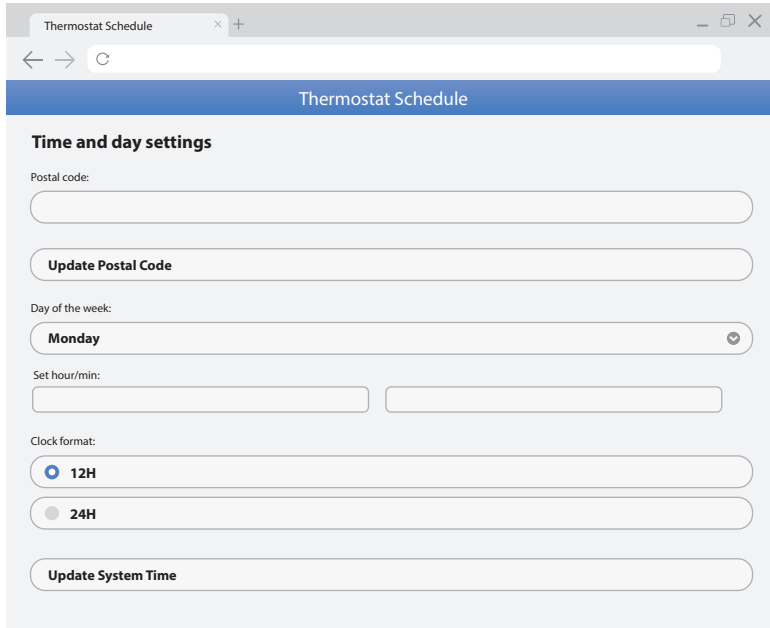
Note: *The economizer alarm will display on the front panel only when the economizer is in an alarmed state.*

Thermostat Calibration: This allows you to adjust display temperature ±4 °F (±2.2 °C).

Note: *The thermostat set points activate based on this displayed temperature.*

Purge Enable: This allows you to enable the purge function on the thermostat. Purge will occur 2 hours before the schedule occupancy.

Purge Period: The installer selects to purge for a fixed period or when the air quality sensors confirm acceptable air quality levels in the space. If a time period is selected, enter a time between 30 - 240 minutes in the space that appears. If AQ Is selected, then the CO_2 set point configured on the CO_2 commissioning page will be used. This feature is only available on the AQ TstatPro+.

Thermostat Schedule

Thermostat Schedule

Time and day settings

Postal code:

Update Postal Code

Day of the week:

Monday

Set hour/min:

Clock format:

○ **12H**

○ **24H**

Update System Time

Before scheduling you will need to set the clock. Navigate to the AQ TstatPro+ home page and select thermostat schedule.

1. Enter the first five digits of the ZIP code where the thermostat is installed. If your thermostat is connected to the **CloudBeam**, the time will sync automatically.
2. Press **Update Postal Code.**
3. Select the current day of the week from the dropdown.
4. To set the time of the day enter the hour and minutes in the fields provided.
5. Select if you want a 12 or 24 hour clock.
6. Press **Update System Time.**

Thermostat Schedule

Time is based on 24 hour clock

Heat and Cool Set Points must have a 4 degrees F or 3 degrees C separation

Select Days of week a schedule update is to be applied to: Select one or multiple

- Monday
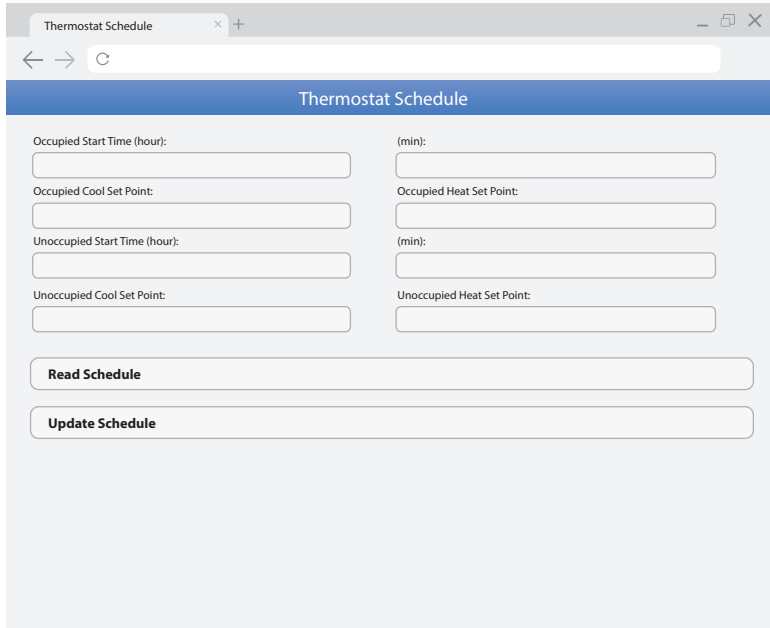- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
- Sunday

The thermostat schedule enables quick and easy scheduling. Schedules are based on 2 periods per day / 7 days per week.

Setting a Schedule: You can set up the heat and cool set points for one or more days at a single time.

1. Select the day(s) of the week the schedule will be applied to. You can select from 1 to all 7 days.

2. Enter occupied period start time in hours and minutes field in 15 minute increments.
3. Enter occupied period heat setpoint and cool setpoint in F.
4. Enter Unoccupied period start time in hours and minutes field.
5. Enter the heat and cool setpoints for the unoccupied periods.
6. Select **Update Schedule** to save changes. These parameters will be applied to all selected days.

Note: *The ventilation selection will also be applied to all selected days.*

Thermostat Schedule

Thermostat Schedule

Select day of week to read schedule from: Select One.

- ● Monday
- ● Tuesday
- ● Wednesday
- ● Thursday
- ● Friday
- ● Saturday
- ● Sunday

Reading a schedule: You can read the heat and cool setpoints for any specific day.

1. Select the day of the week you would like to read the schedule from.
2. Hit the "read schedule" button.
3. The occupied times and heat/cool set points will populate. The unoccupied time and heat/cool set points will populate. *(not pictured)*

This page sets up the selection of data from 1-4 inside zones and one outside zone used by the thermostat control algorithms. The thermostat is always ZONE 1 and defaults to contribute all thermostat sensor data to the temperature, humidity, DCV out and pressure controls.

For 1-4 inside zones units are added, select the sensor data to be included for the appropriate control and the weight added to the data input from each zone sensor. The sum of all weights must = 100%.

Temperature, humidity and pressure data input is based on assigned weights. DCV output is based on the highest CO_2 PPM among the assigned zones.

ZONE 1 - Thermostat
1. Enter the Thermostat's Weight: This is the weight value the thermostat contributes to the control output for temperature, CO_2 and Pressure.

Note: *The total weight contribution must be 100% - including the thermostat contribution.*
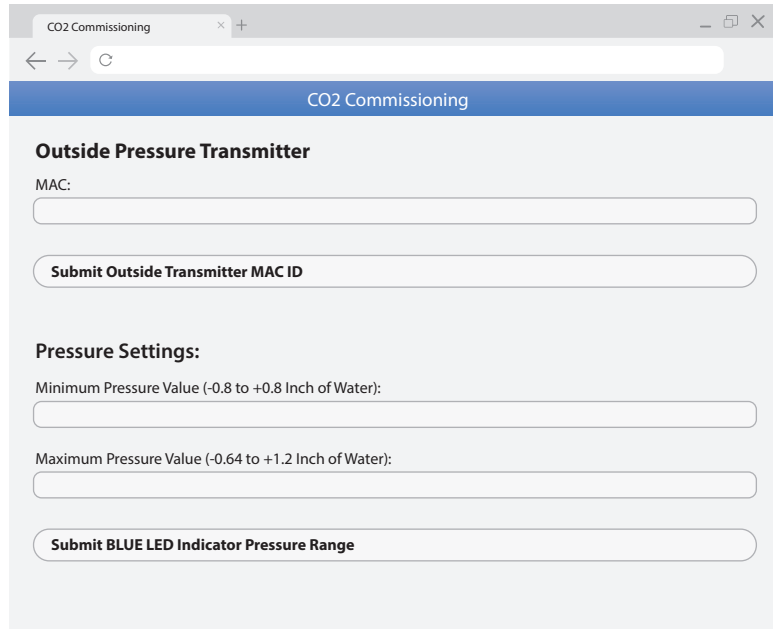
Use the **Submit Thermostat Zone 1 Weight** button to load this information into the thermostat any assigned zone.

Set Up Zone Controls ✕ +

← → C

Set Up Zone Controls

REMOTE ZONE 2 Data To Include:

MAC:

Weight:

Submit Zone 2 Mac ID and Weight

REMOTE ZONE 3 Data To Include:

MAC:

Weight:

Submit Zone 3 Mac ID and Weight

Additional Devices (Zones 2-4).

1. MAC ID: This field should be entered exactly as read from the label on the Zone device, including hyphens.
2. Weight: The weight value this zone should contribute to the control output and is applied evenly to CO_2/temperature/pressure.

Use the **Submit Zone Mac ID and Weight** button to load this information into the thermostat.

Adding an Outside Air Transmitter to determine space pressure.

1. Outside Air Pressure Transmitter: This unit provides the outside air pressure reference used by the thermostat to derive differential pressure. This derived pressure drives the blue LED on the AQ TstatPro+ indicator panel.

2. Enter the MAC ID and use the **Submit Outside Transmitter MAC ID** button to load this information into the thermostat.

3. Pressure Range: This range determines the blue LED status. If the pressure is within range defined here it is solid on. If it is outside this range, the blue LED will blink. The default is set to 0.01–0.05 in. w.c. (typical slight positive pressure). When outside of this range, the blue LED will blink.

4. Use the **Submit Blue LED Indicator Pressure Range** button to load this information into the thermostat.

CO2 Commissioning   × +

← → C

CO2 Commissioning

Outside Air Input Damper Control:

These field options allow you to set the 0-10V output control over the input air damper for specific use cases. In Ventilation Mode, the damper is set to the % open as specified by the "Max Ventilation for Full Occupancy" when occupied.
The Economizer Mode is set up to linearize the CO2 PPM over the PPM high and PPM Low Range and drive a DCV input to an economizer.
The motorized Actuator will drive the input air damper to maintain the CO2 PPM Setpoint.
In all cases, when the thermostat is unoccupied, the input air damper is completely closed.

- **Maximum Capacity Ventilation Mode.**

- **DCV 0-10V input to Economizer Controller.**

- **0-10V proportional control over a Motorized Actuator.**

Maximum ventilation Value (0-100%):

This value is set based on the building requirements for Maximum Occupancy ventilation.

CO2 PPM Set Point (400-3000ppm):

The AQ TstatPro+ supports three modes of operation over an input air damper. Depending on the mode selected – the required input parameters appear on the web page. In all modes, when the thermostat is unoccupied, it will go to the minimum ventilation position. If the CO_2 sensor fails, the thermostat will use the maximum ventilation setting during occupied times and the minimum ventilation setting during unoccupied times.

OFF: This disables any voltage output on the S1 pin.

Ventilation mode: In this mode the damper is set to the % open as specified by the maximum ventilation for full occupancy when occupied.

Economizer Mode: This mode is set up to linearize the CO_2 PPM over the PPM high and PPM low range and drive a DCV input to an economizer.

Actuator Mode: This mode drives a motorized actuator directly based on maintaining the CO_2 set point. This mode is used for ERV operation. If the unit CO_2 reporting fails, the thermostat sets the output to maximum ventilation – per Title 24 requirements.

CO2 Commissioning

CO2 Commissioning

← → C

CO2 Commissioning

PPM High and PPM Low must be separated by at least 100 PPM

Input PPM low (0-999):

Input PPM high (100-3500):

Vdc output configuration:

○ **VDC 0-10V.**

○ **VDC 0-10V.**

Maximum ventilation Value (0-100%):

This value is set based on the building requirements for Maximum Occupancy Ventilation.

CO2 PPM Set Point(400-3000ppm):

Submit Outside Air Input Damper Control

Input PPM Low: The PPM low defines the range of the 0-10V signal output with PPM low being 0 volts output. This only appears if economizer mode is selected.

Input PPM High: The PPM high defines the range of the 0-10V signal output with PPM high value being 10 volts output. This only appears if economizer mode is selected.

VDC Output Configuration: Reference your economizer controller manual to select this option. This only appears if economizer mode is selected.

Maximum Ventilation: This defines the ventilation maximum output voltage the unit will drive in the event of a failure to read CO_2 PPM **OR** if the mode is set for ventilation. Set this according to building design requirements for maximum occupancy.

Minimum Ventilation: This defines the ventilation minimum output voltage the unit will drive during all unoccupied times.

CO_2 Set Point: This defines the CO_2 value the unit will drive the input air damper based on an internal PI algorithm. This value is also used if the ventilation mode is configured to turn the fan **ON** at or above this CO_2 value.

1. PPM High/Low: The PPM High value will drive the red LED on the indicator panel when the sensor PPM reading for CO_2 is at or above this value. The PPM low value drives both the green LED indicator and also turns on the ventilation fan, if this option was selected on the thermostat schedule set up page. The Indicator is green at or below this value. A PPM reading between these two values drives the amber LED.

2. Damper Test: The damper test allows manual confirmation that the unit is wired correctly and the DCV output is working. Setting to manual allows entry of a known value, i.e. 50%. This drives the damper to 50% open (5 volts). When satisfied, the manual test should be terminated. If not manually switched to auto, the unit switches back to auto mode after 10 minutes.

To Run a Damper Test
1. Enter in the damper % open. 50% = 5 volts.
2. Select **Start Test.**
3. Measure 0-10V output to confirm 5 volts or your setting.
4. Select **Stop Test.**

Note: *The test automatically stops after 10 minutes.*

CO2 Commissioning

Calibration CO2:

Force calibration (400-2000 ppm):

Submit

Automatic Self-Calibration (Automatic Self-Calibration is NOT recommended if installed at location with 24/7 occupancy):

- ● ASC Enabled
- ○ ASC Disabled

Submit

1. Forced Calibration: Units are shipped factory calibrated. If there is a need to recalibrate, this field allows forced calibration to a known CO_2 PPM value.

Use the **Submit** button to load this information into the thermostat.

2. Automatic Self-Calibration (ASC) enable: Enabling ASC allows the unit to self calibrate during unoccupied times. ASC is very effective to maintain calibration of the sensor. ASC is NOT recommended if the thermostat installation site operates 24/7.

Use the **Submit** button to load this information into the thermostat.

Thermostat Live Data

Thermostat Live Data

Thermostat Live Data

Operating State: Auto
Heat Setpoint: 62F
Cool Setpoint: 85F
Zone Temperature: 83.6F
Fan mode: Auto
Hold Mode: SCHDL
Hold Hours: 4
Relay State: W1:0, W2:0, Y1:0, Y2:0, O:1, B:0, G:0, H:0, D:0
Ambient Humidity: 43
Operation Mode: OFF
Keypad Lock Configuration: OFF

Thermostat Version: FW-T855iSHv2-209-0A8C
Program Mode: 7D
Temperature Unit: F
Day and Time: Thursday, 19:30
Clock Format: 12H

This page displays real time data from the thermostat.
Use this page to assure zone devices are attached and reporting.

Operating State: Indicates heating or cooling is active
Heat/Cool Setpoints: Active set points
Zone Temperature: Local temperature reading
Fan Mode: ON indicates G relay is energized
Hold Mode: Displays **SCHDL** if a schedule is running or TEMP or PERM if in a hold mode.
Hold Hours: displays the number of hours temporary hold is in place.
Relay State: State of all the relays with a 0 (not energized) or a 1 (energized) next to them.
Ambient Humidity: Local humidity reading
Operation Mode: Indicates the mode the thermostat is operating in - OFF, Cool, Heat
Keypad Lock Configuration: Indicates the **keypad** is locked out

Thermostat Version: This is the software version of the chassis code
Program Mode: displays the current schedule mode 5-1-1 programming or 7 day programming
Temperature Unit: Displays In F-Fahrenheit or C-Celsius
Day and Time: Day and Time set up and displayed on panel
Clock Format: Whether set up for a 12 or 24 hour clock format

Thermostat Live Data   _ □ ✕

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Thermostats Live Data

Ambient Humidity: 43
Operation Mode: OFF
Keypad Lock Configuration: OFF

Thermostat Version: FW-T855iSHv2-209-0A8C
Program Mode: 7D
Temperature Unit: F
Day and Time: Thursday, 19:30
Clock Format: 12H

Local CO2: 476 PPM
Occupied: OFF
Economizer Alarm State: On
DCV Duty Cycle: 0%
RSSI: -34dB
Local Pressure: 406.48 inch

Resultant temperature, humidity, pressure and CO2 values:

Resultant MAX CO2: 476 PPM
Resultant Pressure: 408.48inch
Resultant Temperature: 83.6F
Resultant Humidity: 43%

Local CO2: CO_2 ppm
Economizer Alarm: ON if Active
DCV Duty Cycle: is the % open of the S1 output.
RSSI: Signal strength to access point
Local Pressure: Local pressure reading
Occupied: This is the state of the thermostat based on the schedule
Economizer Alarm: This is the state of the alarm from the economizer received over the S2 input.

The resultant values indicate the final temperature, humidity, pressure and CO_2 when additional zones are included in the calculations.
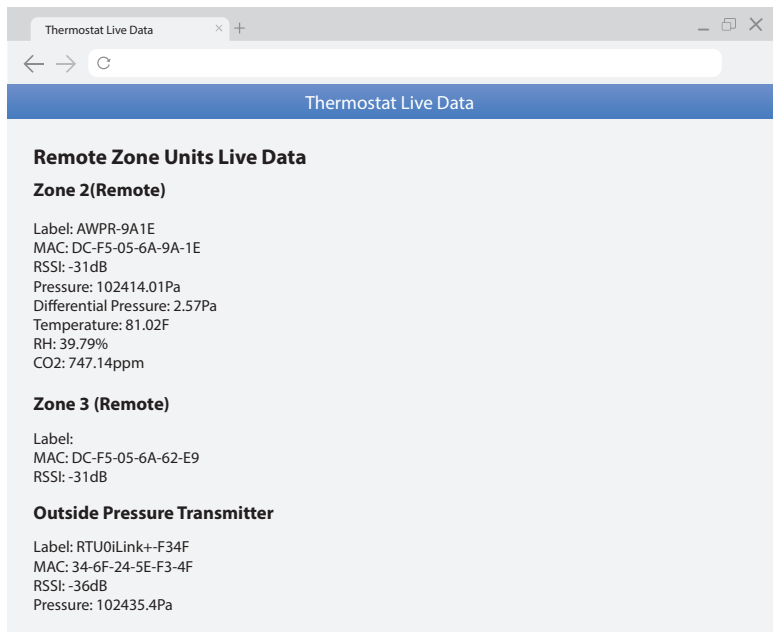
Remote Zone Units Live Data

Label field: Is a human-readable label being received from the remote devices assigned at installation time.
MAC: Is MAC Identifier of that zone unit.
RSSI: Is the relative Wi-Fi signal strength between the Thermostat and that zone device.
Pressure: Is the pressure reading from the zone devices, this will only display if pressure is being sent by the zone device.
Differential Pressure: Is the space pressure being measured by the zone device relative to outside air. This will only display if the zone device is set up to calculate local Pressure.
Temperature: Is the temperature in F, at the zone device being sent to the thermostat.
RH: Is the relative humidity, from 0-100%, at the zone device being sent to the thermostat.
CO_2: Is the in ppm measured at the zone device being sent to the thermostat.

Network Set Up

Network Information

MAC Address:	34-6F-24-5F-6E-85
AP SSID:	PV-IOT1
Connection Status:	Network Configured
IP:	192.168.0.105
RSSI:	-32

DHCP

Network Provisioning

Reset to Provisioning

CLOUDBEAM INFORMATION

CloudBeam communication: -

Previous connection to the server date and Zulu time: 08/02/2024 22:30:59

Set Thermostat Cloud Check in Frequency (30s-10800s supported):
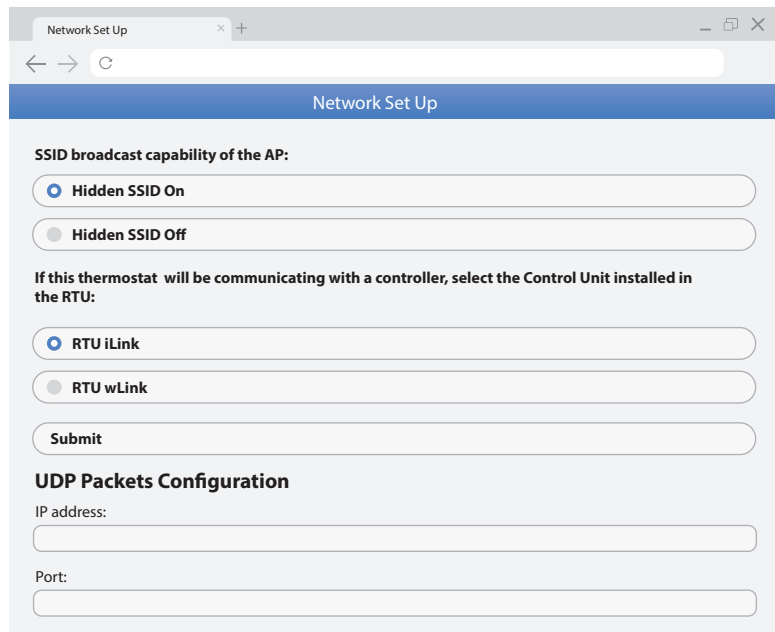
The AQ TstatPro+ is compatible with IEEE 802.11 b/g/n Wi-Fi access points (AP). To connect the thermostat to the Internet for **CloudBEAM** services or email alerts, the Wi-Fi AP must provide internet access.

The Network Set Up page connects or "provisions" the device onto Wi-Fi. When not provisioned a red dot and connection status of "unconfigured" is shown. Use the "SCAN" button to get a list of available Wi-Fi networks. Select the desired network. Enter the network password and **Submit**. The dot turns green when you have successfully connected. The network information available is shown above.

Note: *RSSI (Wi-Fi signal strength) should not be less than -80 dBm for a reliable connection. If the desired network is not displayed, scan again until it appears.*

If it does NOT appear after several scans, you may not be in Wi-Fi radio range of the desired network. Use "**Reset To Provisioning**" to reset and try again if the provisioning process does not go as expected.

The **CloudBEAM Engagement Transmission** (ET) period defines how often the device will check into **CloudBEAM** to send and receive information. This is defined in seconds.

Network Set Up

Network Set Up

SSID broadcast capability of the AP:

- ◉ **Hidden SSID On**
- ○ **Hidden SSID Off**

If this thermostat will be communicating with a controller, select the Control Unit installed in the RTU:

- ◉ **RTU iLink**
- ○ **RTU wLink**
- **Submit**

UDP Packets Configuration

IP address:

Port:

Note: *To receive FREE email alerts or use the* **CloudBEAM** *portal for thermostat site management, the device must be connected to an internet enabled Wi-Fi network.*

Hidden SSID. For security concerns, this can be used to turn off the Wi-Fi beacon of the thermostat.
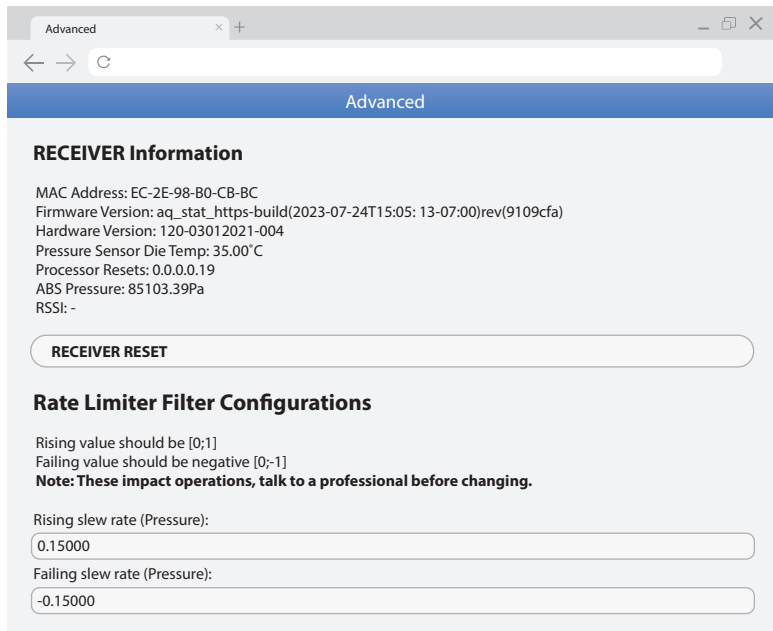
If your thermostat will be communicating with an XCSpec **RTU iLink or RTU wLink** in the RTU, select the device installed in the RTU and the thermostat will use appropriate communications. The **RTU wLink** communicates over the thermostat power lines. The **RTU iLink** communicates over Wi-Fi with the thermostat - assure that signal is available from the thermostat to the RTU.

UDP packet configuration.
For more advanced users, the UDP broadcast can be sent to a particular IP and port address.

Contact **support@xcspec.com** for further guidance on setting this network configuration.

Use the **Submit** button to load this information into the thermostat. *(not pictured)*

Advanced

RECEIVER Information

MAC Address: EC-2E-98-B0-CB-BC
Firmware Version: aq_stat_https-build(2023-07-24T15:05: 13-07:00)rev(9109cfa)
Hardware Version: 120-03012021-004
Pressure Sensor Die Temp: 35.00°C
Processor Resets: 0.0.0.0.19
ABS Pressure: 85103.39Pa
RSSI: -

RECEIVER RESET

Rate Limiter Filter Configurations

Rising value should be [0;1]
Failing value should be negative [0;-1]
Note: These impact operations, talk to a professional before changing.

Rising slew rate (Pressure):
0.15000
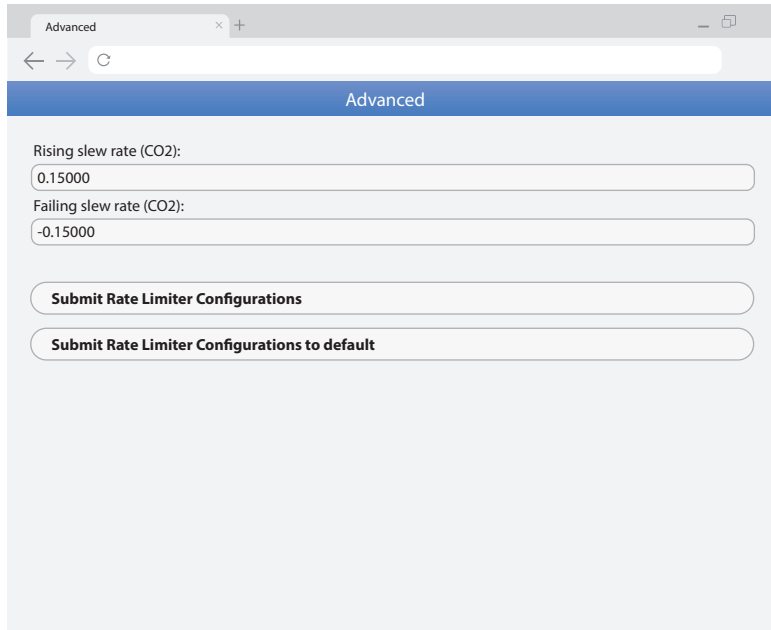
Failing slew rate (Pressure):
-0.15000

The Advanced page is intended for use by XCSpec support and users familiar with the system.

Receiver Information: Information on this page, i.e. the device firmware and other displayed information, may be requested by XCSpec support.

Receiver Reset: The receiver reset can be used to generate a reset to the unit. User settings will be preserved.

Rate of Change (ROC) Limit Filters: The rate limiter controls how quickly the 0–10 V CO_2 output can change to prevent hunting. The default parameters have been selected to assure that "hunting" does not occur so we control the amount of change in the 0–10V for any one cycle. Setting the limit filter to "1" will cause the 0–10V output to following the PPM range–without adding steps between each adjustment. Users familiar with ROC controls can use the slew rising and falling rates to change the control parameters. Before changing the default parameters, please reach out to support@xcspec.com. We can send information about the impact changes will have on the control output. The reset to default sets these values back to the factory condition.

Advanced

Rising slew rate (CO2):

0.15000

Failing slew rate (CO2):

-0.15000

Submit Rate Limiter Configurations

Submit Rate Limiter Configurations to default

Notes On Economizer Set Up

The AQ TstatPro+ is specifically designed to operate directly with economizers.

Occupancy Out Relay: The O/B relay can be repurposed to drive a true occupancy out based on the thermostat schedule. To configure, use the thermostat set up page to select the **Occupancy Use Algorithm**. Select the **relay O/B**. The economizer **Occupancy** input should then be wired to the selected relay.

Input Air Damper Controller (S1): Depending on the mode selected, the S1 output will drive the CO_2 input to an economizer, the CO_2 input to an ERV or a zone control two stage motorized damper.

Alarm In (S2): The alarm output from an economizer can be configured onto the S2 pin of the thermostat. When energized, an **Economizer Alarm** state will be displayed on panel.

Notes on RTU wLink+ or RTU iLink Set Up

The AQ TstatPro+ is part of the AQ Family of products specifically designed to provide easy to install solutions for advanced ventilation and air quality solutions.

To communicate to the **RTU wLink+** or **RTU iLink+** installed in a RTU, there are two different options they can be used.

The **RTU wLink+** communicates with the thermostat directly over the existing thermostat power wires, R and C.

All Zone, DCV and powered exhaust information is communicated directly to the **RTU wLink+**.

The **RTU wLink+** will also communicate outside air conditions - pressure, PM2.5, PPM - back down to the thermostat.

Since this is a wired communications, there is no requirement for a radio link between inside the building and the roof top.

The RTU iLink+ communicates with the thermostat over a Wi-Fi link. The installer must assure that there is signal from the thermostat to the RTU iLink+ directly OR that they are both on the same WiFi network. All zone, DCV and powered exhaust information is communicated directly to the **RTU iLink+**.

The **RTU iLink+** will also communicate outside air conditions - pressure, PM2.5, PPM - back down to the thermostat.

The AQ TstatPro+ is shipped with the following configuration:

Schedule: 2 Periods Per Day. 7 days per week
Mon-Fri Occupied Time 8:00 - 5:00 pm
Mon-Fri Occupied Set Points: Heat: 68 Cool 72
Mon-Fri Unoccupied Set Points: Heat: 55 Cool 79
Sat & Sun Occupied Times: None
Sat & Sun Set Points: Heat: 55 Cool 79
Temperature display units - Fahrenheit
Pressure Units - Inches of Water
Pressure Range for Blue LED: 0.01- 0.05 inches of water
Network: Unprovisioned
Cloud Engagement Transmission period: 60 seconds
No Labels are Assigned
No Zone Devices are Whitelisted
DCV PPM Range 0-2000 PPM
CO2 LED: Red when > 2000 ppm; Green when < 600 ppm
DCV: Not enabled
DCV Rate Limited: Enabled
CO_2 Averaging Filter: Not Enabled
Front Panel to Display: Occupancy and CO2
Rate-of-Change Slew for CO_2 0-10V Output: 0.15

⚠️ **Caution:
Electrical Hazard**

Failure to disconnect the power before beginning to install this product can cause electrical shock or equipment damage.

⚠️ **Warning:**

All components of the control system and the thermostat installation must conform to Class II circuits per the NEC Code.

Wiring

1. If you are replacing a thermostat, make note of the terminal connections on the thermostat that is being replaced. In some cases the wiring connections will not be color coded. For example, the green wire may not be connected to the G terminal.

2. Loosen the terminal block screws. Insert wires then retighten the terminal block screws.

3. Place nonflammable insulation into the wall opening to prevent drafts.

💡 **Installation Tip**

Do not overtighten terminal block screws, as this can damage the terminal block. A damaged terminal block can keep the thermostat from fitting on the subbase correctly or cause system operation issues.

Max Torque = 6in-lbs.

Wiring Tips

C Terminal
This thermostat requires a 24V common wire to the C terminal.

Wire Specifications
Use shielded or non-shielded 18-22 gauge thermostat wire.

Note:
In many heat pump systems with no emergency heat relay, a jumper can be installed between E and W2 to turn thermostat into a single stage control for emergency heat operation.

Note:
Outdoor temperature sensor, Indoor temperature sensors, and slab sensor wiring diagrams are located in R251S manuals.

Terminal Designations

This thermostat shipped from the factory to operate a conventional heating and cooling system. This thermostat may also be configured for a heat pump system.

| Terminal	2 Heat 2 Cool Conventional System	2 Heat 1 Cool Heat Pump System	4 Heat 2 Cool Heat Pump System	5 Heat 3 Cool Heat Pump System
RC	Transformer power (cooling)	Transformer power (cooling)	Transformer power (cooling)	Transformer power (cooling)
RH	Transformer power (heating)	Transformer power (heating)	Transformer power (heating)	Transformer power (heating)
C	Transformer common	Transformer common	Transformer common	Transformer common
B	Reversing valve /configurable terminal	Reversing valve /configurable terminal	Reversing valve /configurable terminal	Reversing valve /configurable terminal
O	Reversing valve /configurable terminal	Reversing valve /configurable terminal	Reversing valve /configurable terminal	Reversing valve /configurable terminal

Terminal Designations

This thermostat shipped from the factory to operate a conventional heating and cooling system. This thermostat may also be configured for a heat pump system.

Terminal	2 Heat 2 Cool Conventional System	2 Heat 1 Cool Heat Pump System	4 Heat 2 Cool Heat Pump System	5 Heat 3 Cool Heat Pump System
G	Fan relay	Fan relay	Fan relay	Fan relay
W/E	First stage of heat	Emergency Heat	First stage of auxiliary heat	First stage of auxiliary heat (4th stage of heat)
Y	First stage of cool	First stage of heat & cool	First stage of heat & cool	First stage of heat & cool
Y2	Second stage of cool	N/A	Second stage of heat & cool	Second stage of heat & cool
W2	Second stage of heat	Auxiliary heat	Second stage of auxiliary heat	Second stage of auxiliary heat (5th stage of heat)
S1/S2	Remote Sensor	Remote Sensor	Remote Sensor	Remote Sensor
H	Humidify	Humidify	Humidify	Humidify
D	Dehumidify	Dehumidify	Dehumidify	Dehumidify

	TstatPro	TstatPro+	AQTstatPro+
S1	Unused	0-10V Output Duct Actuators	0-10V Output for DCV
S2	FDD Alarm In	FDD Alarm In	FDD Alarm In

① Power supply

② Factory-installed jumper. Remove only when installing on 2-transformer systems
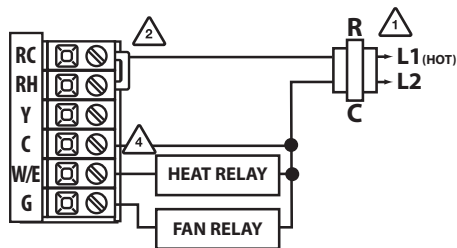
Typical 2H/2C System: 1 Transformer
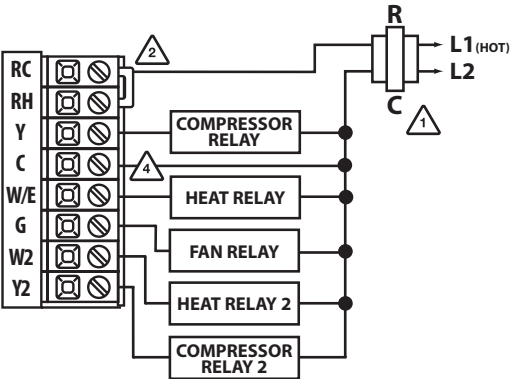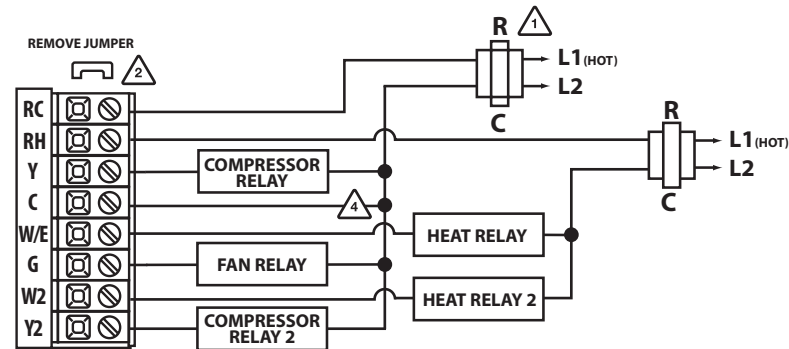
Typical Cool-Only System With Fan
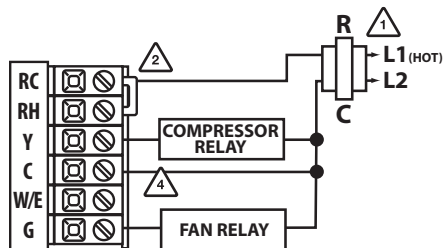
Typical Heat Only System With Fan

3. Use either O or B terminals for changeover valve

4. A 24 VAC common connection is required with this thermostat.

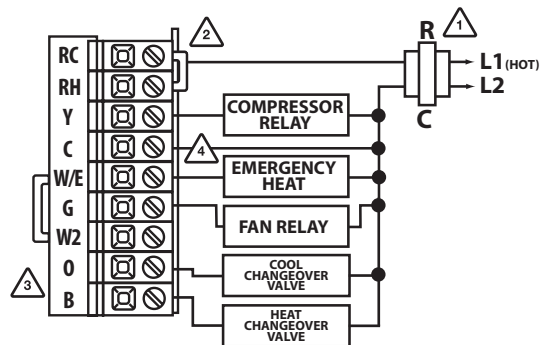5. If DEHUM relay requires a normally energized input, set **Dehumidify** relay to NC in **Technician Setup.**

Typical 2H/2C System: 2 Transformer

Note:

In many systems with no emergency heat relay a jumper can be installed between **E** and **W2**.
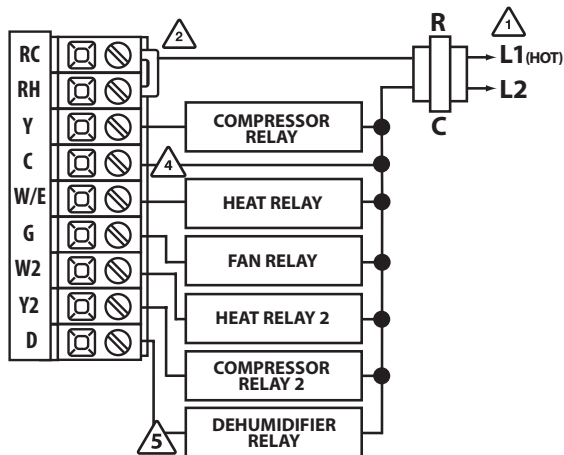
Typical 2H/1C Heat Pump System

RC	
RH	
Y	COMPRESSOR RELAY
C	
W/E	EMERGENCY HEAT
G	FAN RELAY
W2	
O	COOL CHANGEOVER VALVE
B	HEAT CHANGEOVER VALVE

R
L1(HOT)
L2
C

1. Power supply

2. Factory - installed jumper. Remove only when installing on 2 transformer systems.

3. Use either O or B terminals for changeover valve.
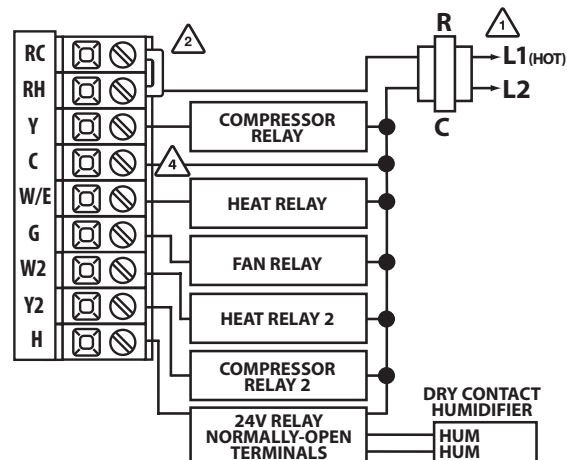
Typical 2H/2C System With 24 VAC Humidifier

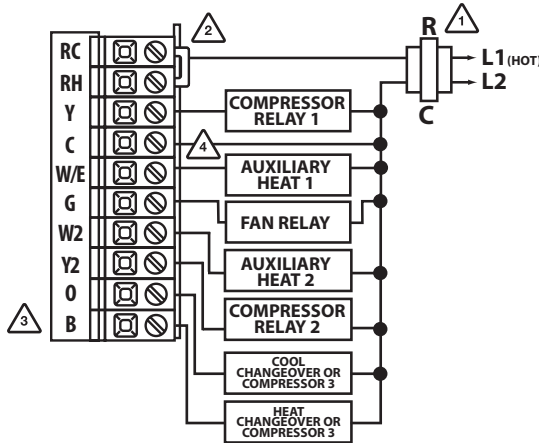| RC	
RH	
Y	COMPRESSOR RELAY
C	
W/E	HEAT RELAY
G	FAN RELAY
W2	
Y2	HEAT RELAY 2
H	COMPRESSOR RELAY 2
	HUMIDIFIER

R
L1(HOT)
L2
C

⚠4 A 24 VAC common connection is required with this thermostat.

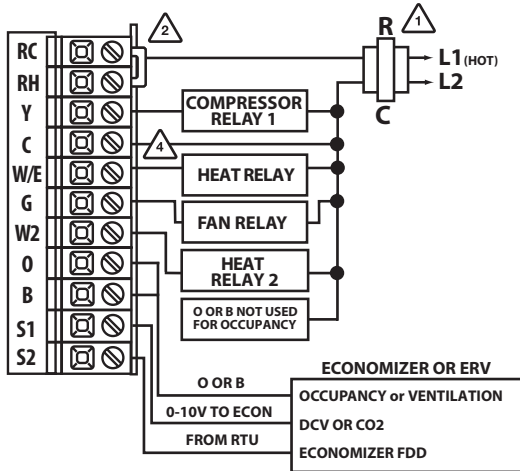⚠5 If DEHUM relay requires a normally-energized input, set **Dehumidify** relay to NC in **Technician Setup.**
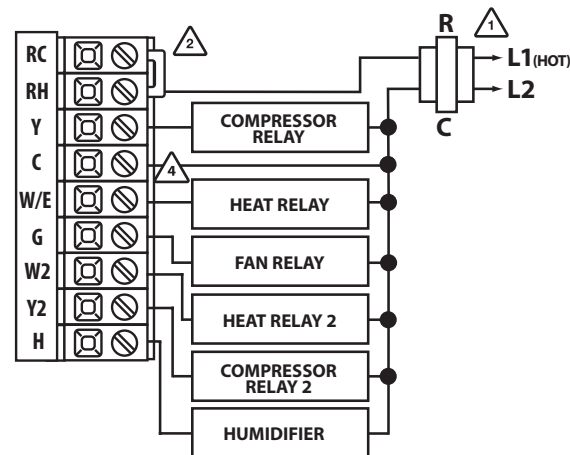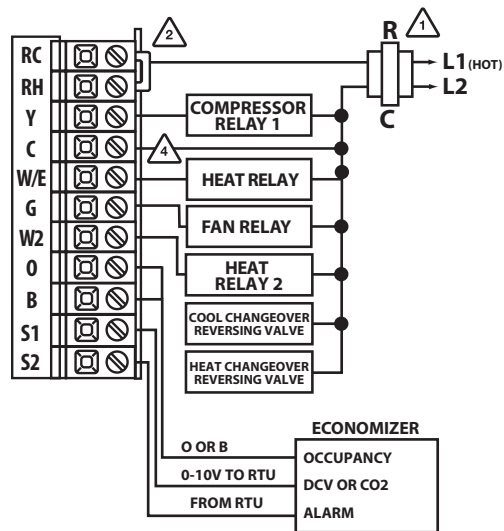
Typical 2H/2C System with Dehumidify Terminal

Typical 2H/2C System with Dry Contact Humidifier

Typical 5H/3C Heat Pump System

Terminals: RC, RH, Y, C, W/E, G, W2, Y2, O, B
- COMPRESSOR RELAY 1
- AUXILIARY HEAT 1
- FAN RELAY
- AUXILIARY HEAT 2
- COMPRESSOR RELAY 2
- COOL CHANGEOVER OR COMPRESSOR 3
- HEAT CHANGEOVER OR COMPRESSOR 3

R
L1 (HOT)
L2
C

Wiring To Economizer For Occupancy

Terminals: RC, RH, Y, C, W/E, G, W2, O, B, S1, S2
- COMPRESSOR RELAY 1
- HEAT RELAY
- FAN RELAY
- HEAT RELAY 2
- O OR B NOT USED FOR OCCUPANCY

R
L1 (HOT)
L2
C

O OR B
0-10V TO ECON
FROM RTU

ECONOMIZER OR ERV
OCCUPANCY or VENTILATION
DCV OR CO2
ECONOMIZER FDD

Wiring To Economizer For Occupancy or ERV

Wiring To Motorized Fresh Air Actuator

* The 0–10 V output on S1 is not available on the TstatPro model.

Note:

When wiring to an economizer—whether repurposing the O or B relays for occupancy or wiring directly to an actuator—ensure all connected devices share the same 24 V common/ground.
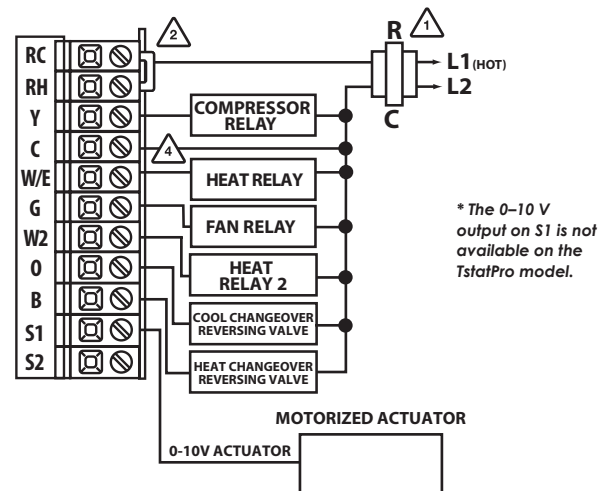
Note:

On the TstatPro model, S1 and S2 can be used for an external 100K wired temperature sensor. If a 100K sensor is used, S2 cannot also serve as the economizer alarm input.