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AQ TstatProPlus

COMMISSIONING GUIDE

Transforming HVAC
Controls for IoT

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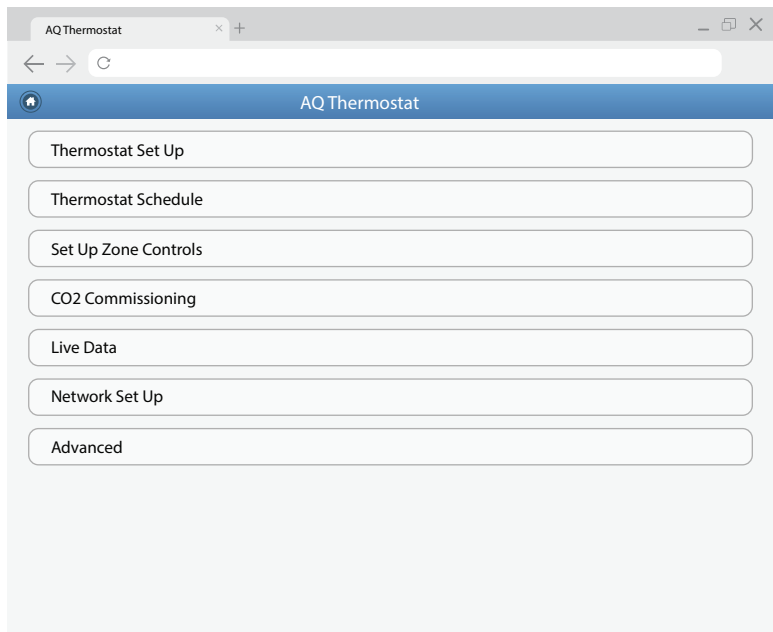
ABOUT XCSPEC

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 saving energy costs.

Introducing our groundbreaking innovation, the AQ Thermostat. 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 environments 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: CO2 Commissioning is NOT used for the TstatPro.



The **AQ TstatProPlus** 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 distance.

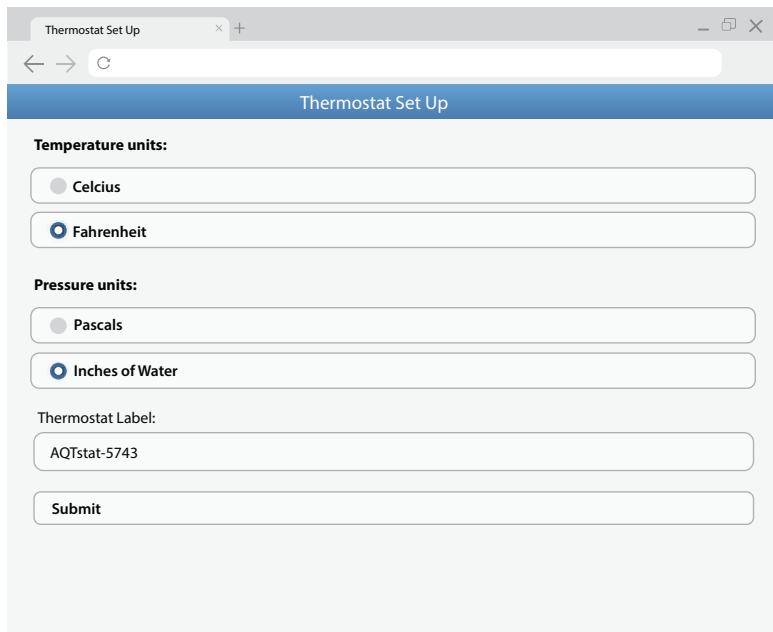
On a mobile phone or PC, pull down the list of available Wi-Fi networks. Select the Wi-Fi network named **AQ-STAT-XXXX** where the last 4 characters match the label on the box or chassis. Select this network and enter the password found on the back of the chassis. After correctly entering the password, 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, Edge

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

Note: CO2 Commissioning is NOT used for the TstatPro.



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 TstatProPlus system parameters and allows repurposing the use of either the B or the O relays.

Centigrade 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 set's the system to display pressure in inches of water or pascals. This allows set up 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 read-able label associated with a particular thermostat. This label allows easy recognition of any specific unit when receiving email alerts or logging onto the BEAM web Portal. The label can be up to 54 characters long.

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

Note: The Ventilation feature that responds to CO2 is NOT available on the TstatPro.

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.

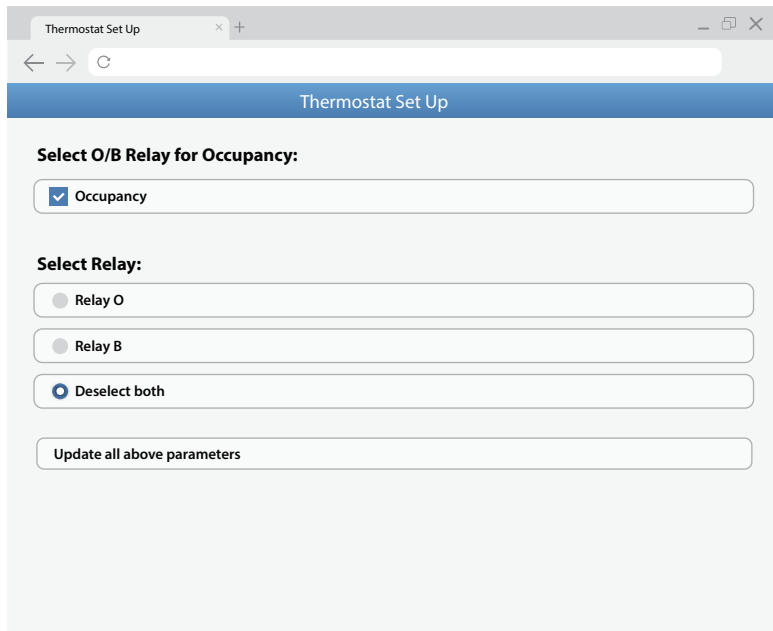
Setting the Thermostat Ventilation Mode: This section allows you to set up the ventilation mode the thermostat operates in. This ventilation selection is applied to all days in the schedule.

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

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

Ventilation ON during active heating or cooling or when the CO2 level is above the CO2 PPM High setting. This option allows runs the FAN when there is a call for heating/cooling OR the measured CO2 PPM is above the CO2 PPM High setting. The CO2 High setting is on the CO2 commissioning page.

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



The screenshot shows a web browser window titled "Thermostat Set Up". The page has a blue header bar with the text "Thermostat Set Up". Below the header, there are two main sections:

- Select O/B Relay for Occupancy:** This section contains a single radio button labeled "Occupancy" which is currently selected.
- Select Relay:** This section contains three radio buttons: "Relay O", "Relay B", and "Deselect both". The "Deselect both" option is currently selected.

At the bottom of the form, there is a button labeled "Update all above parameters".

Thermostat Relay O/B Selection: The O or B relay can be re-purposed to drive an occupancy out relay to an economizer. This page is used to enable the function by selecting Occupancy and then select the Relay to be used for occupancy.

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. Note that if the unit is in Heat Pump mode with O providing the cool reversing value, the B relay can be repurposed for occupancy or CO2 high relay control and vice versa.

O or B Relay Selection: These radials define which relay will be used for the repurposed use. The deselection will remove both relays from the special purpose use.

Use the **Update all above parameters** button to load this information into the thermostat.

The screenshot shows a web browser window titled "Thermostat Set Up". The page has a blue header bar with the text "Thermostat Set Up". Below the header, there is a section titled "Update Front Panel Parameters to Display:". This section contains four rows, each with a checkbox and a text input field. The first row has a checked checkbox and the text "CO2". The second row has an unchecked checkbox and the text "Humidity". The third row has an unchecked checkbox and the text "Economizer Alarm". The fourth row has a checked checkbox and the text "Occupancy". Below these rows is a button labeled "Submit Front Panel Display Parameters".

Update Front Panel Parameters to Display:

☒ CO2

☐ Humidity

☐ Economizer Alarm

☒ Occupancy

Submit Front Panel Display Parameters

Set Thermostat Calibration:

Calibration temperature is a unitless quantity, the magnitude of which is applied equally in Fahrenheit and Celsius temperatures.

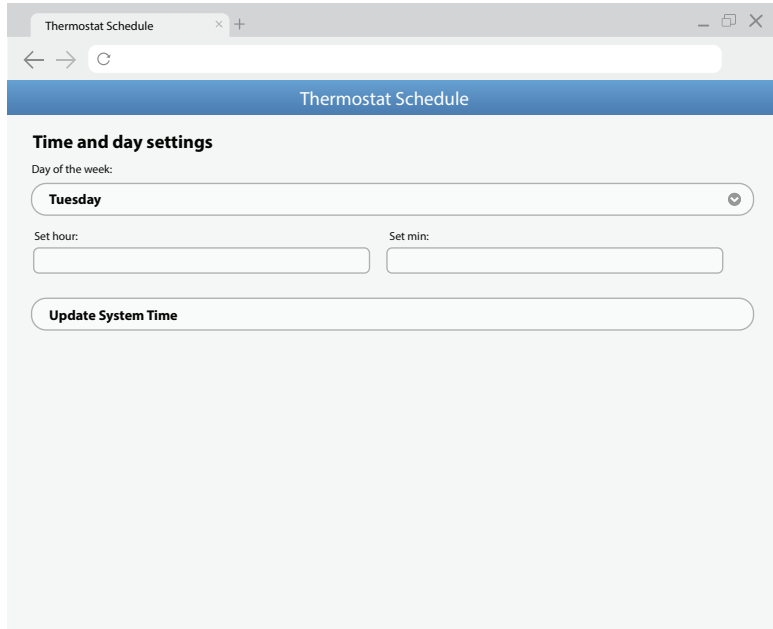
Temperature offset (integer from this range [-4;4]):

Submit Thermostat Calibration

Front Panel Display Options: Check the boxes associated with the data to be displayed on the front panel message area. The Thermostat will banner through the different parameters.

NOTE: The Economizer Alarm will display on the front panel only when the economizer is in an alarmed state.

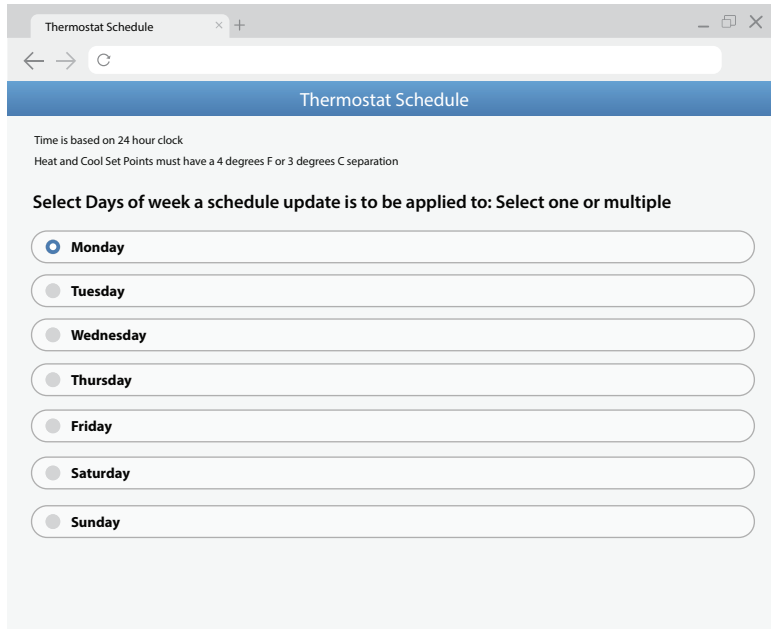
Thermostat Calibration: This allows you to change the calibration of the room temperature display up or down 4 degrees. Note that the thermostat set points activate based on this displayed temperature.



The screenshot shows a web browser window with the title "Thermostat Schedule". The page has a blue header bar with the text "Thermostat Schedule". Below the header, the section "Time and day settings" is displayed. Under this section, there is a label "Day of the week:" followed by a dropdown menu showing "Tuesday". Below the dropdown, there are two input fields labeled "Set hour:" and "Set min:". At the bottom of the section, there is a button labeled "Update System Time".

Before scheduling you will need to set the clock. Navigate to the AQ Thermostat home page and select Thermostat Schedule.

1. Select the current day of the week, followed by the current time of the day. **NOTE:** The time is based on a 24-hour clock.
2. Once completed, press **Update System Time**. **NOTE:** You should see your day/time input on the front of the thermostat.



The screenshot shows a web browser window with the title "Thermostat Schedule". The browser's address bar is empty. Below the browser window, there is a blue header bar with the text "Thermostat Schedule". Underneath the header, there is a section with the following text: "Time is based on 24 hour clock" and "Heat and Cool Set Points must have a 4 degrees F or 3 degrees C separation". Below this text, there is a heading "Select Days of week a schedule update is to be applied to: Select one or multiple". Underneath the heading, there are seven radio button options for the days of the week: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday. The "Monday" option is selected, indicated by a blue dot.

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

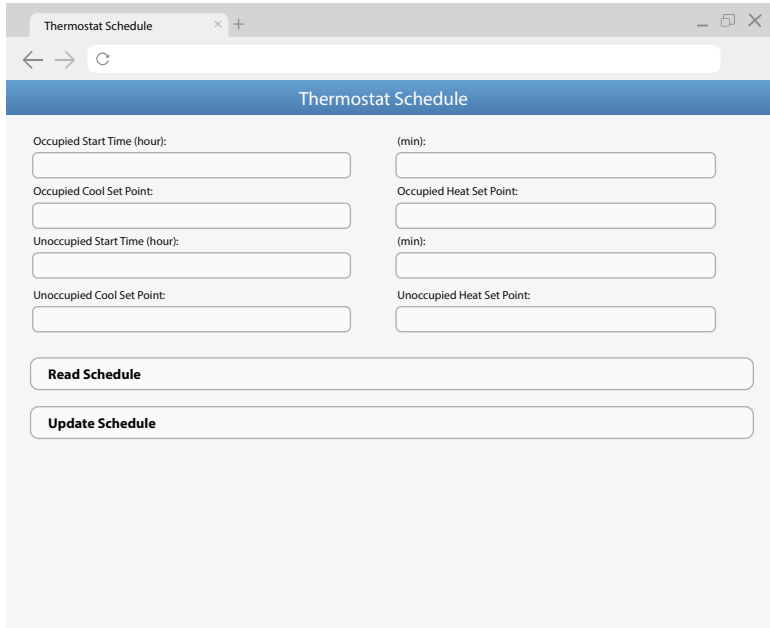
☐ Sunday

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.

(continue to the next page)

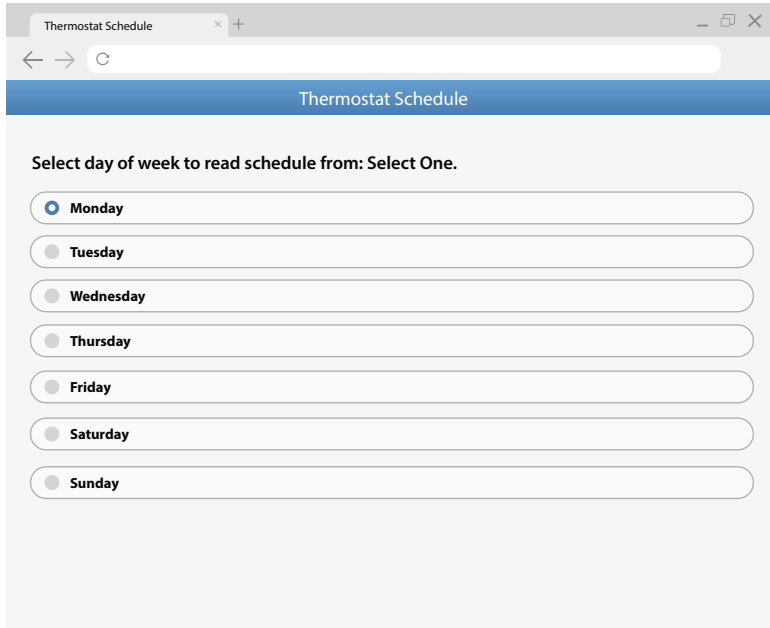


The screenshot shows a web browser window with the title "Thermostat Schedule". The browser's address bar is empty. Below the browser window, there is a blue header bar with the text "Thermostat Schedule". The main content area is a light gray box containing two columns of input fields. The left column has four fields: "Occupied Start Time (hour):", "Occupied Cool Set Point:", "Unoccupied Start Time (hour):", and "Unoccupied Cool Set Point:". The right column has four fields: "(min):", "Occupied Heat Set Point:", "(min):", and "Unoccupied Heat Set Point:". At the bottom of the form, there are two buttons: "Read Schedule" and "Update Schedule".

Thermostat Schedule	
Occupied Start Time (hour):	(min):
Occupied Cool Set Point:	Occupied Heat Set Point:
Unoccupied Start Time (hour):	(min):
Unoccupied Cool Set Point:	Unoccupied Heat Set Point:
Read Schedule	
Update Schedule	

2. Enter Occupied period start time in Hours and Minutes field in 15 minute increments.
3. Enter Occupied Period Heat Set Point and Cool Set Point in F.
4. Enter Unoccupied period start time in Hours and Minutes.
5. Enter the Heat and Cool Set points for the unoccupied periods.
6. Make sure you submit the parameters. These parameters will be applied to all selected days.

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



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 set points 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. **(not pictured)**
3. The occupied times and heat/cool set points will populate. The unoccupied time and heat/cool set points will populate. **(not pictured)**

Set Up Zone Controls

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 highest PPM from any assigned zone.

ZONE 1 - Local Thermostat Data To include

Thermostat weight:

50%

Submit Thermostat Zone 1 Weight

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. The DCV output is based on highest PPM from any assigned zone.

ZONE 1 - Thermostat

1. Enter the Thermostat's Weight: This is the weight value the thermostat contributes to the control output for temperature, CO2 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.

The screenshot shows a web browser window with the title 'Set Up Zone Controls'. The browser's address bar is empty. Below the browser window, there is a blue header bar with the text 'Set Up Zone Controls'. The main content area is light gray and contains two sections for remote zone data.

REMOTE ZONE 2 Data To Include:

MAC:

Weight:

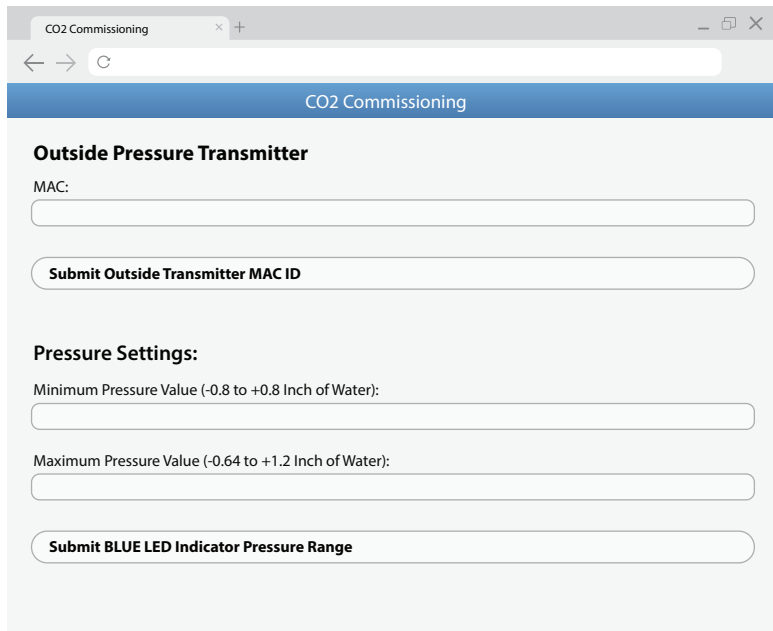
REMOTE ZONE 3 Data To Include:

MAC:

Weight:

Additional Devices Zone 2-4.

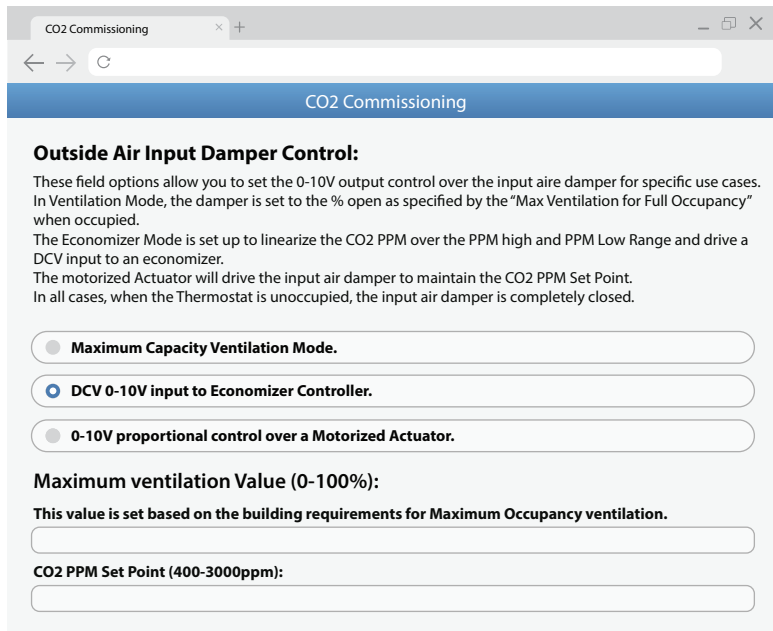
- 1. MAC ID:** This field should be entered exactly as read from the label on the Zone device, including hyphens.
- 2. Weight:** The weight value this zone should contribute to the control output and is applied evenly to CO2/Temp/Pressure. Use the Submit Thermostat Zone Weight button to load this information into the thermostat.



The screenshot shows a web browser window with a single tab titled "CO2 Commissioning". The address bar is empty. Below the browser window, there is a blue header bar with the text "CO2 Commissioning". The main content area is divided into two sections. The first section is titled "Outside Pressure Transmitter" and contains a label "MAC:" followed by a text input field and a button labeled "Submit Outside Transmitter MAC ID". The second section is titled "Pressure Settings:" and contains two labels: "Minimum Pressure Value (-0.8 to +0.8 Inch of Water):" and "Maximum Pressure Value (-0.64 to +1.2 Inch of Water):", each followed by a text input field. At the bottom of this section is a button labeled "Submit BLUE LED Indicator Pressure Range".

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 Thermostat indicator panel.
- 2.** Enter the MAC address and use the **Submit Outside Transmitter MAC ID** button to load this information into the thermostat.
- 3. Pressure Range:** This range determines if 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 up for 0.01 - 0.05 inches of water - which is an HVAC standard for slightly positively pressurized. 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.



The screenshot shows a web browser window with the title "CO2 Commissioning". The page has a blue header bar with the text "CO2 Commissioning". Below the header, the main content area is titled "Outside Air Input Damper Control:". The text explains that these field options allow setting the 0-10V output control over the input air damper for specific use cases. It describes three modes: Ventilation Mode (damper set to % open as specified by "Max Ventilation for Full Occupancy" when occupied), Economizer Mode (linearize CO2 PPM over PPM high and PPM Low Range and drive a DCV input to an economizer), and Motorized Actuator Mode (drive the input air damper to maintain the CO2 PPM Set Point). It also states that in all cases, when the Thermostat is unoccupied, the input air damper is completely closed. Below the text, there are three radio button options: "Maximum Capacity Ventilation Mode.", "DCV 0-10V input to Economizer Controller.", and "0-10V proportional control over a Motorized Actuator.". The "DCV 0-10V input to Economizer Controller." option is selected. Below the radio buttons, there is a section titled "Maximum ventilation Value (0-100%):" with a subtext "This value is set based on the building requirements for Maximum Occupancy ventilation." and an empty input field. Below that, there is a section titled "CO2 PPM Set Point (400-3000ppm):" with an empty input field.

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 Set Point.

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 thermostat 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 CO2 sensor fails, the thermostat will use the Max Ventilation setting during occupied times and the Min ventilation setting during unoccupied times.

Ventilation mode: In this mode the damper is set to the % open as specified by the Max Ventilation for Full Occupancy when occupied.

Economizer Mode: This mode is set up to linearize the CO2 PPM over the 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 CO2 set point. This mode is used for ERV operation. If the unit CO2 reporting fails, the thermostat sets the output to MAX Ventilation – per Title 24 requirements.

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.

Max Ventilation: This defines the ventilation MAX output voltage the unit will drive in the event of a failure to read CO2 PPM OR if the Mode is set for Ventilation. Set this according to building design requirements for maximum occupancy.

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

CO2 Set Point: This defines the CO2 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 CO2 value.

CO2 Commissioning

PPM under this value CO2 LED is Green:

PPM under this value CO2 LED is Green (0-3000):

PPM under this value CO2 LED is Red (400-5000):

Submit

Damper Test:

Test status: is not in progress.
Input damper value in %.

Stop test

Start test

1. PPM High/Low: The PPM High value will drive the RED LED on the indicator panel when the sensor PPM reading for CO2 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 will automatically stop 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**

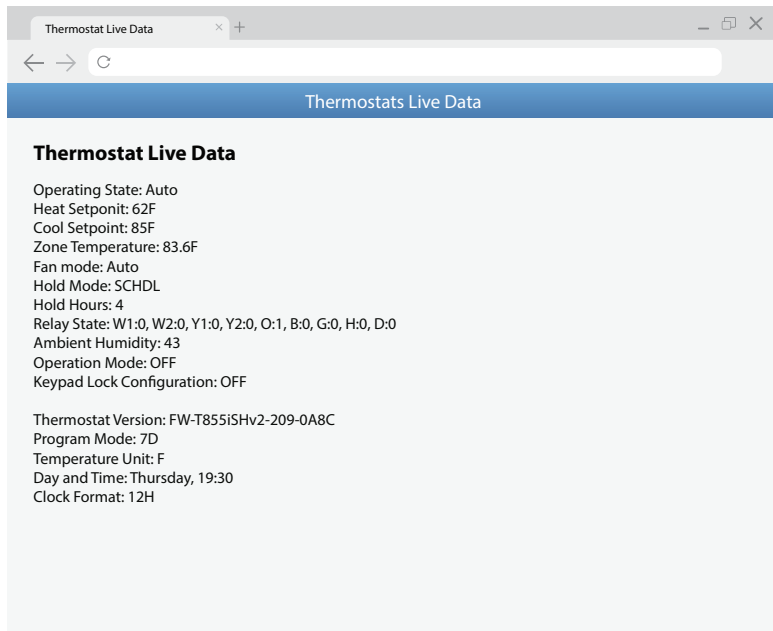
Submit

1. Forced Calibration: Units are shipped factory calibrated. If there is a need to recalibrate, this field allows forced calibration to a KNOWN CO2 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.



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 if Keypad locked out

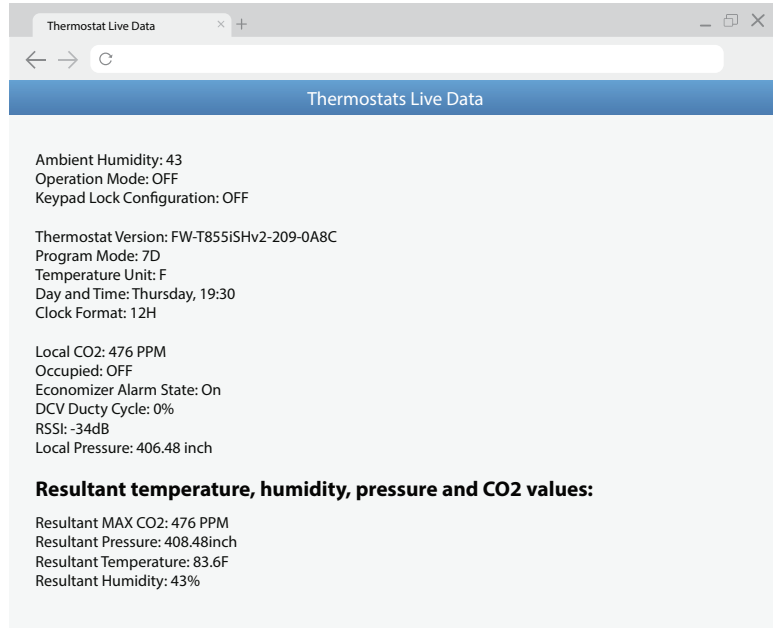
Thermostat Version: This is the software version of the chassis code

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



The screenshot shows a web browser window with the title 'Thermostat Live Data'. The page has a blue header bar with the text 'Thermostats Live Data'. The main content area is light gray and contains the following text:

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 Ducty 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: CO2 ppm

Economizer Alarm: ON if Active

DCV Duty Cycle: is the % Open of the S1 output.

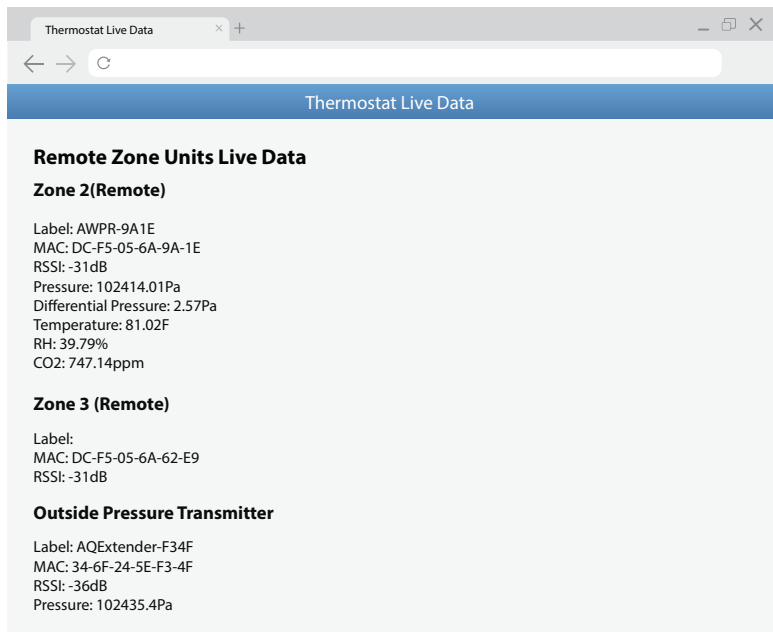
RSSI: Signal strength to access point

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 indicator the final temperature, humidity, pressure and CO2 when additional zones are included in the calculations.



The screenshot shows a web browser window with the title 'Thermostat Live Data'. The page has a blue header bar with the text 'Thermostat Live Data'. Below the header, the main content area is titled 'Remote Zone Units Live Data'. It contains three sections: 'Zone 2(Remote)', 'Zone 3 (Remote)', and 'Outside Pressure Transmitter'. Each section lists various sensor readings.

Remote Zone Units Live Data

Zone 2(Remote)

Label: AWPR-9A1E
MAC: DC-F5-05-6A-9A-1E
RSSI: -31dB
Pressure: 102414.01Pa
Differential Pressure: 2.57Pa
Temperature: 81.02F
RH: 39.79%
CO2: 747.14ppm

Zone 3 (Remote)

Label:
MAC: DC-F5-05-6A-62-E9
RSSI: -31dB

Outside Pressure Transmitter

Label: AQExtender-F34F
MAC: 34-6F-24-5E-F3-4F
RSSI: -36dB
Pressure: 102435.4Pa

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 measure 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.

CO2: Is the in ppm measured at the zone device being sent to the thermostat.

The screenshot shows a web browser window titled "Network Set Up". The page has a blue header bar with the title "Network Set Up". Below the header, there are three main sections:

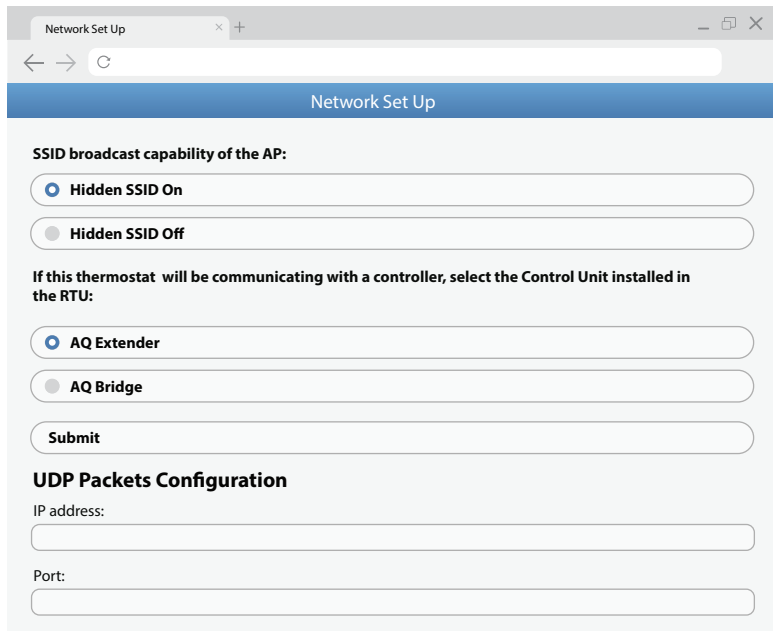
- Network Information:** This section displays the following details:
 - MAC Address: 34-6F-24-5F-6E-85
 - AP SSID: PV-IOT1
 - Connection Status: Network Configured
 - IP: 192.168.0.105
 - RSSI: -32To the right of the AP SSID and Connection Status, there is a green dot and the text "DCHP".
- Network Provisioning:** This section contains a single button labeled "Reset to Provisioning".
- CLOUD INFORMATION:** This section displays the following information:
 - Cloud 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):Below this text is a large empty text input field and a small expand/collapse icon.

The AQ Thermostat is compatible with IEEE 80211 b/g/n Wi-Fi access points (AP). To connect the Thermostat to the Internet for Cloud services or email alerts, the WiFi AP must have 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 db 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 **Cloud Engagement Transmission (ET)** period defines how often the device will check into the cloud to send and receive information. This is defined in seconds.



The screenshot shows a web browser window with the title 'Network Set Up'. The address bar is empty. The page has a blue header with the text 'Network Set Up'. Below the header, there is a section titled 'SSID broadcast capability of the AP:'. It contains two radio buttons: 'Hidden SSID On' (selected) and 'Hidden SSID Off'. Below this, there is a section titled 'If this thermostat will be communicating with a controller, select the Control Unit installed in the RTU:'. It contains two radio buttons: 'AQ Extender' (selected) and 'AQ Bridge'. Below these is a 'Submit' button. At the bottom, there is a section titled 'UDP Packets Configuration'. It has two input fields: 'IP address:' and 'Port:'.

NOTE: To receive FREE email alerts or use the XCSpec BEAM 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 controller in the RTU, select the device installed in the RTU and the thermostat will use appropriate communications. The AQ Bridge communicates over the thermostat power lines. The AQ Extender 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 professional before changing.

Rising slew rate (Pressure):

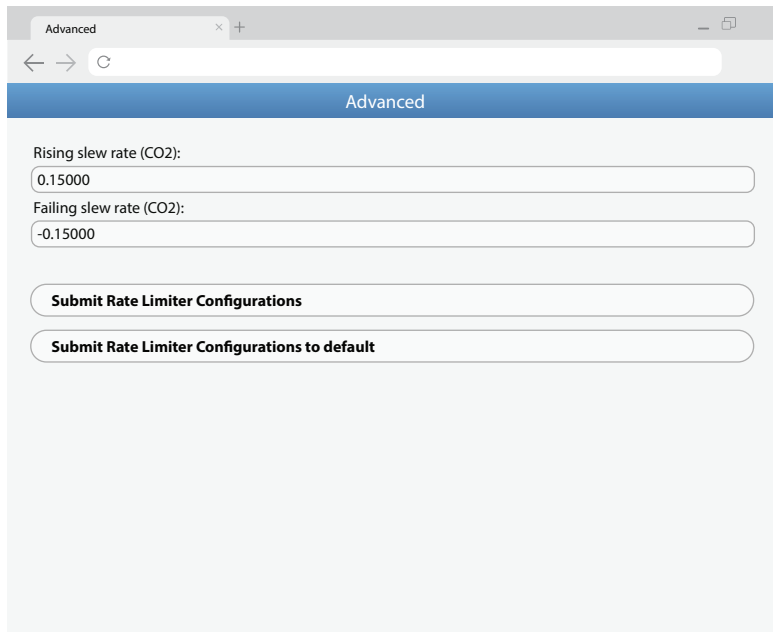
Failing slew rate (Pressure):

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 adjust the response of output control of the CO2 response. 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 0-10 V 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

← → ↻

Advanced

Rising slew rate (CO2):

0.15000

Falling slew rate (CO2):

-0.15000

Submit Rate Limiter Configurations

Submit Rate Limiter Configurations to default

Notes ON Economizer Set Up

The AQ Thermostat 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 CO2 input to an economizer, the CO2 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 AQ Bridge or AQ Extender Set Up

The AQ Thermostat 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 AQ Bridge or AQ Extender installed in a RTU, there are two different options they can be used.T

The AQ Bridge 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 AQ Bridge.

The AQ Bridge 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 AQ Extender communicates with the thermostat over a Wi-Fi link. The installer must assure that there is signal from the thermostat to the AQ Extender directly OR that they are both on the same WiFi network. All Zone, DCV and Powered Exhaust information is communicated directly to the AQ Extender.

The AQ Extender will also communicate outside air conditions - pressure, PM2.5, PPM - back down to the thermostat.

The AQ TstatProPlus 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
 Engaged Transaction time to Cloud: 60 seconds
 No Labels are Assigned
 No Zone Devices are Whitelisted
 DCV PPM Range 0-2000 PPM
 Display: Red when PPM >2000 Green ppm < 600
 DCV: Not enabled
 DCV Rate Limited: Enabled
 CO2 Averaging Filter: Not Enabled
 Front Panel to Display: Occupancy and CO2
 Rate Of Change Slew for CO2 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:

Outdoor temperature sensor, Indoor temperature sensors, and Slab sensor wiring diagrams are located in R250S and R251S manuals.

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.

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

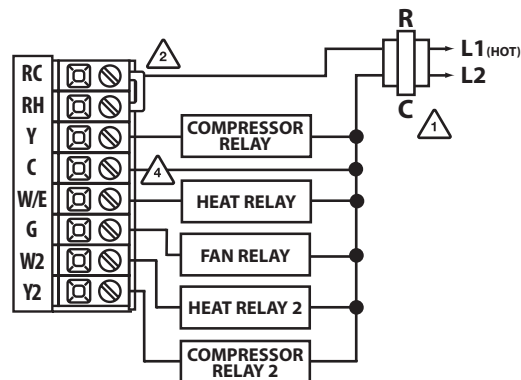
Terminal Designations

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.

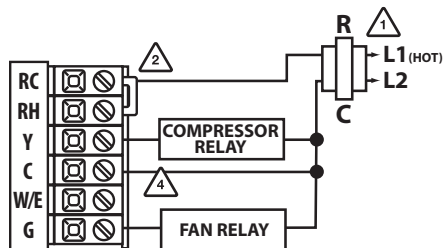
Terminal	2 Heat 2 Cool Conventional System	2 Heat 1 Cool Heat Pump System	4 Heat 2 Cool Heat Pump System	5 Heat 3 Cool Heat Pump System
G	Fan relay	Fan relay	Fan relay	Fan relay
W/E	First stage of heat	Emergency Heat	First stage of auxiliary heat	First stage of auxiliary heat (4th stage of heat)
Y	First 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

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

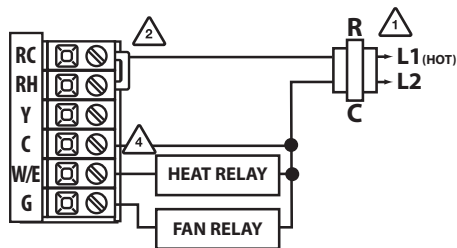
Typical 2H/2C System: 1 Transformer



Typical Cool-Only System With Fan

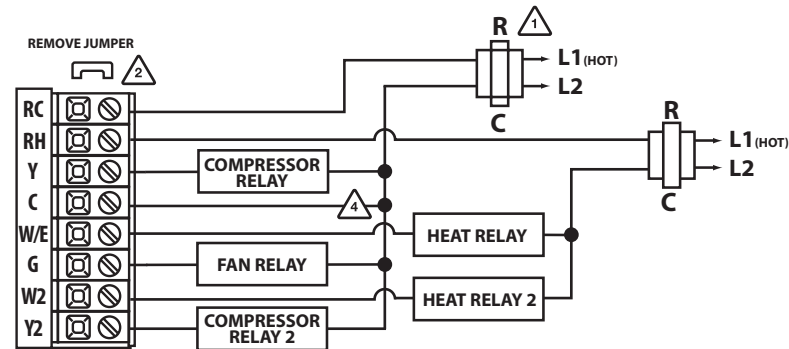


Typical Heat Only System With Fan



- 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.

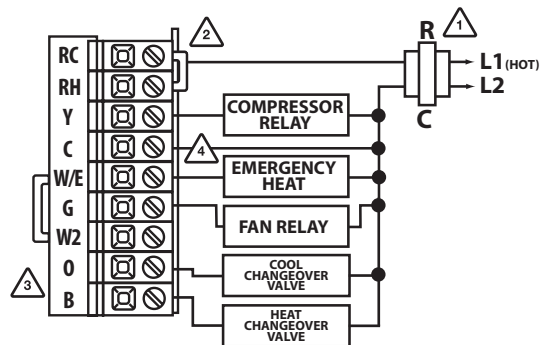
Typical 2H/2C System: 2 Transformer



Note:

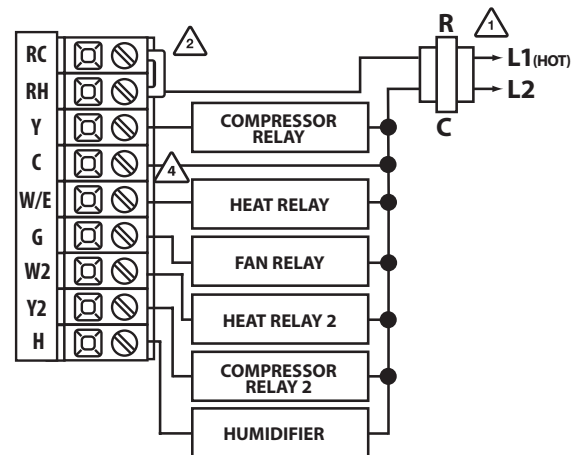
In many systems with no emergency heat relay a jumper can be installed between E and W2.

Typical 2H/1C Heat Pump System

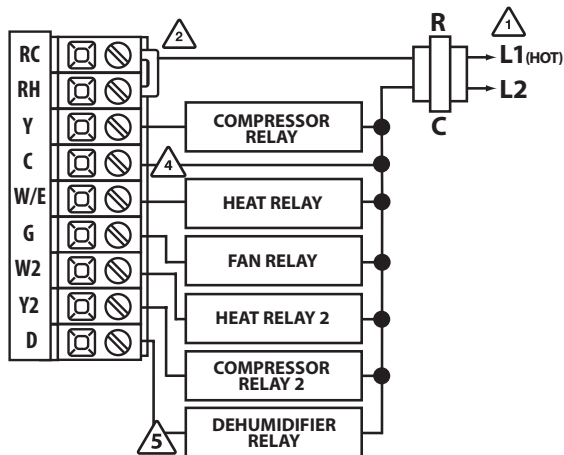


- 1 Power supply
- 2 Factory - installed jumper. Remove only when installing on 2 transformer systems.
- 3 Use either O or B terminals for changeover valve.

Typical 2H/2C System With 24 VAC Humidifier



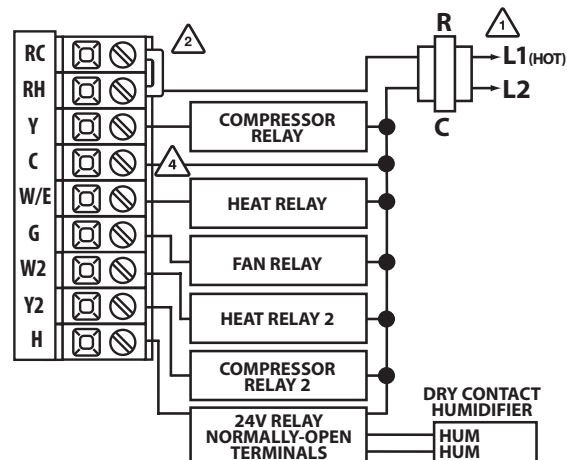
Typical 2H/2C System with Dehumidify Terminal



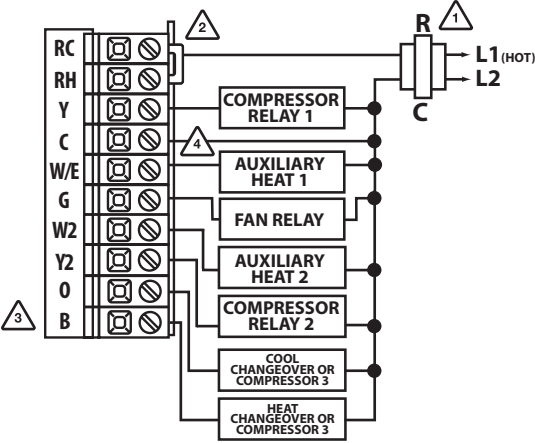
4 A 24 VAC common connection is required with this thermostat.

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

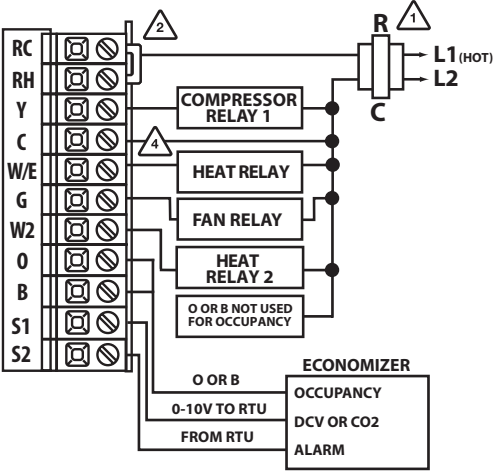
Typical 2H/2C System with Dry Contact Humidifier



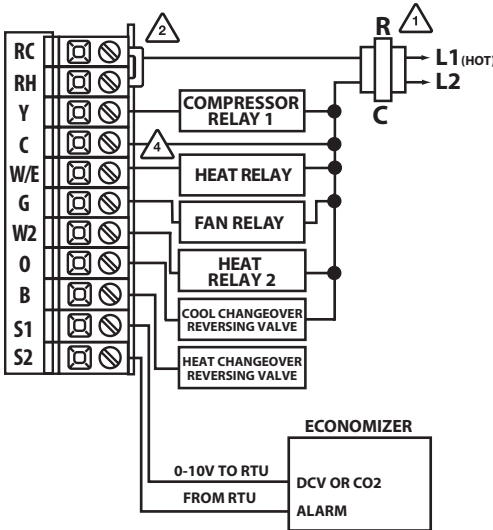
Typical 5H/3C Heat Pump System



Wiring To Economizer For Occupancy



Wiring To Economizer For Occupancy



Wiring To Motorized Fresh Air Actuator

